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Our Convention Report Numbers

In this issue we are completing our report of the four Philadelphia conventions, by presenting the discussion on the papers of Messrs. Scott and Potter on Thursday afternoon; the papers presented at the Claim Agents' Association; the papers, reports and question box of the Accountants' Association; the question box of the American Railway Mechanical and Electrical Association, and a complete account of the exhibits. The publication of one paper before the Accountants' Association, that by Mr. Tingley on the cost of carrying a passenger, is unavoidably delayed, but all of the other reports and papers are published. We believe and trust that our subscribers will appreciate the prompt service which we have given them in presenting this entire report within less than a week after the close of the convention, as well as the other articles which this paper has published. During the last three weeks we have printed in the STREET RAILWAY JOURNAL an aggregate of over 400 reading pages, including the dictionary of street railway apparatus published in our issue of Sept. 23. These three issues have not only covered a report of the most important street railway convention which has ever been held, but have given as well the most complete analysis and description of the street railway system in any city which has ever been published. At the same time, the current news notes, market reports, letters from foreign capitals and other regular features of the STREET RAILWAY JOURNAL have been retained. To those who are not especially familiar with other technical periodicals, we might say that a record of this kind within the short space of three weeks is unparalleled, even in the past history of this paper, and our previous issues have always surpassed anything of the kind attempted by publishers of other technical papers.

The wealth of material presented at the Philadelphia convention precludes an analysis in our editorial pages of all of the important subjects debated at that time. Several of the subjects, however, were discussed last week, and in this issue interesting features of certain others will be considered.

The Accountants' Convention

As in the case of the other associations, the papers and reports presented at the Accountants' convention this year were more than usually complete, and reflect great credit upon the association and upon the committees and authors presenting the reports and papers.

The annual report of the standing committee on a standard classification of accounts discusses as usual various knotty problems which have come up during the year, and gives rulings for the assignment of these accounts. This report as well as those of the committees on an international form of report, and of the committee in attendance at the National Association of Railway Commissioners, indicate a progressive attitude on the part of the association to extend the field for a standard form of account and the number of companies which can adopt it. The increasing number of trunk line railroad companies which have announced their intention of using electric power on a large scale, annually adds to the importance of having a standard form of accounting which will be as close as possible to the form which these companies have been using in their steam railroad accounts. At present there are a number of differences between the two forms, although they are of minor importance, and it is satisfactory to learn that, in the opinion of those most interested, these differences are capable of adjustment. The possibility of an international standard has received encouragement during the past year from the conference which the committee on an international form of report had with Mr. Dalrymple while in this country, and as the British form does not differ directly from our own, there seems to be no serious obstacle toward a standard classification which would cover all English-speaking countries. The Continental Association has officially adopted such a radically different form of account that any adjustment between the two methods seems very difficult, if not impossible. Nevertheless, if a standard system of account should be adopted for all English-speaking countries, we believe a most important advance will be made. If this is accomplished, we believe that many of the Continental companies will adopt the same general system, especially as a number of the important companies on the Continent are now following forms of accounts which resemble the American system much more than the decimal classification of accounts adopted by the Continental Association.

The question box of the Accountants' Association is unusually interesting this year, and occupies a considerable portion of the space devoted to the proceedings of the Accountants' Association at Philadelphia; this method of settling disputed points in classification of accounting should be of great assistance to all members of the association. In addition to these reports, valuable papers were presented by Messrs. Fullerton, Pardee, Beardsley and Tingley. The first two papers are devoted to interurban practice, the third to methods of handling joint accounts of a large public service corporation, while the last analyzes depreciation and other factors in the cost of operation which sometimes are not always fully considered.

Single-Phase Railways

The convention last week was the first street railway convention at which the subject of single-phase motors has been considered, and the discussion which followed was ample. Mr. Scott's paper on this topic strikes the reader as most straightforward and businesslike. It has a note of evident sincerity and earnestness that is very characteristic of the author, and that here is most gratifying. Most previous utterances on the single-phase problem have sounded either over-sanguine or half-hearted. Mr. Scott, however, in his paper and subsequent remarks has a story of struggle and accomplishment to tell which must be listened to with respect. That the single-phase roads now in operation have made a creditable, even if short, record is most encouraging. Difficulties are to be expected in every new line of endeavor, and if the single-phase system ultimately dodges them it will be the first to have that fortune. At least, from Mr. Scott's report, one must concede that the new apparatus must be regarded as not only a substantial addition to the resources of electric railroading, but as giving much promise of successful work in that larger field of railway service to which the way has been so beset with difficulties. The big work undertaken by the New York, New Haven & Hartford Railroad is evidence enough that the alternating-current traction motor is here to do business.

Mr. Scott generally manages to give the engineer something to think about, and in this instance he has opened the question of variable-speed control in its broadest aspects. One of the stock arguments against alternating-current motors of every sort has been the difficulty of efficient control. Mr. Scott carries the war into the hostile territory by a forcible reminder that to all intents and purposes the direct-current motor is a one-speed machine under normal conditions of working, else there would have been no necessity of going to series-parallel control. One cannot get large control of speed with any known form of motor, save at the cost of some complication to avoid serious loss of efficiency, and while alternating-current motors involve a somewhat different kind of complication, it is no more serious or expensive than with direct-current motors. It is unquestionably a fact that there are now in operation, both here and abroad, alternating-current traction systems of several varieties which are actually doing succesful work. It is equally clear, as we have over and over reiterated in these columns, that the key to large work over long distances is the use of high voltage on the working conductors. It is futile to expect a first-class long distance distribution of power on a 500-volt basis. Any system which cuts loose from this limitation is a clear gain, provided it shows good operative properties, which must now be conceded to alternating-current motors, not necessarily of any one kind or make. One cannot expect the alternating-current systems to reach in a year or two the perfection of detail which twenty years of experience have accumulated in direct-current practice. Yet alternating-current traction undeniably has the benefit of much of this experience, and will profit by it. Given a good alternating motor system as a basis and better systems will come in due season. We note with interest that Mr. Scott is disinclined to favor, save as an emergency measure, equipments for use with either kind of current. Compromises are generally sacrifices, and the issue between the two systems seems now to be clearly defined. Are we to have two systems of traction or one, and if one, which?

The A. R. M. and E. A. Question Box

The American Railway Mechanical and Electrical Association is to be congratulated on the quality and practical value of the answers to the question box questions, which are printed in full in this issue. It has sometimes been the case the past few years, since the question box feature became popular for conventions, that, while the quantity of questions and the number of answers to each was large, there was too much evidence of many questions being answered without sufficient thought being given to them. Thus some, with commendable intentions to help along the question box and contribute their share to it, have sometimes given answers too brief to be of much value. Although the opinion of an experienced man, expressed briefly, as yes or no, in answer to a certain question, has its value, it is much better backed up by stated reasons. As a rule, the man who has given any specific question sufficient thought to make his answer of value in a question box, will be enough interested to give his reasons for his opinions in some detail.

The American Railway Mechanical and Electrical Association question box has a limited number of questions and a limited number of contributors, but each answer given bears evidence of careful thought on the part of the contributor. We are glad to note also that the association has not been burdened with the expense of publishing and answering a lot of elementary questions that any electric railway engineer should be able to answer. The taking up of space with such questions is likely to detract considerably from the excellence of the question box in the eyes of the busy, experienced man, who does not want to dig through a lot of chaff to get at the grain. Secretary Mower, the editor who conducted the question box this year, has done an excellent piece of work.

There is hardly a question of those answered that does not give a valuable lot of boiled down information by some of the best talent in the country. Car lubrication matters receive considerable attention. There appears a great difference in the cost of lubricating a given type of car equipment on different roads, and this should give food for profitable reflection and inquiry as to the cause. Oil lubrication has undoubtedly come to stay, and the only question is as to the best way of applying the oil on motors that were built originally for grease lubrication. Much thought has been expended on this point, and the question box can be read with profit by all having motors equipped with grease cups to be changed for oil lubrication. The many other questions taken up are too numerous to be mentioned in detail here, but the question box is one of the most valuable of its kind ever produced, and must be read in full to be appreciated.

Railway Equipments

Mr. Potter's paper on the improvements in recent practice is one that will well bear careful study. It is full of useful hints, and is especially valuable to the practical railway man in emphasizing the changes of the past few years in increasing in many ways the demands upon car equipments. These have come upon the field so gradually that it has been no easy matter fully to appreciate them, and many a manager has discovered them only at considerable cost. From a general operative standpoint, it seems a simple matter to put on somewhat larger and heavier cars and to run them at higher speed. So indeed it is, but in so doing, one runs the risk of passing the unseen frontier between security and danger. One is at every step trenching on factors of safety that are but imperfectly known. Hence, while the improvements of the past few years have been great, they have consisted of an aggregate of unsensational details. The great work of the manufacturing companies has therefore been appreciated at its full value only by those who have followed it very closely. On the whole, the most interesting improvements have been those along the line of multiple-unit control, or rather semi-automatic control, substituting for the manual controller in its usual inconvenient position a relay control far simpler to operate and doing its work more perfectly. With these changes has come a better brake control and more adequate safety devices, so as to bring the factors of safety in car operation more nearly to adequate values. These things make the difference between good and bad operation, and are important far beyond casual appearances.

Controller Systems

It often chances that the discussion of a paper brings out more novel points than the paper itself, particularly if the topic is a live one, and such was the case in the controller papers before the Mechanical and Electrical Association which we published last week, useful as these papers were in themselves. It is certainly a fact that cars and motors have outgrown the capacity of the earlier forms of control, with the result that serious controller accidents have occurred. Mr. Olds called especial attention to the fact that controller accidents really meant not a fault in the controller design, but merely that it was not competent to deal with the short-circuits which might occur beyond it. He described a plan used by his company, which is characterized by placing the main circuit closer beneath the car and arranging for the protection of each motor by its individual fuse. Mr. Taylor added a description of the multiple-unit control used in Brooklyn, with the main apparatus located under the car and the operative controller on the platform. The general consensus of opinion seemed to be that the main control should certainly be under the car, both on the score of general safety and for the sake of avoiding severe complication in the car wiring.

This is assuredly a sound position to take, for with modern heavy two and four-motor equipments, attempting ordinary manual control from the drum controller on the platform, means taking many risks. The car wiring becomes both costly and complicated, and the mass of cables required to effect the connections is a source of very considerable fire risk. Just how much actual simplification can be counted upon in using a relay controller with the switching controller under the car remains to be seen. In cases where actual multiple-unit control is important, the gain is evident, but in the commoner case of operating single cars, the main thing is to get the controller somewhere near the things it is expected to control, quite irrespective of the means employed to actuate it. Whether pure electrical control is necessary or desirable merely because the controller is placed under the car or somewhere else than on the platform, is a point on which there may be justifiable difference of opinion. In any case, the main thing in distant control is, as Mr. Taylor indicated, the certainty that the apparatus will automatically go to the stop position in case anything goes wrong. Of late, remote control switches of every sort have been exceedingly fashionable, and punctilious designers seldom fail to put them in wherever an opportunity is offered. In central station work this tendency is sometimes carried to an amusing extent, so that there are several sets of automatic apparatus keeping watch upon each other, with a final opportunity for the exasperated operator to climb down from his conning tower and put his hand to the offending switch. In some such cases, it is an open question whether it is not more work to watch the automatic labor-saving devices than to do their work, but here in modern railway practice the issue is simple.

Under a car crowded with passengers, even on the platforms, are two or four big motors which must be put through an intricate series of combinations with complete precision, on pain, perhaps, of a disaster, costing many lives. The amount of energy required has become so great that there does not seem to be an adequate factor of safety in the usual controllers, which, being on the platforms, require a very complex system of wiring to enable them to accomplish their purpose. All in all, it looks very much as if the platform controller had been outgrown and remote control was the thing. There is none too much space beneath a car, so that it takes some rather fine figuring to get room for the controller if built on its ordinary plan. This fact makes it not altogether easy to arrange a simple mechanical control from the platform of an under-the-car controller. Hence the applicability of the multiple-unit apparatus to a problem apparently too simple to require so intricate a solution. It strikes us that the Brooklyn plan follows sound lines, irrespective of its detail. If once the need of remote control is granted, why should one not push the plan to its legitimate conclusion and employ its resources, not merely in putting a controller beneath the car, but in so distributing the parts of that controller as to bring the real power wiring down to an irreducible minimum? There would seem to be small need of conceding to custom the aggregation of all the controlling devices in a single box. When we go in for remote control let us do it thoroughly and leave in the new equipment as few of the weak points of the old as we can. There is complication enough in a four-motor system without adding to it by trying to bring it within the scope of a single controlling drum. It is far easier and safer to complicate the control wiring a little and save trouble in the power wiring. In other words, granted indirect control for single cars, one had best take a fresh start and make the most of it.

REPORTS AND QUESTION BOX PRESENTED AT THE PHILADELPHIA CONVENTION OF THE STREET RAILWAY ACCOUNTANTS' ASSOCIATION OF AMERICA

PRESIDENT'S ADDRESS

The selection of Philadelphia for the ninth annual convention of the various associations must have had the inspiration from President Ely, of the American Street Railway Association, as he no doubt felt that the City of Brotherly Love was required in which to preside over the most important meetings that have been held since the organization of the associations. As you are all aware, the question of the reorganization of the American Street Railway Association is one that affects us most vitally and has been a source of considerable anxiety to those appointed at St. Louis last year to watch over the destiny of your association, as well as to others of the old guard, most of whom still retain their active interest in the welfare of this association. One and all of us felt and hoped that, as far as our association is concerned, we should always remain as we were—an independent organization attending to our own business in our own way, and not only maintaining our past successes and results, but achieving new successes and progressing in every direction and in every way appertaining to the objects for which we joined together in Cleveland in 1897. But conditions have arisen outside of our organization that necessitate our having to face a new condition of affairs, and while it may or may not affect our association, it was felt the duty of your committee and myself to meet this condition in a broad-minded spirit and endeavor to do our share toward the welfare of the whole street railway fraternity, even if we had to sacrifice in a great measure our feelings and pride, and join hands with the members of the parent association in an effort to assist them by a reorganization that would be of advantage to them but not to ourselves.

Your executive committee, at a meeting held in New York in February prior to the meeting of the executive committee of the American Street Railway Association, very thoroughly discussed the idea of a reorganization of the American Street Railway Association and appointed myself with F. R. Henry as alternate, to represent the Accountants' Association on the committee especially appointed to consider this question. Both Mr. Henry and myself were present at the preliminary meeting in New York and very forcibly expressed our views that while we were willing to assist in every manner possible the reorganization of the American Street Railway Association, it must be understood that we would agree to no scheme whereby the autonomy of the Accountants' Association would be effected, and I might here repeat the addresses made by Mr. Henry and myself at that session:

Chairman Ely.—I shall be glad to hear from the Accountants' Association. W. G. Ross, of Montreal, is president of that association.

Mr. Ross.—I may say at the start that the Accountants' Association is opposed to any change whereby it might lose its identity. I do not mean to say that there is no necessity for a change in the organization of the American Street Railway Association. I think we are pretty well agreed, so far as we have studied the question, that there should be some change. Our members think that Mr. McCulloch's plan has a good many features of value, but we are opposed to being a section of the parent association. We want to retain our identity and we want to retain our name. As you know, we have been in existence since 1897, and we think we have accomplished a great deal. The accounting methods at that time were very crude, and they are now very complete. We still have many important questions before us for discussion, the latest being the question of accounts for interurban electric railways, and there are many others.

You all know also of the good work that has been accomplished by the Accountants' Association in regard to the State Railroad Commissioners. We have a committee that is in very close touch with these Commissioners, some members of the committee being personal friends of the Railroad Commissioners, and our committee is invited to the conventions of the Railroad Commissioners, and is on very strong personal footing with the Commissioners. I do not think we should do anything to offset the position which we have reached.

I believe that there is a necessity for a change in some of the methods of work of the association. I quite agree with Mr. Ely that the subjects at our meetings are not followed up as closely as they might be, on account of the subjects coming up which do not interest every one who is at the meeting. I think the street railway business has reached the stage now where there is a necessity to have associations to take up the different departmental work in the street railway field and discuss it more thoroughly than we have been discussing it. I think many believe that the American Street Railway Association should only look after the street railway work in a general way—it should deal with the subjects which relate to the management of the company, rather than the practical operation of the road. I think Mr. McCulloch's outline in that respect is very good. I do not agree with him as regards the general secretary having full control of all the sections of the association, because there is a great deal of work—I know this is true as far as the Accountants' Association is concerned—in connection with our association. This work is just as much as one man can handle, and I doubt if it would be a success to have one secretary for six or seven sub-associations or sections. As far as the Accountants' Association is concerned, there is the general work of the secretary, and we have exhibits of forms and blanks which are continually sent all over the country, which entails a great deal of work in itself, as well as keeping track of the forms and keeping them up to date. I think the suggestion of the chairman that a sub-committee be formed to take this matter up is a very good one, indeed, and I think it will be productive of good results.

Then, there is the question of subscription for the purpose of maintaining these associations. Of course, it will be necessary, if the associations are divided into sections, being part of a general association, that there will be only one subscription. While I see many advantages in that, at the same time there are disadvantages, and one disadvantage is that the subscription might have to be so large that it would keep out a great many of the smaller companies, and we might lose members instead of gaining them. That is a question which must be studied, no matter whether there is one subscription or several subscriptions. Another important matter to be taken into consideration is the question of individual membership. I think this meeting affords a very excellent opportunity for us to express our views, and I think after the discussion here a sub-committee should be able to study the matter out and submit a satisfactory plan.

Frank R. Henry.—I do not think there is anything additional to be said on behalf of the Accountants' Association to what Mr. Ross has said. We all feel, as accountants, on account of the good work we have done in the last seven years, we do not wish to imperil the value of our work through any change which may be adopted. We believe we can do better work if some scheme can be devised whereby our individuality can be maintained. That is the primary thing we have in mind. The other matters of detail could be worked out altogether satisfactorily, but that seems to be the proposition that confronts most of the accountants. They would like the scheme, whatever it is, to be along the lines of maintaining our organization in such way that our contact with the Railroad Commissioners and other organizations in the country would give us the standing which we maintain at the present time.

We were assured at that meeting that there was not the slightest intention of doing anything to effect the autonomy of our association, and the meeting adjourned in order that an expert be appointed to draw up the draft of the constitution.

At the next meeting of the special committee, held in Philadelphia in June, the draft of the proposed constitution was considered, and as the same had been printed and distributed among the committee prior to the meeting, we were enabled to discuss the same intelligently and considerable changes were made. At this meeting there were two changes that I endeavored to have made, viz.:—in clause "C" the elimination of the words "for specific purposes" on the ground that they were meaningless and unnecessary; clause "D," the whole of the clause, as it affected the autonomy of our association by practically doing away with our secretary's office.

The draft of the final conclusion of the Philadelphia conference has been printed and distributed among the various companies and you have all, no doubt, had a chance to study it. Attached to this draft, however, is a suggested form of charter agreement which was not approved by the special committee, and I am surprised that this should not have been so stated, so that the members of the various associations would know that it was only a suggestion of the expert appointed to assist in the reorganization of the parent association, and not the opinion of the special committee. This agreement or form of charter would seem to make it impossible for us to join with the American Street Railway Association unless it is amended, otherwise we will lose our present standing and identity. Of what has taken place in the last two days since the writing of this address, you are all aware, and it is for you now to decide what step this association should take in the matter.

It was a very great disappointment to me at the time of my election to hear our late and valued secretary, W. B. Brockway, declare that he would not continue in the office of secretary, and to hear E. M. White also decline the office (I thought I had enough worries without such a calamity happening). However, the kindness of Mr. Brockway in offering to continue the work until Jan. 1 in order to give us time to catch our breath as well as a new secretary, was a very considerable relief, and it was a further source of relief eventually to persuade E. M. White to accept the position. It is needless to say that the work Mr.

White has done is deserving of all praise, and that the association is to be congratulated on having such an able successor to Mr. Brockway.

While the year has been a very strenuous and unsettled one, owing to the great question of the reorganization of the American Street Railway Association, at the same time the good work of our association has progressed most favorably, as you will judge from the various reports, etc., to be submitted to you. Two matters, however, have been considerably disturbed by the main question, and that is the membership and the conference with the other associations with regard to forms of reports affecting their departments, and it can only be expected that nothing very much can be accomplished in these directions until the reorganization of the American Street Railway Association is completed.

The question of the international form of report referred to at length by our previous president, Mr. Smith, in his annual address, was promptly taken up and a committee was appointed to consider this important matter. You will hear the results of that committee's work so far as it has gone. At the same time I can only repeat what Mr. Smith has stated—that it was unfortunate that this matter was not taken up through a personal representative at the time it was first talked of, as it is naturally a more difficult task to succeed in getting associations to change their attitude once it has been formed. However, I think we have started out in the right direction, and hope that with patience and persistent effort we will be able to bring about an international form of report and accounts that will be recognized as standard the world over.

At this rather interesting period of our existence it might not be out of place for me to refer to the short history of our association and the good work it has accomplished. It seems to me that the great success it has attained, as well as the continual source of congratulation from those of the American Street Railway Association who know and appreciate the good work that has been done and the results that have been achieved, should be a source of great pride to us all, and to the various committees and officials who have unselfishly and generously given of their time and brains, we are all deeply grateful.

Since the organization of the association brought about by the suggestion of our late and able secretary, W. B. Brockway, and the action of our good friend, H. H. Windsor, the history of the association has been one of unparalelled success. At the organization meeting called by Mr. Windsor and held in Cleveland on March 23 and 24, 1897, there were twenty-five companies present and enrolled in the membership. Since that date the membership has steadily increased, notwithstanding the numerous consolidations, till it now numbers 152. To my mind this alone shows that the earnest, persistent and effective work done attracted the attention of the companies throughout this Continent, otherwise the membership now in the association would not have reached this large number.

The promptness with which the association set to work resulting in the immediate appointment of a committee on organization and the adoption of the report on the constitution and by-laws submitted by that committee, and the appointment of a committee on a standard classification of accounts, and the interesting papers read and discussed, spoke well for the future success of the association.

At the first annual meeting, held at Niagara Falls Oct, 19 to 22, 1897, we were officially recognized and welcomed by the American Street Railway Association, and their organization passed resolutions of endorsement and approval and pledged a cordial encouragement and support.

At this meeting a standing committee was appointed on a standard system of street railway accounting. This committee was composed of Messrs. C. N. Duffy, H. L. Wilson, J. F. Calderwood, W. F. Ham and H. J. Davies, and while you all know how satisfactorily they prepared their arduous task, I do not think that those who were not in immediate touch with these gentlemen quite appreciate what a tremendous amount or self-sacrificing work has been done by that committee; not the work of a day or a month, but of years, and I feel that I am voicing the sentiments of all when I say that their efforts have the deep and grateful thanks of every member of the association.

It was at this first annual meeting that a suggestion was made by Mr. Bartlett, treasurer of the Manchester Street Railway Company, that the form of report and accounts should be taken up with the State Railroad Commissioners. The matter was at once taken into consideration by the committee on standardization of accounts, and later on taken up by them with the Association of the State Railroad Commissioners, and after numerous conferences and attendance at the annual conventions of the Railroad Commissioners, the committee succeeded in having the standard classification and form of reports adopted by that important body, as a standard classification and report required by them from the various companies throughout the United States. Of the courtesy, kindness and broad-minded views shown by the Commissioners in these conferences, too much cannot be said, and the thanks of the associations, I am sure, are cordially and heartily granted to them, both for their adopting our classifications and for their kind invitations and recognitions at their annual conventions, providing us as these do an opportunity to work in harmony with them in all matters appertaining to street and interurban railway accounting as they now exist and in new conditions that may arise from time to time, and in which they and we have a common interest.

Another and important matter that has been organized and kept up is the department of blanks and forms, initiated first by W. B. Brockway, and later carried on, improved and completed in the highest possible and most perfect manner by E. M. White and his able lieutenant and daughter, Miss White, has been a great source of assistance and usefulness to all. The great mass of work entailed in the gathering together of the various and numerous forms of the different companies was not fully realized until Mr. White made his report to the convention of 1903, when those present at that meeting were fairly staggered at the amount of work involved in bringing the department to its present high state of efficiency, and it engraved the committee of one and his fair assistant on the hearts of all members.

The work initiated and started at the earlier conventions of our association has been carried on in the most satisfactory and successful manner. The many papers on interesting subjects so carefully prepared and submitted have been most instructive, and the discussions entered into on the various topics have not been confined to a few, but have been taken up always by a large majority of those present. The attendants at the meetings have been numerous, and the close attention paid to the proceedings and the earnestness with which the work has been pursued speak well for the interest taken by the various members in the conventions. And I do not know of any conventions of associations which I have attended where the work has been so earnestly and persistently followed up, or where more satisfactory results have been attained.

There is still much work to be done, and work that is just as important as that done in the past, and we may confidently look forward, if not hampered, to a progressive and successful future, for, as the great progress that is being made by street and interurban railways continues, new problems and new conditions will surely arise and claim our best thoughts and energy, to keep our very important part in the industry up to date.

In connection with the various forms and records, one of the important matters still to be followed up and dealt with is the taking up of these forms and records with the departments they affect, and as new associations are formed, such as the Mechanical and Maintenance of Way Associations now organized, the committee of our association appointed for this purpose should follow this matter up vigorously so as to endeavor to arrive at a standard set of forms that can as far as possible be used by all companies.

Another question that should be given serious thought is the one of depreciation. This matter has been mentioned by previous presidents, especially by H. C. Mackay. Whether any conclusion can be arrived at or not as to the fixed amount necessary to provide for such a fund, it is difficult to say, owing to the various conditions existing with the different companies, but it is a question well worth our best thoughts, especially when we note the collapse of numerous companies within the last year or so.

There is another matter which perhaps might well be taken up by the committee on standard form of reports and accounting, viz., enlarging to a considerable extent the statistical information for our monthly and yearly reports. It seems to me that statistical information is of the very greatest importance to every road, not only on its own comparisons, but for comparisons with other companies.

I would call your attention to the valued and important services rendered the association by our esteemed retired secretary, W. B. Brockway. Those who have been in the association since its organization, and those who have joined since, know that to a very great extent the success of the association has been due to his untiring efforts and effective work, and I know all feel deeply grateful and thankful to him for his great services, and although the executive committee registered a hearty vote of thanks to him at the time he retired, I am sure this meeting, through its committee on resolutions, will indorse it by another one.

I am afraid I have taken up rather more time than I should have, and will just say in closing that I deeply felt the great honor that was done me in electing me to the presidency of this, and trust and am confident that its future will continue to be as successful and progressive as in the past.

REPORT OF THE COMMITTEE ON STANDARD CLASSIFICATION OF ACCOUNTS

Your committee on standard classification of accounts beg leave to make the following report:

Referring to the last report of this committee, with respect to submitting to this convention the questions asked of and the answers given by this committee between the date of the last convention and Sept. 1, 1905, relative to certain matters in connection with the use of the standard system of street railway accounting of this association, we beg leave to submit the following questions and answers, nine in all, numbered respectively 20 to 28, both inclusive, addressed to the chairman of the committee:

QUESTION NO. 20

Question.—Should the cost of extending the sprinkler system in car houses, installed for protection against fire, be charged to Account No. 3 or Account No. 38?

Answer.—The installation or extension of a sprinkler system is a part of the "buildings and fixtures," therefore a part of the cost of the construction or maintenance of them. Assuming that the cost is dealt with as a charge to operating expenses, the charge should be to Account No. 3—Maintenance of Buildings and Fixtures. Answered by C. N. Duffy, Dec. 12, 1904.

QUESTION NO. 21

At the last convention of the association, Question No. 12 was as follows: Question 21. We have in connection with our property some air compressors. Some are situated at car houses, and a pump for same is operated by a small motor in the car house. In other cases they are adjacent to our power stations, and the pump is operated by power furnished direct from the station. These compressors are used for filling the tanks in our cars for operating the air brakes on same. I am somewhat at a loss to know to what account I should charge the maintenance of the air compressors and the motors for operating the same.

Answer.—I should regard your air compressors, pumps, and the motors that operate them as miscellaneous tools, and should charge the expense of maintaining them to Account No. 9. Of course, the expense of maintaining the tanks and air brakes on the cars should be charged to No. 6—Maintenance of Cars, and I think the cost of the air, which would include the current for operating the compressors and the labor of getting the air into the tanks, should go to Account No. 21—Car Service Supplies. Answered by H. J. Davies, May 20, 1903.

On Dec. 13, 1904, a member of the association addressed a letter to the chairman of this committee stating that he had intended to enter an objection to the ruling of the committee on Question No. 12, but was called from the meeting before having an opportunity of doing so. He desired to enter his objection in writing and requested the committee to consider same. The member is the auditor of a company operating one of the large city systems of the country, and the first company to install a storage air system for operating air brakes. The cost of the air brake equipment, which included the compressor equipment, was charged to Construction and Equipment Account "K"—Cars; the maintenance of compressor stations was charged to Operating Expense Account No. 6—Maintenance of Cars, the reason for so doing being that they were a part of the equipment of the cars.

The chairman presented the gentleman's letter to the committee. The committee recognized the consistency and logic of the position taken by the gentleman, from his standpoint, as well as the possibility of the proposition advanced being different from the one presented to the committee in Question No. 12, because of the conditions governing the respective propositions being different.

After a careful consideration of the arguments advanced by the gentleman in support of his position in disagreeing with the ruling of the committee and the association, the committee could see no reason for reconsidering or changing the action taken, ruling that the compressor equipment was properly a part of the tools and machinery and not a part of the cars.

QUESTION NO. 22

Question.—We manufacture our cars and do all repair work. To each shop order we charge the material used and the cost of the productive labor, also a certain per cent to cover non-productive labor and incidental shop expenses, non-productive labor and incidental shop expenses being charged to Account No. 9—Miscellaneous Shop Expenses. When supplies for construction or repairs are manufactured in the shop and turned over to the storekeeper, Account No. 9—Miscellaneous Shop Expenses is credited with the expense added to cover non-productive labor and incidentals. You will note that this balances Account No. 9—Miscellaneous Shop Expenses. A proposition is made to leave a certain proportion of the debits in Account No. 9—Miscellaneous Shop Expenses and create a sinking fund. It appears, however, in so doing a duplicate charge is made against operating expenses, as supplies manufactured for construction and repairs include the per cent to cover shop expenses, etc., and are charged to operating expenses in the accounts for which the supplies are used.

Answer.—If your idea of a sinking fund is a charge for a depreciation reserve to provide a fund for the replacement and renewal of your shop-plant and equipment and the manufactured material has not borne this depreciation reserve charge, operating expenses would then stand not a duplicate charge, but an additional charge, which would be offset by the depreciation reserve, which account would stand the charge for replacement and renewal of your shop-plant and equipment when made. If this is what you have in mind, then operating expenses would not be saddled with a duplicate charge, but with an additional charge, over and above the bare cost of manufacturing the material which it is perfectly proper it should stand, provided a proper reserve is credited and is available for replacements and renewals when necessary. Answered by C. N. Duffy, Dec. 12, 1904.

QUESTION NO. 23

Question (asked by the accountant of the State Board of Railroad Commissioners). A certain amount of paving was done in one of our cities by the city itself, and the amount to be paid by the railroad company is paid by them as "taxes," a certain amount each year until the whole amount is liquidated. Now the question arises, should this be charged as a betterment in construction account, or the difference between the cost of the old and the new paving be charged as a betterment and the remainder to operating expenses? We have a number of similar cases of this sort, and while it is called "paving taxes" by the city, it still is in the nature of a betterment of the road.

Answer.—Answering the question as to whether this paving should be charged as a betterment in construction account, or the difference between the cost of the old and the new paving be charged as a betterment in construction account and the remainder to operating expenses, in my opinion, the latter would be the proper disposition of the charge. If the paving in question is "new and additional," it is a proper charge to Construction and Equipment "D"; if it is a substitution, for example, if brick or wooden block paving was replaced by asphalt or granite paving, the paving substituted would represent an additional investment over and above the original cost of the paving first laid. The difference in cost could be charged to construction account and the remainder, representing the original cost of the paving first laid, to operating expenses, provided, or course, that the company in question did not have an appropriate reserve account, created by debiting operating expenses and crediting the reserve account to take care of such a charge. This disposition of the charge would not be according to strict accounting principles or conservative financiering or capitalization, for as a matter of fact, in the case of the substitution, while the new paving may be better and may have cost more than the old paving, the fact remains that there is no more paving than there was before the substitution was made; furthermore, the probabilities are that the new paving will require less maintenance than the old paving and will facilitate the operation of the road, consequently operating expenses would be correspondingly reduced thereby. If the difference in the cost between the old and the new paving is charged to capital, and operation would receive the benefit of the substitution in decreased cost of maintenance and increased operating facilities, in a way, you would be capitalizing "earnings."

On the question as to whether the cost of the paving referred to should be charged in "taxes," which was the charge made by the road in question, in my judgment, the charge was erroneous, notwithstanding the liquidation of the obligation is in a sense a "tax" upon the company and should be considered a "tax" in taking into account the amounts paid by the railway company into the municipal treasury, in order to determine the total amount of taxes paid by the railway company to the municipality. The reason for this is that there is no more necessity for having the space between the tracks of an electric railway paved in order to operate the cars, even if the tracks are laid in a city, than there is to have the space between the tracks of a steam railroad paved. The requirement of making a street railway pave the space between its tracks is simply a continuation of conditions prevailing when street railways were operated by animal power and the space between the tracks was paved or ballasted in order to provide a roadway for the animals drawing the cars. The only purpose which the paved roadway of an electric street railway serves is to provide a place which is appropriated by vehicles, in order that the vehicles may be pulled in the tracks and over the roadway of the street railway. This results in interference with the operation of the cars, to the great annoyance of the public who patronize the railway, and to the disadvantage of the railway. The use of the tracks and roadway of the railway by vehicles causes excessive wear on the rails and paving, and is responsible for collisions between vehicles and cars, frequently resulting in personal injuries and damage to property, the claims for which the railway must defend, and often, unjustly, be compelled to pay. These conditions are all brought about because the space between the tracks of the street railway is paved.

This condition is unfair to the street railway, and is a burden that should not be put upon it, but which, if put upon it, should be considered as the payment of a tax compensation for franchise rights and privileges, although the charge of such a "tax" would not be carried in the accounts of the company in "taxes."

The cost of the paving is not a "tax" in the sense of being an amount levied on the property of the company, as ordinary taxes are levied, nor is it collected for the same purpose, but it represents a charge against the company for tangible property, and therefore should not be carried on the books in "taxes."

As a bookkeeping proposition, the matter should be taken care of on the books by opening a liability account under an appropriate title, debiting construction and equipment, reserves or operating expenses, as the case may be, and then the liability account would show the amount unliquidated and due on the paving in question, but the paving itself would be taken care of on the books in so far as it affected the property of the company.

In the instructions relating to "deductions from income," in specifying the deductions for taxes, as shown on page 55 of the consolidated report of committees, nothing is said as to treating paving as an item of "taxes." The item "track taxes," mentioned on page 55, refers to a charge for the payment of an annual tax based on a certain amount per mile of track operated, but has nothing to do with paving. Answered by C. N. Duffy, Jan. 5, 1905.

QUESTION NO. 24

Question.—Will you please advise me if it is proper in computing the car-hours to figure the total hours cars are out of the car house, or the time they are actually engaged in earning revenue. Extra cars for ball games and pleasure resorts are sometimes held with their crews on duty for two or three hours awaiting the closing of the attraction. In figuring passenger car mileage, is it proper to include mileage made by a car between the car house and the point on system where they begin carrying passengers? Our car house is situated some 2 miles from where some cars begin the regular run, and it is not clear to me whether or not this mileage should be used. When a car is disabled and it is necessary to send a relief car, it creates considerable mileage that is not necessary to actually transport passengers.

Answer.—In figuring car-hours and car-miles, the hours of service and the miles run from the time the cars leave the car house to the time of turning in at the car house, after their runs have been completed, should be included in computing the total car-hours and the total car-miles. Answered by C. N. Duffy, March 13, 1905.

QUESTION NO. 25

Question.—Will you kindly advise to what account, in your judgment, should be charged the expense of oiling that portion of the streets which the company is obliged to maintain? This oiling, as you no doubt know, consists of sprinkling one or more coats of crude oil on the streets and covering same with sand or other similar material, and rolling same.

Answer.—Account No. 23—Cleaning and Sanding Track. Answered by C. N. Duffy, May 17, 1905.

QUESTION NO. 26

Question.—What account should be charged with the expense of street assessments payable by street railway companies covering their proportion of cost of opening streets on which the company has no track?

Answer.—Taxes. Answered by C. N. Duffy, May 17, 1905.

QUESTION NO. 27

Question (asked by the accountant of a State Board of Railroad Commissioners).—As a sample of the questions which we are asked to pass upon in connection with street railway accounting matters, I enclose you correspondence from a railway company of this State. In order that everything should come from headquarters and that we may always co-operate with the Street Railway Accountants' Association in such matters, I have to ask that you will make proper assignment of the various additional accounts as shown by the letter and return to me, when I will instruct the assignment to be made as you direct. If you will kindly mark the number of the account to which you decide the additional accounts should be assigned, it will cover the ground.

Answer.—The additional accounts referred to and the assignments of same, as made by the chairman, were as follows:

	Additional Accounts	Assignments of Same
1A	Maintenance of Bridges and Culverts	1
1B	Maintenance of Fences, Road Crossings, Signs and Cattle Guards	1
2A	Telephone Line	2 or 32
5A	Maintenance of Sub-Station Apparatus	5
10A	Sub-Station Wages	10
16A	Wages of Despatchers	16 or 19
17A	Wages of Conductors, Freight and Express	17
17B	Wages of Conductors, Canandaigua	17
18A	Wages of Motormen, Freight and Express	18
18B	Wages of Motormen, Canandaigua	18
19A	Wages of Station Agents	19
22D	Despatching System Expenses	22
22F	Miscellaneous Car Service, Expenses, Freight and Express	22
22A	Station Agents' Expenses	28, 27 or 22
22AF	Station Agents' Expenses, Freight and Express	28, 27 or 22
26A	Salary of Clerks, Freight and Express	26
27A	Printing and Stationery, Freight and Express	27
28A	Miscellaneous Office Expenses, Freight and Express	28
31A	Advertising and Attractions, Freight and Express	31
32A	Miscellaneous General Expenses, Freight and Express	32
37A	Rent of Tracks and Terminals, Freight and Express	37

Answer.—In connection with these assignments made, attention is called especially to the following:

A. 2A—Telephone Lines.—There is nothing in the instructions under Account No. 2 of the standard classification as to the charging of the maintenance of a telephone line to that account; in Account No. 32 there are instructions to charge that account with the cost of "maintaining and operating private telephone system." In the absence of any other information than that submitted, I would say that, according to the instructions of the standard classification, Account 2A of the railway company should be charged to Account No. 32, but it is possible that this is or could be treated as a part of the electric line, and might, therefore, be charged to Account 2. This is a question where the facts should be taken into consideration in making a decision as to what should govern the charge.

B. 16A—Wages of Despatchers.—There is a question whether this account should be assigned to Account No. 16 or Account No. 19 of the accountants' classification, dependent upon whether the despatchers are superintending transportation or not. If they are, 16A should be assigned to Account No. 16 of the accountants' classification; if not, to Account No. 19.

C. 19A—Wages of Station Agents.—Assuming that the duties of the station agents referred to are general in their character, and not strictly clerical, I should say Account 19A should be assigned to Account No. 19 of the accountants' classification; if their duties are strictly clerical, I should say they should be assigned to Account No. 26.

D. 22A—Station Agents' Expenses. 22AF—Station Agents' Expenses, Freight and Express.—Assuming that the expenses referred to are general in their character and do not include any printing or stationery, or any of the items chargeable to Account No. 28 of the accountants' classification, I should say that Accounts 22A and 22AF should be assigned to Account No. 22 of the accountants' classification; should these expenses include items properly chargeable to Account No. 27 or Account No. 28, Account No. 22 should not carry all of such expenses.

With regard further to Accounts 2A, 16A, 19A, 22A and 22AF, of the railway company, and with reference to my remarks concerning same, you will readily understand that there is a broader question involved than the mere assignment of the items charged in these accounts to the accounts of the accountants' classification, that it would be proper to assign them to, the broader question being the question of an interurban classification of accounts. You will understand and appreciate what I mean when you recall what has transpired in the past in connection therewith with reference to the classification of the Accountants' Association, and what it is proposed to do in the future with respect to drafting instructions governing the disposition and charge of such items as an interurban classification should take care of. For these reasons I hesitate to make an official ruling on these assignments without consulting the other members of the classification committee of this association.

However, I should say, assuming that Accounts 2A, 16A, 19A, 22A and 22AF, of the railway company, stand for such charges as would appear proper in interurban operation to charge to Accounts 2, 16, 19 and 22 of the accountants' classification, that the assignments should be to these accounts, as it would hardly do to leave the assignment open or optional, as between one or more accounts, as that would be misleading and unsatisfactory, and might lead to future complications. Answered by C. N. Duffy, July 31, 1905.

QUESTION NO. 28

Question (asked by the accountant of a State Board of Railroad Commissioners). In treating under "miscellaneous income" the net income from the operation of an illuminating or power plant, do you have any positive rule as to the proportion of the interest on funded debt to be charged on account of the operation of the plant which might be said to be used for producing light and power? Is there any way of arriving at a firm basis for a charge of this character? I understand that it must necessarily in many cases be an arbitrary settlement. Will you kindly give me your ideas as to the most positive way of arriving at a fair proportion?

Answer.—As far as I know, there is no positive rule governing this question. In fact, I do not recall in my experience that the question has ever been raised before. I would take as a basis for the charge of the proportionate interest, the interest on the investment as between the railway company's plant and the illuminating plant; this could be determined by the proportionate kilowatt capacity of the plant, or the proportionate kilowatt output in the operation of the plants. Answered by C. N. Duffy, Aug. 17, 1905.

The following questions, nine in all, numbered respectively 29 to 37, both inclusive, were asked through the "Question Box," referred to the chairman of this committee, and answered by him, as follows:

QUESTION NO. 29

Question.—To what account should be charged the wages of those who put up and take down snow fences?

Answer.—Account No. 24—Removal of Snow and Ice.

QUESTION NO. 30

Question.—To what account should a snow fence privilege be charged? The above to be put up in the fall and removed in the spring.

Answer.—Account No. 24—Removal of Snow and Ice.

QUESTION NO. 31

Question.—Should taxes be treated as a fixed charge, or should they be charged to expense?

Answer.—The standard form of report of the association adopted at the Detroit convention in October, 1902, shows taxes as a deduction from income, therefore they should not be charged to expense; neither are they a fixed charge in the sense that interest on funded debt is understood to be a fixed charge.

QUESTION NO. 32

Question.—What income account should be credited with revenue from trail cars chartered for hauling freight?

Answer.—Chartered cars.

QUESTION NO. 33

Question.—What is the proper charge to dispose of discount allowed on treasury bonds sold? Should it be charged out as part of fixed charges during length of time bonds run, or charged out direct to profit and loss, so much each year?

Answer.—The proper charge to dispose of discount on bonds sold would be Construction and Equipment Account N—Interest and Discount. According to the classification of the construction and equipment accounts and the instructions governing same, the total amount should be charged direct to Account N—Interest and Discount. If the charge was treated as a part of fixed charges and distributed over the period of time the bonds run, it would have a tendency to mislead as to the actual fixed charges which the company would have to meet and would necessitate the opening of a suspense account.

QUESTION NO. 34

Question.—To what account is chargeable wages of solicitor for advertisements in cars?

Answer.—The instructions of the standard system of street railway accounting of the association, governing a standard form of report, with reference to treating income from advertising, by a company that conducts the business of selling or renting advertising space in its cars instead of leasing the privilege so to do to someone else, should be the net income from this source, after deducting all expenses of conducting the business. Under this instruction the proper charge of the wages of a person engaged in soliciting advertisements in cars would be the expense of conducting the advertising business. There is no specific account in the classification of operating expense accounts provided or intended for such a charge.

QUESTION NO. 35

Question.—Our agents at sub-stations sell tickets and take care of machinery. To what accounts should we charge their wages?

Answer.—It would appear that the installation of a sub-station and the operation of the necessary machinery installed therein would require the services of sub-station employees, regardless of whether they acted as agents or in any other capacity, or whether they sold tickets or not, and should therefore be classed primarily as sub-station employees. On this theory their wages should be charged to Account No. 10—Power Plant Wages, and carried under a subsidiary account to show they were sub-station employees and not employees of the central power plant, if such a separation should be desired. If it is desired to make the distribution and charge of the wages of such employees to conform with the diversified work they may perform, the distribution and charge should be made on the basis of the work performed. If a part of their work would be acting as agents and selling tickets, a further distribution of their wages would be to Account No. 19—Wages of Miscellaneous Car Service Employees. The questioner is referred, for further information, to the committee's remarks concerning "Account No. 19A—Wages of Station Agents," appearing in the answer to Question No. 27.

QUESTION NO. 36

Question.—Some replies were made last year to an inquiry as to mileage to use in figuring costs. Will the association standardize this point?

Answer.—At the last convention of the association, Question No. 11 was as follows: "Is it customary to use total mileage (i. e., work car, special car, and snow plow, added to regular passenger car mileage) in figuring income per car-mile and expense per car-mile?" It is assumed that the replies made to Question No. 11 are the replies the questioner refers to, which replies number nineteen in all and are somewhat diversified. The standard car-mile basis to use in figuring costs should be the revenue car-miles run, including passenger, freight, mail and express.

QUESTION NO. 37

Question.—Do not interurban companies find present classification of accounts entirely inadequate?

Answer.—Approximately 45 per cent of the membership of this association consists of interurban companies. The association on April 4, 1905, issued Circular No. 35, wherein this committee asked for an expression of opinion from the members of the association to guide the committee in determining whether or not it would be advisable to revise the present classification of accounts. Only 18 per cent of the interurban companies were in favor of having any changes made in the present classification, and the changes suggested applied only to a few accounts. The reasons given for the suggested changes were principally for the purpose of determining the cost of conducting freight and express business. Some interurban companies were not in favor of having any changes at all made in the present classification of accounts; other interurban companies replied that the present classification met their requirements and was satisfactory. Other interurban companies submitted a subsidiary classification of accounts, subdividing certain accounts of the present classification in order to make them applicable to interurban operation and their own specific conditions.

The present classification of accounts was devised in 1897 for street railways, there being but comparatively few, if any, interurban railways in operation at that time. This committee does not take the position that perfection has been reached in the present classification of accounts, and appreciates the fact that it might be desirable to make some amplifications with a view to enlarging its flexibility so that the operation of an interurban railway, or any other railway, by electricity, will be covered, although it is the judgment of this committee that the present classification, through the medium of a subsidiary classification devised to cover specifically the operation of interurban railways, could be made to cover interurban operation satisfactorily. In view of these reasons, the answer to the question propounded is that interurban companies do not find the present classification of accounts entirely inadequate.

PROPOSED CHANGES

Referring to the discussion at the last convention of the association with reference to the advisability of changing the present classification of accounts, particularly the amplification of same, with the idea of covering specifically the operation of interurban railways, the committee prepared the following letter, a copy of which was sent to each of the 150 members of the association by the secretary on April 4, 1905, designated as Circular No. 35:

To the Members: Hartford, Conn., April 4, 1905

At the last convention of the Street Railway Accountants' Association of America, held in St. Louis, October, 1904, the committee on standard classification of accounts were empowered by resolution to revise the present classification of accounts, if it was deemed advisable or advantageous to do so.

There will be a conference between this committee and a similar committee representing the National Association of Railroad Commissioners, and a similar committee representing the Association of American Railway Accounting Officers, held in the month of April, 1905. In order to receive an expression of opinion from the members of this association to guide the committee on standard classification of accounts in any action they may decide upon at the conference to be held with the committees representing the other two associations, the committee on standard classification of accounts requests the benefit of your views. Kindly answer the questions asked in this letter, supplementing same with any ideas, suggestions or criticisms bearing on the proposition that will enable the committee to understand clearly the view of each company comprising the membership of the Street Railway Accountants' Association of America.

Please give this letter your prompt attention and mail your reply to C. N. Duffy, chairman, 2020 State Street, Chicago, Ill., not later than April 15, 1905. Very truly yours,

(Signed) ELMER M. WHITE, Secretary.

QUESTIONS

1. Are you in favor of having any change at all made in the present classification of accounts?

2. If so, what are the specific changes that you recommend?

3. Do you operate an interurban railway? If so, what recommendations would you make as to changing the present classification, with reference specifically to the accounts of an interurban railway?

4. Should there be a standard subdivision of the present classification of accounts, Construction and Equipment, as well as operating, especially a standard subdivision of each one of the Operating Expense Accounts of the present classification, with the idea of providing a uniform basis for comparing same?

5. Do you use any subdivision of accounts? If so, please forward a copy of same.

Remarks:

There were only thirty-seven replies received by the chairman of the committee, exclusive of one reply mailed twenty-five days after the mailing date specified in the letter, April 15, 1905, and thirteen days after the committee met to take action on the replies, this number, thirty-seven, representing less than 25 per cent of the membership.

Of the thirty-seven replies received to the question, "Are you in favor of having any change at all made in the present classification of accounts?" twenty-two answered "No," twelve answered "Yes," and three were in favor of having the proposition considered without taking a positive stand one way or the other. Sixty per cent, therefore, of the replies received, were against the proposition of changing the classification of accounts, 30 per cent were in favor of it, and 10 per cent were non-committal. Of the twelve who replied "Yes," a large proportion were interurban companies. These companies desired such changes or amplifications as would cover specifically the operation of interurban roads, their suggestions applying to only a few accounts of the present classification, the reasons given for desiring changes being principally because of the desire to provide for a separation of the cost of conducting passenger, freight and express business.

This proposition, to the minds of the committee, does not appear altogether practical; they question whether or not the result attained will be satisfactory or cover what it is sought to accomplish, in so far as the use of any classification of accounts is concerned. The Interstate Commerce Commission classification of accounts does not attempt to provide for any separation of the expense of conducting passenger business from the expense of conducting freight, mail, or express business, although the earnings are separated. It would appear to be more difficult to make such a separation on an interurban road than it would be on a steam road. The proposition of ascertaining the cost of conducting a freight, mail, or express business, separate and distinct from a passenger business, could, in the judgment of the committee, be determined independently of any classification of accounts, as the cost of producing power is ascertained and determined by the use of the present classification of accounts, but absolutely independently, in so far as the classification of accounts in themselves is concerned, as to showing specifically the cost of producing power. In other words, such a proposition is one that is to be considered and treated as a specific proposition, independently of any classification of accounts.

To the question, "Should there be a standard subdivision of the present classification of accounts, construction and equipment, as well as operating?" twenty-five (68 per cent) answered "No," nine (24 per cent) answered "Yes," and three (8 per cent) were non-committal.

The entire committee, with the exception of Mr. Mackay, met in New York on April 27, 1905, devoted a whole day to a careful consideration of the replies received to Circular No. 35, and were unanimously of the opinion that the present classification of accounts should not be changed. The suggestions offered were deemed of insufficient importance to warrant the making of any change; the committee concluded that there should not be a standard subdivision of the present classification of accounts formulated, for, outside of the feeling of the members, as evidenced by their replies to the circular letter, the committee thought it questionable as to whether a standard subdivision would answer the requirements, specifically, of different companies operating under different and varying conditions. Furthermore, we were influenced in our decision by the fact that we recognized that each company would prefer to devise such a subdivision as would cover its specific conditions. This is a matter that your committee has presented to the association before.

On April 28, 1905, the committee attended a joint conference in New York with the committee representing the National Association of Railway Commissioners, together with Mr. Billings, secretary of the Connecticut Board of Railroad Commissioners; Mr. Campbell, representing Mr. Kochersperger, a member of the Association of American Railway Accounting Officers and comptroller of the New York, New Haven & Hartford Railroad, a railroad owning and operating a large system of electric roads, and Mr. Brockway. The three gentlemen named were present at the meeting upon the invitation of Mr. Seymour, chairman of the committee representing the National Association of Railway Commissioners. At the conference, the committee advised the gentlemen of the sending out of Circular No. 35 of this association, of the replies received, and of the position of our committee, as previously stated and explained. The proposition was thoroughly discussed, Mr. Campbell, representing the New York, New Haven & Hartford Railroad, taking quite an active part in the discussion and explaining his ideas on certain questions, together with the conditions of operation of his road and their practices in connection therewith, with reference to the use of the standard classification of accounts. The gentlemen heartily endorsed and approved of our position, agreed with us in our conclusions, and unanimously decided to recommend to their association that no change in the present classification be made, recognizing, however, the desirability of the amplification of certain accounts of the present classification in order to cover specifically the operation of interurban roads.

The question of the use of electricity by steam railroads was also taken up and discussed, the conclusion being that it would be advisable that this proposition be kept before each association through their respective committees, with the idea of harmonizing the classification of accounts of this association and the Interstate Commerce Commission classification of accounts and ultimately formulate a classification devised to meet the requirements of all interests concerned.

With the idea of keeping the standard system of accounting of this association abreast with the development of the art of electric railroading, in response to the replies to circular No. 35, of those interurban companies who requested such amplification of the present classification of accounts as would cover specifically the operation of interurban roads, pending any future formal action that may be taken with the other associations interested, with respect to formulating a classification of accounts that will satisfactorily meet the requirements of any electric railroad, with the firm conviction that no change in the present classification of accounts should be made, and reiterating all that has been said by your committee with reference to this proposition from their standpoint, we beg leave to submit the following recommendations as to the application of the present classification of accounts to the operation of interurban railways.

If it is desired to separate the charges in the thirty-nine operating expense accounts of the classification, with the idea of having such a separation as will determine the cost of conducting passenger, freight, mail or express business separately, the committee suggests the following procedure:

(A). Provide subsidiary accounts for each of the thirty-nine operating expense accounts, designating them respectively passenger, freight, mail, express.

(B). Charge to these subsidiary accounts such proportion of the total charges to the classification accounts as will be proportionately correct.

In order to determine the correct proportionate charges to the subsidiary accounts, a separation of the charges could be made and classified as follows:

(1). Specific Charges.—These charges should be based on the specific use of tracks, real estate, buildings, cars, miscellaneous equipment, tools or power, and by specific conditions of operation that will permit of or warrant specific charges covering the conduct of the business as between passenger, freight, mail or express.

(2). Proportionate Charges.—These charges should be based on the use of tracks, real estate, buildings, cars, miscellaneous equipment, tools or power, and by conditions of operation that are not specific or would not permit of or warrant specific charges covering the conduct of the business as between passenger, freight, mail or express.

The proportionate charges could be distributed on the following bases: (A). By proportionate car mileage for maintenance and transportation expenses, as covered by the twenty-five operating expense accounts, Nos. 1 to 24, both inclusive. (B). By proportionate gross earnings for general expenses, as covered by the fourteen operating expense accounts, Nos. 25 to 38, both inclusive.

Referring to the alphabetical list of items chargeable to operating expense accounts, with reference to the explanations and instructions of the standard system governing same, to bring about a standard method of making charges, the items mentioned below are suggested as being some of those that may enter into the charges of the operating expense accounts of an interurban road, not specifically mentioned in the alphabetical list of items chargeable, that could be grouped under the operating expense accounts designated.

ACCOUNT NO. 1—MAINTENANCE OF TRACK AND ROADWAY

Interlocking system.
Signal system.

ACCOUNT NO. 2—MAINTENANCE OF ELECTRIC LINE

Telephone line (telephone line independent of the maintenance and operation of a private telephone system installed and used in lieu of a public telephone service for which a rental would have to be paid, and which should be charged to account No. 32—(Miscellaneous General Expenses).

ACCOUNT NO. 3—MAINTENANCE OF BUILDINGS AND FIXTURES

Freight stations.
Passenger stations.
Section houses.
Sub-station building.

ACCOUNT NO. 4—MAINTENANCE OF STEAM PLANT

Turbines.

ACCOUNT NO. 5—MAINTENANCE OF ELECTRIC PLANT

Storage-battery depreciation.
Sub-station apparatus (including oil switches, transformers, rotary converters, switchboards and switchboard appliances, etc.)

ACCOUNT NO. 10—POWER-PLANT WAGES

Storage-battery tenders.
Sub-station employees.

ACCOUNT NO. 13.—LUBRICANTS AND WASTE FOR POWER PLANT

Charge to this account all expenditures for lubrication of power plant and sub-stations, including oil, grease, waste, rags, etc.

ACCOUNT NO. 14—MISCELLANEOUS SUPPLIES AND EXPENSES OF POWER PLANT

Charge to this account all expenditures for operation of power plant and sub-stations, not otherwise provided for.

ACCOUNT NO. 16.—SUPERINTENDENCE OF TRANSPORTATION

Charge to this account wages of division superintendents, their assistants and aids, road officers, inspectors, despatchers and others employed in superintending transportation.

ACCOUNT NO. 19—WAGES OF MISCELLANEOUS CAR-SERVICE EMPLOYEES

Charge to this account wages of starters, transfer agents, switch tenders, trolley men, trail-car couplers, despatchers, station agents and other car-service employees.

ACCOUNT NO. 22—MISCELLANEOUS CAR-SERVICE EXPENSES

Charge to this account all expenditures for secret inspection, transfers and tickets, conductors' books, punches, portable registers, tools for motormen, employees' barges and uniforms; cost of getting derailed cars on track and removing obstructions and wreckage; miscellaneous expenses of car houses and stations, including fuel, light, water (except water used for car washing), ice and all other car-service expenses not otherwise provided for (exclusive of printing and stationary, which should be charged to account No. 27—Printing and Stationery).

ACCOUNT NO. 26—SALARIES OF CLERKS

Charge to this account the salaries of bookkeepers, cashiers, receivers, paymasters, stenographers, clerks employed in counting cash, tickets and transfers, clerks employed in billing and other clerical work in connection with freight and express, and all other clerks employed in the general office or elsewhere.

Referring to the classification of construction and equipment accounts and the instructions governing charges to same, the items shown below, not specifically mentioned in the instructions governing charges, should be included under the accounts designated.

ACCOUNT D—TRACK AND ROADWAY CONSTRUCTION

Interlocking system.
Signal system.

ACCOUNT E—ELECTRIC LINE CONSTRUCTION

Telephone line (exclusive of a private telephone system installed for use in lieu of a public telephone service for which a rental would have to be paid, and which should be charged to Account O—Miscellaneous).

ACCOUNT G—BUILDINGS AND FIXTURES USED IN OPERATION OF ROAD

Freight stations.
Passenger stations.
Section houses.
Sub-station buildings.

ACCOUNT O—MISCELLANEOUS

Including installation of private telephone system to be used in lieu of a public telephone service for which a rental would have to be paid (exclusive of the telephone line installed in connection with electric-line construction, which should be charged to Account E—Electric-Line Construction). Respectfully submitted for the committee,

C. N. DUFFY, Chairman.

SUPPLEMENTAL REPORT OF COMMITTEE ON STANDARD CLASSIFICATION OF ACCOUNTS

Your committee on standard classification of accounts beg leave to make the following supplemental report:

After the report of the committee on standard classification of accounts had been completed, the secretary of the association received two questions which he referred to the chairman of the committee to be answered, with the request that the answers be included in the committee's report. As this could not be done, the questions and answers are herewith submitted, numbered respectively 38 and 39.

QUESTION NO. 38

Question.—What would be the proper account to charge desks and other office furniture to?

Answer.—Desks and other office furniture, if an original purchase in connection with the construction and equipment of the road, or if an addition to the original number purchased, should be charged to Construction and Equipment Account O—Miscellaneous. If a replacement or a renewal, the charge should be Operating Expense Account No. 28—Miscellaneous Office Expenses.

QUESTION NO. 39

Question.—A company owning the exclusive street railway franchise and electric lighting franchise is required by the city to place arc lamps at the intersection of its tracks; also at the inters ction of its tracks with steam railroads. To what account should the cost of these lights be charged?

Answer.—As it is evident that the company in question is conducting a railway and a lighting business, the installation of the lamps, their maintenance and the current furnished to light them, should be considered a part of the lighting business, the expense carried in the lighting accounts, the railway charged with the service rendered by the lighting department, as any lighting customer would be charged for similar service, and the cost of the service carried in the railway expenses in Account No. 22—Miscellaneous Car Service Expenses, if the lighting is necessary in the operation of the road; if not necessary in the operation of the road, in Account No. 32—Miscellaneous General Expenses.

If it is desired to show the cost of the above as a "tax" imposed upon the company for the exercise of the rights and privileges conferred by the exclusive franchise, the cost can be so shown under proper subsidiary accounts.

The net income resulting from conducting the lighting business should appear in the railway accounts under "Miscellaneous Income," sub-head "Other Miscellaneous Income." This is in accordance with instructions governing "Miscellaneous Income," as follows: "If the company conducts a lighting business as well as a railway business, the net income resulting from the lighting business should appear under "Miscellaneous Income." (See report of committee on a standard form of report for electric railways, made to and approved by the sixth annual convention of the Accountants' Association, Detroit, October, 1902.)

Respectfully submitted for the committee.

C. N. Duffy, Chairman.

REPORT OF COMMITTEE ON INTERNATIONAL FORM OF REPORT

Your committee on international form of report, C. N. Duffy, chairman, W. G. Ross and W. B. Brockway, beg leave to make the following report:

The question of an international form of report was taken up early in the year with Ludwig Spangler, direktor der stadtischen Strassenbahnen, IV-1, Favoritenstr. 9, Vienna, Austria, and copies of our form of report were forwarded with a request that an endeavor should be made by his association and ours to take up this question and endeavor to arrive at a form of report that would be international. Mr. Spangler, in replying, forwarded copies of their reports, and replies as follows:

"I received your communication of Jan. 12, and thank you for kind information. In accordance with your wishes, I send you herewith draft of the accounting system used at the present time by the City Railways in Vienna, which is identical with the system of the International Street and Interurban Railway Association, with headquarters in Brussels, and is only amended to suit our purposes. The system issued by this international association, together with monthly report which forms the basis for statistics, was accepted at the convention at Vienna last year, and was recommended to the members of the association for their use. I place the reports, etc., relative to this matter at your service."

It was felt, however, by your committee that, owing to the difference in languages, distances and time lost in correspondence, that the matter should first be taken up with the associations in Great Britain, with the idea that it would be a simpler and easier matter to get the tramway associations in Great Britain to agree on a standard form of report, and as they are in close touch with the European associations, we could have their co-operation toward getting the European associations to agree with us on this question.

To this end a conference was held in New York on June 14, 1905, between James Dalrymple, manager of the Glasgow Corporation Tramways, Glasgow, Scotland, and your committee, to take up the question of formulating an international form of report, to bring about its adoption and to discuss what steps should be taken in order to secure the co-operation of all parties interested, in order to accomplish the best results.

Mr. Dalrymple, now the manager of the Glasgow Corporation Tramways, is a chartered accountant, and was the accountant and deputy manager of the company before becoming its manager. Mr. Dalrymple formulated the suggested standard form of tramway accounts, presented by him to the convention of the Municipal Tramway Association of Great Britain, held in Glasgow in 1903. In presenting his report and suggested standard form of tramway accounts to the Glasgow convention, Mr. Dalrymple stated that he had endeavored to adhere as closely as possible to the standard form which had been adopted by the street railways and steam railroads of America. The suggested standard form of tramway accounts, after certain modifications and changes recommended by the joint committee of the Institute of Municipal Treasurers and Accountants (incorporated) and the Municipal Tramways Association of Great Britain, was approved and adopted as the standard form of the Municipal Tramways Association of Great Britain.

Mr. Dalrymple is very much interested in the proposition of formulating an international form of report that would be worldwide in its application and scope, and in bringing about its adoption and use. At the conference he assured your committee that he would do everything in his power to co-operate with us to bring about all that we hoped to accomplish. Mr. Dalrymple's prominence in the street railway world, the fact that he is a chartered accountant, formulated the suggested standard form of tramway accounts, and is a member of the executive committee of the Municipal Tramways Association of Great Britain, will enable him to exercise a powerful influence and assistance in the work undertaken by your committee.

The result of our conference was an understanding between Mr. Dalrymple and your committee that he would present the proposition of an international form of report before the convention of the Municipal Tramways Association of Great Britain, that he would take up the question with the other tramway associations, keep us advised of anything that developed in the matter on the other side of the water and work in harmony with your committee.

At the recent convention of the Municipal Tramways Association of Great Britain, held in London, July 4, 5 and 6, 1905, Mr. Dalrymple was called away from the convention before he had an opportunity of bringing up the question of an international form of report. The matter was brought to the attention of the convention, however, by J. M. McElroy, the secretary of the Municipal Tramways Association of Great Britain, and by resolution of the convention, referred to the executive committee.

Your committee recognizes and appreciates the fact that formulating an international form of report and bringing about its adoption and use will require the most patient, persistent and untiring work on the part of the committee. However, we earnestly hope, with the co-operation and endorsement of this association and the European tramway associations, to establish an international form of report to the mutual benefit of all interests concerned. Respectfully submitted for the committee,

C. N. Duffy, Chairman.

REPORT OF COMMITTEE ATTENDING CONVENTION OF NATIONAL ASSOCIATION OF RAILWAY COMMISSIONERS, HELD AT BIRMINGHAM, ALABAMA, NOV. 15-16-17, 1904

Your committee to attend convention of National Association of Railway Commissioners, consisting of C. N. Duffy, chairman, W. F. Ham and H. C. Mackay, with W. B. Brockway, alternate, beg leave to report that the entire committee, including Mr. Brockway, who was in Birmingham at the time, attended the convention as representatives of this association. There was nothing special before the convention which affected matters concerning the Street Railway Accountants' Association of America other than the report of the committee on the classification of construction and equipment expenses and operating expenses for electric railways. This report was as follows:

"Your committee appointed on classification of operating and construction expenses of electric railways, submits the following report:

"In pursuance of a resolution adopted at the ninth annual convention of the National Association of Railroad Commissioners, held in St. Louis, a committee of three, consisting of Hon. William O. Seymour, of Connecticut; Hon. Ashley W. Cole, of New York, and Hon. R. S. Kayler, of Ohio, was appointed to prepare a form of classification of the construction and operating expenses of electric railways. This committee had the co-operation of a committee representing the Street Railway Accountants' Association of America, and as a result of their labors a standard system of street railway accounting, covering the classification of operating expense accounts, was adopted at the convention held at Denver, Col., in 1899. This classification has been adopted in several States, including New York, Illinois, Connecticut, Pennsylvania, Virginia, Vermont and Massachusetts. So far as your committee knows, this system has given general satisfaction, and we have no suggestions or changes to offer. Your committee recommends its adoption by all the States requiring reports from street railway companies, and we also recommend the use of the standard form of report for electric railways adopted by this association at its convention held in Portland, Maine, in July, 1903."

Mr. Ham was a member of this committee of the National Association of Railway Commissioners, having been appointed by the incoming president after the 1903 convention, held at Portland, Maine, at which convention Mr. Ham and Mr. White represented this association.

On behalf of the committee representing this association, I reported to the convention what had transpired at the St. Louis convention of the Accountants' Association, with reference to the committee on standard classification of accounts being empowered by resolution of the convention to revise the present classification of accounts, if deemed advisable or advantageous to do so, with the idea of covering specifically the operation of interurban railways, and to take up the question of rearranging the classification to cover the operation of roads by steam and electricity, notably the operation of the New York terminals of the New York Central and Pennsylvania companies by electricity; and of the committee being authorized to meet in conference with a similar committee, representing the National Association of Railway Commissioners and the Association of American Railway Accounting Officers, to take up the discussion of the proposition in the interests of the three associations.

The National Association of Railway Commissioners, by resolution adopted, authorized its committee to meet with the committee representing this association in such a conference. A conference was held in New York on April 28, 1905, between the representatives of the three associations named, and the proposition of changing the classification of accounts was fully discussed. It was unanimously decided not to make any changes at present, but it was deemed advisable that the respective committees of each association keep the proposition before them, with the idea of ultimately formulating such changes or additions as would take care of the needs of all interests concerned.

The convention extended all courtesies possible to the representatives of our association, and we were accorded full recognition in every way.

The Accountants' Association and Mr. Ham were honored by placing Mr. Ham on the committee on resolutions, as well as by appointing him a member of the committee on classification of expenses for electric railways.

At the close of the Birmingham convention, the three representatives of the association made the trip by special train with the convention party through the South and Mexico, returning on Dec. 5, 1904, after a three weeks' tour, to St. Louis, the starting point. The tour afforded the representatives of the association an opportunity of becoming personally and intimately acquainted with the members of the National Association of Railway Commissioners, their families and guests, thereby strengthening the cordial relations existing between the two associations.

The street railways of Birmingham, New Orleans and the City of Mexico entertained the convention party very handsomely, which redounded to the credit of the street railways named and to the Accountants' Association.

Respectfully submitted for the committee,

C. N. Duffy, Chairman.

INTERURBAN FARE COLLECTIONS

By Irwin Fullerton,
Auditor, Detroit United Railway

"Interurban Tickets, or Fare Collections," has been the subject of a great deal of thought by every operator of interurban lines, and the brightest minds have for years been trained on this subject, devising schemes and tickets by which an absolute check could be made on conductors, so that all the revenue collected by its employees would find its way into the treasury of the company. The ideal system, in my estimation, is the one used in part by our friends, the steam railroads; and they have been working on this same problem for upward of half a century. They have in effect in the larger cities a system whereby a passenger purchases a ticket from an agent, and, before getting to his train, he passes a gateman, who punches his ticket, which indicates that the passenger has used it in that way.

Of course, it is not possible to have all this machinery in connection with our electric lines, where the cars stop at cross-roads, street corners, flag stations, and in fact at almost any place where a passenger wishes to board a car.

My experience with interurban fares is to sell as many tickets as possible through agents. My reason for this is that you have an absolute check upon your agent as to the number of tickets sold, and it is much better for one man to handle the revenue than to have it divided among twenty-five or fifty conductors. Another reason is that a conductor can collect his fares more readily by collecting tickets than he can if he has to make change with each passenger. I have been on heavily loaded interurban cars where runs were made into the country for 25 miles, and destination was nearly reached before all the fares were collected —the car in each instance being operated by a good man.

The system of collecting interurban fares in effect on the Detroit United Railway system is briefly outlined as follows:

The general passenger agent is the custodian of all interurban tickets, and supplies of these tickets are sent direct to each car house foreman of the different lines. At the car house we have large cases, divided into thirty-one compartments, so as to keep the tickets for each day of the month separate. In starting out the cars for any one day, the conductors are given a certain number of these tickets, and upon a blank prepared for that purpose, a record is kept of the number and the consecutive numbers of the tickets delivered to each conductor. When the conductor's day's work is completed, the car house foreman credits the conductor with the number returned upon the blank above referred to, and this is then forwarded to the auditor's office. The blank is then checked by the accounting department, and the number of tickets used by each conductor must be accounted for in his report. In addition to this, the car house foreman reports at the close of each day the number of tickets in stock for that day, and this is also checked in the accounting department, to ascertain that every ticket of that day that has been charged to any particular car house has been accounted for, either in the car house foreman's report or in the conductor's returns. In other words, a complete record is at all times kept in the accounting department of the number and the consecutive numbers of all tickets for each day of the month in each car house.

Registers are placed in all interurban cars, and all 5-cent fares, employees' tickets and free transportation are registered. Conductors are required to first collect all fares on rear platform of car and then go to front end of car and collect—at all times facing the passenger when collecting and issuing tickets.

The ticket shown in Exhibit 1 is used on one of this company's divisions. It is a tear ticket and printed in two colors: yellow, "good going north only," and blue, "going south only." When this ticket is sold to a passenger it is torn off by the conductor, indicating the stations from and to which the passenger is traveling, and the amount of fare paid is indicated in heavy type in the lower left-hand corner of the portion held by the passenger. The part retained by the conductor is forwarded to the auditor's office, and he ascertains the amount for which the ticket was sold by the small ending figures which appear in the upper corner of the ticket where it is torn off.

These tickets are consecutively numbered, and the day of the month is indicated in the circle at the bottom.

The ticket shown in Exhibit 2 is a duplex ticket used on one of our divisions, and having four different tints or colors, two of which are "good going north only," one for even days of the month and one for odd days of the month; and the other two colors are "good going south only," one for odd and the other for even days of the month. These tickets are all consecutively numbered, and the day of the month is indicated in the circle. A conductor in issuing one of these duplex tickets is required to punch the station from and to which the passenger is traveling, the month in which the ticket is issued, and the amount of fare paid, giving one-half of the duplex to the passenger and returning the other half to the auditor's office.

The ticket shown in Exhibit 3 is an exchange duplex ticket. On one of our divisions all agents sell one-way tickets to all stations, and round-trip tickets to all stations where the round-trip rate is less than single fare each way. They also sell single and round-trip coupon tickets, good over boat lines going north and east from Detroit. The exchange duplex ticket is issued by the conductor to passengers holding a local agent's ticket or a foreign agent's coupon, a trip pass, or special ticket, the conductor taking up the transportation presented by the passenger and issuing an exchange duplex ticket. These exchange duplex tickets are printed in two colors, one "good going north only" and the other "good going south only." The conductor is required to punch out the station from and to which the passenger is going, the day of the month and the form of transportation. The passenger retains his half of the exchange ticket, to indicate to what station he has paid his fare. The conductor's half, with the transportation collected, is forwarded to the auditor's office. The feature of this ticket is to avoid, as far as possible, substitution.

The ticket shown in Exhibit 4 is an agents' one-way duplex and round-trip triplex ticket, which is sold at all stations where there are agents on our rapid railway system. These tickets are the regular form of duplex and triplex tickets, except they are printed without date. The agent when issuing them punches out the station to which the passenger desires to go. He also punches out the amount of fare collected, and stamps them on the back with a dating stamp, which indicates the date and station. The one-way coupon can be sold to any station where the fare is 10 cents or more. The round-trip tickets are sold to such stations where round-trip rates are in effect. The round-trip ticket has two coupons, one printed as the "first, or going coupon," and the other "second, or return coupon."

The agent makes daily return of his sales to the auditor, sending in the auditor's portion of the tickets sold, and these are checked with the conductors' returns or the passengers' portion of the ticket.

The object of this form of an agent's ticket is its simplicity—only two forms, one-way and round-trip. When a supply of these tickets is issued to any station, before sending same the station to which they are sent is stamped by the general passenger agent on the ticket where it reads "From .... Station." We formerly used coupon and card tickets with the station printed in. This meant a complete set of coupon and card tickets for each station and a multiplicity of forms; but with this system, as we have said before, we have but two forms, and this ticket will soon be in effect on all of our interurban lines.

In addition to the tickets enumerated above, we have a few commutation tickets, to encourage summer travel to summer resorts; but these concessions are voluntary on the part of the company. Then we have some school tickets, required by franchise regulations for a reduced rate of fare in townships for school children, good only during school hours and on school days.

In the use of the present duplex and tear tickets we do not claim perfection; but our system is the best we have found applicable to our conditions, especially as a means of aiding inspectors in checking the conductors. The common practice of conductors all over the country is the reissuing of the tickets, whether tear or duplex; but with our different colors—only good going north or south—and with our close inspection, the opportunities offered in this respect have been brought to a minimum. But our system necessitates quite a large clerical force in the accounting department for checking and auditing, but the information furnished and the results obtained are such that our people think the money is well spent for such services.

Note.—It was found impossible to reproduce the tickets (Exhibits 1, 2, 3, 4) in time to be printed with this paper. The originals were on exhibition at the meeting.

INTERURBAN TICKET ACCOUNTING

BY J. H. PARDEE,

General Manager, Rochester & Eastern Rapid Railway, Canandaigua, N. Y.

A very few years ago the questions involving electric railway ticket accounting were confined simply to one denomination of ticket. In other words, all tickets issued had the same transportation value and it was not necessary to use any special methods in the issuance or accounting of them. As electric railways have more nearly approached steam roads in methods of train and traffic operation, it has become obviously advantageous to abolish the 5-cent fare zone and adopt the steam road system of fares based on mileage. With the adoption of that system and the establishment of ticket offices at all the principal stations, single and round trip, excursion and special rate tickets are necessary between each and every other station on the line, and instead of one form of ticket there are hundreds, and the accounting takes on a more serious aspect. It is almost unnecessary to state that the theory of modern accounting is to record in the simplest and most convenient form such data and computations as will preserve and accurately show a complete history of any financial transaction.

This paper will simply and briefly describe the methods of ticket accounting on one interurban road, and if the facts presented are sufficiently interesting to provoke thought, criticism and discussion, and thus develop simpler, more convenient and better methods, its object will have been attained. The principle of this method is that tickets are considered the same as cash, as currency or silver of different denominations, and every employee handling tickets must either produce the ticket or the cash.

Each kind of ticket, irrespective of stations named thereon, has the same form number, and all tickets of the same form number reading between the same stations are numbered consecutively from 0 to 9999, and then a new series is started by prefixing a

TICKET STOCK RECORD.

ROCHESTER & EASTERN RAPID RAILWAY COMPANY.

Form #1 Canandaigua to Rochester , N. Y.

	Date Received. 1905		Commencing No.	Closing No.	No. Tickets.	Date Issued. 1905		To Whom Issued	Commencing No.	Closing No.	No. Tickets.	Balance.
	Jan.	3	0	9999	10000	Jan.	5	Canandaigua Agt	0	4999	5000	
1	Feb.	13	A 0	A 9999	10000	Feb.	4	" "	5000	9999	5000	
						Mar.	7	" "	A 0	A 2999	3000	

[Reproduced from original sheet, size 10 ins. x 12 ins.]

FIG. 1

FORM O 6-3000.

TICKET REQUISITION.

Rochester and Eastern Rapid Railway Co.

..........STATION. ....190..

MR. ....AUDITOR.

Please furnish this station with the following tickets:

..........AGENT., CONDUCTOR.

On Hand. Com. No.	Closing No.	Form.	No. Required.	Delivered. Com. No.	Closing No.

Received the above tickets.

..........Agent., Conductor.

Date..........190....

[Reproduced from original sheet, size 5 ins. x 8 ins.]

FIG. 2

TICKET REPORT.

ROCHESTER & EASTERN RAPID RAILWAY COMPANY.

At..........Station. Month of.........., 190..

Ticket Form.	On Hand 190 Com. No.	Closing No.	No. Tkts.	Sold , 190 Com. No.	Closing No.	Tkts Sold.	Rate.	Amount.

.........., 190.. ....Agent.

[Reprinted from original sheet, size 8½ ins. x 11 ins.]

FIG. 5

R2-2M-8-06

ROCHESTER & EASTERN RAPID RAILWAY.
AGENT'S DAILY CASH REPORT.

DATE.., 190

TICKET SALES..		
CHARTERED CARS..................................		
BAGGAGE...		
FREIGHT AND EXPRESS.........................		
TOTAL..		

....
AGENT.

[Reproduced from original sheet, size 3 ins. x 5 ins.]

FIG. 4

letter of the alphabet, and thus large numbers are avoided. All regular single and round-trip tickets are of regulation card size to fit the ordinary grooves in a regular railway ticket case. Special coupon and interline tickets are somewhat larger and are hung on pins in the rear part of the ticket case. Mileage books in denominations of 100 miles, 500 miles and 1000 miles are of ordinary form, except smaller than used on steam roads, and are treated the same as tickets. When a supply of tickets is received from the printer, the ticket accountant checks them against the invoice and enters them on a loose leaf ledger in which a page (see Fig. 1) or more is devoted to each form for each station. The date received, commencing number, closing number and total number of tickets received are shown on the debit side and the same data of tickets disbursed shown on the credit side.

Tickets are issued to agents on a requisition (Fig. 2). This requisition is issued by the agent, and shows the form, commencing and closing numbers of tickets then on hand and the number wanted. When the tickets are furnished, their commenc-

Form O—7

THE ROCHESTER AND EASTERN RAPID RAILWAY COMPANY.

STATIONS	Commencing Nos. at First of Month	DAILY CLOSING NUMBERS							First Week		DAILY CLOSING NUMBERS							Second Week		DAILY	
		1	2	3	4	5	6	7	No. Sold	Amount	8	9	10	11	12	13	14	No. Sold	Amount	15	16

[Reproduced from original sheet, size 13½ ins. by 16½ ins.]

FIG. 3

RECORD OF TICKET SALES at____________________ Station, for Month of________________ 190__

CLOSING NUMBERS					Third Week		DAILY CLOSING NUMBERS										Fourth Week		MONTHLY REPORT			REMARKS
17	18	19	20	21	No. Sold	Amount	22	23	24	25	26	27	28	29	30	31	No. Sold	Amount	No. Sold	Rate	Amount	

[Reproduced from original sheet, size 13½ ins. by 16½ ins.]

FIG. 3—Continued

ing and closing numbers are entered on the requisition, which is sent back with the tickets to the agent for his receipt, and is then returned by him to the ticket accountant for his files. Entries for all tickets issued are made on the credit side of the ticket stock ledger, so that for purposes of checking, taking inventory, or ordering, the stock on hand is shown at a glance at any moment.

The agents' accounting is confined chiefly to a cash book and ticket register. The cash book should be ruled, with four columns, to enable the agent to keep separate regular ticket sales, baggage check sales, interline ticket sales and chartered car revenue. The ticket register (Fig. 3) is a special ruled book having columns to show the different forms of tickets, commencing numbers at beginning of month, daily closing numbers, weekly revenue, total number of tickets sold during month, and monthly revenue for each form.

At the close of each day's business, the closing number of each form of ticket is entered in ticket register and the number of tickets sold ascertained by comparing the present closing number with that of the previous day. After that has been computed, the agent makes an entry on the debit side of the cash book showing the number of tickets sold of each form and the rates, entering the extensions in the proper columns. When this has been done, the remittance for the total amount of the day's business, as shown by the debit side of the cash book, is made up, and the agent's cash report (Fig. 4), showing the distribution of the receipts, is filled out and corresponding entries made on the credit side of cash book. The month's business is computed in the same manner. The commencing numbers at the first of the month are compared with the closing numbers at the end of the month, and monthly ticket report (Fig. 5) is made out, showing in detail the commencing and closing numbers of tickets on hand.

Monthly ticket reports, accompanied by the ticket requisition for tickets needed, should be sent to ticket accountant not later than the second day after the close of month's business.

Monthly ticket reports are checked against the inventory and ticket stock ledger, and by these methods every ticket is accounted for in an easy and simple manner from the time it is received by the printer to its issuance to a passenger, and the absolute record is secured that the company has received the proper amount of cash therefor. The tickets turned in by the conductors in their trip envelopes are counted to ascertain the number of passengers carried, and are inspected to see that all are good for transportation on that particular date. At this point, ticket accounting, except for some special purposes mentioned later, ends. It is not necessary to account, at considerable expense, and ascertain the number of sold but unused tickets, for all limited tickets expire by their own limitation, and other tickets constitute simply a liability which is unimportant except in the case of the sale of the property, and that has never yet been considered.

Clerical errors will occur, but it is almost impossible for them to remain undetected more than twenty-four hours. The agent can readily prove his work daily, and in thirty minutes an employee of the auditor's office can check up any ticket office at any time.

Another very valuable advantage incident to this system is the ease with which traffic reports can be made up. For instance, the receipts of some particular ticket office may show a decrease for certain days, and a comparative report can be prepared in a few minutes which will show in what particular tickets and between what particular points the decrease arose.

Accounting is reduced to a minimum and all records necessary are preserved simply and in convenient form.

ACCOUNTING WITH FOUR DEPARTMENTS

BY H. M. BEARDSLEY,

Sec. and Treas. Elmira Water, Light & Railway Company, Elmira, N. Y.

In presenting a short outline of the methods pursued in my own company, I have in mind about the same idea that the maker of a motion sometimes has in a parliamentary body—that is, to get the question before the house so that it may be discussed, amendments offered, etc., and the whole matter be crystallized and put finally into the best possible form. I hope, therefore, that these notes will bring out comments and amendments which will go further than the paper itself goes in suggesting a simple, compact method of handling the accounts of companies having more than one department. Our system may be of interest, because I believe that to our company belongs the distinction of being the first to combine into one operating company, water, gas, electric light and railroad properties, and in addition to these four mentioned divisions, I may say that we also operate a rack track and a summer theater as separate departments, both of these, however, being operated through the railroad department, but each one having its own set of accounts and showing its own profit or loss at the end of the year.

When the combined company was first organized and the old companies were wiped out of existence, it was probably but natural that the use of a separate set of books for each department was continued, following out the method of a set for each company. The cash account for each department was kept distinct from that of every other department. Each department had its own stores account, and the whole system was practically the same as when the companies were operated separately.

The present system, of course, retains the distinction between departments, as it is absolutely necessary to know the standing of each department regardless of the other departments, and to know whether or not each particular department is being operated at a profit, and what that percentage of profit is. But the machinery for arriving at this knowledge is quite different to-day from that originally started when the first set of books was discovered to be impracticable. Our ledger to-day is a wide book, ruled with four main columns, one each for water, gas electricity and railroad, each main column having the customary ledger rulings for date, description, folio, and debit and credit amounts. Each department also continues the use of a journal. This is now a very small book, and the entries are so summarized that two or three pages per month cover the entire business which has to go through this book. Each department has its own invoice or sales book, which was formerly carefully journalized before posting at a great expense of time and labor. Postings are now made directly from this invoice book to either the main ledger or the consumers' ledger, as the case may be, and the invoice book is summarized at the end of the month and the credits are posted directly from this summary to offset the various debits during the month.

The second system inaugurated made use of a distribution journal for each department. This distribution journal is now superseded by a distribution cash book, in which all checks for payment of goods are entered, and the cash account is credited from the total of this cash book each month, and each operating expense or other account is charged with the total of all entries made in its particular column during the month. This does away with the opening of ledger accounts with the various consignors of goods. This distribution cash book takes the place of the distribution journal and also of the credit side of the old cash book. The debit side of the cash book has remained practically the same through all the changes. As now printed, however, the so-called cash book contains only the cash debit. It is ruled with four main columns, one for each department, each column being subdivided according to the needs of the department. On gas, electric and water departments there is a column for credits to consumer's ledger which are entered each day according to the total of the stubs chopped off by the cashier, who lists each day separately. There is a column for the forfeited discounts in each of these three departments for cash deposits and for sundry credits. In the railroad division there is a column for passenger receipts, receipts from chartered cars, freight, tickets, driving park, theater and sundries.

In addition to the working set, there was formerly another set consisting of journal and ledger only, upon which all of the other work was summarized into the usual balance sheet accounts—that is, under assets; construction, material and supplies on hand, prepaid taxes and insurance, accounts receivable, bills receivable and cash on hand; then on the other side, under liabilities: capital stock, bonds, accrued interest, bills payable, accounts payable and surplus. This summarizing was done by taking each department journal and distribution journal and the cash book and summing up all the entries under the above various classifications into one entry on this "company" journal, which was then posted into the ledger and the balance sheet drawn off from this ledger. This outside, or so-called company set, has now been entirely abolished, and the entries for capital stock, bonds, accrued interest, bills payable and surplus transferred to the working set.

In taking up the methods of ordering goods, auditing and paying bills, it must be borne in mind that, although we have but one cash account, we are very careful to keep the earnings and operating expenses of the four departments entirely separate and distinct. One of the aids to this end is the adoption of a different color for the stationery of each department, and this is carried through from the original superintendent's requisition for the goods to the check which finally pays for them.

It is not necessary, of course, to describe any of the details of ordering goods and checking the bills and the receipt of the goods, as it differs in no wise from the method which would be employed in a one department company, except for those things which we are able to buy from ourselves, and for these things no formal order approved by the general manager is issued, the superintendent's requisitions being sufficient authority for the obtaining of goods from other departments. For instance, our railroad department can buy tar for tar walks at the park from the gas department, and the water department can get the picks used by its street gang in laying water mains sharpened and tempered at the blacksmith shop in the car house. The goods bought or labor supplied are billed from one department to the other, just as they would be billed to any other person, but, of course, at cost price. This interchange between departments is quite a feature of the company, and always seems to be a great stumbling block to a new bookkeeper. It is very simple, however, when it is once understood, and, as stated above, it simply involves a billing similar to that which would be employed in selling to any outsider. To give other instances of this interchange; the electric department having need to use more horses than the other departments, carries the entire stable account, and men paid by the electric department assume all the care of the horses and do the driving, and the electric department charges the other departments for all hauling done at a fixed price per hour. The water department sells water for power to the electric plant and the electric plants sells steam for power to the gas department, and steam for heating the car houses to the railroad department. The railroad department furnishes badges for transportation to the men in the other departments who read meters, inspect services, etc., at a fixed price per month, and last, but by no means least, the electric department sells to the railroad department its motive power. Monthly bills are rendered for all these services, and except for regular monthly charges, a bill from one department to another must show the superintendent's order number and be checked as carefully as though it came from outside.

In addition to the above class of services which are interchanged upon a cost basis, there is another class which is for convenience put upon the basis of an equal division into fourths. For all of this class, which includes office rent, some office expenses, and some of the salaries, one department pays the bills and charges one-fourth at the end of each month to each of the other departments by bill duly rendered. This account is carried in the water department, and is called "General Office Expense." There is a column for it on the distribution cash book, and the total of this column is divided at the end of each month. There is another account which is carried in the water department which is called a "Departments Account." This covers charges which are to be divided among other departments, but not according to any fixed ratio, and is analyzed carefully at the end of each month, and the other departments are charged with their due proportion of the account. "Taxes" is one of the items which is carried in this account. We get one tax bill from the city, which is itemized, of course, but we draw a check on the water department to pay these taxes, charge the amount which belongs to the water department strictly, to taxes payable, and the balance of the check goes into the department account. At the end of the month the different amounts chargeable to the gas, electric and railroad departments are sifted out and billed and settled for by the other departments.

Our stores and supplies are all kept at one point, and stores account is handled by the water department. There is a special form of requisition for stores, and the checks for payment are drawn on the white checks of the water department. At the end of each month the storekeeper sends in four reports, one for each department, with the value of the stores used duly distributed between the various operating expense accounts. On the water department journal, the report for the water department is entered, simply charging the various operating expense accounts and crediting stores; also on the water department journal the other departments are debited with the amount used by them, and stores are credited. On the journals in the other departments the reports are entered up by debiting the various operating expense accounts and crediting the water department the total.

In handling the cash, even after the separate bank account for each department was abandoned, the fiction was kept up for some time, of a separate cash balance in the cashier's hands for each department, and although he might make but one deposit to the bank in a day, say of $2,000, he would figure that he took a certain amount of this from each department and would enter on his book a balance carried forward to the next day for each department. The system now is much simpler, as he starts in the day with but one amount on hand, he enters on his blotter the various amounts received under each department, carries out a sub-total, foots us the entire receipts, deducts his bank deposit and carries forward the balance to the next day. We have a page in our blotter for each day, properly ruled and printed, and the keeping of the cash seems to be at the present time a very simple matter.

By means of the system which has here been partially outlined, we are now able to handle the entire business of the company, which has increased 25 per cent or 30 per cent in the last three or four years, with an expenditure for office help about 40 per cent lower than had been required up to the time the system was inaugurated. There are one or two imperfections which we hope to have eliminated very soon, but on the whole it works very well, and we can commend the prominent features most thoroughly for a small company like ours.

QUESTION BOX OF THE STREET RAILWAY ACCOUNTANTS' ASSOCIATION

QUESTION 1

What is the best method of establishing a "Sinking Fund Account?"

ANSWERS

A sinking fund would be established by a resolution of the board of directors. The sinking fund account would be opened by the accounting department.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

Deposit at bank each month, in a special account, the proportionate monthly amount required for the sinking fund.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

If the sinking fund account is not a fixed amount per annum, then it would be better to set aside a fixed percentage of the gross earnings.—Frank R. Henry, Aud., United Railways Co., of St. Louis, Mo.

Set aside a certain amount of the net profits each year. Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

By setting aside a per cent of gross earnings for depreciation, and a per cent on bonds if for bond redemption.—Montreal Street Railway Co.

It depends upon what the sinking account is for. If it is to take care of extraordinary items of maintenance, a certain amount may be charged to the operating account which would be affected, and this amount set aside for the specific purpose desired. If it is to take care of losses by fire, a certain per cent of the earnings might be taken, or an estimated sum charged to operating and credited to insurance fund. If it is to provide for payments on account of damage to persons or property, it might also be treated in the same way. In all instances it might be well to invest this amount in some interest-bearing securities and allow all accumulations to be credited to it.—H. L. Wilson, Aud., Boston Elevated Ry. Co.

The proper method of establishing a sinking fund account depends upon the purpose for which the fund is to be applied. Sinking fund or reserve accounts created to distribute equitably during the twelve months of the year, the proper charges account operation, such as "injuries and damages," "legal expenses," "fire insurance," etc., should be created by charging to the various accounts an arbitrary percentage of the gross earnings, each month, and crediting same to the sinking fund or reserve account. If the purpose of the fund is to pay off at maturity outstanding bonds, an amount should be transferred annually from the "surplus account" that will be sufficient to pay in full the indebtedness for which the fund was created.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Buy up your own bonds and save the interest on them; they can be reissued when money is required from the fund.—F. E. Smith, Aud., Chicago Union Traction Co.

Draw a check for amount desired and deposit same in a separate bank account, charging sinking fund account and credit cash. We assume that sinking fund account must be an available asset as cash or security that can be converted into cash on demand.— H. T. Bunn., Aud., Knoxville Traction Co., Tenn.

To set aside each month in deductions from income an amount for sinking fund account.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

By making a periodical charge against profit and loss.—W. F. Ham.

It seems to me that the sinking fund account connotes the payment of money into a separate account which shall be maintained in cash, and used only for the purpose for which the sinking fund is established. Such funds may be put at interest and should be laid aside from time to time through the profit and loss account.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry, Co., Mass.

By deducting from earnings monthly one-twelfth of the amount of sinking fund required for the year. This amount should not be included in operating expense, but considered a "Deduction from Earnings," and charged to profit and loss at the end of the year.— J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

In addition to having a sinking fund account in the general ledger, it is desirable to open a separate set of records for the sinking fund account. A separate bank account is advisable, and a book showing the detail of securities held in sinking fund should be kept.—P. S. Young, Comptroller, Public Service Corp. of N. J.

Assuming that the "Sinking Fund Account" referred to is to be a cash reserve or the equivalent of cash, it should be established by setting aside certain amounts at given periods, in order that the amounts so set aside, with the accumulated interest thereon, will equal the amount of the sinking fund that it is intended to establish. The required amount should be credited to "Sinking Fund" and debited to "Reserve for Sinking Fund," proportionately, for any specific period, monthly or yearly, preferably monthly. The amounts so proportioned should appear in "Income Account" as a deduction from "Net Income" under the item "Reserve for Sinking Fund."—C. N. Duffy, Secy. and Auditor, Chicago City Ry. Co., Ill.

QUESTION 2

What is the best method for filing cancelled coupons?

ANSWERS

Have had scrap books made and each page is intended for bond of same number. The coupons, as fast as paid, are pasted on the page corresponding with the number of the bond, and it is intended when the bonds are paid, to paste each bond on the proper page. The pages in this book are made just the right size for whichever covers the most space, bond or coupons.—H. S. Swift, Secy., The Toledo Ry. & Lt. Co.

Enter in book specially ruled and headed, and numbered consecutively down the lines from page to page, giving date of payment under the heading of quarterly, semi-annual, or annual dates of year, as the case may be, using a rubber dating stamp for date of payment. All open spaces will represent unpaid coupons, and at any time a balance can be taken off in a few minutes. Then file the coupons away in numerical order, say in packages of 100. As delinquent coupons come in, they can be entered with date of payment, and then placed in the proper numerical package. This makes a very condensed record, and, particularly where many coupons are handled, is a great saving of labor and bulky handling over the old method of pasting coupons in books.—P. V. Burington, Secy.-Aud., Columbus Ry. & Lt. Co., Ohio.

Have a scrap-book made with a page for each bond, and a space on each page for each coupon; then as the coupons are returned by the fiscal agent, paste each coupon in its proper place.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

The best method of filing cancelled coupons is by pasting the coupons in a book which is specially ruled with spaces for each individual numbered coupon. This method shows at all times just what numbered coupons are missing, and of what date. The leaves of these books are generally made of manilla paper, with scrap-book binding.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

A complete list of the numbers of all coupons paid should be attached to the voucher covering payment, and the cancelled coupons can then be arranged numerically and filed in that manner.—Clarence Jones Thomas, Secy., San Antonio Traction Co., Texas.

We have found the most satisfactory method of handling cancelled coupons to be: Pasting them in numerical order in a book made for that purpose and keeping each six month's series to themselves, or having a separate book of each series, the manner of handling being regulated by the number of coupons in each series to be cared for. They can also be filed similar to the manner usually followed in filing cancelled bank checks, keeping a record of the outstanding coupons in each series. This plan would involve less work, but there is a great danger of losing or misplacing the coupons, and is not as satisfactory to the trustee, as it requires more work on the part of the trustee in examining the coupons. Furthermore, in Missouri we have to present the cancelled coupons to the recorder for cancellation in order to get the mortgage released of record. The latter plan would cause more work and therefore more expense in this connection.—Frank R. Henry, Aud., United Railways Co., of St. Louis, Mo.

Attach them to a regular coupon book, which you can purchase from any large printing house.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

In filing our cancelled coupons we use a large blank leaf book and paste the coupons on pages of same. The pages are numbered from 1 to 500 in one book, 501 to 1000 in another, and so on up to the total number of bonds issued. Each page is divided into squares and numbered (if, for instance, the bonds were for 25 years, the squares would number from 1 to 50).—W. H. Dankerley, Aud., Utica & Mohawk Valley Ry. Co., N. Y.

In book form, have pages ruled across sectionally so that each space will contain one coupon. Coupon from bond one should be filed on page one, and coupons from bond two on page two, and so on throughout. When bond is redeemed the coupons on page bearing same number would be turned over to the trustee with bonds for destruction.—Montreal Street Railway Co.

We file our cancelled bond coupons in pasteboard boxes holding one thousand (1000) coupons each. Upon receipt of coupons from the trustee, they are arranged in numerical order, and those outstanding are noted by crossing off the corresponding numbers on a blank enclosed in each box, the total number outstanding being checked with the ledger account. Each subsequent lot of coupons being treated in like manner, and when any box is filled, it is certified, sealed, and filed away ready for delivery to the trustees.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

In boxes made to fit the several issues. These boxes should hold numbered cards for each coupon, which cards should be withdrawn when the coupons they represent are inserted. The cards remaining in the boxes indicate the numbers outstanding.—F. E. Smith, Aud., Chicago Union Traction Co.

When a bond issue is not over one or two million dollars, would say that the best way of handling cancelled coupons would be to paste them in bound books of manilla paper specially ruled for this purpose, in numerical order, leaving spaces for the missing coupons, if any, to be pasted in later. In the case of a larger bond issue, it is perhaps better first to sort the coupons, numerically, in packages of 100 and note the missing numbers, if any, on a sheet of paper attached to package, and hold same with rubber band attached until the 100 is completed, when package should be tied with linen thread at each end, winding thread around several times in same manner as tickets are received from printer. When coupons are all in, bind packages of 100 coupons up in larger packages of, say, 1000 coupons, and file in a uniform filing case, with proper information on the outside concerning contents.—J. T. Slocum, Secy. and Treas., International Ry. Co., Buffalo, N. Y.

We have large canvas-bound books made, containing fifty leaves each, each sheet ruled giving spaces just the size of coupons, in which we paste the coupons in numerical order when they are paid. The cover of book is labeled showing particular kind of coupons, also have the top of each page printed with spaces for coupon numbers and date of payment. This method is very satisfactory, as it keeps all coupons in numerical order; the blank spaces showing number of all coupons not paid.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

The best method of filing cancelled coupons is to have a large book in which are glued the coupons in numerical order, using one book for each series of bonds.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

By pasting them in specially ruled and numbered coupon books.—W. F. Ham.

I think the easiest and best way for filing cancelled coupons would be to punch two holes through the top and file them away consecutively by number of bond, and each semi-annual payment by itself.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry. Co., Mass.

It has been the custom of the writer to keep coupons of a certain date in numerical order, and when all have been paid and returned by the bank to send them to the trustee under the mortgage and request that they be destroyed, and a certificate of cremation issued and filed in the office. By this method no valuable space is taken up in the safe and the statement is easily audited.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

A scrap-book with squares printed corresponding in size and number to the cancelled coupons which are pasted thereon in numerical order, each page to contain fifty coupons.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

We have been pasting cancelled coupons in book provided for that purpose, and find it satisfactory. Where there is not too large a number of coupons, think this is a good method.—W. H. Burroughs, Secy. and Treas., Memphis Street Ry. Co.

Coupons should be filed numerically by bond and coupon number in uniform sized boxes, a record being kept of the missing coupons in each box. The book record in which coupons are pasted, while a good one, occupies considerable space and involves more labor than the above-mentioned plan. (See exhibit.) —P. S. Young, Comptroller, Public Service Corp. of N. J.

QUESTION 3

In cases where same company operates both railway and lighting plants: Equitable division of expenses not directly chargeable to either plant.

ANSWERS

This company divides all expense which cannot be charged direct to railways or light on a basis of the output from the power house. This of course is a proper method of distributing the expense at the power house, but we use the same percentage for divisions of other expenses. In some cases it is not correct, but in the total it is not far from right.—H. S. Swift, Secy., The Toledo Railway & Light Co.

The most equitable way of dividing expenses not directly chargeable to either railway or lighting department is to base the division on relative per cent of earnings derived from a year's operaton under similar conditions.—P. V. Burington, Secy,-Aud., Columbus Ry. & Lt. Co., Ohio.

If connected with generating station, proportion on a kw-hour basis; all other, for which specific apportionment is not obvious, on basis of gross receipts.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

General expenses not directly chargeable to either railway or lighting plants can be proportioned at the close of each month according to the gross earnings of each. This plan gives the railway —provided, of course, that its earnings are about equal with the lighting company—the larger proportion of the general expenses during the summer months when its traffic is the heaviest; and the reverse is true of the lighting plant in the winter when its business is the heaviest. The easiest way to accomplish this is to have one or the other pay all of these expenses, and at the close of the month charge the proportionate amounts to the other departments or companies.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

An equitable division of expenses, seems to me, could be made by basing same on the kilowatt output of plants.—Frank R. Henry, Aud., United Railways Co., of St. Louis, Mo.

Prorate the expenses in proportion to the gross income from the railway and the light.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

It is customary for us to proportion manufacturing expenses between the railway and light and power department in proportion to the kw-hours generated for each department. In the case of general expense, items which are not chargeable directly to either department are divided in proportion to the gross earnings.—G. W. Brine, Aud., Georgia Ry. & Elec. Co., Atlanta.

We use the gross earnings as the basis.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Divide such expenses according to the proportion of gross earnings of the several divisions. If your lighting plant earns 40 per cent, and your railway 60 per cent of the total gross earnings, use these percentages in distributing the expenses. It might be argued that this rule would only apply in general cases, and that several of your officers devoted three-quarters of their time to the weaker division, the percentage used would have to be decided arbitrarily by the person best acquainted with the situation. In the main, however, the rule averages all right, because a loss in one place is usually overcome by a corresponding gain in another.—A. C. Emmerick, Aud., International Ry. Co., Buffalo, N. Y.

Use the proportion that the relative earnings of each department bears to total earnings of both departments. In our case we charge 66 2-3 per cent of such costs to railway department, and 33 1-3 per cent to lighting department, as this is about the proportion of each department's earnings.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

As to the division of expense between the lighting and railway departments, they should be divided, using the output for the respective departments on a kw-hour basis as a unit.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

In proportion to gross earnings.—W. F. Ham.

An equal division would be considered fair.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

We have not found in our experience any charge which could not be readily made to either lighting or railway plants. Where one power plant is used, an equitable division of operating and maintenance charges would be made on the basis of station output for railway and lighting purposes. Office expenses and other similar charges should be divided in the same ratio.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

Charge to each plant the proportion the gross earnings of that plant bears to the gross earnings of the whole property.—W. H. Burroughs, Secy and Treas., Memphis Street Ry. Co.

This company operates both a railway, lighting, and gas plant. We make a division of expenses not directly chargeable to either plant in different ways. The expenses of the power plant are divided between the railway department and the light and power department in proportion to the percentage of current used by each. In the general expenses, such as office expense, office salaries and taxes, a division is made between the three departments in proportion to the amount of income from each department. This, of course, applies to such expenses as are not directly chargeable to either department.—H. Woollcott, Secy., Consolidated Rys., Lt. & Power Co., Wilmington, N. C.

A division proportionate to the gross receipts of each plant is probably as equitable a one as could be devised, care being taken to charge direct to either plant wherever possible.—P. S. Young, Comptroller, Public Service Corp. of N. J.

On the basis of the kw-hour output, apportioned as between the railway and lighting plants.—C. N. Duffy, Secy. and Auditor, Chicago City Ry. Co., Ill.

QUESTION 4

Best method of computing car mileage and car hours, in detail.

ANSWERS

Our mileage clerk has the actual mileage or round trips on all lines; also maps giving the distance in feet from the car houses to every point where cars can be turned or diverted. Our car house despatchers send us each morning the total number of regular round trips, and the route of all cars making special runs. Thus far it is very easy. We, however, sometimes have occasion to place cars on down-town sidings, where they are subject to the order of despatchers, who may send a car on whole or partial trips over several different lines. We have experienced so much difficulty in securing a correct statement of the routes of these cars that we at length compromised by establishing a mileage per hour and using that as a basis for figuring such trips. While this is reasonably accurate as far as earnings and operating expense is concerned, it does not give us accurate mileage for each line.—H. S. Swift, Secy., The Toledo Railway & Light Co.

The accounting department should have a table of mileage showing each run, from which it can figure mileage from conductor's day card, on which should be noted any short trips. Car hours should be had from the same sorce. A large sheet can be prepared on which each run can be entered from the day card, showing total fares, miles, hours and such other information as may be desired, the total of this sheet being the total for the day.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

Car mileage and car hours are figured directly from the trip sheets of the conductors, on which they report the actual operation of each car run during the day, distances, time, etc.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

Use the time schedule as the basis for car mileage, adding or deducting therefrom any variation. Time allowed conductors and motormen will give the best and most accurate basis for car hours. —Frank R. Henry, Aud., United Railways Co., of St. Louis, Mo.

Provide a book or ruled sheets for each separate line of your system and record daily the car miles and car hours.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

In computing car mileage we use a card which is placed in each car called a car record. Each conductor in charge of car marks down how many half trips he makes, so that at the end of a day the card shows total number of trips made. On the back of the card is a list of stations numbering from 1 to 36; if a conductor makes, say, five round trips from Utica to Little Falls he marks down ten half trips from No. 1 to No. 36. This card is also used by conductor for marking down his register on taking and leaving car, so that he is not liable to miss setting down number of trips made. The used cards are taken from cars by starter every night and new ones put in their place. By using these cards a daily record of mileage made by each car is obtained, in addition to daily mileage for each route. Each division has a daily time sheet for computing car hours which the conductors and motormen sign for number of hours worked; this is vouched for by the starter and time sheets forwarded to office daily; from these sheets we compute our car hours, also pay rolls.—W. H. Dankerley, Aud., Utica & Mohawk Valley Ry. Co., N. Y.

Make daily report showing number of cars operated, trips made, length of route, and time per trip, of each line operated. From this data your total mileage and car hours for each route may be arrived at.—Montreal Street Railway Co.

A simple method is to add, once or twice a month, the number of trips of each route run, and multiply this by the length of each route for car mileage. For car hours another simple method is to have a record made by car houses of all cars out each hour. This might not be absolutely correct, but it would be approximately so, as a car is liable to be pulled out a few minutes before the hour, and another car is equally liable to come in a few minutes afterward, but the average would probably be very nearly correct.—H. L. Wilson, Aud., Boston Elevated Ry. Co.

Our mileage and car hours are both primarily computed from the time-tables, which show the number of trips and hours required for each regular run. Daily reports are sent from each station to the office of the superintendent of transportation, giving the extra cars run on each line and the time consumed. From this a report is prepared and forwarded to the accounting department, showing the car hours made by each line. Daily reports are sent to the accounting department, from the various stations, showing the particular cars operated upon each run. If there was any break in the operation of the regular schedule, the number of trips, from and to, are shown, together with all extra trips made. Mileage cards showing the distance between any given points are kept, which facilitate the work. We also keep "individual car mileage cards," and prove the daily mileage by listing individual cars and checking the result with the mileage made by lines.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Car mileage and car hours are computed at the several stations and forwarded to the auditor's office daily, both items of information appearing on the auditor's daily and monthly reports. The station clerk is familiar with the length of track and number of trips of each line entering his station. He multiplies miles by trips and makes due allowance for short trips. Car hours are figured from the white time slips turned in by trainmen. Colored time slips represent work on snow plows, work cars, etc. In the auditor's department we keep an individual car-mile record, giving mileage on each car per day.—A. C. Smmerick, Aud., International Ry. Co., Buffalo, N. Y.

We have car numbers placed on each conductor's trip report, and when the reports are all in we arrange them so as to get all reports of a certain car together and then we calculate the mileage run by that car for the day. This total we place in our mileage book in a column headed with the name of the division on which the car has operated. Having treated all cars operated in this manner, the mileage book will show total miles run by each car, and also total miles run on each division. We carry forward each day the mileage made by individual cars and also mileage of each division. Car hours are computed in the same manner.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

Car mileage can best be arrived at by taking the number of trips on each line, multiplying same by mileage of line, adding the dead mileage, or the mileage from the car house to the point of entry on the line. Car hours can be arrived at the same by figuring the time of the conductor from trip sheets.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

Figure the car mileage and car hours on each standard timetable. Add or deduct mileage and hours according to the variations from the standard.—W. F. Ham.

The mileage for one round trip on each division must be figured and that mileage multiplied by the number of round trips made each day. In case extra trips are run, the mileage must be figured in the same manner. In case an individual record is kept daily for each car, the clerk in charge of this work can obtain all the information from the day card. This is also true in the case of car hours, as the schedule and day card shows the number of hours consumed in making the regular number of trips on each run per day plus the number of hours consumed by extra cars on extra trips.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

This company has a transfer station where cars pass and a train sheet is kept. From this the mileage is computed. Car hours are computed from trainmen's register sheets.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

Mileage.—We have plan of system showing the mileage of each line for the full round trip, also for round trip to each turnback. The trips made by each car being shown on trip sheet, we can figure the mileage very closely.

Car hours.—Two ways of ascertaining the hours: First, by multiplying trips made by a car by the schedule time for trip; second, taking the total time for each car as shown by conductors' and motormen's time report. The latter is the more accurate plan, as it takes in the time a car may be laid over on any point of the lines, which would not be clearly shown on the trip sheets.—W. H. Burroughs, Secy. and Treas., Memphis Street Ry. Co.

The method employed by us in getting this information is the use of a 3 x 5 index card giving the car number line, time out and time in, trainman's name, etc., on one side, which is provided on the other side with blanks showing the number of trips between certain points during the day. We, of course, know the mileage between all the points, and when the trainmen fills out this card, computing the mileage is very simple. We then transfer the information from this card to a larger card on which there are thirty-one lines for the days of the month on one side, and columns for the different lines across the other side. In this way we get the total mileage for the month on the different lines for each car. It is then very simple to make another recapitulation of the several cars to get the total mileage by lines and the grand total for the month. Samples of these cards are on file with the association's display of forms. We make the pay rolls from these cards also, and no register is necessary.—E. D. Spruill, Pueblo & Suburban Traction & Lt. Co.

A daily statement from each car house of mileage of cars in service and car-hours run on each line, made on proper form, is a very good method to follow. (See exhibit.)—P. S. Young, Comptroller, Public Service Corp. of N. J.

QUESTION 5

What is the best method of handling employees' transportation—by operating as well as accounting department?

ANSWERS

Badges for conductors, motormen, foremen of car houses, inspectors, and foremen of track and overhead lines, and regular linemen of lighting department. For all other employees necessary to send out occasionally for above work, issue tickets as required. For all office heads of departments and attachees, issue a stated number of tickets monthly. This may be done by special tickets or regular tickets properly accounted for.—P. V. Burington, Secy.-Aud., Columbus Ry. & Lt. Co., Ohio.

By a special employee's ticket issued by the foreman.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

Employees' transportation is in two classes. Regular employees carry card passes and are required to sign signature slips for the conductor, which signature slip is turned into the office and compared with the original signature which was taken at the time the pass was issued. This plan enables the company to know what employees are traveling on its cars, between what points, and at what time, and if there is any abuse of the privilege it can be promptly checked. Extra employees are provided (through their superintendents or foremen) with an employee ticket each day, which is good only on the date stamped on the back thereof, and must be signed by the parties using the ticket before being accepted by the conductor.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

This question belongs in the same class with the much-discussed question of the best method of handling transfers. To employees engaged in the general office, and those having general supervision, we issue coupon pass books good until used. To all other employees are given tickets punched for the day, on which he is required to write his name, time used, and number of car riding on. The color of the tickets is changed each half month.—Frank R. Henry, Aud., United Railways Co., of St. Louis, Mo.

Badges worn in plain view by employees riding on the cars are preferable to passes, as they cannot be manipulated by conductors. Employees or others riding on badges should be recorded by the conductor on his trip sheet, in a column provided for that purpose.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

Provide employees (other than trainmen) with non-transferable pass coupon books. Separate coupons limited to a particular date, by a marginal punch mark, may be issued to mechanics, laborers, etc., from day to day.—L. A. Bowen, Aud., Savannah Electric Co., Ga.

Issue employees' tickets good only for month in which they are issued. Have each head of department send in weekly list of employees entitled to tickets for the ensuing week. These lists can be verified by time books. Keep a record of the number of tickets issued to each employee with the strip numbers. This will enable you to trace back any one ticket to the employee to whom issued. After tickets have been used they should be counted and destroyed.—Montreal Street Railway Co.

By giving employees two tickets for the outward and the inward trip when sent on company's business, and to allow others to pay their fare in the regular way and make a detail statement on blanks furnished for that purpose of the rides taken. This to be approved by their superior officers.—H. L. Wilson, Aud., Boston Elevated Ry. Co.

We have special tickets good on date stamped thereon which are issued to the heads of the various departments, which issue same to employees when sent on the company's matters, stamping date and department on same. In addition to the above, heads of departments and others traveling regularly on company's business are furnished either with pass books containing tickets or with badge which must be worn on a uniform cap. Conductors pass the latter and collect tickets from the former.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

To issue tickets to all employees who do not wear uniforms and have the tickets collected and rung up.—F. E. Smith, Aud., Chicago Union Traction Co.

We use tickets for all employees and prefer this to any other method, as these tickets are registered and are turned into the accounting department each day along with other tickets and transfers.—H. T. Bunn, Aud., Knoxville Co., Tenn.

The handling of employees' transportation by this company is through the use of employees' tickets, control of which is in the hands of the superintendent of the railway department.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

All uniformed employees to ride on badges. Employees not traveling on business of the company to be provided with sufficient transportation in book form to bring them to and from their work each day. Employees who are obliged to travel on company business to have unlimited employees' passes in book form. Special passes to be used for isolated trips by employees not having unlimited pass books.—W. F. Ham.

We handle employees' transportation by three methods. Those who have uniforms are passed without further evidence of employment except their complete uniform Other regular employees have a small pass on which there are numbers from one to one hundred, which are punched in order by the conductor, one for each ride. A record of the number of this pass is kept on a small printed blank, one for each trip, and the record of number passed carried in a column on the day card or trip sheet. Records of such passes, to whom and when issued, are kept in the office, and the total rides are kept on the earnings book. Other occasional or temporary employees are given tickets sufficient for their needs. The matter of free transportation, it seems to us, should be handled simply, without a great deal of operating or accounting machinery, a sufficient amount only of red tape being used to indicate to other passengers on the car or to the office or both that persons who do so are entitled to ride free.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry. Co., Mass.

In regard to handling employees' transportation, I think that the original authorization should be made by the operating department and the issue of said transportation to be made by the accounting department, and a strict record kept of same to see that the privilege is not abused.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

We use the Ohmer register, which indicates six classes of fares, among them is a dial for employees. We have an ordinary coupon book for our unlimited passes. We also have what we call a limited employees ticket that is issued numerically to the foremen, in pads of one hundred. This ticket is similar to the ordinary transfer ticket, except that the foreman writes the name of the employee on the ticket and punches the day and hour when it expires. We identify the ticket by the foreman's punch mark, also by the number. From an accounting standpoint these tickets are, of course, treated in the same manner as the others.—E. D. Spruill, Pueblo & Suburban Traction & Lt. Co.

By having employees travel on uniform and badges, conductors making record of same. Ununiformed employees should be furnished with tickets having distinguishing feature, same to be given out daily by foreman or other officer.—P. S. Young, Comptroller, Public Service Corp. of N. J.

QUESTION 6

Is it better practice to keep car, armature and wheel records at the shop or at the office?

ANSWERS

At the shops.—P. V. Burington, Secy.-Aud., Columbus Ry. & Lt. Co., Ohio.

At the shops.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

They would be of more service and easier kept if kept at the office of the general repair shop.—Frank R. Henry, Aud., United Railways Co., of St. Louis, Mo.

Get the data from the shop, but keep the records in the office.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

The shop is the best place.—L. A. Bowen, Aud., Savannah Electric Co., Ga.

At the shop.—Montreal Street Railway Co.

It all depends upon the organization of the company.—H. L. Wilsin, Aud., Boston Elevated Ry. Co.

Prefer to have these records kept at the shop where the superintendent of rolling stock can be kept in closer touch with them.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Whenever local conditions warrant, it is better to keep all matters of record in the general office, having the necessary information sent in at certain stated periods by the men in shops or outside stations. This, perhaps, involves more labor, but it produces better results than the plan of depending on shop men to keep records.—A. C. Emmerick, Aud., International Ry. Co., Buffalo, N. Y.

I think it better to keep such records at the shop for the reason that the master mechanic will have his information on such records always accessible.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

I think it better to keep car, armature and wheel records at the shops instead of at the office. The office should furnish the shops with the number of miles of each car per day, from which such records as they desire to keep can be made.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

At the office.—W. F. Ham.

We keep such records at the shop, copies being sent to the head of the operating department as requested.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry. Co., Mass.

I think it is preferable to keep car, armature and wheel records at the office, as you are thus enabled to keep in touch with what is going on more accurately than you would be if kept at the shop and a report received only once a month.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

In our opinion, car armature and wheel records belong to the transportation department and should not be kept by the accounting department in the general office.—E. T. Moore, Secy., Dallas Consolidated Electric St. Ry. Co., Texas.

With large companies a shop record is preferable.—P. S. Young, Comptroller, Public Service Corp. of N. J.

QUESTION 7

What system do you think best in keeping track of scrap material?

ANSWERS

Our system does not go into many details. At the end of each month we estimate the amount of scrap on hand which is to be credited to each account, and we charge scrap account with this estimate and credit the proper operating expense. In making sales, the scrap for each account is weighed separately and credited to scrap account. Every few months we take an inventory of our scrap, and an adjustment is made. The errors have never been of such an amount as to affect the expense account at the time of this adjustment. I may add that the scrap to be credited to the different accounts is kept separate at our storeroom.—H. S. Swift, Secy., The Toledo Railway & Light Co.

Charge all scrap into the storeroom at the end of each day at arbitrary prices, crediting the proper maintenance account. When scrap is sold, credit storeroom.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

Credit scrap material to the account entitled to credit and charge to material and supplies account. Have found it of great advantage to carry separate accounts for track scrap and shop scrap, dividing shop scrap into cast, steel, malleable and copper. The advantage of doing this is that it makes it easier to adjust the differences between the estimate and the actual amount realized therefrom.—Frank R. Henry, Aud., United Railways Co. of St. Louis, Mo.

Provide bins for the different kinds of scrap, and keep a record showing where the scrap material came from, and when it is sold credit the proceeds to the account from which the scrap was received; as, for example, scrap brake-shoes should be credited to account 6, while old armature coils should be credited to account 7.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

All scrap material is turned over to the stockkeeper, who makes out credit stock slips covering same, and this is charged to the stock account at the prevailing price of scrap, and credited to the proper maintenance or construction account at the time. In case of differences between the price received and price at which it was taken into stock, the difference is charged or credited to the proper maintenance or construction account. We thought it much easier to take the scrap material in stock in this way at the time, as otherwise if allowed to accumulate and then sold, it is simply a matter of guesswork as to the proper accounts to be credited.—G. W. Brine, Aud., Georgia Ry. & Elec. Co., Atlanta.

Issue triplicate scrap receipt forms, one to remain with department sending scrap to storekeeper, one to go with scrap to storekeeper, and one to go to accounting department, where an account should be kept with different classes of scrap material, each class to receive credit as scrap is sold. Balances should be checked up from time to time by scrap inventory from stores.—Montreal Street Railway Co.

So far as possible have material at regular intervals sent to some central point. With every shipment have a duplicate manifest showing the amount sent, one copy of which is to be retained by the person receiving the scrap and the other receipted and returned to the place from which sent. This will prevent loss of material while in transit.—H. L. Wilson, Aud., Boston Elevated Ry. Co.

All scrap material is returned daily to the storekeeper, who receipts for same in duplicate, one copy being sent to the head of department from whom the scrap is received, thus enabling him to check quantity and distribution of accounts credited, the other going to the accounting department. By this method the accounts receive credit for the scrap at market value when same is removed. When material is sold it is simply a credit to stock and does not disturb the operating comparisons.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

When scrap is sold or used in the shops we credit it to "scrap account," and at the end of the year throw this into a "reserve betterment account," which is used for the purpose of making small additions or betterments not properly chargeable to maintenance, yet hardly worth while charging to the capital accounts. Of course, the net result is that construction gets the benefit of scrap and is not charged therefor.—A. C. Emmerick, Aud., International Ry. Co., Buffalo, N. Y.

Have your storekeeper collect all scrap at least once a month and make sales so that the credit can be applied to proper accounts before you have lost track of where the scrap came from.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

Scrap material should be under the supervision of the master mechanic, and bins should be provided to keep the classes of materials separated. It is advisable that scrap material be sold as often as possible, which will keep the yards and shop grounds cleaned up, as well as permit credits to be more nearly in the proper month.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

By putting all scrap material under lock and key in the care of an honest man.—W. F. Ham.

Scrap material should be kept in bins built for that purpose and disposed of each month, so that the operating account will receive the benefit of the credit. In case the material is not sold, the amount should be estimated and adjusted when the credit is received.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

Where the amount of scrap is of importance, for example, scrap rail taken up on a particular job, it should be charged to supplies and the proper account on that job credited. Small amounts of scrap which come from armatures or trucks can be sold for cash and proper account credited each month.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

A monthly report of scrap on hand for sale should be furnished the general office. Bids should be obtained and office representative should be present at delivery. Reports of material sold, prices, etc., should be furnished on printed forms. (See exhibits.)—P. S. Young, Comptroller, Public Service Corp. of N. J.

When practicable, the best system is to carry scrap material in stock account with each lot designated by a lot number, debiting stock account on the books and crediting the accounts entitled to the credit of the value of the scrap.—C. N. Duffy, Secy. and Auditor, Chicago City Ry. Co., Ill.

QUESTION 8

What is the best method of destroying used tickets after an accounting has been made?

ANSWERS

We are particular in the destruction of tickets. Each day, as soon as the tickets audited have been rechecked, they are all put through a ticket destroyer and tied up in paper bags. Once a week they are hauled to our power house and burned in the furnaces. A careful investigation of the burning of tickets would indicate that there is no possibility of tickets coming through the furnaces without being scorched, when burned in reasonable quantities. And we should consider the cutting as an unnecessary precaution, were it not for the fact that while the tickets accumulate they are accessible to quite a number of employees. In addition, there is always danger of their being tampered with while en route to the power house and during the time that they are being burned.—H. S. Swift, Secy., The Toledo Railway & Light Co.

Every railway office building should be provided with a furnace crematory and a canceled ticket storage room. Ten days after tickets are counted and audited is a sufficient time to hold same on account of any question of average or shortage before sending them to the crematory.—P. V. Burington, Secy.-Aud., Columbus Ry. & Lt. Co., Ohio.

A pulp machine. If the company is not large enough to warrant the investment, the ticket company will doubtless grind them for you.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

As soon as used tickets have been handled by the accounting department, they are destroyed by machine, and later the chopped tickets are burned.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

A cutting machine can be used to good advantage.—Clarence Jones Thomas, Secy., San Antonio Traction Co., Texas.

Burn them.—Frank R. Henry, Aud., United Railways Co. of St. Louis, Mo.

Tear the tickets in two or more pieces as soon as they are counted and then burn them, unless you have great quantities, when it will pay to purchase a machine made for that purpose, which grinds the tickets into small pieces and they can be disposed of as waste paper.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

Burn them from day to day.—L. A. Bowen, Aud., Savannah Electric Co., Ga.

We use a Globe ticket destroying machine.—G. W. Brine, Aud., Georgia Ry. & Elec. Co., Atlanta.

Burn them.—Montreal Street Railway Co.

Use a ticket chopping machine and sell the refuse.—H. L. Wilson, Aud., Boston levated Ry. Co.

We are burning tickets under the boilers of one of our power plants. This method, however, has many disadvantages, and we are trying to devise or purchase a machine which will enable us to dump the tickets in a hopper, which should lock, and without further attention other than the turning on or off of the power, grind up the tickets and transfers, after which they could be sold and thus reduce the cost of operation and maintenance of the ticket destroyer.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Run them through a machine that will effectually mutilate them and then burn.—F. E. Smith, Aud., Chicago Union Traction Co.

We have abandoned the use of a ticket chopper and now seal the used tickets in paper flour bags and place them in a small room to which only two persons have access. When the accumulation amounts to a carload, the bags are taken to the shops and burned in the presence of two employees.—A. C. Emmerick, Aud., International Ry. Co., Buffalo, N. Y.

Burn them in your boiler room in presence of a responsible party.—H. Woollcott, Secy., Knoxville Traction Co., Tenn.

Tickets and transfers of this company, after leaving the accounting department, are burned; special care is given to the total destruction of same by a reliable employee.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

By burning.—W. F. Ham.

Our few tickets we put through a rotary ticket cancelling machine, then burn the refuse. We also insist that conductors shall cancel tickets.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry. Co., Mass.

The best method of destroying tickets is to run them through the cutting machine, which chops them into small pieces and leaves little chance for used tickets getting into employees' hands. Burning is not at all satisfactory, as the writer has found from time to time tickets which were supposed to have been destroyed and which were found only partly burned. The method adopted by the writer is to run all tickets through the chopping machine and then through a blower into the boiler.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

It is the practice to burn used tickets and transfers. We think, however, a chopping machine would be better and safer.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

We find it easier and safer to burn them.—W. H. Burroughs, Secy. and Treas., Memphis Street Ry. Co.

This company has tried several methods of destroying tickets, and has found that the best method is the use of a patent ticket chopper operated by an electric motor. As soon as the clerk is through counting the tickets they are immediately taken to the ticket chopper and destroyed. We never allow the old tickets to accumulate.—H. Woollcott, Secy., Consolidated Rys., Lt. & Power Co., Wilmington, N. C.

This company has, in the past, disposed of used tickets and transfers to a box factory. This plan has been satisfactory up to the present time, when, the offices having been moved at a distance from factory, the cost of hauling proves a considerable expense.—P. S. Young, Comptroller, Public Service Corp. of N. J.

For many years the problem of destroying tickets occupied our thoughts and we tried several methods and machines with more or less success. About six or seven years ago, however, I devised an apparatus which has been in constant use and has given the utmost satisfaction. I had our engineer construct in the basement of our building adjacent to the furnace used for heating the building and using the same flue, a small brick enclosure about 5 ft. square with a large iron door in front. In this enclosure was placed a cylinder made of extra heavy steel wire with 3/8-in. mesh, but so constructed as to allow a portion to open and receive the bags of tickets. The cylinder revolves on a short axle at each end, one axle, however, being extended to project through the brick wall and to which is attached a crank for revolving the cylinder. Under the cylinder, and running its whole length, is a 1/2-in. gas pipe with numerous openings. When the ticket counting clerks are through counting, their individual counts are placed in small bags and taken to the cashier's office, where they are weighed and the count thus checked. Then they are enclosed in large flour sacks and sealed, after which he takes them down to the destroyer, where they are placed in the cylinder, which is immediately locked. The gas is ignited and the outer door of the brick enclosure closed and locked with spring locks, the keys of both locks never leaving the hands of the cashier. The gas is left burning long enough (about fifteen minutes) to merely ignite the tickets, when the office boy is sent down to turn out the gas and revolve the cylinder. It has been found advantageous to place a small piece of bar iron in the cylinder. When the latter is revolved, this falls, breaking the mass of tickets and exposing fresh surfaces to the flames and knocking the burnt paper in pieces and driving it through the meshes into the ash trays below. The capacity of the furnace just described is about 175,000 tickets completely destroyed in two hours. You will thus see, I think, that we have in our own building a secure, clean and expeditious method requiring no supervision whatever, and but a moment or two of the cashier's time.—J. M. Smith, Comptroller, The Toronto Ry. Co., Canada.

QUESTION 9

What are the methods used by interurban roads in the accounting of cash fares paid on the car? If registers are used, how many classes of fares have you, and do you register tickets according to their value?

ANSWERS

Duplex tickets for all fares over five cents. The conductor must turn in 5 cents or a duplex stub for each ring on the cash side of his register unless Ohmer register is used, when the amount of each fare is shown on register. As high as eight classes of fares; and tickets are not registered according to their value except where Ohmer register is used. As stated above, the conductor must turn in 5 cents or a duplex stub for each ring on the cash side, and a ticket for each ring on the ticket side; that is to say, the register represents passengers and not amount of fares.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

Ohmer register indicating six classes of fare, supplemented by cash-fare receipts for all fares over 5 cents. All tickets registered according to their value.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

Some roads use cash-fare slips, while others use Ohmer registers, which seem to be satisfactory for interurban lines, as they register several different classes of tickets (according to their value) and also different classes of cash fares.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

Our interurban road, running between Everett and Snohomish, a distance of about 10 miles, registers fares varying from 5 cents single fare to 40 cents round trip, on a single straight register, the value of tickets not being considered. Regular single-trip tickets and round-trip tickets are sold by city conductors and at interurban station. For tickets bought on interurban car, the conductor issues cash-fare receipt, on which he punches the stations between which the passenger rides, and amount of fare paid, also the date, one copy being turned into the office with his statement for the trip and the other given to the passenger.—Everett Ry., Lt. & Water Co., Washington.

Issue fare receipts to passengers. We do not use registers, but collect tickets in boxes.—Montreal Street Railway Co.

We use no registers on our interurban lines. Cash fare receipts are issued for both one way and round trip and settlements made with conductors according to the stubs on the books, which contain one hundred consecutively numbered tickets.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

We use two registers in interurban cars: one (white) is for full cash fares and tickets, and the other (red or brown) for transfers and half fares. At the city line both registers are turned back to zero so that we may keep a record of city passengers. When a passenger boards at an interurban point and offers a cash fare, the conductor accepts same and issues a duplex, both halves of which are punched at the same time, showing date, destination, and cash paid. The conductor gives one-half to passenger as a receipt and returns the other half to the auditor. These returns are tallied against the consecutive numbers in a book printed for that purpose, so that each duplex issued must be accounted for.—A. C. Emmerick, Aud., International Ry. Co., Buffalo, N. Y.

Use register and register all fares, both cash and tickets, according to their values.—H. S. Bunn, Aud., Knoxville Traction Co., Tenn.

The method of collection of fares on interurban lines of this company is to collect the full amount of fare from one point to destination. For instance, if a 15-cent fare is collected, two tickets are given by the conductor, the value of which is five cents each, and 5 cents rung up on the register. When he gets to a certain point, that is, to the 5-cent limit, he goes through his car and makes another collection, counting the tickets the same as a cash fare. These tickets are originally charged to the conductor at the rate of 5 cents each. He can return them and get new ones when they wear out. If they are not returned, or if he should get some other conductor's tickets, he pays the difference, or is paid for the collected tickets other than those given out by himself.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

We use the Ohmer fare register for accounting for the cash fares paid on the cars. We also register tickets, but not according to their value. The value of the tickets is accounted for after they are turned in the office. The different classes of fares shown on the registers on our suburban line are as follows: "Tickets, passes, transfers," and cash fares, divided into 5, 10 and 15-cent amounts.—H. Woollcott, Secy., Consolidated Rys., Lt. & Power Co., Wilmington, N. C.

We collect the full fare for the entire distance the passenger desires to ride and give him in return a simple fare receipt from which the coupon has been detached to be returned to the office for audit, the consecutive number being the same on both fare receipt and coupon. This fare receipt is then rung on one side of a double register, and the 5-cent cash and ticket fares are rung up on the other side. We do not register tickets according to their value, but as the coupon turned in to the office is so arranged that it must show the value of the fare receipt sold, there must be collusion between the conductor and the passenger in order that the company shall be cheated, excepting, of course, the always present provision that if a passenger does not pay, or a conductor fails to register or issue a fare receipt for payment, the company is bound to be cheated.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry. Co., Mass.

In all cases where cash fares are paid on interurban lines of this company the same are registered on the cash register on each collection. We have only one class of fare; tickets and transfers of all values are registered on the ticket and transfer register.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

QUESTION 10

On roads where single and round trip tickets are sold, is it the practice to carry indefinitely the value of the return coupon (not good after thirty days) in the ticket sale account, or are the values transferred to profit and loss at set periods?

ANSWERS

The value of tickets which remain outstanding over thirty days is usually so small that the bookkeeping involved in keeping track of them individually to show that they are overdue will cost more than the amount involved; besides, the tickets may be presented for redemption, when they should be redeemed by refunding the difference between full one-way fare and the price of the ticket.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

Transfer unused tickets, where the limit has expired, to an account "Expired Tickets," and at the end of your fiscal year transfer this account to profit and loss.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

Our return portion of ticket is good until used, hence it is carried in ticket account until collected.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Excepting in cases of limited excursions, all of our tickets are good until used, but it would seem perfectly legitimate to give your income the benefit of all coupons upon which time limit had expired. Since there is no liability, none should be shown on the books.—A. C. Emmerick, Aud., International Ry. Co., Buffalo, N. Y.

We have never used round-trip tickets, but I would consider it advisable to credit same to a ticket account, and, when lifted by the respective lines, charge the ticket account and credit earnings on that line with the amount of business they carried.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

The ticket account is carried on the ledger as a liability until the amount is large enough to reduce by a profit and loss entry, which should be done at least once in three or four years.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

As there is a certain percentage of purchased tickets which are never presented, representing tickets lost or destroyed by purchaser, it seems proper to close yearly to profit and loss a percentage of the values outstanding based on an estimate of tickets so lost and destroyed.—P. S. Young, Comptroller, Public Service Corp. of N. J.

QUESTION 11

Where a company is obliged to sell round trip and other tickets, through conductors on the cars, what system is employed to keep account of tickets supplied to conductors? How often is their stock of tickets checked up? And, is a deposit required from conductors to protect company against loss?

ANSWERS

Require each conductor to make a cash deposit with the company, and require him to keep a certain amount of tickets at all times, which can only be done by checking the conductors frequently.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

A memorandum account is kept with each conductor to whom tickets are supplied, giving serial numbers and style of ticket. Their stock is checked up whenever they call for tickets, not issuing more than fifty tickets to a city conductor, which will last from one week to one month, and to an interurban conductor in bunches of from 300 to 500. We do not require a deposit from the conductors for these tickets.—Everett Ry., Lt. & Water Co., Washington.

We issue books of tickets to the conductors, through the station clerks, who charge the conductors with them, noting the beginning and ending numbers. All unsold tickets are turned in by the conductors at the completion of their day's work, together with the money collected. Both the ticket books and cash are forwarded to the accounting departments the following morning, where they are audited, and unsold tickets are returned to the station to be reissued, another outfit being issued to the conductor for the following day's work. By this method the stock of tickets is checked every day. We require a deposit of $25 from all trainmen.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

We invoice the tickets to the station-masters, who in turn sell them in consecutive order to the conductors. The conductors are supplied with a certain number of tickets and are expected to replenish their stock daily when they turn in their day's receipts, at which time they are checked in by the station-master. About once a month a representative of the auditor's department checks the conductors and the station-masters. A deposit of $25 is required from all conductors, and those on interurban lines are also bonded by a surety company, as they carry a stock of tickets amounting to nearly $100.—A. C. Emmerick, Aud., International Ry. Co., Buffalo, N. Y.

This company does not sell round-trip tickets, or, in fact, any tickets on the cars, but in the opinion of the writer, the only way to handle this business is to make the conductors pay for the tickets taken.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

We sell round-trip tickets through conductors, and also through ticket agents who sell the tickets on the cars. The conductors and agents are made to balance up their accounts each day. This is done in the following manner: The conductors and agents are required when their tickets are given them, to sign a receipt for them on a sheet provided for that purpose. At the end of the day's business they turn in the cash collected and all unsold tickets, dropping them in a safe in the office. The next day they receipt again for a new lot of tickets, and in the meantime their previous day's business is gone over and balanced up by a clerk in the office. In this way any shortage is immediately detected.—H. Woollcott, Secy., Consolidated Rys., Lt. & Power Co., Wilmington, N. C.

(a) The tickets should be charged by the receiver or other representative handing them to the conductor, against each conductor, and a settlement made each day. (b) Daily settlement. (c) No.—P. S. Young, Comptroller, Public Service Corp. of N. J.

QUESTION 12

On an interurban line with collections made on zone plan. How to obtain traffic statistics?—for instance, a road of 21 miles has six separate 5c. fare collections, how to ascertain the actual number of passengers carried through from one terminal to the other, or between stations.

ANSWERS

Do not consider it practical to ascertain correct traffic statistics when separate collections are made. Consider it better to accept and receipt to passenger for the total fare to destination. By this method accurate statistics of traffic can be readily ascertained.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Where it is desired that a record of the number of passengers carried should be kept, where there are six kinds of tickets used, it seems to me that the best plan possible would be to put in an additional register, requiring the conductors to register the number of passengers only, in order to get this information, but there is a question in my mind as to whether it is worth the expense.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

Do not believe that the desired information can be obtained in collections by the zone plan, and if it is of sufficient importance, would advise a single system fare receipt plan. A neighboring road has an excellent system by which it divides the back of its day card into divisions according to fare collections, and the conductor puts in each division the number of fares of each kind collected in that division on each trip.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry. Co., Mass.

In the case where collections are made on the zone plan, it is customary for this company to consider everyone who pays a 5-cent fare on each collection a passenger. It is impossible to ascertain the actual number of passengers carried through from one terminal to the other, but you can tell the number carried between the stations. The only method which can be adopted to obtain this result is to sell through tickets, and by this method you will get the approximate number of through passengers. In a great many cases passengers do not buy tickets, but prefer to pay their fare on each collection.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

QUESTION 13

When a weekly pay roll does not end with the calendar month, what is the best way to separate it for a change?

ANSWERS

We handle our weekly pay rolls in the following manner: Paying from 1st to 7th, 8th to 14th, 15th to 21st, and the 22d to the last day of the month. This is not properly a weekly pay roll, but it is satisfactory to our employees.—H. S. Swift, Secy., The Toledo Railway & Light Co.

Division on the basis of days for each total item of classification is approximately as near an equitable division as can be had. —P. V. Burington, Secy.-Aud., Columbus Ry. & Lt. Co., Ohio.

We pay twice a month, roll closing on the 15th and last days.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

Should a weekly pay roll not end with the calendar month there should be no difficulty in separating it for charges. Time should be kept so that a classification of each day can be readily had; then enter charges upon books by charging expense accounts and crediting wages due.—Clarence Jones Thomas, Secy., San Antonio Traction Co., Texas.

Our pay rolls have always ended with the calendar month, but it would occur to me that the motormen and conductors' wages for the lap-over days could be arrived at very accurately by taking the total time allowed for the lap-over days and multiplying same by the rate of pay, or the average rate of pay. For the other portion of the pay roll a percentage basis could be used from month to month. If at the end of the fiscal year's period it was desired to get the year's business as accurately as possible, the time for the accrued days could be figured accurately.—Frank R. Henry, Aud., United Railways Co. of St. Louis, Mo.

Figure the exact amount that belongs to the calendar month and separate the remainder from your monthly operating expenses by a journal entry. Weekly pay rolls cause much increased work and are not as satisfactory as semi-monthly.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

We do not endeavor to separate the weekly pay roll when it laps over into the succeeding month, except at the end of the fiscal year. If the weekly pay roll is paid on the 2d or 3d of the month, it is entered in that month. This, of course, makes the monthly statements slightly incorrect for this reason, but the percentage would be so small compared to the total expenses that we do not consider it worth while making separation except at the end of the fiscal year.—G. W. Brine, Aud., Georgia Ry. & Elec. Co., Atlanta.

To avoid having pay rolls that do not end with the calendar month, they are made up in the following manner (take month of January for example): Pay roll ending Jan. 7 is paid Jan. 11, pay roll ending Jan. 14 is paid Jan. 18, pay roll ending Jan. 21 is paid Jan. 25, pay roll ending Jan. 31 is paid Feb. 4, so that our pay rolls are always paid on the 4th, 11th, 18th and 25th of each month, unless these days come on Sunday or holiday, when we pay either day previous or day following, as is most convenient. The employees are thus paid weekly, with the exception of the last portion of the month, which may be 7, 8, 9 or 10 days, respectively, according to number of days in month.—W. H. Dankerley, Aud., Utica & Mohawk Valley Ry. Co., N. Y.

Divide it actually.—H. L. Wilson, Aud., Boston Elevated Ry. Co.

Would say that the only accurate method would be to make two distributions covering separately the time spent in each month.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Divide the weekly pay roll into sevenths and charge the fractions to the different months.—A. C. Emmerick, Aud., International Ry. Co., Buffalo, N. Y.

Calculate the portion of such pay roll to and including the last day of the month and make charge to proper accounts for that portion, then charge remainder to a suspense account and take it out by journal entry during following month.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

When the weekly pay roll does not end with the calendar month, a method to separate same for a charge in its respective months, with the least possible work or accounting, would be, for instance, if the roll should end on the 3d of August, making three days in August and four in July, a journal entry should be made when the roll is taken into account in July, charging suspense with three-sevenths of the total amount of the roll, or, if it is preferred, with the actual amount for the three days, and crediting July operating expense accounts as designated by roll. In August, journal entry should be made charging operating expense and crediting suspense, referring to the previous entry.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

Charge to each calendar month actual wages of trainmen, so that the charge for motormen and conductors will be absolutely correct. Balance of the roll to be divided in proportion to the number of days that fall within each calendar month.—W. F. Ham.

We adopted the primitive method of extending the pay roll to the various accounts on the cash book. The proportion (so many sevenths) belonging in the next month or the month previous is carried as audited wages and journalized through the various extensions.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry. Co., Mass.

When a weekly pay roll does not end with the calendar month, it is customary to deduct one-seventh, two-sevenths or three-sevenths from that pay roll and charge it up to the next month.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

When a weekly pay roll does not end with the calendar month, the proper way to handle it is by days, assuming that pay rolls are journalized; otherwise it will be necessary to have two pay rolls for the same week.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

Charges can be divided by separating amounts applicable to each month on pay rolls. The practice of dividing the total charges on the weekly pay roll between the two months on the basis of the number of days on the pay roll in each month is followed by some companies.—P. S. Young, Comptroller, Public Service Corp. of N. J.

If a weekly pay roll ended with, say, Oct. 1, the charge should be separated on the basis of six-sevenths of the pay roll to the month of September and one-seventh to the month of October. This separation should be provided for and properly shown on the voucher register, when the pay roll is entered therein, by having two columns on the voucher register, one for the current month and one for the succeeding month. In dealing with the proposition in question, six-sevenths of the pay roll should appear in the column designated "current month" and one-seventh in the column designated "succeeding month"; this would separate the charge as between the months of September and October; the October charge not being distributed, would not appear in the September accounts.—C. N. Duffy, Secy. and Auditor, Chicago City Ry. Co., Ill.

QUESTION 14

Is an individual receipt for each person on pay roll considered better than the plan of signing on a book?

ANSWERS

Pay all force by special pay roll check, payable at bank. The indorsement is the only receipt.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

An individual receipt is to be preferred for some reasons, but it makes considerable more work, and the liability of misplacing an individual receipt is always present.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

Why not use a pay check, which, when properly indorsed and paid, is receipt sufficient?—Clarence Jones Thomas, Secy., San Antonio Traction Co., Texas.

We take no receipt.—Frank R. Henry, Aud., United Railways Co. of St. Louis, Mo.

If you require signatures, use a pay roll sheet or book, as it is just as good as an individual receipt and is easier kept.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

Yes.—L. A. Bowen, Aud., Savannah Electric Co., Ga.

We do not have a book signed by employees for their wages, and we only use pay roll receipts in case of the office pay roll. In the case of all other employees, a time check is made out, giving the number of hours and the amount of wages, and these are distributed to the different employees, who present them on pay day, and their money is turned over to them without any receipt.—G. W. Brine, Aud., Georgia Ry. & Elec. Co., Atlanta.

We consider individual receipt best.—Montreal Street Railway Co.

Yes. The whole record is then in one place.—H. L. Wilson, Aud., Boston Elevated Ry. Co.

If the roll is paid in cash, would prefer signature on the pay roll. If paid by check, consider signature unnecessary.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

I think so.—F. E. Smith, Aud., Chicago Union Traction Co.

This company has for the past two years paid its men by check, weekly, and the indorsement on the check has been considered sufficient. This has been found the most economical method of paying the men.—J. T. Slocum, Secy. and Treas., International Ry. Co., Buffalo, N. Y.

No. We prefer that all employees sign in a pay roll book. This method does not permit of receipts getting lost or misplaced.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

I consider a receipt from each person on the pay roll better than a plan of signing a book. We make a pay check for each employee, which is cashed by the paymaster, the same as a check is cashed by the bank-teller. This is then charged to pay roll account, and until such checks are paid they remain in pay roll account.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

Both ways entirely unnecessary.—W. F. Ham.

I think the individual receipt causes too much work and waste of paper. We have employees sign the pay roll, which is then filed away as a voucher. This is the simplest method.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry. Co., Mass.

It is the opinion of the writer that the individual receipt on the pay roll is the better plan, as in a number of instances the fact that the amount paid was disputed, was proven beyond doubt by the individual receipt in the pay roll for that particular week.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

We think individual receipts for each person on the pay roll not desirable, and this method is used in this office for office employees only. All other employees receipt on the pay roll.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

We have adopted the individual receipt. We think it will prove better in some respects than signing a book.—W. H. Burroughs, Secy. and Treas., Memphis Street Ry. Co.

For several years we have employed an ordinary bank check in paying all of our men, with a receipt indorsed on the back, this being the only signature required. We find it very satisfactory, never having had a complaint. We, of course, are careful to see that the check gets into the hands of the proper employee.—E. D. Spruill, Pueblo & Suburban Traction & Lt. Co.

An individual receipt enables employee to be paid wherever he is found. The plan of signing on a book is less convenient in many ways.—P. S. Young, Comptroller, Public Service Corp. of N. J.

QUESTION 15

What is the best process of apportioning damages into operating accounts 33 and 34?

ANSWERS

Our practice is to charge a percentage of the gross receipts each month, apportioned arbitrarily between 33 and 34.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

All damage expenses other than legal expenses should be charged direct to account No. 33 at time vouchered. Account No. 34 provides for the charge for legal expenses in connection with damages.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

By charging a percentage of the gross earning to each of the respective accounts. To illustrate, the following are the percentages as used by us: For account 33, personal damages, 4 per cent; property damages, .50 per cent; medical services and expenses, .20 per cent; salaries of claim department and expenses, .60 per cent; total, 5.30 per cent. Account 34, attorneys' salaries, .20 per cent; legal expenses, .50 per cent; total, .70 per cent. Grand total, 6.00 per cent.—Frank R. Henry, Aud., United Railways Co. of St. Louis, Mo.

Charge off each month a certain percentage of your passenger earnings, which you consider sufficient to take care of the damage account.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

By per cent of earnings in proportion of two-thirds and one-third.—Montreal Street Railway Co.

Follow instructions laid down by "standard system."—H. L. Wilson, Aud., Boston Elevated Ry. Co.

The proper method is to charge, monthly, an arbitrary percentage of the gross earnings into accounts 33 and 34 and credit same to "injuries and damages reserve." Against this reserve charge payments when made.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Think this is covered by the "standard classification."—F. E. Smith, Aud., Chicago Union Traction Co.

We use the "standard classification" adopted and recommended by the Accountants' Association.—A. C. Emmerick, Aud., International Ry. Co., Buffalo, N. Y.

We follow the standard classification and can offer no other process.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

It seems to me that the classification of operating expense relative to accounts Nos. 33 and 34 of the Accountants' Association covers this question very plainly.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

By following the instructions laid down by the standardization committee.—W. F. Ham.

It is customary for this company to charge to operating expense 5 per cent of the gross earnings and credit the same to accident liability account, which account is supposed to take care of all cases settled during that month and others which occur during that particular month and which are to be settled in the future. The amount charged to account No. 34 being small, we make this entry when the bill is paid without regard to the number of cases it covers.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

The best way to handle account No. 33 is to create an "Injury Fund" account, to which all settlements are charged, and then make a journal at the end of each month, charging account No. 33 with the determined percentage of gross earnings and credit the "Injury Fund" account. The better practice is to have the attorneys render monthly bills for their services, which can be vouchered and charged in the ordinary way. We would advise abandoning account No. 34.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

All amounts paid for settlement of claims should be charged to account No. 33. In addition, a part of the salary of the attorneys engaged in settling claims and defending suits for damages, and all the salaries of claim department should be charged to same account. Court costs, legal expenses and a part of salary of attorneys go to account No. 34.—W. H. Burroughs, Secy. and Treas., Memphis Street Ry. Co.

Payments when made should be classified between these two accounts. A record should be made of all legal expenses in connection with damages in each month. When making monthly apportionment against operating of the percentage credited to "Accident and Damage Fund," the actual charges against Account No. 34, "Legal Expenses in Connection with Damages," should be charged to that account and the balance of the apportionment shown against Account No. 33, "Damages."—P. S. Young, Comptroller, Public Service Corp. of N. J.

Open a reserve account, crediting same monthly and debiting operating expense accounts 33 and 34 with the month's proportion of the estimated monthly charges to these accounts, based on the percentage of the passenger receipts of the month in question, the percentage to be determined on the basis of previous operations, providing for any change in operating conditions that should be taken into consideration.—C. N. Duffy, Secy. and Auditor, Chicago City Ry. Co., Ill.

QUESTION 16

Method employed in keeping record of the expense incident to each individual case of personal or property damage?

ANSWERS

An individual card is made up for each accident, on which is recorded the amounts paid on account of that particular case, also the court record, if any; in fact, a brief history of the case. Each accident is numbered and given an envelope, in which is filed the crew's report, witness statements, card, release (if any), and all other papers in the case.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

Have claim department make report of each and every claim, and the nature thereof, numbering the claims in consecutive order, and, when approving charges, indicate the claim number to which such charge applies. A memorandum account can then be kept in a separate book, with each claim, and the charges posted from the voucher. These charges can also be classified under different headings as desired, such as regular damages, hospital and medical attendance, witness fees and court costs, attorneys' fees, personal and traveling expenses, and incidental expenses.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

Upon the accident reports should appear disposition of claim, giving expense and amounts paid.—Clarence Jones Thomas, Secy., San Antonio Traction Co., Texas.

We keep a card record of each case, together with a journal upon which all payments on account of injuries and damages are first entered and then posted to the individual cards.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Don't think it can be done accurately. Think this is a matter to be discussed by the Claim Agents' Association rather than ours.—F. E. Smith, Aud., Chicago Union Traction Co.

We do not charge incidental expenses to the separate damage cases. The amount of settlement can, of course, be easily ascertained, but our adjusters and attorneys work on several different cases every day, and their salaries and expenses could not be distributed accurately.—A. C. Emmerick, Aud., International Ry. Co., Buffalo, N. Y.

We keep no record of expense incident to each damage case other than that shown by voucher in making settlement.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

There is a question in my mind whether it is worth the expense and trouble necessary to keep a record of the expenses incident to each individual case of personal damage. As to the company's property damage, I think such record should be kept by the master mechanic, which will be of service to the general manager.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

The individual record of all personal and property damage cases are kept in the office of the claim agent, and are only entered in bulk by the auditor's office.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

By the use of a card system, subsidiary to the general books. Each card contains a record of all the expenses incurred in any one case; these cards are filed alphabetically and are always accessible to the operating or claim departments, affording them complete information without interrupting the auditing department.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

Each case when reported should be given a case number, and a case record book kept in which all charges against the individual cases should be posted.—P. S. Young, Comptroller, Public Service Corp. of N. J.

QUESTION 17

What is the best manner in which to treat "Additions and Betterments" account for a particular fiscal year?

ANSWERS

If "Additions and Betterments" is used in the strict sense, charge month by month to the proper construction accounts, and at the end of the fiscal year transfer the balances to the property accounts.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

In the case of additions and betterments, I believe in a separate account for each piece of machinery installed or line of track laid, or any particular construction. These accounts can be charged to plant at the end of the fiscal year.—Clarence Jones Thomas, Secy., San Antonio Traction Co., Texas.

If the additions and betterments are really additions to the property they should be charged to construction and equipment at the time they were made.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

Charge to construction accounts benefited.—Montreal Street Railway Co.

We show in detail the amounts expended account additions and betterments monthly, also for the period of the fiscal year to date. These are carried on the general books under construction account, which is transferred at the close of the year to property account.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Add to property accounts actual additions and the real betterment, charging balance to the proper expense accounts.—F. E. Smith, Aud., Chicago Union Traction Co.

When a new piece of construction is proposed, the engineer makes out an estimate of cost on a blank 14 ins. x 17 ins. prepared for the purpose, giving a description of work to be done. This estimate is approved by the president or general manager and numbered by the auditor. Each charge to construction must bear some estimate number, which is noted on the book of original entry, such as journal, requisition book, voucher book, etc., and thence posted to the different estimate blanks. The blanks do not form part of the general books. The postings to these blanks show at all times the cost to date of any construction job, and make it easy to explain where the increase to construction occurred.—A. C. Emmerick, Aud., International Ry. Co., Buffalo. N. Y.

The account "additions and betterments" is a much abused one. In my judgment all disbursements of this nature should be classed either as construction or as operating expenses.—W. F. Ham.

Assuming that the "Additions and Betterments" account in question for a particular fiscal year has carried all charges that are really additions and betterments, and therefore a proper charge against capital and not against revenue, "Additions and Betterments" account should be credited and the proper "Construction and Equipment" accounts debited.—C. N. Duffy, Secy and Auditor, Chicago City Ry. Co., Ill.

QUESTION 18

What are the advantages of the voucher check over the old method of separate check and voucher?

ANSWERS

I think there is no doubt but what a voucher check is best for those roads who are blessed with sufficient ready cash to pay their bills as fast as vouchered. Some of us, at times, are obliged to hold these vouchers, and it requires additional entries to adjust the bank balance. I think this difficulty could be avoided if an arrangement could be made with your bank to notify you each day of the vouchers presented for payment and draw one check for the total amount.—H. S. Swift, Secy., The Toledo Railway & Light Co., Ohio.

The voucher check embodies in one piece of paper the details of the cash transaction, including receipt.—P. V. Burington, Secy.-Aud., Columbus Ry. & Lt, Co., Ohio.

Requires only one-half the signatures needed by the old method, reducing the manual work of the approving officers; the certainty of getting a properly receipted voucher for your files.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

Use separate voucher and check, and prefer it to the voucher check.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

We do not use the voucher check. The principal advantage of the voucher check is that the check could not be used without receipting and returning the voucher, and a portion of the time required for making out checks could be saved.—Frank R. Henry, Aud., United Railways Co., of St. Louis, Mo.

It saves writing a voucher and a check, and insures the return of voucher.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

We have been using voucher check for some months, and find that it saves time in issuing a voucher and in filing, not having to wait for return of the voucher from the customer before the invoices can be placed in a permanent file, and not being obliged to keep tab on the return of the voucher. Under the old style of separate check we found ourselves continually obliged to send sometimes a second and third request for return of voucher, which had either been mislaid by them or lost in the mails.—Everett Ry., Lt. & Water Co., Washington.

Bills when received remain in the company's possession, thus assuring the officers an unbroken voucher file and avoiding the inconvenience of being even temporarily deprived of a valuable source of reference afforded by the original bills. Saving of time and expense of postage by not mailing bulky documents for the purpose of obtaining receipts on vouchers, the return of which in many cases is delayed, and from time to time vouchers are mislaid, damaged, and occasionally lost. Validity of indorsement receipt is guaranteed by the bank. Saving in safe or vault space, the receipted voucher checks being of uniform bulk may be filed in very compact form.—L. A. Bowen, Aud., Savannah Electric Co., Ga.

The voucher paid by separate check is often destroyed through carelessness or ignorance of the party to whom made, thus necessitating frequent audits of vouchers to determine those missing or unsigned. The voucher check returns by natural steps to your files, as the party cannot otherwise secure payment, and is carries on its face the evidence of payment.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

The advantage of voucher check over separate check is as follows: The voucher check is sure to be returned without any expense to the payee, and the sender is sure to receive same through his bank and is not obliged to keep track of these vouchers and see that they are returned properly receipted, as is the case when a check and voucher is used.—J. T. Slocum, Secy. and Treas., International Ry. Co., Buffalo, N. Y.

Among the many advantages of the voucher check we find that its particular advantages are that we can show on the check just what bills we are paying, thereby giving a clear statement to the party receiving the check, and at the same time we keep the original voucher and invoices in our files. It also serves as a receipt for all bills that are attached to the original voucher.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

The principal advantage of the voucher check over the old method of separate check and voucher is the return of the receipt to be attached to the voucher. In a case of the voucher check the money is not paid unless you get a receipt for it and the voucher check when returned is attached to its papers the same as formerly when the receipts and checks were separate.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

First, there is no trouble about getting receipts back; second, no separate notification is required as to what items are being paid.—W. F. Ham.

We use a very simple form of voucher check, there being printed on the end of the check a statement showing the amount of each item paid, the date it was billed, discount, if any, and deductions, together with room for remarks. With this we send a card explaining that no receipt is necessary, etc. We do not send the original invoice or a copy of it. After several years of experience, we believe that this, while very simple, is exactly as effective as the most elaborate method, for a road of our size or even considerably larger. The particular advantage to us is that the original invoice is always in the office for reference at the time when we have found that it is most likely it would be wanted (when it is being paid), and, on the other hand, we avoid in this way the expensive method of copying an invoice. We have had called to our attention by the bank where we do business a large number of voucher checks, and fail to see the need of a great deal of the detail which a great number of small concerns assume in this connection.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry. Co., Mass.

I do not see any advantage in the voucher check over the old method of separate check and voucher as it requires just as much work.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

The advantages of the voucher check over the old method of voucher and ordinary check are apparent, because the voucher check can be typewritten, as a second sheet at the same time the audited voucher is made, and its use allows the audited voucher to remain always on file in the office.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

The greatest advantage is the returning of the voucher. A voucher check is nearly always sure to come back to the office. With a separate check and voucher, the check will come and the voucher may or may not be returned.—W. H. Burroughs, Secy. and Treas., Memphis Street Ry. Co.

We think the only advantage of the voucher check over the old method of separate check and voucher is that it insures the return of the voucher. In our business, however, we have found that the disadvantages are so great that they outweigh these advantages. We have, therefore, not found it convenient to use the voucher check.—H. Woollcott, Secy., Consolidated Rys., Lt. & Power Co., Wilmington, N. C.

For some time we have been using a voucher check, samples of which are filed with the association's forms, but we have recently adopted a more simple form on which considerable labor is saved, for our amusement park, a sample of which I enclose. The ordinary old style voucher, or simply a schedule, may be used as a cover for the original papers and approval of the officials. We find this form more satisfactory as it saves labor and is less liable to be mutilated.—E. D. Spruill. Pueblo & Suburban Traction & Lt. Co.

The voucher check is a labor-saving device, reducing errors to a minimum and facilitating the checking of disbursements.—P. S. Young, Comptroller, Public Service Corp. of N. J.

(1) There is only one document as compared with two. 2. The official signatures that should appear on both voucher and check all appear on the voucher check, which becomes the draft on the funds of the company. (3) The requirements of having the voucher check indorsed before it is bankable insures absolutely the return of the voucher properly receipted. (4) The voucher check system decreases the detail work.—C. N. Duffy, Secy. and Auditor, Chicago City Ry. Co., Ill.

QUESTION 19

What is the best form of voucher check?

ANSWERS

A sample voucher check is enclosed.—P. V. Burington, Secy.-Aud., Columbus Ry. & Lt. Co., Ohio.

Form enclosed.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

There are several good forms, samples of which can be secured from your printer.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

We are enclosing herewith three copies of the form of voucher check which we are using. When our bills are received in the office they are stamped as to date received and handed to the bookkeeper, who numbers all invoices consecutively in a book ruled for that purpose, showing the name of the biller, amount, column indicating to whom bill has been passed for checking and approval, and its return to the bookkeeper, and the voucher number. The invoices of one firm are kept together until the end of the month, and voucher is made and attached to the invoices, the voucher attached on top. The vouchers are made out on the typewriter with carbon, and distribution put on the voucher. After the checks are mailed, the vouchers are filed without folding in a vertical file. The voucher when drawn is registered in a check register, giving the number, date, name and amount. The distribution is made into a recap. journal direct from the voucher. This recap. journal is made, not with a line for every voucher, but in sets of short columns, having a place for the voucher number and the amount only. This facilitates posting and saves a great deal of journal space. After the vouchers are posted for the month, the journal is posted into the same recap. journal and balanced, and then the accounts that go to operation are posted on the cost sheet or earnings sheet, and the construction accounts to the construction sheet, and from these sheets one posting is made to the ledger. We believe this minimizes the amount of labor in writing up the books, and yet everything is as easily understood as though an usually laborious method were used in posting the ledger in detail.—Everett Ry., Lt. & Water Co., Washington.

One that contains the check and blank for indorsement on one side and the details of the accounts settled, together with the receipt for same on the other, folded to bring the check and blank on the outside.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

We think the best form of voucher check is one something after the order of the one attached herewith, which has been found by this company to answer all requirements.—J. T. Slocum, Secy. and Treas., International Ry. Co., Buffalo, N. Y.

We enclose a blank check which we think is very good.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

This company considers its form of voucher check now in use the best, sample of which can be found on record with the secretary of the association.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

Form herewith.—W. F. Ham.

We believe ours to cover the ground, and as it is simple it must be, in our view, the best.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry. Co., Mass.

The form of the voucher check in use here is that suggested by reply to last question above, that is, it is similar in size to the audited voucher and folds in the same manner. The inside corresponds exactly with the audited voucher, containing the name of payee and the list of bills paid by date and amount. The back of cash voucher, when folded, it left blank for the endorsements.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

Form 11,093—Chicago City Railway Company's voucher check, a copy of which is on file in the library of the association, has proven to be the best for the Chicago City Railway Company; it is thought that it would be best for any other company.—C. N. Duffy, Secy. and Auditor, Chicago City Ry. Co., Ill.

QUESTION 20

What operating expense accounts should be taken to get the cost of power per kw-hour? Should anything be added for interest or depreciation?

ANSWERS

Accounts 10 to 15, both inclusive; accounts 4 and 5, and so much of account 3 as is applicable to the generating station, sub-stations, storage battery houses, coal docks, etc. If specific depreciation accounts are kept, those applicable to the generating plant and its auxiliaries, as enumerated, should be added. I think that the interest charge is too arbitrary to be of much value.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

All the accounts applying to the operation of the power plant, with the addition of the maintenance accounts of steam and electrical plant. To the total of these should be added a proportionate amount applicable to the power station for insurance, taxes, accident risk, interest and depreciation.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

In arriving at the cost per kw-hour I use accounts 10 to 15 inclusive, and accounts 4 and 5 and that portion of account 3, which is charged to power plant building repairs. This gives us the first or manufacturers' cost per kw-hour hour, and the one that is generally used for comparison. In making comparisons, under some circumstances, it would be necessary to add interest on value of power station, ground and equipment, and allowance for depreciation.—Frank R. Henry, Aud., United Railways Co. of St. Louis, Mo.

Accounts 3, 4, 5, 11, 12, 13, 14, 38 and 10. Interest, taxes and depreciation should be included.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

Numbers 4, 5 and 10 to 15 inclusive; also a proper proportion of Nos. 3 and 38, and taxes. Something should be added for depreciation.—L. A. Bowen, Aud., Savannah Electric Co., Ga.

We use expenses Nos. 4, 5, 10, 11, 12, 13, 14 and 15, and do not add anything for depreciation.—W. H. Dankerley Aud., Utica & Mohawk Valley Ry. Co., N. Y.

Power house expense and maintenance power plants.—Montreal Street Railway Co.

Accounts 4, 5, 10, 11, 12, 13, 14 15, and the proportion of account 3 that relates to the power plants divided by the kilowatt output would give an average cost that is generally used for comparative purposes. If the intent is to determine the total cost it would be necessary to consider taxes, insurance, depreciation, interest on investment, as well as percentage to cover general management, injuries and damages, etc.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Accounts 3. 4, 5 and 10 to 14 inclusive. Interest should be added on the cost of the plant and depreciation, unless all renewals are included in expenses.—F. E. Smith, Aud., Chicago Union Traction Co.

Accounts Nos. 4, 5, 10, 11, 12, 13, 14 and 15. We do not add anything for depreciation or interest.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

In figuring the cost of power per kw-hour, I do not think that anything should be added for interest or depreciation, in making up the monthly report. When it comes to figuring on a contract or making up a statement showing the actual cost per kw-hour, everything should be taken into consideration. This latter should be information for the officers and directors only.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

Accounts Nos. 4, 5, 10, 11, 12, 13 and 14. Proper amount of account 3 and account 38. Proper charges for taxes interest and depreciation.—W. F. Ham.

To secure the operating expense of power per kw-hour, accounts Nos. 10, 11, 12, 13, 14 and 15 should all be taken into account, and only those. If, however, the total cost of power is desired, there should be added interest insurance, taxes, and a reasonable amount for depreciation.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry. Co., Mass.

The amount of labor and material used in producing power should be considered as the cost of power per kw-hour. I do not think that interest or depreciation should be considered.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

Nos. 4, 5, 11, 10, 12, 13, 14. Yes.—W. H. Burroughs, Secy. and Treas., Memphis Street Ry. Co.

That part of Account No. 3 which represents "Maintenance of Buildings and Fixtures (Power Plant). Account No. 4, maintenance of steam plant; Account No. 5, maintenance of electric plant; Account No. 10, power plant wages; Account No. 11, fuel for power; Account No. 12, water for power; Account No. 13, lubricants and waste for power plant; Account No. 14, miscellaneous supplies and expenses of power plant; Account No. 15, hired power. In arriving at the cost of power per kw-hour, it is necessary, in addition to the charges against the accounts above mentioned, to take up amounts sufficient to cover interest on the investment and depreciation on plant. A proportion of general expenses, such as insurance, etc., should also be added. The cost per kw-hour so arrived at would not necessarily mean the cost of additional power if generated, as it is possible to show that there is a more or less fixed charge connected with production of power which does not vary appreciably with the current generated at the station. For instance, the amounts charged to the accounts mentioned could be divided as follows between charges that are fixed and those that vary with output:

Acct. No.		Per Cent Fixed	Per Cent. Variable
3	Maintenance of buildings and fixtures	100	..
4	Maintenance of steam plant	50	50
5	Maintenance of electric plant	50	50
10	Power-plant wages	75	25
11	Fuel for power	10	90
12	Water for power	10	90
13	Lubricants and waste for power plant	10	90
14	Miscellaneous supplies and expenses of power plant	80	20
15	Hired power	...	100

Interest would not vary with output and depreciation to any appreciable extent. If sale of current beyond capacity of station is contemplated, a figure for interest and depreciation on the additional installation necessary should be considered.—P. S. Young, Comptroller, Public Service Corp. of N. J.

3—Maintenance of Buildings and Fixtures (power plant buildings and substantial buildings); 4—Maintenance of Steam Plant; 5—Maintenance of Electric Plant; 10—Power Plant Wages; 11—Fuel for Power; 12—Water for Power; 13—Lubricants and Waste for Power Plant; 14—Miscellaneous Supplies and Expenses of Power Plant; 15—Hired Power. Interest and depreciation should be added, also taxes on the value of the real estate, buildings and fixtures, and power plant equipment.—C. N. Duffy, Secy. and Auditor, Chicago City Ry. Co., Ill.

QUESTION 21

On a small road is it necessary to separate the register checkers and ticket counters from the cash counters?

ANSWERS

The road should be a small one indeed not to warrant the separation of register checkers and ticket counters from the cash counters.—P. V. Burington, Secy.-Aud., Columbus Ry. & Lt. Co., Ohio.

No.—C. L. S. Tingley, 2d Vice-Pres, The American Railways Co

Not if the clerical force can be handled to a better advantage otherwise.—Frank R. Henry, Aud., United Railways Co., of St. Louis, Mo.

No.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

No, but very desirable on any road.—L. A. Bowen, Aud., Savannah Electric Co., Ga.

Think it advisable.—H. L. Wilson, Aud., Boston Elevated Ry. Co.

Would not consider this necessary, as other methods of verifying the cash turned in can readily be applied. Conditions might make it desirable.—H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

Think it a very wise plan to keep money counters separate from all other office employees.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

Regardless of the size of the road, whether large or small, I think it necessary to separate the register clerks and ticket counters from the cashier, or man in charge of the cash. This can be done, as I have tried it on a road that is not taking in over $200 per day. —C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

No.—W. F. Ham.

It is certainly preferable to separate the register checkers and the ticket counters from the cash counters. This method leaves no room for collusion between employees employed in this work.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

We think it a good plan to separate them.—W. H. Burroughs, Secy. and Treas., Memphis Street Ry. Co.

Such a separation would mean an additional safeguard and would be advisable.—P. S. Young, Comptroller, Public Service Corp. of N. J.

QUESTION 22

Should register totals be carried forward from day to day, that is, a record made so that the closing number can be compared with the opening number the next day?

ANSWERS

A record of register totals should certainly be kept in some manner for comparison one day with another.—P. V. Burington, Secy.-Aud., Columbus Ry. & Lt. Co., Ohio.

A continuous record of registers can be kept so that the closing number of one day is the opening number of the next.—C. L. S. Tingley, 2d Vice-Pres., The American Railways Co.

Yes.—S. C. Rogers, Aud., Youngstown-Sharon Ry. & Lt. Co., Ohio.

It is not necessary to carry register totals forward from day to day, nor to keep a record, but register closing numbers should be compared and checked with opening number the next day.—Frank R. Henry, Aud., United Railways Co., of St. Louis. Mo.

It is absolutely necessary in order to keep a check on the register taker and the conductors.—Frank J. Duffy, Secy., Beaumont Traction Co., Texas.

Yes.—L. A. Bowen, Aud., Savannah Electric Co., Ga.

Most certainly.—H. L. Wilson, Aud., Boston Elevated Ry. Co.

Yes —H. C. Mackay, Comp., The Milwaukee Elec. Ry. & Lt. Co.

We do.—F. E. Smith, Aud., Chicago Union Traction Co.

Yes. We carry register totals forward each day.—H. T. Bunn, Aud., Knoxville Traction Co., Tenn.

I do not think that register totals should be carried forward from day to day by the register clerk. If this is done it will have a tendency to make the man in the office careless, and he would not give it the check that he would if he is compelled to go back to get the report of the day before to compare with the day following. In other words, he would depend too much upon the register clerk for the information, and give him an opportunity to work in collusion with the conductors.—C. O. Simpson, Treas., Birmingham Ry., Lt. & Power Co., Ala.

Not if you have implicit confidence in the honesty of your conductors and car house employees. Otherwise, yes.—W. F. Ham.

Certainly. Each night our night foreman goes through all our cars and makes a record of all register readings, and with this the conductor's last reading for the day is compared, and also the first reading for the next day. In case of discrepancy, the night foreman's figures are taken to be correct, unless circumstances indicate that they are not. The only question with us is whether we should not read our registers through some one responsible head every time the car comes into the car house or passes a given point. If we were a larger road, we certainly should do so.—Robert N. Wallis, Treas., Fitchburg & Leominster St. Ry. Co., Mass.

The regular totals should be carried forward from day to day so that the closing number can be compared with the opening one of the next day. I think this is absolutely necessary.—J. W. Lester, Treas., Worcester Consolidated St. Ry. Co.

The closing register numbers at the end of the day are always repeated as the beginning numbers for the succeeding day, and these are checked with care to avoid skips, and also to check register changes made on account of repairs or far other reasons.—E. T. Moore, Secy., Dallas Consolidated Elec. St. Ry. Co., Texas.

Our registers are not taken when car goes out. Only when car comes in. We use "In" reading of one day as "Out" reading of the day following. If "Out" reading is taken, think a record of "In" reading for previous day should be preserved for a check.—W. H. Burroughs, Secy. and Treas., Memphis Street Ry. Co.

Yes.—P. S. Young, Comptroller, Public Service Corp. of N. J.

Yes; otherwise it would be impossible to check the register readings and determine whether or not all fares were accounted for.—Chicago City Railway Company.

THE ACCOUNTANTS' CONVENTION

The convention of the Street Railway Accountants was held in the Philadelphia Commercial Museum, in the hall at the southeast end of the second floor instead of that at the northwest end, where the other meetings were held. This hall corresponded in size to the other and there was a large attendance at the meetings.

A feature of the Accountants' convention was the exhibits of blank forms which is shown at every convention of this association. Mr. White, secretary of the association, had arranged for a number of large tables at the end of the hall, and on these tables his valuable collection of forms was arranged, where they could easily be inspected. This collection has been considerably amplified during the year. In addition to the collection belonging to the association, Mr. Van Ryper, traveling auditor of the Public Service Corporation, had a supplementary exhibit showing all of the forms used by that organization. These forms were arranged in the same manner and pasted into the same kind of a scrap-book as those used for the collection belonging to the association. The collection was shown in four books, which were entitled, respectively, "Electric," "Gas," "Railway" and "General Office." These divisions cover the four divisions of the company, viz., electric lighting, gas lighting, electric railway and general. All of these blanks were carefully indexed, and in the railway collection the same classification has been adopted as that shown in the White collection. The collection attracted a great deal of interest, and both Mr. Van Ryper and Mr. White were heartily congratulated by the attendants upon the exhibits shown.

The various papers and reports presented at the meeting of the Street Railway Accountants' Association of America are published in this issue. The meetings followed the programme published in the Sept. 23 issue, and at the first meeting the association decided without a dissenting vote to accept the proposition of the American Street and Interurban Railway Association looking toward reorganization. A feature of this meeting was a long and earnest speech by President Ely, of the parent association, in which he outlined the purposes and plans of the new body.

At the close of the meeting the following officers were elected: President, Walter B. Brockway, general auditor, Nashville (Tenn.) Railway & Light Company, Yonkers, N. Y.

First vice-president, P. S. Young, comptroller, Public Service Corporation of New Jersey, Newark, N. J.

Second vice-president, Robert N. Wallis, treasurer, Fitchburg & Leominster Street Railway Company, Fitchburg, Mass.

Third vice-president, H. A. Ferrandau, auditor and treasurer, New Orleans Railways Company, New Orleans, La.

Secretary and treasurer, Elmer M. White, assistant treasurer, Birmingham Railway & Light Company, Birmingham, Ala.

Executive committee—W. G. Ross, managing director, Montreal Street Railway Company, Montreal, Can.; C. L. S. Tingley, second vice-president, American Railways Company, Philadelphia, Pa.; F. Dabney, assistant treasurer, Seattle Electric Company, Seattle Wash.; J. H. Pardee, general manager, Rochester & Eastern Rapid Railway Company, Canandaigua, N. Y.

The Vallejo, Benicia & Napa Valley Electric Railway has been sold to Boston capitalists. The road was owned by W. F. Bottsford, of the American National Bank, of Los Angeles, and was promoted by Captain Cross, of that city. The company intends at an early date to begin constructing a road to the popular summer resorts in Lake County. The franchises for the extension have already been obtained. The road is to be managed by L. J. Perry, of Los Angeles, who was with the Los Angeles & Redondo Railway as superintendent.

DISCUSSION OF THE PAPERS PRESENTED BY MESSRS. CHARLES F. SCOTT AND W. B. POTTER

The papers presented by Messrs. Scott and Potter before the American Street Railway Association, on Sept. 28, were published in the last issue of the STREET RAILWAY JOURNAL. At the conclusion of the reading of his paper Mr. Scott said:

The development of this system has not been undertaken merely for the purpose of supplying the street railway manager with a new device, but it has been a development to meet the needs of railway service. The direct current has reached its limitations. Its cost of installation is very high in certain cases, and it is because there is a growing demand for this class of new apparatus, that its development has been taken up, and I am sure that I voice the views of the engineers with whom I am associated when I say, as engineers, that we feel that this single-phase system should stand on its own feet; that it has a field. If you find that the direct current meets your requirements as well or better, you have no particular reason for adopting the single-phase system simply because it is novel. We believe, however, that on its own merits it will be found of very great value in the development of the railway work which you men have carried on at such a rapid rate. In other words, the engineers of the manufacturing company are not foisting a fad upon you, but have worked out a system to meet your own needs. The single-phase system and its apparatus must be developed in the course of a few months or a few years, not only to equal, but to more than equal the result of the development of the direct-current system during the past dozen years. A great deal of that development can be done by the designing engineers in the factory, but, as we all know, the service test is the final test, and a great many of the practical points as to control, the interworking of various parts and the best forms of apparatus must come from experience. That has been begun, but just as with the direct current after its fifteen years, so the alternating current after as many months has not reached perfection, but we have reached that point where we feel that with our knowledge of the apparatus and with the experience which has been secured, it can now be presented to the operating street railway man as a perfectly feasible and practicable system.

President Ely.—Are there any questions that any one desires to ask concerning this paper? Let me say that the companies, the representatives of which have read the papers here, have been so kind as to have with us the gentlemen who have written the papers and who are familiar with the subject, so that any one who wants information ought to be able to get it.

Prof. W. E. Goldsborough.—The subject discussed in the paper which Mr. Scott has presented for our consideration to-day is one to which every electrical engineer in the country is devoting a good deal of his time. The announcement which has been made before this association of the placing of an order for twenty-five alternating-current locomotives with the Westinghouse Company by one of our large steam railroad systems, is a very notable one, and the fact that the announcement was made before this body is something which deserves our special consideration. To my mind the alternating current is destined to play a most important part in railroading. Presumably, there will be no large electrification of steam railroads in the sense of miles of track extending across the country in which the system will not be used in some form. I think that the electrical fraternity, and particularly the operating companies, owe a great deal to the courage of the manufacturers of electrical machinery. I do not know that we can look back to any other period in the development of the art in which the manufacturers have taken so great a load off of the shoulders of the consumers. This morning we listened to the papers on the gas engine, and reference was made to the steam turbine, and this afternoon we are discussing railway motors. I doubt if any company purchasing any of this apparatus in the United States really takes any risk. As regards the specific characteristics of the apparatus under discussion, I have for a long time felt that the alternating-current system was coming to the front, and that ultimately the single-phase system would take a place over all other systems. I believe I once had the pleasure of defending the single-phase motor at a discussion in Chicago on the single-phase system used for lighting at St. Louis, at a time when there were only two of us in the room who would say a good word for the single-phase motor. I do not believe any designer of electrical machinery to-day is satisfied in his own heart with the single-phase alternating-current motor which he has to use. I say this in spite of the fact I do not know of all the good things which the designers of this apparatus have in store for us. The fact that we can use a 220-volt motor with a larger commutator than that in direct-current machines is an indication in itself that we have better things to hope for, and I am confident in my own mind that in time, through insistent and persistent work on this problem, we will get a single-phase motor which will be more nearly analogous to the multiphase motor and which will not have a commutator. A great many gentlemen in this room will say that I am wrong, and that the problem has been given up, but I still feel that there is a demand for it. Necessity being the mother of invention, will produce the article we are all looking for. When it comes to the question of maintenance of equipment, I feel that we should step aside and look the ground over carefully before we throw out direct-current equipment for alternating-current equipment. When you have a very large number of equipments operated on a rather restricted mileage, then you are confronted with a condition wherein maintenance is an important factor, and there is no question but that at this time it is much cheaper to maintain a direct-current system (I mean maintain the motive power equipment) than to maintain the alternating-current motive power equipment. On the other hand, if you are confronted with a great deal of mileage, and relatively small number of units running over the mileage, then maintenance is a matter of secondary consideration, and you can take long chances in the matter of maintenance, for the reason that you are saving so much investment in copper and sub-stations and other things. I believe each of these problems is going to be met by the engineer and solved by the engineer, not for the sake of having a new thing—and we must grant the American engineer and the American people generally are enthusiastic for new things—but for the practical utility of these things. As thoughtful men we should discard any consideration of these things because they are new, but look upon each problem from an engineering standpoint, and use the direct-current apparatus in those places for which it is best adapted. However, without the alternating-current apparatus, it goes without saying that the enormous expansion which is to take place in electric railroading in this country would be utterly and entirely impossible. I wish, therefore, to say again that to the manufacturers of this country we owe a gratitude which it is difficult for us to express in adequate terms.

C. O. Mailloux.—I am greatly interested in the subject of single-phase alternating-current traction. I went to Europe last year on purpose to study it, because it was only there that anything was then being done with it commercially. I visited all the single-phase railway installations in Europe, and came back pleased with the result of my visit. I am glad that we are beginning to make progress with it in this country. I have no fear but that we shall soon entirely outdistance even the good results obtained in Europe. I believe there is a great future for it, but I want to emphasize the words which Dr. Goldsborough has said about studying each case by itself. The principal lesson conveyed to me by some of the papers, and especially by this one of Mr. Scott's, is that we shall not go too hastily, and it teaches also the importance of good engineering, not only from the standpoint of the manufacturer, but more particularly from the standpoint of the operating company. It is sad to contemplate and realize, but unfortunately it is true, that there is too little engineering done by the operating companies. The company, as a rule, has its engineering done for it by the manufacturer, and to this is largely due the great number of mistakes which have cost a great deal of money. We cannot, and should not, blame the engineers of the manufacturing companies if in doing their duty to their employers they sometimes consider the interests of the manufacturer too closely and those of the purchaser too remotely or indifferently. The practical application of the statement which I have made is this: that the present paper on single-phase alternating-current traction will, if nothing more, act as a wholesome check on the rather reckless or unwarranted introduction of the so-called alternating-current sub-station system of distribution which has been used for interurban work in many cases. There are many cases in the Middle West of companies which are blessed, or perhaps cursed, with applications of that system where it has been indeed a very expensive luxury. The statement which Mr Scott makes of those cases where the rotary sub-station is idle 75 per cent of the time is a clue to the kind of engineering which has been responsible for that sort of work. It shows exactly what Dr. Goldsborough just stated, namely, that in matters of that kind we are too apt to follow fashions and adopt them too readily, and that we jump too quickly at the conclusion that because a thing is good for a certain case it is going to be good for another case. While I have much faith in the single-phase system, I do not believe that the d. c. motor or the d. c. system is to be put on the shelf forthwith. I was recently called in consultation with two other engineers by the power committee of a board of directors in regard to the new equipment of a road. I found that those who had undertaken to do the engineering for that company had received their inspiration more from the manufacturer's interest than from the study of the interests of the operating company, and had recommended an alternating-current system of generation and distribution with d. c. sub-stations. I looked over the case carefully, and I said: "Don't, don't make that mistake; stick to direct current." I found that a director of the railroad company, who was himself operating an electric lighting plant in the same city, was in favor of the alternating-current system, having been converted by the manufacturer's engineers, though he himself was operating an Edison three-wire d. c. system. He had never understood the real inwardness of the situation until I explained to him and his colleagues that in their particular case the electrical "center of gravity" of the system was within 2 miles of the station. That is, if you take the total car miles for the heaviest day (and the heavier the day the more strongly the fact was shown) their center of electrical distribution was at an average distance of something like 1¾ miles from the power station, and over 75 per cent of the car miles was within the city limits and within a radius of 6 or 7 miles. Gentlemen, I characterize the attempt to foist on that board of directors a system of alternating-current sub-stations as foolish, to put it mildly, and I believe that such a thing will react on the manufacturers. That was a striking case, a splendid example where it will pay the company to have had their engineering done for them on their own account and at their own cost. These directors, I am pleased to add, quickly saw the point, and they decided to follow the recommendation of the engineers advising them. The paper read shows the possibilities of a system inherently far better adapted to many cases that we know of in the West, than the previous systems. This paper is opportune, because those who are assembled here might otherwise be tempted to make equally ridiculous mistakes to those already made. They will be deterred from making such errors, and will either wait until the single-phase alternating-current system has been perfected sufficiently to warrant their full confidence, or if in doubt will accept it in preference to the other in cases where the other has not proved an undiluted success. I do not know whether I voice Mr. Scott's sentiments in stating that in many cases of long-distance traction to-day the single-phase system, even in its present state, will be more practicable than the other system. It may be alleged as an excuse for the other that it was introduced at a time when it would have been impossible to have gone a very long distance without it. That is, perhaps, true; I do not wish to make a categorical criticism of them all, for there are many cases in the Middle West where the system is eminently practicable, and where it is to-day the very best, cases where the traffic is very frequent and where you have sufficient mean power distribution over the whole line to warrant the use of such stations. My criticisms refer particularly to the cases where they find the cost of operating sub-stations to be so great that they are trying to find employment for the men who run the sub-stations, by making them wind armatures or field coils, so as to justify charging the larger part of their time to the mechanical and repair department. Some of these cases are sad, and would have been prevented by a little discretion or discrimination in the selection of the system. I am glad that this paper has been presented before this body. It shows we have made a great deal of progress; that there are to-day two good single-phase systems, both of them sufficiently good for the great majority of these cases just noted, is interesting. The single-phase a. c. motor will greatly enlarge the field of operation of the companies operating the d. c. motor system, by enabling them to extend their lines in the suburbs. In the particular case to which I have just alluded, I told the gentlemen that even granting the possibility that they may some time or other want to go as far as 25 miles, it would still be better for them to generate their power current with d. c., and transform what little portion of it might be wanted into alternating current for their suburban lines, which in car miles represent only a relatively small percentage of the whole system. I made the very suggestion which is practically made by Mr. Scott, namely, that they should run the lines in the city with the direct current as they have been doing; that they could, if necessary, buy a few new single-phase equipments for the suburban lines; then run with direct current inside of the city limits, and even for some distance beyond use the alternating current (single-phase) to operate the longer suburban lines. There will, doubtless, be a very large field for that sort of work, and we are apparently on the point of realizing it practically.

Mr. Scott.—There is one gentleman here whom I am sure we will be glad to hear from, and I know he can give us some information about this system. He is the man who has been running the single-phase road at Indianapolis, Mr. Nicoll, the chief engineer. He is the man Mr. Mailloux talked about among the operating men who had the courage to go ahead. In talking over this paper with my colleagues, they were quite anxious that in presenting to this association the matter of single-phase railways, there should be nothing done in the way of covering up the details of operation; that there should be no air of mystery about the single-phase motor. They have done their work and give you the results. We believe that if the practical men of this association, many of whom have heard that there has been some trouble, understood frankly as operating men what was the nature of the troubles encountered, they would understand the circumstances and be as well satisfied as we are as to the fundamental elements. This being the case, you need not hesitate to ask Mr. Nicoll what questions you choose, and he need not hesitate, so far as the manufacturers are concerned, to reply freely.

D. G. Nicoll.—I do not know that I have anything special to say regarding the operation of our system, and possibly it would be better to answer questions rather than to attempt to say anything on the operation of the system. As Mr. Scott has outlined very clearly some of the minor details, I think you will understand what troubles we have had. As stated in the paper, we began operating on the first day of January of this year. On the 1st of April we ran within 4 miles of Indianapolis, all of the operation being on alternating current. We were handicapped in getting into the city of Indianapolis on account of two overhead bridges which were so low that our cars could not pass under them. These were raised, and on the 1st of July we began operating into Indianapolis. The line then was 41 miles in length, 37 of which was on alternating current, and the remaining 4 miles on direct current in the city of Indianapolis. Up to the time we began operating into the city we had no trouble with the motor insulation. The worst trouble was the question of the transformer ventilation. This was overcome, but on operating the motors in the city of Indianapolis defects developed in the motor windings. These were also overcome, and we are having no further trouble. We are operating the highest schedule that is maintained in the State of Indiana, collecting our current by means of a bow-trolley as outlined. We have experienced no trouble whatever with the bow-trolley. I am not able to give any data as to the car mileage of the life of the shoe of the trolley, which is composed of wood plated with aluminum, but it will suffice to say that the cost of operation and of renewing the shoe is not more than, and I consider it is less than, would be the case with the ordinary trolley. In general terms I can say that we are well pleased with the operation of the equipment. Some minor changes have been made in the apparatus, but on the whole it is very satisfactory.

W. B. Potter.—Without doubt there is a large field for the alternating single-phase railway motor, and where the service conditions are such that the desired results can be obtained with a smaller expenditure this type of apparatus can be used with advantage. Likewise there is a field of usefulness for the three-phase induction motor, but whatever type of equipment be installed it should be selected with special reference to the work it is required to perform. The comparative expenditure for equipping a given project with single-phase alternating or direct-current apparatus can be accurately determined, but this comparison of first cost does not represent the net result of operation. The comparative maintenance cost of both systems should also be taken into account. The elimination of the rotary converter and the possibility of operating without sub-station attendants who have no other duties, is a credit in favor of the alternating-current equipment. The maintenance of the car equipment itself will, however, in all probability be more expensive for the alternating-current than for the direct-current equipment. There are several inherent features in the single-phase alternating-current motor which influence the question of maintenance, and to which I will briefly refer: The magnetism of the motor, like the current by which it is produced, is alternating in character and develops differences of potential in the windings of such a degree and character as to be more liable to prove injurious to the windings than in the case of the direct-current motor. For instance, should a single turn of the field winding in a direct-current motor become short circuited on itself, the effect would be simply to eliminate one turn of the field coil; while in an alternating-current motor a similar short circuit would cause that turn to act as a secondary of a transformer, and a large local current would be produced within the short-circuited turn, which would soon burn out the coil. The alternating magnetism also produces within the armature coils an e. m. f. which injuriously affects commutation and necessitates special provision being made to secure results comparable with direct-current practice. A feature essential to the commutation of the alternating-current motor is an additional field winding, known as the compensating winding, which is wound through the face of the pole pieces midway between the ordinary field coils, and serves to neutralize the armature reaction. In addition to this compensating winding in the fields the motor armature is sometimes provided with what are called high-resistance leads between the armature coils and the commutator. The effect of these leads is to diminish the local current in the armature, caused by short circuiting adjacent commutator segments by the brush. The location of the compensating winding in the pole faces renders it liable to injury in case the armature core should strike the pole pieces, and the presence of high resistance leads may, under some circumstances, result in severe local heating and burning out of the armature. The magnetism of the motor, owing to its alternating character, is of less average density than in a direct-current motor, with the result that for a motor of given dimensions and output the armature speed is considerably higher. To keep the armature speed within the limits that direct current experience has shown to be advisable as affecting the performance of the bearings and a proper contact of the brushes with the commutator, it is necessary to make the alternating-current motor of larger size for the same output. The characteristics of an alternating-current motor, particularly the power factor, are affected by the air gap between the armature and pole pieces; better results being secured with a smaller gap. The alternating-current motors, as ordinarily designed, have an air gap of about one-half that commonly used in direct-current motors of the smaller sizes, and even a less percentage of air gap in the larger motors. We have, therefore, a tendency toward higher armature speeds and a smaller air gap, coupled with a field winding wound in the pole faces, conditions which necessitate a more frequent and careful inspection of the motors or else more frequent and expensive injuries to repair. It is probable that the maintenance of the control and other appliances will not differ materially from that of a direct-current equipment. The maintenance of the car equipment is, however, not a controlling factor in the cost of operation, and if it should be doubled, or even trebled, the alternating-motor maintenance may be far more than offset by the reduction in fixed charges resulting from a lower first cost of the proposition considered as a whole. The conditions which demand more frequent inspection, particularly of the motors, may presumably be a cause of more frequent interruptions in service; hence the importance of giving the alternating equipment more attention than is customary with direct-current motors must not be overlooked. Improvements in detail will, undoubtedly, be made, and the motors will be strengthened and improved in such features as may develop a weakness, but there appear to be certain inherent conditions, some of which I have mentioned, which cannot be wholly eliminated in the alternating-current motor as we know it to-day. I would also call attention to possible interference with telephone and telegraph lines which may result from the installation of an alternating-current trolley adjacent and parallel to such circuits. The telephone lines, having a metallic circuit, are more subject to electro-static influences, the effect of which it is possible in some degree to eliminate. The telegraph lines having, however, a ground return may have developed within the circuits sufficient e. m. f. to seriously affect the working of the instruments. A metallic return with the circuits frequently transposed, as is common in telephone practice, may prove an efficient remedy. An alternating control of the single-phase motors differs from that of direct current, in having a transformer or compensator carried on the car as a medium for supplying the motors, instead of using the fixed voltage of the trolley line. The secondary windings are provided with taps giving different voltage, and each point of the controller is, therefore, an efficient running position, and, furthermore, additional taps may be provided in the secondary to give higher voltage than the normal running potential. This higher potential serves to give a higher speed to the car for making up time or to compensate for any abnormal drop in the trolley voltage.

Mr. Potter then presented his paper.

President Ely.—Is there to be any further discussion on the paper of Mr. Scott or the paper of Mr. Potter?

John I. Beggs.—I desire to ask a question on this subject of Mr. Potter, to see whether the answer will be as pronounced as was Mr. Scott's, when he expressed his views concerning the single-phase motor as to its present state of development and as to the advisability of adopting it on operating roads. Mr. Scott's paper has been of great interest to me. I feel differently toward the single-phase motor from what I did when I came to this convention, and I wish to say that if I had obtained no other knowledge at this convention than that which I have gathered in the last hour, I should feel myself fully repaid for attending this convention. In connection with my associates I have given a great deal of attention to this motor in the operation of our properties. The representatives of the manufacturing side of the two large manufacturing concerns have not previously been nearly so positive in making statements from the commercial side as Mr. Scott is in his statements from the engineering side; and I have been wondering what the reason for the reticence of the representatives of the commercial side was, whether there was a disinclination to go into this matter extensively, or whether it was doubt as to the results of the promises of their engineering corps. In one of the large street railway properties which I administer, we control everything in the State. We have interurban lines radiating almost like the spokes of a wheel at diagonal points. We bring our interurban cars, which is a large part of the business, into the center of the city. We must enter the city over 6 or 7 miles of track, operated by direct current. I have sent representatives during the past twelve months to investigate these various lines operated with alternating current, and we have had very conflicting reports concerning them. One of our most recent reports was to the effect that the system was so unsatisfactory that it was to be abandoned. We were contemplating trying the apparatus, but it has been very difficult until to-day to obtain data that the manufacturers were willing to stand behind. At the present time I am building three 12-mile extensions, the farthest point of which will be 33 miles from the center of operation. It is the intention to continue these extensions to 75 or 80 miles, possibly 100 miles, in our development of that section of the country. It is a serious question whether we should put on this composite motor; and if it would be equally effective with the direct current as it would be with the alternating current in the more sparsely settled sections of the State, on many of the lines a car operating only once every 2 hours. The paper is one of the most meaty papers I have ever heard presented at a meeting of this association, and I desire to know whether Mr. Potter and his associates in the engineering department of the General Electric Company feel as strongly on this question as Mr. Scott indicated in his paper and by his remarks following the presentation of his paper. One of our representatives came back from one of the tours of investigation with the statement that after you got onto direct current the capacity of the motor was greatly reduced; that taking a 75-hp motor, which seems to be about the maximum size that it is practicable to get under the ordinary car which is used for both urban and interurban service, the capacity of the motor was cut down very greatly when brought onto the direct-current system. I now understand that is not the case, and that it has practically the same power at 600 volts that it has on the higher voltages on the alternating-current section of the city road. As we have present representatives of the engineering departments of both the large electrical manufacturing companies, I want to get some information from both. There seems to be some difference of opinion between the engineering and manufacturing side and the commercial side.

Mr. Potter.—I would say in reply to Mr. Beggs' question that there is no doubt that the alternating-current motors can perform any service now done by direct-current apparatus. I believe that fully; there is no question in my mind on that point. The proposition is simply a question of judgment and selection as to whether you should or should not use the alternating current.

Mr. Beggs.—That is the point. That is what perplexes me, as a man who takes the responsibility for an expenditure of money running into hundreds of thousands of dollars. It is a question which I have up now, whether I shall build at points, say, 35 miles distant from our main center of generating power, new power stations or depend upon this alternating-current single-phase motor, knowing that the heavy amount of the service in our case must be after the cars reach the 7 or 8 miles area where we have the direct current and where the trains are heavier. It is the doubt you throw out which perplexes those of us who are charged with determining what the engineering shall be. When there is this difference of opinion between the most eminent authorities in the business, it leaves the layman in a quandary.

Mr. Potter.—In replying to Mr. Beggs I would add that the question of judgment and selection as to whether alternating-current motors should or should not be used is mainly a financial question, and not strictly an engineering proposition. Both these factors are, however, closely related, and while it is the latter which determines the former, it is the former, giving due consideration to all incident advantages, which should govern. The alternating-current motor when running on direct current will do even more work than it will on alternating current. A good alternating-current motor in a general sense is a most excellent direct-current motor, with respect to acceleration and heating.

Mr. Beggs.—The statement on expenditure as I gather from Mr. Scott's paper, is that it would cost less money to put in the composite system than to limit one's self to the direct current, and install sub-stations and power plants at different points.

W. B. Potter.—It depends largely upon the relative cost of the car equipments, sub-stations and trolley conductors for any particular proposition. On a road of, say, 50 miles in length, employing few cars, the saving secured by the use of a high potential trolley would be so much greater than the additional cost of the alternating car equipments that there would be little question but that alternating-current apparatus would be more suitable for such a proposition. On a road of a few miles in length and having a number of cars per mile the relative cost of the alternating car equipment would be a much larger proportion of the total cost, and whatever saving could be made in the trolley conducting system would be relatively small. As I have stated before, it is not, however, wholly a question of initial cost, but it may be said in general that where the initial cost for alternating-current and direct-current installations are about equal, the choice should be for direct-current equipment, owing to the lower probable maintenance of the installation as a whole.

C. O. Mailloux.—I think both of the gentlemen are right, though they do not express themselves in exactly the same terms. Let us define these terms, and the whole situation becomes clearer. Mr. Potter is correct when he says it is a question of finance, or it is a question of the financial analysis and estimation of many factors which bear upon and affect the operation of the road, but it is, unfortunately, one of those financial questions involving considerations, both technical and financial, which can only be properly handled by a competent engineer. That is what it means. If Mr. Potter had said it was a question of financial engineering, or of engineering finance, he would have made the statement a little more clear. To put it somewhat differently, we may say that the question, whether the equipment shall be alternating single-phase or whether it shall be a direct current, fed by sub-station systems, depends in general terms largely on the number of car miles run per mile of track. If we have a long track mileage and a small number of trains, that is to say, a very long headway—suppose, for instance, we have a line 35 miles long and expect to run only three round-trips a day—there is no question but that the single-phase system, even in the crudest form, would be the only thing to use. Those who have undertaken to solve the problem in such a case by the use of sub-stations are sorry now, or soon will be, for it. Perhaps one remark by Mr. Potter gives a clew as to why some of them were led to do it. It was possibly because there were then no direct-current turbines on the market. They had good turbines for alternators. The temptation was placed in their way, and they were led into it. I wonder if to-day they would not do what others will do, namely, generate current direct when the bulk is to be used as direct current, and have a little of the current converted into single-phase or multi-phase for the outlying districts. Again, to go to the other extreme, suppose we have a line of considerable length in miles, but with heavy traffic, with trains running on 10 minutes headway, especially with double or four-track equipment, it is manifest that there is no question but that the three-phase a. c. transmission with d. c. sub-stations would be the better plan. Evidently, between the two extreme cases just assumed, there is somewhere a particular case where the merits and demerits of the two systems nearly or quite fully compensate each other. In such cases the question which system should be adopted is one which cannot be answered offhand or by one person alone. It is necessary to study both the financial and engineering features, possibilities and limitations of the case, first with one system and then with the other. It is a question for the intelligent manager of the railroad company in connection with the intelligent engineer to decide together. They then doubtless will have to call into their confidence Mr. Scott and Mr. Potter and other representatives of the manufacturers, to furnish them the proper information as to the possibilities available in any electrical or mechanical way by means of the different kinds of apparatus. Knowing these different factors, and estimating the value of the different elements in terms of money, the equation of dollars and cents quickly indicates the system which will give the best return on the investment in the particular case. I think this was what Mr. Potter meant. I think that both Mr. Potter and Mr. Scott will agree with me when I say that the fitness of any system is sooner or later determined by substantially this same process.

Mr. Hall.—In connection with this subject I will say that I rode on a single-phase railway a few months ago—I think this may have some bearing upon Mr. Beggs' questions—and it took some 4 hours to make a trip which would, with the direct-current motor, not have taken more than about 2 hours. That was due to the speed of the car in ordinary running and also due to a lack of acceleration. The time it took to start was a great deal longer than to start on direct current. That is one of the difficulties which has been experienced and has possibly been overcome. My experience occurred a few months ago on a single-phase road, and I understand that the road is now in perfect operation and supposed to be satisfactory. In connection with Mr. Potter's paper I refer to one paragraph, in which he says: "To meet the requirements of the higher voltage now more commonly used, and to further insure the stability of the motor as regards flashing, it is now the practice to provide a greater number of commutator segments; that is, the voltage difference per commutator bar has been reduced to a lower figure." That paragraph in itself seems to my mind somewhat misleading. It seems to say that increasing the number of commutator bars in a given machine will reduce the liability to flashing. I beg to take some exception to that paragraph if I interpret it correctly, because a given motor with the one-turn winding, having 150 bars, would probably be a much poorer motor if it had 200 bars. Its motor power would be increased before its armature increased. Consequently, I should put this paragraph in just the opposite sense, and say if you reduce the number of commutator bars in a given machine that you improve the commutation because you reduce the reaction and increase the time of commutation. The bars I should leave out. That may have some bearing, but at the same time the motor could be improved by having the bars reduced.

Mr. Potter.—In order that my paper might not be too lengthy, I have perhaps stated a number of facts without giving sufficient reasons therefor. The commutation is not influenced by the width of the commutator segment to the same degree that it is by the voltage between segments and the speed of the armature. The so-called sparking of a motor is the arc visible at the instant the segment leaves the brush. Incidentally, by increasing the number of segments with a given winding two beneficial results, as affecting commutation, are secured; an armature having a lower speed, and a commutator in which there is less difference of potential between adjacent segments.

Mr. Hall.—I take it your remarks apply to a motor of a given rating and given speed. Of course, if the speed is reduced at the same time the motor is different.

Mr. Beggs.—I ask whether, when the alternating-current motor runs as a direct-current motor, the acceleration of the alternating-current motor is as good as the direct-current motor?

Mr. Scott.—The rate of acceleration in the motor depends upon the rate of application of higher voltage to the motor; in other words, at the rate at which the controller is thrown on. The rate of acceleration on the alternating-current motor in some cases has been slow, because the controller was thrown on slowly. For example, on the Indianapolis road, if the controller handle, which is adapted to both direct and alternating current, should be turned at the same rate, it happens to give a much lower rate of acceleration on alternating current than on direct current. In order to get the same acceleration in the case of alternating current the controller should be moved faster. Some of the earlier motormen, who were accustomed to operate on direct current, operated in the same way with the alternating current, and got a slower acceleration for that reason. When the rate of the acceleration of the controller was increased the rate of acceleration of the car was increased also. Regarding the point brought up a moment ago, in which a visit to some road somewhere was made and conditions were found which were not equal to those in roads operated by direct current, I presume that the Indianapolis road was referred to in that case. I visited that road a number of months ago, and found that the schedule was as about stated, it took 4 hours to make the round trip, where 2 hours ordinarily would be plenty, but I did not care to go any faster than we were running. The road had been laid in the winter time, and the original contour of the ground was somewhat rolling and the car rolled also. This had one very good effect, which was in the bow-trolley. The bow-trolley had some 3 ft. of length of contact, and the car rolling back and forth made contact sometimes at one point and sometimes at another, and had an oscillation of some 2 ft. or 3 ft. That was all right until the car tipped so far over the one side that the trolley left the trolley wire, and then there was apt to be trouble. That has been straightened out and things are running smoothly now at 60 m. p. h.

Mr. Mailloux.—I want to refer to a point not mentioned in the discussion, namely, the reference to artificial ventilation mentioned by Mr. Potter. I am glad to have that point mentioned by Mr. Potter, as I consider it very important, perhaps one of the points of greatest importance to street railway men at the present time. All street railway men are familiar with overheated motors, especially when they find themselves compelled to add another trailer to an overworked motor that is already hauling one or two trailers. They find that the motors are overworked to the point where the poor things give up the ghost. In many cases, while the practice of adding trailers, which is always reprehensible, since it is often unavoidable, palliative measures are sought through the means of artificial ventilation, and if no extensive use of this means has yet been practically made, it is because it has not yet been developed sufficiently. I took up the matter with my associate, Mr. Gotshall, some years ago, out of necessity. We found ourselves compelled to resort to artificial motor ventilation, because we feared that we could not obtain the desired schedules on the New York & Portchester Railroad without it, since the largest motors then on the market were not of sufficiently large size. Since that time larger motors have been made, and it may not be necessary to resort to artificial ventilation when we get running, but the attention we gave the subject at that time showed conclusively that the same methods which we had in view should be successfully applied in many cases.

I have been surprised in talking with street railway men to find the great necessity which actually exists for artificial motor ventilation. I am glad, therefore, to have the manufacturers who have good facilities for developing such methods as that take hold of it and see what can de done. I fear ventilation cannot be accomplished by means of ventilating fans. I think some means of producing a current of air having a greater pressure than is obtained from fans will be necessary. We contemplated using first the exhaust from the air brakes, and, secondly, a direct air stream taken from the auxiliary air brake tanks, which would mean that the air compressor would have to be made of larger capacity in order to afford sufficient air for ventilation, in addition to that required for the air brakes. I hope that even the ventilating fan will succeed, as it possibly will in large units. In the case of small motors under street cars I think it would be useless, but it is interesting to find that efforts are going to be made in that direction.

PAPERS PRESENTED AT THE CLAIM AGENTS' CONVENTION

OPERATING DEPARTMENT VS. CLAIM DEPARTMENT

BY E. W. O'CONNOR,
Claim Agent, Savannah Electric Company

The relationship between the superintendent and the claim department should be most cordial, inasmuch as their interests are identical. We find that the claim department can best co-operate with the transportation department by keeping in close touch with the trainmen, noting negligence, carelessness, etc., and immediately reporting the time and circumstances to the superintendent, who in turn applies the necessary remedy. All of this should be done in perfect good faith without causing any friction or the slightest suggestion of usurping any authority—simply the best ways and means to lessen accidents.

We also find it good policy that after the trainmen are instructed by the transportation department in the operation of cars to give them in charge of the claim department for thorough instruction in the handling of accidents and the best way to avoid them. As we know, at least 50 per cent of accidents are attributable to women disembarking from cars the wrong way, that is, catching the grab-handle with the right hand and facing the rear of the car and stepping off just as the car is in the act of stopping. The result is invariably the same—a fall backward. The crew are immediately on the ground assisting her to her feet, brushing dust from her skirts and offering sympathy galore. Sometimes she will thank them,—perhaps exonerate them,—and walk to her home feeling a little mortified, perhaps, about the figure she cut before the rest of the occupants of the car, but really feeling all right. 'Tis then that the ambulance chaser, runners and neighbors get in their work. A physician is sent for. Ordinarily a dose of salts and a little liniment would be all that is necessary; "but, a street car accident, why, that is different," quoth the doctor, as visions of a fat fee arise before him.

In the next scene, probably on the next day, a letter is handed to the claim agent from some "shyster" that his client (if married) is suffering from a possible miscarriage (if this side of fifty years), but at all events a floating kidney, menstruation fearful, partial paralysis, heart-rending pains in the back, badly bruised, mangled, innumerable lacerations (invisible to any one save the doctor), any one of which will amount to a permanent injury—all on account of the careless, vicious and malignant manner in which his said client was treated, for just as she had one foot on the running board and was in the act of placing the other on the ground, the fiend of a motorman started the car off with a sudden and violent jerk, hurling his said client to the ground, "all of which I would be pleased to settle for a fee for myself and the doctor, and we will treat our client right," or words to that effect.

If the case should ever come up for trial, that same woman would get on the stand and under oath swear that the allegations set forth by her lawyer are true, when she knows she is telling a deliberate lie—all for the sake of the almighty dollar. How often have you been up against the same proposition?

I merely cite you this in order again to call attention and to urge earnest co-operation between the transportation department and the claim department. Some roads adopt the system of having the conductor (on open cars) stand on the running board with both hands on the grab-handles and not allow a woman to leave her seat until the car is fully stopped. Others adopt different methods. For that reason we have organized this association in order to exchange ideas on anything that may be of mutual benefit to our respective roads.

The Savannah Electric Company, of Savannah, Ga., operates one of its suburban lines to a salt-water resort known as the Isle of Hope, a distance of about 6 miles from the city. While one of its vestibule cars was returning to the city on Saturday, Oct. 8, 1904, about 11 p. m., it ran into a wagonload of negroes at a grade crossing, killing two, Silas Barns and Edgar Barns, father and son. The widow, Emma Barns, was also an occupant of the wagon at the time of the accident and was considerably bruised and shaken up. She declined to treat with the claim agent of the company, but placed her case in the hands of attorneys, who filed suit on Oct. 15, just nine days from the date of the accident. The amount of the suit was for $27,123. This amount included her personal injuries in connection with the death of her husband and son. On July 28 a settlement was effected with the attorneys for $1,250. On July 31, one of the relatives of the widow Barns called on the claim agent of the company and wanted to know: "How much moneys de railroad gin to dem liars wat hab Emma Barns' case." Being asked the amount she received, his reply was: "Fo hundred and sixty tree dollar and tweny fibe cent." Or, in other words, the lawyers got $824.75, and the woman who lost her husband and son, aside from her own injuries, received $463.25. Ye gods and little fishes, does this remind you of the story of the superintendent who shook hands with the short arm conductor and thanked him for returning the car to the barn at night?

BOGUS CLAIMS AGAINST STREET RAILWAY COMPANIES

BY JAMES R. PRATT,
Claim Agent, United Railways & Electric Company, Baltimore, Md.

Some time ago I received a notice from the secretary of your association, requesting me to come to Philadelphia prepared to make a few remarks upon the subject of fakirs, malingerers and ambulance chasers. I wondered at first if anything personal was meant, then decided he referred to those outside the railway companies. That all of these people exist, is well known to every one who has had any experience in the adjustment of damage cases. The methods pursued by them to secure money by dishonorable means is so well known to every claim agent that I deem it hardly necessary to occupy your time by describing the various channels through which they must work before securing either a settlement or a verdict. I will, therefore, mainly confine myself to some suggestions which may be of value in eliminating this class of people.

First—Fakirs. These may be divided into two classes: the criminal fakir, who starts out with the intention of deliberately getting injured for the purpose of securing money, and the malingerer, or injury fakir. In most cases those who fake accidents work in twos or threes, and conspire to defraud railway companies, public service corporations and quasi-public service corporations. They properly belong to the lower class of criminals, and, like murderers, will almost invariably leave some loophole whereby with persistent effort they are eventually brought to justice. A system of photographing suspicious claimants, who may be classed as floaters, or persons who have no permanent place of abode, would probably aid much in eliminating accident fakirs.

Second—The injury fakir or malingerer. This class is by far the most dangerous of any class of crooks with which defendants in damage cases have to contend. Morally, these people ought to be looked down upon and despised with more contempt than a common thief, because they have it in their power, when trained by legal and medical minds, to perpetrate fathomless frauds. It frequently happens that a person, honest in the ordinary walks of life, is very slightly injured in an accident. At first he pays little attention to the injury, but upon reaching home and conversing with friends, many of them newly discovered among the legal fraternity since his misfortune, he is advised to take some action against the person or company through whose agency the accident occurred. The injured party at first thinks he has no case because he does not feel that there is any responsibility on the part of the person or corporation connected with the accident, and makes a statement as to how the accident occurred which would tend to relieve the person or corporation from any liability whatever. His friends begin to talk to him and advise him that he should take some action, to which advice he listens, and, in the language of the street, sees a chance to make "easy money." If his mind is once made up to this, he at once lends himself to the unscrupulous, and I must say, dishonest lawyer, medical man and ambulance chaser, and he is willing then to testify to anything that is necessary to make out a case of negligence; his medical man is willing to testify to all kinds of serious and permanent injuries, such as shock to the nervous system, spinal trouble, floating kidneys, pains in various parts of the body, loss of sleep, and, if the injured party be a child, one of the favorite pieces of testimony produced by the parents and medical men is absentmindedness. The testimony sometimes shows that a child is sent to a grocery store to get a pitcher of milk and asks for a pitcher of water; again it is sent for bread and asks for butter; all of which I have heard parents and medical men testify to in court. It is really very pathetic to see how easily some plaintiff's conscience fades away at the trial of a damage case.

Then there are people who meet with an accident and who are only slightly injured but, aided through a process of mental suggestion by those who traffic in injuries, finally honestly believe that the injuries are serious and brood over the accident until they suffer from melancholia or perhaps become hysterical. These people are often difficult to deal with, and much depends upon the character and ability of the attending physician. They may be attended by a physician who is perfectly honest, but who belongs to that class of medical men known as "alarmists," and who is afraid that the injury is going to prove permanent and serious. On the other hand, frequent cases have come before me where the physician was an "alarmist" for a contingent fee. If the physician is honest and is only alarmed at the seriousness of the case, it usually follows that he is a man with a limited practice and has not had much, if any, hospital experience. In this connection I might add that the medical men who are the most competent to treat accident cases are those who have had a large hospital experience. They see accident cases in every form daily. Medical experts advise us that the best way to deal with people who are alarmed about their condition is to engage them in some occupation which will not leave their minds free to dwell upon their ailments, real or imaginary. Statistics show that a passenger who is injured by the negligence of a carrier does not recover from his injuries as speedily as an employee who is injured by the negligence of a fellow servant and has no legal right of recovery, which indicates to what extent mind is controlled by matter. A man who has no right to recover in damages recovers in health almost twice as rapidly as his more or less fortunate brother.

The ambulance chaser is one of the most aggressive and progressive individuals with which society of the present day has to deal. He is very eager for business, his nerve and audacity are unlimited, and his persistence is worthy of a better cause. To my mind, there is no reason why such a person should exist today, but the main question in many States is how to eliminate him. The ambulance chaser or shyster lawyer, as soon as he hears of an accident, either through the press reports at police station houses, or by any one of the various channels through which his information comes, goes at once to the home of the injured party, if taken home, or to the hospital if he be taken there. The injured party is advised of the gross negligence on the part of the person or corporation connected with the accident, and is told what an excellent chance he has to recover damages. The rivalry between ambulance chasers is such that the methods pursued by them in getting business are very unique, to say the least. In our own city, one of the most persistent ambulance chasers that ever existed usually goes to see the injured party, representing that a client or friend of his has witnessed the accident and that he, the ambulance chaser, has secured the names of several witnesses and could prove a strong case of negligence, but unless the case were given to him the witnesses would not be forthcoming. The injured party naturally feels that he should give his case to the one who is in the best position to prove it. The ambulance chaser, of course, has no witnesses, but uses this pretense in order to get the case. Owing to the various attacks made on the shyster lawyer he is beginning to recognize the danger of continuing to solicit cases himself or of even employing a regularly paid runner, and he is therefore beginning to devise new methods of getting business. One of the favorite methods which the ambulance chaser pursues to influence the minds of injured parties is to carry with him newspaper clippings containing accounts of the verdicts which his shyster lawyer has recovered, and then presents a contract which reads as follows:

> I, Peter Plaintiff, hereby employ John Smith, attorney-in-fact, who agrees to prosecute my case against Daniel Defendant for injuries received by me, blank date, blank time, blank place, and I further agree to pay said John Smith, attorney-in-fact, 50 per cent of such sum of money as I may recover either by way of verdict or compromise; and I further certify that I sent for the said John Smith, attorney-in-fact, and requested him to take my case, and that he did not come to my house before I sent for him.
>
> (Signed) PETER PLAINTIFF.

When this is done the question of how the accident occurred is discussed. The description of the accident given by the injured party may be such as would prevent his recovery. The ambulance chaser then says, "On your own statement you have not much of a case, but if the accident had happened in this way, etc. (describing a case of negligence), you would have no trouble in recovering." The injured party begins to study over it, and finally works himself up to a certain pitch whereby he discovers that what the lawyer says is identical with what he did say or intended to say in his narration of the accident, and if it be a case of falling while boarding or alighting from a car, the usual stereotyped testimony is that he had one foot on the step and one on the ground when the car was suddenly started and he was precipitated to the ground and sustained serious and permanent injuries. It is also amusing to discover the extent of the legal knowledge of many ignorant people. Frequently we hear in court descriptions of an accident, the wording of which is identical with the language used in our Appellate Court decisions where the plaintiffs were permitted to recover. How often in cases against the railroad company we hear the plaintiffs testify that they stopped, looked and listened—those watchwords which the courts have written over the doors to the steam railroad companies' treasuries—these words throw open the doors and they step in and take the money. From this it may be seen that the ambulance chaser is not only guilty of common law barratry, but of the more serious crime of subornation of perjury. These people are the most difficult class to eliminate, and for myself, I would rather deal with a criminal fakir than with an ambulance chaser and an unscrupulous lawyer.

One of the favorite methods pursued now by shyster lawyers is to have a number of steerers located in different parts of the city; the steerer is usually a person engaged in some occupation—in some cases it is believed they are persons who hold public positions—and as soon as he hears of an accident he proceeds to the nearest telephone and informs the shyster lawyer, giving him the name and address of the injured party. The shyster lawyer upon receipt of this message goes at once to the home of the injured party and states that he was sent for; when pinned down to it, does not know by whom, but presumes it was the injured man himself or one of his relatives or friends. He immediately starts the usual line of talk in order to get a 50 per cent contract. When an effort is made to get at the shyster lawyer for this kind of practice, he invariably states that he was sent for—sometimes he claims the injured party sent for him, oftener he cannot remember just who it was. This also applies to physicians who make a practice of testifying for plaintiffs. Frequently, when one of these physicians is on the witness stand, under oath, an effort is made by the defendant's counsel to show the connection which exists between the plaintiff's counsel and the expert medical witness, but the medical man never has any recollection of who called him to attend the plaintiff other than the message came by 'phone. From this it is very evident to any fair mind that this kind of a medical witness has no regard for the sanctity of an oath.

Nor has this practice even the redeeming feature of being a blessing in disguise to those whom the shysters approach. It is true, perhaps, that in some genuine cases of injury where the people would be entitled to recover they are too ignorant to make claim for redress, but in these days of damage-suit enlightenment the ignorance of a man injured by a railroad or railway company who does not understand that he may bring a suit, is indeed the acme of ignorance, and the enlightenment of the Russian peasant will shine brightly beside the darkness of the ignorance of such a man.

Of course, some people are benefited pecuniarily by the shyster lawyer who persuades them to bring suit; but these are the people who know they have no right of action and can be benefited only by their own fraud. The party who has honestly suffered an injury can get a square deal and a larger return by dealing directly with the companies themselves, or if they refuse them, through an honest, reputable lawyer, than by the best of the shyster lawyers, who not only under contract take 50 per cent of the amount recovered, but by the most dishonorable methods generally manage to absorb the lion's share of the claim or verdict. I think it can hardly be questioned that it would be much to the benefit of the honest claimant to have the shyster lawyer and the ambulance chaser behind the bars.

It has not been so many decades ago that the legal profession was a liberal profession, and solicitation of cases was a criminal offense at common law. It may still be so in many of the States. It was made a criminal offense, not because of any gentleness toward the profession or toward those who have committed an injury, but for the protection of the community. Nothing was deemed to be more injurious to the community than constant litigation which broke into the peace of the community, stirred up conflicts among the people, and found its way into the sacredness of home life. The lawyer, therefore, in those days who dared to approach an individual unsolicited with a suggestion of litigation was not only debarred by his professional brethren from further practice, but found his way into the common jail. It may or may not be a criminal offense at common law to-day, but the principle of the protection of the community of the days of common law which made it a criminal offense is still an abiding principle in our larger and more complex life of to-day.

But the question, however, which most concerns us now is not so much the methods pursued by fakirs, malingerers and ambulance chasers to obtain money dishonestly, or how to meet them at the trial table, as how to eliminate them. Under the conditions which exist in politics to-day, it is doubtful if the shyster and ambulance chaser can be entirely eliminated, but with constant effort and united action it seems to me there could be some method devised by which they could at least be kept in check. The reputable lawyer and physician with a fearless and absolutely fair-minded jury can do much to relieve the existing conditions. It should be the duty of an attending physician, as soon as he finds that a claimant is faking an injury, to advise him at once that he will have nothing further to do with the case unless the claimant makes up his mind to act fairly and honestly.

When it comes to actual fight at the trial table there are a number of little practices that constant study will produce and which often give good results. In cases where it is suspected that the plaintiff and his witnesses will testify to such facts as might be necessary to prove their case, it is very desirable that the witnesses be excluded from the court room. I have seen this worked successfully; in fact, I recall one case—a wagon collision—in which no two of the witnesses could tell the same story; some of them had the wagon going in so many different directions and the car going in two directions, that the jury just laughed at them.

Under the decisions of our own courts, and of the United States Supreme Court, the court cannot compel the plaintiff in a damage suit to submit to a physical examination, but our courts have held that if the application is made and the plaintiff refuses to submit to an examination, his refusal is a matter that can be argued before the jury. It has been found desirable when a case is first called in open court to make an offer in the presence of the jury to have the plaintiff examined by any physician whom the court might name. If the plaintiff refuses, it should be an indication to the jury that the injuries are not genuine. Satisfactory results have been obtained by this method. Reputable lawyers, by united and concerted action can accomplish much toward breaking up the practice which prevails in most of the country in damage cases, many of which practically amount to blackmail, to which end I would offer the following suggestions:

First—That an organization composed of a committee of young, active and aggressive lawyers, to be known as a vigilance committee, be formed in every large city. This committee should gather all information possible in relation to the practices pursued by shyster lawyers, unscrupulous physicians and ambulance chasers, and should keep a record of the testimony given by unscrupulous physicians who make a practice of testifying in cases as to serious and permanent hidden injuries; also keep a card index of all professional and suspicious witnesses, whether medical or otherwise, and report this, with any other information bearing on the subject which they may be able to gather, to the Supreme Bench of their respective cities. This committee should be composed of men who are absolutely honest and absolutely fearless and who would not be afraid of a little criticism from the underelement of the bar.

Second—The passage of a law by the Legislatures of the various States, which would not only disbar and punish the shyster lawyers who persistently gun for cases, but also punish the common ambulance chaser, who, under existing conditions, is practically absolved from any criminal action whatever. He is not a member of the bar, but is one of the greatest curses with which the community has to deal. Such a bill should meet with the approval of the better element of the bar in all States and can only be opposed by the shyster lawyer and his followers.

Third—In the event of the failure of the two previous suggestions, the passage of a law by the Legislatures of the various States which would require plaintiffs in all cases before instituting suit to deposit with the clerk of the court in which the suit is brought, an amount of money estimated to be sufficient to cover the costs of the suit, or to give security for like amount, said security to be approved by the clerk of the court in which the suit is filed. This, in some cases, might work a hardship, because it is undoubtedly true that there are honest people who receive bona fide injuries and who have a right of action, who are not financially able to deposit the amount of costs or to give security for same. This objection might be overcome by the adoption by the various States of an act of Congress which authorizes the bringing of a suit in forma pauperis.

A still better method probably would be a law making the attorneys who bring the suits personally responsible for the costs. This, to my mind, would be the most effectual means of driving the shyster lawyer from the court house, or temple of justice, as he chooses to call it.

The ambulance chaser and the shyster lawyer are a menace to society, an obstruction to business and a curse to the legal profession; they prowl around like hungry wolves seeking whose property they may devour. The question may well be asked: "Is a man even in the humbler walks of life, who by industry and thrift has saved enough to procure a home for himself and family, secure?" The ambulance chaser and shyster lawyer first leveled their guns at steam railroads and street railways, as this class of defendants comes in more frequent contact with a greater number of people than any other public service corporation. The work of the ambulance chaser was gradually extended until it embraced private corporations, manufacturing establishments, large mercantile houses which are compelled to employ a great many persons, and the retail dealer who may employ only a few clerks and drivers. To-day the shyster lawyer finds his way into the home and drags into court the ugly petty quarrels of the family, that would have otherwise been quietly and easily settled but for his bestial presence.

We hear so much of the prevalence of divorce to-day. Has it ever occurred to you to what extent the shyster lawyer is responsible for this, or how great a part he will play in the future if unchecked? In days gone by, men and women learned to put up with the small inconveniences of life and passed over the unavoidable quarrels of everyday life. To-day they are dragged into the court by the hungry jaws of the shyster lawyer, and the result is a wrecked home, man and wife separated, children perhaps thrown upon the community—all this in order that the shyster lawyer may secure his $25 fee as the ambulance chaser secures his graft.

Therefore, I say that this is not a question to arouse the railroad and railway companies alone, but it is a question for the whole community, for the man who is engaged in the manufacturing or mercantile business, the man in the transfer or express business, the man who keeps a retail grocery store and owns only one horse and wagon, the man who owns his home and has a pavement in front of his door and the man who holds sacred the bonds of matrimony and the ties of home life.

As the object of this association is to overcome this evil, I would respectfully suggest and most earnestly urge that no effort be spared for the elimination of the injury fakir or malingerer, the shyster lawyer, the ambulance chaser and the unscrupulous doctor. When these factors are eliminated there will be a very noticeable decrease in the number of claims filed and suits instituted. The three most able factors in combatting this modern evil are the honest lawyer, the honest physician and the public press.

KNOXVILLE RAILWAYS & LIGHT COMPANY

The Knoxville Traction Company and the Knoxville Electric Light & Power Company have been bought by the Knoxville Railways & Light Company. A mortgage for $3,000,000 in favor of the Standard Trust Company, of New York City, has been recorded at Knoxville, looking to the complete refinancing of the properties. Of the amount $160,000 will be set aside to complete improvements under way and in prospect, making the total of $1,000,000 expended in betterments in two years. A reserve of $850,000 is provided to liquidate electric light bonds outstanding, held by the Baltimore Guarantee & Trust Company. An immediate bond issue of $900,000 will be made, but the remainder of the $3,000,000 of bonds will not be floated at present. Ford, Bacon & Davis, of New York, will have charge of both light and railway construction. The Newman syndicate, of New York and New Orleans, is interested in the properties.

QUESTION BOX OF THE AMERICAN RAILWAY MECHANICAL AND ELECTRICAL ASSOCIATION

The following question box was presented at the convention of the Mechanical Association on Sept. 26. The figure enclosed in parentheses after each answer indicates the name of the writer corresponding with the figure opposite his name in the list following:

No. 1.—C. F. Baker, Superintendent of Motive Power and Machinery, Boston Elevated Railway Company, Boston, Mass.

No. 2.—F. F. Bodler, Master Mechanic, United Railroads of San Francisco, San Francisco, Cal.

No. 3.—D. W. Dozier, Chief Engineer, Twin City Rapid Transit Company, Minneapolis, Minn.

No. 4.—T. M. DuBois, Master Mechanic, Syracuse Rapid Transit Company, Syracuse, N. Y.

No. 5.—E. E. Franklin, Master Mechanic, Portland Consolidated Railway Company, Portland, Ore.

No. 6.—J. M. King, Master Mechanic, Danville Railway & Electric Company, Danville, Va.

No. 7.—W. H. McAloney, Superintendent of Rolling Stock, Denver City Tramway Company, Denver, Col.

No. 8.—Wm. Pestell, Chief Engineer, San Juan Light & Transit Company, New York, N. Y.

No. 9.—W. Boardman Reed, Engineer, Maintenance of Way and Buildings, New York City Railway Company, New York.

No. 10.—P. J. Mitten, Superintendent of Overhead Construction, the Milwaukee Electric Railway & Light Company, Milwaukee, Wis.

No. 11.—G. J. Smith, Master Mechanic, Metropolitan Street Railway Company, Kansas City, Mo.

No. 12.—J. L. Sullivan, Master Mechanic, St. Francois County Railway Company, Farmington, Mo.

No. 13.—W. Wallerstedt, Engineer of Car Equipment, Interborough Rapid Transit Company, New York, N. Y.

No. 14.—E. T. Munger, Master Mechanic, Metropolitan West Side Elevated Railway Company, Chicago, Ill.

1. *What is the best composition to use in setting an engine bed on its foundation?*

The best method of setting an engine bed on its foundation is to grout it onto the foundation with Portland cement. The cement should be mixed one-half cement and one-half sand, and poured through a high gate in order to give it pressure to fill up thoroughly under the bed-plate. The engine should be staked up, and leveled to the proper height and lined before pouring the cement. For the same purpose, rust joints made from cast iron borings and driven or calked under, after the engine has been leveled and lined up, are often used. (No. 3.)

2. *What are the arguments for and against a solid spider in large generators?*

1. The spider, divided into two or three parts, has the advantage of being less liable to shrinkage strain than it would be if cast in one piece. It is also more easily handled and transported, and requires less apparatus to place it on the shaft. The advantage of the solid spider lies in its rigidity, and also in the fact that the shaft may be withdrawn from the spider without interfering with the armature. However, the last point is of no value with a large armature, and if sufficient care is taken, the spider which has been assembled in parts, can be made as strong and rigid as the solid spider. (No. 1.)

2. Some of the arguments in favor of solid spiders in large alternating-current generators are: (1) Greater strength on account of solid core in place of spokes. (2) The fly-wheel and rotating portion of the generator are combined into one piece, making a simpler design. (3) When the fly-wheel and rotating element of the generator are combined, it does not require as long a shaft and concentrates the load at one point, thus allowing a shorter distance between bearings. The reduction in length of shaft allows of greater strength and cheaper shaft construction. Some of the points against the use of a solid spider are: (1) Greater weight is required to obtain sufficient fly-wheel effect on account of the metal being nearer the shaft. If the same weight is concentrated in the rim, the rotating moment is, of course, greatly increased. Owing to the design of a solid spider, it is usually necessary to make it of materials which can be built up instead of casting it in two or more sections. (2) The use of a solid spider in the ordinary alternating-current generator usually requires an abnormal diameter or an excessive weight of rotating element in order to obtain the required fly-wheel effect. If this question refers to solid spiders as against split hub and spider, then some of the arguments for and against solid spiders are: (1) Solid spiders give greater rigidity, and, if no internal strains exist, due to shrinkage in cooling, they are much stronger than split spiders of the same weight. Some disadvantages of the solid spider are: (1) That it requires a press to place it on the shaft when being erected. (2) A single large casting is more difficult to produce and heavier to handle. (3) If a solid cast spider is not free from internal strains, it is quite probable that the split spider will be the stronger of the two. (No. 8.)

3. The principal objections to a solid spider in a generator are: In large generators the excessive weight causes great trouble in transportation. The great weight also makes the solid spider (for large units) expensive and difficult to erect at the power station, as it must be pulled over the engine shaft by special devices and put into place by the help of hydraulic rams of 400 tons or 500 tons capacity for the largest generators. In the case of the split spider, it can be bolted together around the shaft, and is, of course, much easier and less expensive to handle, both in transportation and erection. The split spider, however, costs considerably more to make than the solid spider. For small units the solid spider is undoubtedly preferable to the split spider, while in large sizes the split spider is probably the more satisfactory and economical. (No. 3.)

3. *What is the best kind and grade of carbon brush for a 550-volt d. c. generator, and what has been the experience with the various grades?*

The grade of carbon brush to be used on a generator can best be determined by trial. A brush which works satisfactorily on one generator may not be at all suitable for another. A low grade carbon brush can be used with good results on but few 500-volt generators where overloads are carried. The brush from which we have obtained the best service is a high grade brush which contains a small percentage of graphite. The condition of load and inherent characteristics of the generator determine which brush is best. (No. 1.)

4. *Which is the better form of brush holder for a generator; one in which the carbon is free to move up and down, necessitating the current passing the entire length of the brush and being taken from the tip; or a holder which firmly grips the brush, and is designed with elasticity enough to allow of the brush following the commutator?*

1. We have a large number of generators using various kinds of brush holders. From my observation I am of the opinion that a brush which is firmly gripped by a holder which has spring enough to hold the brush on the commutator with the proper pressure, gives better service during overloads and blowouts than one which moves up and down in a holder which only serves as a guide. Almost any holder is satisfactory during light loads, but it requires a good holder and brush to give satisfactory service during times of overload and abnormal conditions. A brush which is held in a holder that merely serves as a guide is very apt to give trouble, due to area of contact between brush and pigtail not being great enough, which causes the pigtail to burn off. Again, if the brush has a soldered cap on the end, it is not unusual for this cap to become unsoldered owing to the brush heating up. If a holder is used which firmly grips the brush, troubles similar to the above do not occur. (No. 1.)

2. I think a brush holder that firmly grips the brush, the best form of holder if designed so as to make quick changes when necessary to change brushes. (No. 6.)

5. *Does a storage battery working in conjunction with a power house with moderately fluctuating loads show an ultimate economy?*

The advantages of a storage battery working in conjunction with a power station with moderately fluctuating loads, depends to a great extent upon the total capacity of the station. If the plant is small and has but a few generating units, a battery is sometimes very useful for carrying the peak and light loads, and can also be used as a standby in case of accident to any of the generating apparatus. If the station is a large one, the principal use of a storage battery is to take the momentary fluctuations, but when these fluctuations are small as compared with the size of a generating unit, the first cost and maintenance of a battery having sufficient capacity to carry the peak load or to be of use as a standby is usually too great to warrant its installation. When greater capacity is needed in a large station having a moderately fluctuating load, it is usually found advisable to install additional generating apparatus instead of storage batteries. Frequently the battery is useful as an insurance against interruption to service, due to its ability to supply sudden demands in case of breakdown to generating units or cables, and the value of this as an insurance may entirely outweigh the question of first cost and economy. (No. 8.)

6. *What is a good cleaner for slate switchboards, where burned around the circuit breakers?*

First clean off with sandpaper; then give one coat of any good filler that will not carry current. When dry, putty up all uneven surfaces, using good, hard drying putty. Rub down with rock pumice stone, clean off and give one or two coats of color, give two coats of japan, varnish, after thoroughly dry, polish in the usual way. A good polish can be made from butter of antimony and raw oil. (No. 14.)

7. *What economies are shown by buying coal on specification of high B. T. U. contracts?*

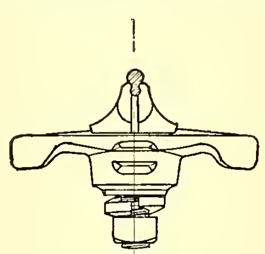
The buying of coal on specification of high B. T. U. contracts is done to protect the purchaser by keeping the coal up to the contract standard, with a penalty of a rebate for every B. T. U. below the number of units stipulated in the contract. Otherwise there would be practically no way to prevent the seller from supplying coal of a very much inferior grade than that considered when the contract was made. In a number of power stations, when coal is bought as above, every cargo or car of coal is tested for its calorific value at the station when received. (No. 3.)

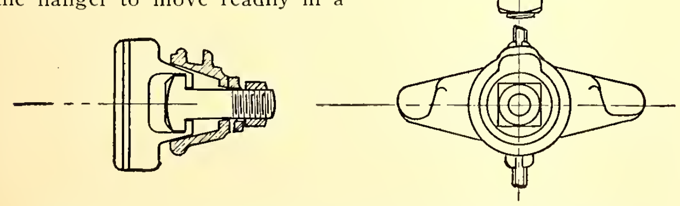
8. *Does the advantage obtained from the use of phono-electric trolley wire outweigh the disadvantage experienced on account of its reduced conductivity?*

The advantages obtained from the use of phono-electric trolley wire depend primarily upon the amount of traffic over and the curvature of the line. Its use is desirable on curves in practically all cases, as the length of wire in use for such purposes does not materially affect the resistance of the whole line, and with the ordinary sizes of trolley wire it has sufficient conductivity for all practical purposes. Wherever the conductivity may not be sufficient, it is advisable to erect feed wire in connection with it. The phono-electric wire has sufficiently increased wearing qualities to warrant further investment for feed wire, as the interest and maintenance charge will be much less with this arrangement than with the common trolley wire used alone. Its use on straight lines is only advisable where cars are running on very short headway, in which case sufficient feed wire may be erected to take care of the difference in resistance between the phono-electric and hard drawn trolley wire, the increased interest being easily taken care of by the difference in maintenance as above. (No. 8.)

9. *What style of "trolley ear" do you recommend? What are the points of advantage of the "clinch," "semi-clinch," soldered ear, etc.?*

The best, for all purposes, is the mechanical clamp ear, being easily attached to the wire during construction, and permitting of ready adjustment when overhauling and tightening trolley wire. By using the combination of ear and hanger, as shown (thus bringing the span wire in close proximity with the trolley wire), a very short ear may be employed, and the possibility of kinking trolley wires at hangers is then obviated. The employment of a flexible suspension, permitting the hanger to move readily in a vertical direction, and slightly horizontally, will overcome the difficulty arising from fracture due to crystallization of trolley wire at the point of the ear. A soldered ear should never be used. The heat necessary to attach softens the wire at its most vital point.





MILWAUKEE COMBINED TROLLEY EAR AND HANGER

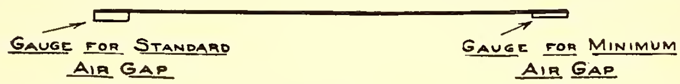
10. *What is the most common cause of flash-overs on small four-pole motors?*

There are several causes for this: weak fields, due to insulation rotting from the wires, causing them to come together, and shortening the field; brush holders not spaced to cover the exact number of bars on the commutator or placed to one side. They should point exactly to the center of the armature shaft; otherwise, as the commutator wears down they will throw out of line, covering the wrong bars on the commutator. Proper care should be taken in winding armatures to get the commutator bars perfectly lined with the slot in the armature core, and the proper lead from the coil to the proper bar in the commutator; otherwise with the coil lead one bar either way you will have the same effect as with the brush holders a little to one side, causing the brush holders to flash over. (No. 4.)

11. *What is the best method of inspecting motors for low bearings?*

1. By going over the motor shell carefully immediately after coming in from service and feeling of it on all sides, should one side be warmer than the other it would denote that the armature is crowding that side and touching slightly. By careful inspection, it may be discovered in this way before doing any injury to the armature. (No. 4.)

2. Most motors are now designed with a removable cover on the bottom shell at the commutator end, whereby free access is obtained to gage the air-gap between the armature and bottom field pole. A simple gage for this purpose, consisting of a piece of spring



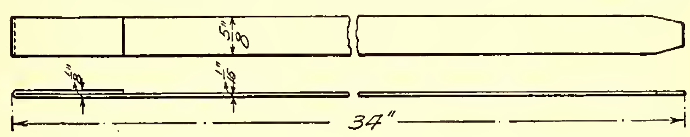
GAGE TO LOCATE LOW ARMATURE BEARINGS

brass about 1-32 in. thick with a width of ¾ in. and long enough to reach the full length of the pole, has been used to advantage. By riveting a small piece of brass on each end, the gage can be used in inspecting the standard as well as the minimum air-gap allowed. (No. 13.)

3. Cars should be run over the pit at least twice a month, and the clearance between armature and pole pieces inspected, by removing clearance cover from lower half to motor casing. All bolts and the condition of grease boxes should be examined at the same time. On an interurban road motors should be inspected as often as is possible, but must not be allowed to run one week without inspection. (No. 12.)

4. GE 58 motors can oftentimes be satisfactorily inspected by taking a "candle look" through the handholes. If in doubt, however, the clearance may be ascertained by taking a narrow strip of fibre and moving it between the pole piece and armature. By keeping the shells tight in the boxes, better results are obtained than if they are put in loose, as I have seen some do. The shaft should be kept true to get the longest wear from the bearings. (No. 5.)

5. We use a piece of iron for a gage, as per sketch, to locate low bearings. This is shoved in between the armature and lower pole piece. An armature in first-class condition should take the large end of the gage; if it will not take the large end and the small end enters freely, the car is left in service and a record made that



GAGE TO LOCATE LOW ARMATURE BEARINGS

the armature is working down. The car is then carefully watched until the small end of the gage just enters, when the car is sent to the shop for repairs. (No. 14.)

12. *How often should motors be overhauled; if on a mileage basis, how many miles?*

1. This should be left to the judgment of the man in charge, as it depends greatly on the design of the motors and on the conditions under which they are operated. Our cars are ordered in for general overhauling about every fourteenth month, the maximum mileage of the motors during this period being 65,000, the average 52,100 and the minimum 43,500. (No. 13.)

2. Motors should be overhauled according to inspection, as the mileage basis will not apply equally to city and interurban service. (No. 4.)

3. This depends upon the condition of armature and field coils, pinion, commutator and bearings. Usually only the last two conditions are understood when the word "overhauling" is used. The style of motor, methods of lubrication, quality of babbit in bearings, quality of copper in commutators, kind of brushes used, and service conditions vary widely. On two-motor GE 1000 equipments, 10-ton single-truck cars, an average of 10,000 miles is considered right in one Western city. On four-motor GE 1000 equipments, 20-ton double-truck cars, 14,000 miles is considered right in the same city. On four-motor GE 800 equipments, 16-ton cars, 9000 miles is all that can be gotten in the same city. (No. 2.)

4. GE 58 motors should be overhauled every 90 days for inspection and cleaning; W. P. or the 800 class should be overhauled every 30 days. (No. 5.)

5. Different types of motors need different attention; a motor run in grease should be overhauled every 90 or 100 days, one run in oil every six months; this is general overhauling. (No. 12.)

13. *What should be the composition of babbit metal for motor bearings?*

1. The following babbit metal composition makes a long-lived and tough metal, that will not pound out nor be too severe on the armature shaft: 100 lbs. tin, 10 lbs. copper, 10 lbs. antimony. (No. 4.)

2. We are using the following composition with good results: Tin, 83 1-3 per cent; antimony, 8 1-3 per cent; copper, 8 1-3 per cent. Our motor bearings have without rebabbiting an average mileage of 52,100, with an oil consumption costing $0.089 per 1000 car miles, the cars being equipped with two 125-hp motors. (No. 13.)

3. A good composition of bearing metal for motor bearings is: Copper, 105 lbs.; phosphor-bronze, 60 or 55 lbs.; tin, 9¾ lbs.; lead, 25 lbs. Phosphor-bronze is composed of copper, 79.7 per cent; tin, 10 per cent; lead, 9.5 per cent, and phos. 0.8 per cent. (No. 3.)

4. Ten parts tin to 1 part antimony. (No. 7.)

14. *Do you use felt wicking or waste packing with oil in your car journal boxes?*

1. Wool waste packing with oil is used on the subway and Manhattan division of the Interborough Rapid Transit Company, New York City. (No. 13.)

2. Elastic wool waste is far superior to felt wicking for journal boxes, from the standpoint of economy and efficiency. (No. 2.)

3. Wool waste well saturated with oil and packed under the axle so as to give a pressure on the under side of the axle, filling the top with a heavy cup grease, gives satisfactory results. (No. 4.)

4. We use wool waste with good results. (No. 5.)

5. Wool waste packed with oil. (No. 7.)

6. Felt wicking. (No. 6.)

7. Wool waste packing I have found to be all right when waste and oil are properly mixed. (No. 12.)

8. We use waste packing with oil in our car journal boxes. (No.14.)

15. *What should be the chemical composition of a good car oil?*

1. This company is using a composition of crude oil, whale oil and red lead. (No. 13.)

2. Analysis of a car and motor oil that we consider very good: A specific gravity 25 degs., flash test 425 degs. F., fire test 495 degs. F., cold test 15 to 20 degs. F. below 0, viscosity 25.5 at 68 degs. F., or the viscosity as compared with that of water at that temperature. (No. 7.)

16. *What is an economical figure for lubrication (per mile) of a 20-ton car equipped with four 40-hp motors?*

1. A figure showing good economy would be 19½ to 20 cents per 1000 miles. (No. 13.)

2. This is a hard matter to determine. Very few roads are able or will give any data as to the cost of lubrication. From data of our own at hand, we would judge that 18 cents per 1000 miles, with oil at 20 cents per gallon, should be the maximum with cars equipped with four 40-hp motors, designed for oil lubrication and air brakes with independent motor compressors. This figure should cover all the oil used about the car. There is no doubt in our minds that this figure could be reduced to 12 cents or less with close attention. We have found that the latest type of motors only require oiling every 10 to 15 days, and the cost of our oil on this type of equipment is not above 11 cents. We have not the exact data, as we operate cars equipped with the syphon lubricator on the same division, and the cost per 1000 miles is figured as a whole. (No. 11.)

3. About 28 cents per 1000 car-miles. (No. 7.)

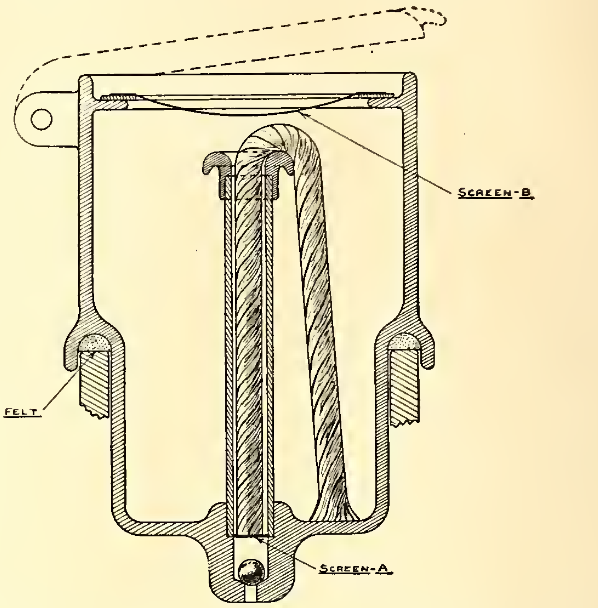
4. Eight cents per thousand car-miles for all oil and grease used. (No. 14.)

17. *Is there a satisfactory oil cup for use on old style motors with gravity grease cups?*

1. Yes. Several have been described in railway publications. (No. 2.)

2. A satisfactory oil cup may be had by fitting a cup into the gravity grease cup with a ¼-in. brass pipe threaded into its center, and coming up even with the top, into which felt wicking is drawn as tight as possible. A hole is drilled in the pipe near the bottom, allowing the oil to feed the shaft only through the felt. A regulating attachment may be made by placing a second piece of brass pipe outside of the standpipe, close fitting, and with holes of different sizes drilled to meet the hole in inner pipe. The feed may be regulated to a great extent by bringing the hole of the desired size opposite the inner hole. While this is quite satisfactory, we are still looking for an oil cup that will stop feeding when the car stops. (No. 5.)

3. There are various designs of oil cups for use on old style motors with gravity grease cups, and though they have several defects, such as clogging of wicks (if such are used) and a possibility of becoming loose, the superiority of oil grease as a motor lubricator should warrant their adoption. The flow of oil can be regulated by means of the number and size of wicks used, and should be determined by actual tests, as the size of bearings and grade



TYPE OF OIL CUP USED ON OLD-STYLE MOTORS, WITH GRAVITY GREASE CUPS

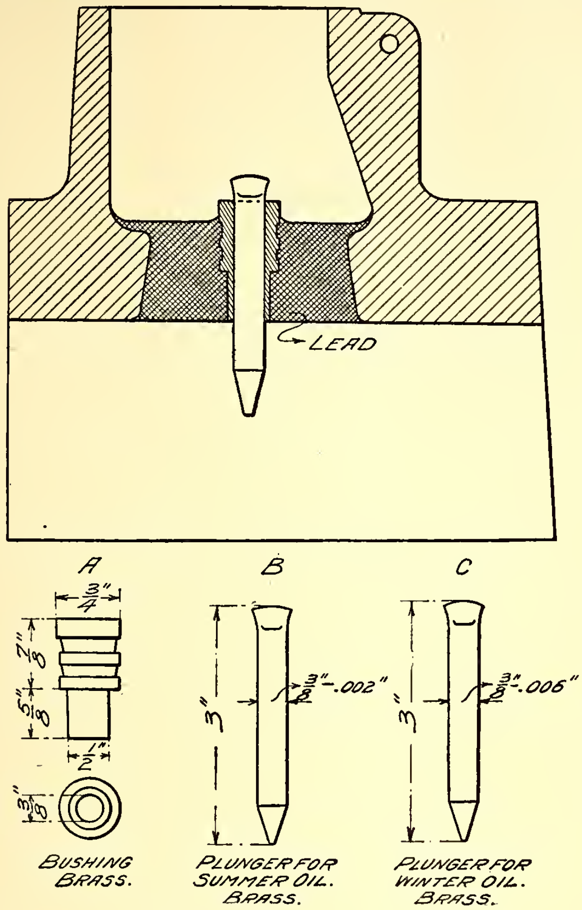
of oil used must be taken into account. The accompanying sketch shows a type of cup commonly used. If in addition to the screen "A" another were located at the opening "B," the clogging of the wicks would undoubtedly be reduced.

The design of the cup can be such as to utilize the old covers. (No.13.)

4. We doubt very much as to there being a satisfactory oil cup for use on old-style motors—*i. e.,* where a motor has been designed for grease lubrication. When we say satisfactory, we mean a cup that is reliable and at the same time "fool proof," and while the desire for oil lubrication has created a demand for an oiling device that will give results, the efforts so far have been unsatisfactory. In our experiments we have used seven different devices with indifferent results. Of these, three were of the adjustable gravity-feed type, and four were gravity feed without adjustment. We have discarded all cups with adjustable feed, as we found that no dependance could be placed in them, as a slight particle of grit, or in fact any foreign matter getting into the oil, would either stop the feed entirely or would prevent the automatic valve from closing and allow the oil to run out, and the result in either case would be the loss of an armature. Of course, some will say that foreign matter has no business in an oil cup, but we are speaking of conditions as they exist and not as they should be.

As to the best method of lubricating with oil where grease was used, this is a matter which is largely governed by local conditions and the number of cars. As, for instance, roads with from 1 to 150 cars could probably get good results from a cup with an adjustable feed, as the master mechanic or person in charge of the rolling stock could give the matter close personal attention. A case in point is a road in Ohio operating 150 cars, principally single truck, where the cost of oiling was 11 cents per 1000 miles with an adjustable feed cup. This same cup has since been modified and made with a feed that is non-adjustable, but which depends on the vibration of the motor to feed the oil. The result was a greatly increased consumption of oil. We are now experimenting with a method in which we have great confidence, which consists of simply packing the grease cup with a wool waste. The method is as follows: We fit a piece of wood (perfectly tight) in the slot at the bottom of the grease cup. This wood should be driven in to allow no oil to leak through. We then bore a ⅛-in. hole in the center of it, and fit a piece of ¾-in. felt in the bottom of grease cup. This felt has previously been soaked in oil and is used to retard the flow of oil. We then pack the remaining space with wool waste, packing very tight, and pour in two or three tablespoonfuls of oil. The first car thus equipped ran 320 miles, the waste was removed for examination, and oil could still be pressed out of the waste with the hands. This test was made with GE 1000 motors, in which the grease boxes are somewhat less in depth than the later motors.

We have since equipped with this method a car having four 50-hp motors, and the results have been equally as good as on the smaller motors. Aside from this method, we are using a syphon—*i. e.*, a cup with a tube extending to within ½ in. of the top with a ¾-in. wick. This, as a whole, except the cost of oil, in our opinion, is the most satisfactory device so far for several reasons, the principal



OIL CUP FOR G. E-2000 MOTORS

ones of which are the immunity from grit or any foreign substance getting into bearings, as it matters not whether the oil is clean, the wick will only take the clear oil and deposit it in the bearing, and as long as there is any oil in the cup you can depend on the bearing being lubricated. (No. 11.)

5. Attached is sketch of oil cup that we use on GE 2000 motors. This is a very cheap method of lubrication. All armature bearings on a four-motor car can be lubricated with this for four cents per 1000 car-miles. When car is stationary no oil will be fed to the bearings. (No. 14.)

Note.—The suggestion has been made that delegates bring with them for exhibition at the convention the different types of oil cups in use on their roads.

18. *How shall we do away with the breaking of motor leads where they leave the iron conduit, recommended by the board of underwriters?*

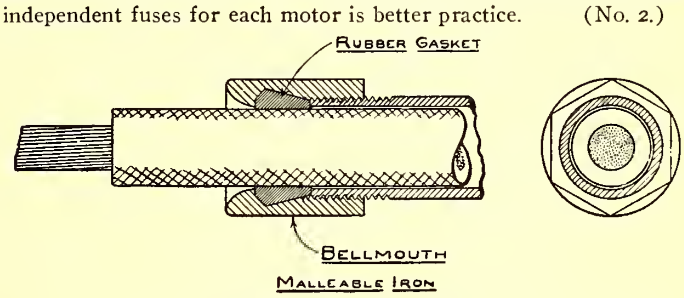
1. A bell-mouth should be used at the end of the iron conduit, so designed as to hold the leads firmly to prevent any possible chafing. A cleat should then be used at a distance of about 6 ins. from the bell-mouth, with a second one about 13 ins. from the first, allowing the connector to come between the two cleats. This method has been used and found satisfactory. The accompanying sketches show the designs of bell-mouth and method of securing the leads. (No. 13.)

2. Bring the cable leads out from the center of bolster to the motor, if motor is outside hung. Carry the motor leads over center of motor to the cable leads and connect, leaving just enough slack to curve well. We have very little trouble with broken wires in this way. (No. 5.)

3. Where wire leaves the conduit we wind friction tape around the wire and then screw a T. & B. bushing ,which is bell-mouthed, on to the end of the pipe. The bushing squeezes tight onto the tape and thus avoids chafing of the wire. We have had no trouble with work done in this manner. (No. 14.)

19. *Do you consider it good practice to depend entirely upon car circuit breakers, or do you use a fuse box also?*

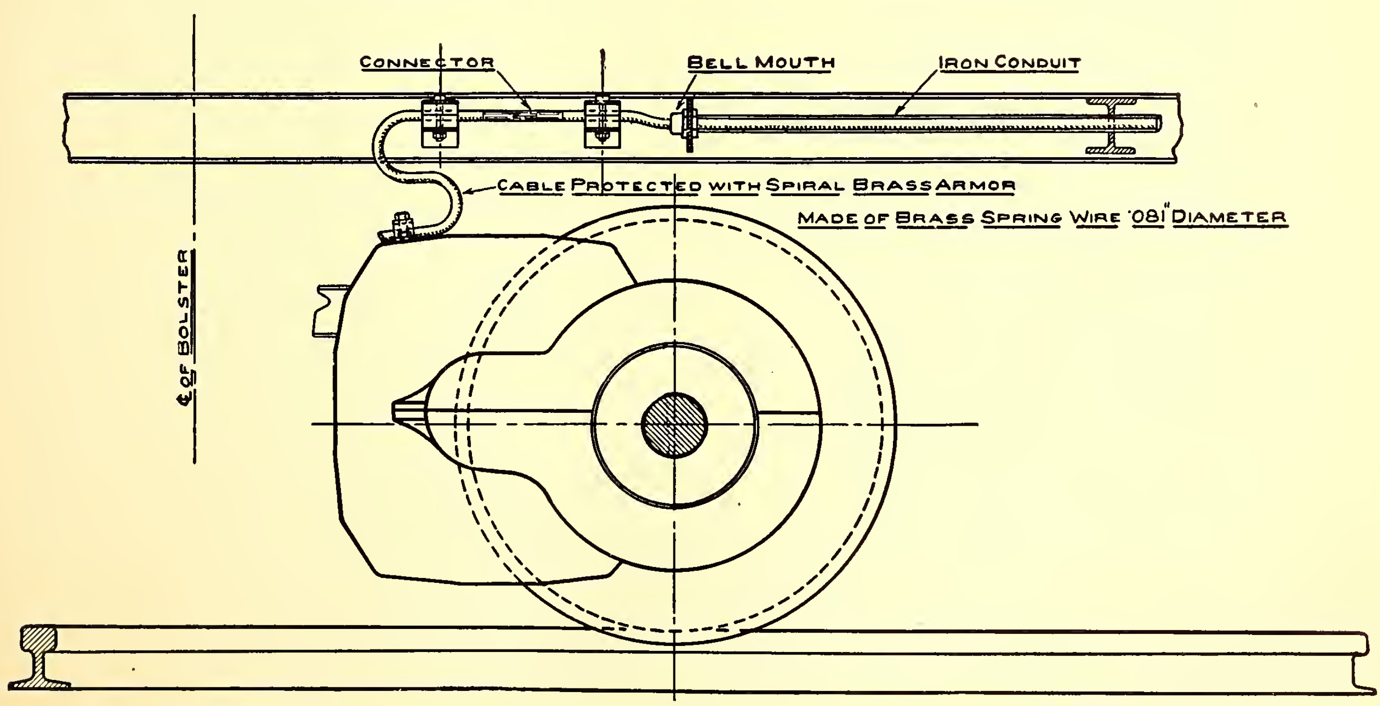
1. For the ordinary city service, circuit breakers should be sufficient if equipment is properly taken care of. For heavy suburban or interurban service one circuit breaker for all motors and independent fuses for each motor is better practice. (No. 2.)



DESIGN OF BELL-MOUTH

2. It is not good practice to depend entirely upon circuit breakers. They are complicated pieces of apparatus, subject to mechanical as well as electrical failures. It is necessary, therefore, to use fuses in addition to the circuit breakers. (No. 13.)

3. An automatic circuit breaker can be depended upon if properly inspected and kept in close adjustment and well lubricated. (No. 4.)



METHOD OF SECURING THE HEADS WHERE BELL-MOUTH IS USED WHEN WIRES ARE LAID IN IRON CONDUIT

4. For interurban service, where stops are made at infrequent intervals and the controllers are of ample capacity for the work, circuit breakers seem to be sufficient for the protection of wiring and car equipment.

On cars operated on city service, where stops are made at frequent intervals, more chances for trouble occur incident to opening of circuits at the controller, and it seems to be good practice to employ fuse boxes in series with circuit breakers. In case of a short circuit either at the controller or in the car wiring, sufficient current may flow to badly burn the controller or car body without opening the circuit breaker. If the short circuit is maintained, however, the fuse will soon burn out, as it will not stand an overload for any length of time. In case of a sudden short circuit to ground, the circuit breaker will open before much damage is done, and the fuse may not be burned out owing to the time limit of fusing. (No. 8.)

5. Use both fuse box and circuit breaker. Without the fuse box a continued overload would heat the motors and may not trip the circuit breaker, where, if the fuse is used in connection with the circuit breaker, you will have some protection from a continued overload. (No. 12.)

6. I do not think a circuit breaker is safe without a fuse box, as I have had cases where they did not cut off the arc on a heavy ground, and burned the controller badly and scorched the vestibule. We, therefore, use a fuse box in addition to the circuit breaker. (No. 5.)

20. *What is the best composition for trolley wheels?*

1. A good composition for trolley wheels is: Copper, 91.0 per cent; tin, 5.5 per cent; zinc, 3.5 per cent. (No. 2.)

2. One part tin to nine of copper. (No. 7.)

3. Our trolley wheels are 90 per cent copper, 3 per cent zinc, 6 per cent tin, and 1 per cent lead. We have found that if a trolley wheel is too hard it will spark on high-speed cars, wasting considerable current. (No. 5.)

21. *What can be done to increase the life and prevent the wearing out of trolley wheel bearings?*

1. Have the tension of the wheel against the wire as light as possible, and keep the bearings well oiled. (No. 6.)

2. We use a trolley wheel bored to 7/8 in., with an oil way in the center into which a piece of felt is fitted. Bushings are pressed in from each side to the felt, just tight enough so the oil will not flow through too fast, and a reamer run through the bushing and felt for the pin. It is oiled through a screw hole on the side of the wheel every three days, the screw being kept in. By keeping the side contact springs in good repair, the bushings will last as long as the wheel.

22. *How large a trolley wheel can be used to advantage on high-speed interurban lines?*

1. The size of the trolley wheel is limited by the difficulty in sustaining weight at the end of a trolley pole. By reducing the wearing cross-section of the wheel (which may confidently be done, owing to the slower speed due to larger circumference, hence less wear), the weight of the wheel may be considerably reduced. A 6-in. wheel so constructed gives very satisfactory service on high-speed interurban lines. The spring in the trolley base, however, should be of proportionate strength. The wheels used in this service should be made of very clear, hard metal, of high conductivity, and should be subjected to the greatest care in construction and maintenance.

The practice of allowing a groove to wear one side of the wheel and flat surfaces to form is the cause of the majority of broken trolley wires. New wheels should be properly milled, and wheels in service which become unequally worn should be immediately removed and, if possible, be remilled. Bearings should be graphite bushings of ample size, running on hard steel pins, the pins being so attached to the harp as to prevent any lost motion at this point. The common practice of tying the rope around the pole adjacent to the harp should not be allowed. This is a frequent source of trouble, preventing the trolley pole from slipping through frogs etc., when wheel leaves wire. A metal loop at least 6 ins. long should be fastened in an eye in the throat of the harp, to which loop the trolley rope should be spliced; no loose ends of rope must be allowed in the joint, as the arc caused by the trolley leaving the wire frequently ignites these loose ends, burning off the rope. (No. 10.)

2. We find a 4-in. wheel for city service, and a 6-in. wheel for suburban cars to be entirely satisfactory. (No. 5.)

3. A 6-in. trolley wheel for high-speed interurban. (No. 12.)

23. *What mileage should a trolley wheel run? How often can it be economically turned down?*

24. *What methods of trolley wheel lubrication can be employed which will prevent oil from dropping on the car roofs?*

Design a harp that will collect all drippings and automatically use them over again, or make the pin hollow with oil well in head of pin and feed oil out with wicking. (No. 6.)

25. *What tension (in pounds) should a trolley wheel have against the wire?*

1. Sufficient tension should be put on base springs to enable the trolley pole to support a 20-lb. weight attached to trolley rope with the wheel at the height of trolley wire, or to give a pressure of 20 lbs. on the trolley wire. (No. 10.)

2. This depends entirely on overhead construction, and other conditions; 16 to 18 lbs. is ordinarily used. (No. 2.)

3. For city service, 25 lbs. on wire; interurban high speed, 35 lbs. on wire. (No. 12.)

26. *How shall the interurban car of the future be designed, with or without platform; and where shall the entrance be, in the center or at the ends?*

How shall they be operated, in trains or singly?

If in trains, shall all be equipped with motors, or will one be a motor car and the balance trailers?

1. The interurban car should have platforms and entrances at the ends. The number of people getting on and off at any one point is not large enough to warrant side entrances. Side entrances involve structural weakness in the car, which it is expensive to overcome, and they are difficult to operate, except by station platform attendants, or by expensive mechanism for operation by the conductor. Interurban cars should be provided with doors, so that passengers and conductors can pass from one car to another when cars are operated in trains. All cars on up-to-date roads should be provided with some form of multiple control, so that they may be operated in trains where the service warrants doing so. It is practically impossible to operate cars at high speed at more frequent intervals than one every half hour in each direction on a single-track road, and the ability to operate the cars in trains when the traffic requires doing so will frequently remove the necessity of building a double track, where the traffic requires the operation of single-car trains at more frequent intervals.

Preferably all cars should be equipped with motors, as the modern interurban road high-speed car generally has an equipment but little in excess of the requirements for propelling itself, and is therefore apt to be overworked if required to haul trailers. In most cases it would not pay to equip all cars with sufficient power to haul trailers. If it can be foreseen that the traffic of the road will require the operation of trains during the major portion of the time, it is probable that the equipment of two out of three cars in each train, or a like proportion with larger trains will be satisfactory. The number of cars which should be equipped with motors in each train will depend largely upon the acceleration desired, the grades, frequency of steps and other conditions encountered. (No. 8.)

2. It is a difficult matter to design a car that will meet the requirements of all interurban roads, as there are various conditions to be taken into consideration; conditions that may be characteristic for certain roads only. The length and width of the cars should be as great as the streets would permit in cities through which they may be required to pass. In determining the size of cars the density of traffic must also be taken into consideration. The cost of operating and maintaining a number of large cars is smaller than that of a greater number of small ones. As an up-to-date interurban service demands a high speed, the cars should be built with steel sub or floor-framing so as to minimize possible injuries to passengers in case of collisions or derailments. Seats should be provided for all passengers, if possible, especially if the cars are intended for long runs. The greatest seating capacity is obtained by the use of cross seats with a center aisle. Cross seats are, besides, more comfortable than longitudinal seats. This is especially true in case a high rate of acceleration and retardation is required.

If platforms are not adopted, it will be necessary either to provide the stations with platforms raised to an elevation corresponding to that of the car floor or to provide the cars with steps, which undoubtedly would project considerably beyond the car body. In either case it would prohibit the running of the cars on streets. Therefore, it seems advisable to build interurban cars with platforms. If this is a fact, they should also be designed with end side doors. These should not be less than 40 ins. to 48 ins. wide. The platforms should accordingly be wide and of the vestibule type. The number of passengers handled at any one time at stations on an interurban line would hardly warrant center side doors. The greatest number of passengers would undoubtedly be taken on inside city limits, where side doors could be of no advantage, as the use of such would necessitate raised station platforms, which would not be permissible in the streets.

As to the question if the cars should be operated singly or in trains, this would depend on the distance over which they are to run and on the density of the traffic. For short hauls, where stops are frequent, it would seem that single cars would be more economical and efficient. For longer hauls, when stops are not too frequent, trains made up of two or more cars can be used to advantage during rush hours or for handling excursion parties. All cars should in such case be equipped with motors, as it would otherwise be impossible to maintain the schedule. All cars should also be equipped with air brakes. In determining the type of control to be used, the greatest safety to passengers, the reliability and flexibility of control, the size of cars, and if run singly or in trains, should be considered. If cars are run in trains, it necessarily follows that a multiple unit control should be adopted. In case small cars are used equipped with small motors with a comparatively small power consumption, a straight hand control can be used with economy and safety. When large cars are considered, with necessarily large motors, a multiple unit control should be decided upon as being better adapted for handling heavy currents. Besides the flexibility of such a control in case it is desired to run cars in trains, it has the great advantage that all apparatus and cables carrying heavy currents can be placed underneath the floor framing, thus minimizing possible panics in case of a burnout in the cables or control. (No. 13.)

27. *On a city, suburban and interurban service, can cars weighing 26 tons complete, equipped with four 50-hp motors, maintaining an average speed of 20 miles per hour, make a daily mileage of 300 miles without seriously impairing the electrical equipment?*

1. This would entirely depend on the design of the motors and the profile of the road. (No. 13.)

2. The conditions named in this question have been met with in a Western city with no bad results to electric equipment. Not a single armature or field has been lost through baking or burning out. Close inspection is required. The climate is decidedly favorable in this instance.

3. Four 50-hp motors on a car weighing 26 tons complete, should easily make an average speed of 20 miles an hour for 15 hours per day, without seriously impairing the equipment, providing the number of stops, grades and length of time on slow schedule in the city do not require the car to make a maximum speed in the country of over 35 miles an hour. If the previously mentioned conditions made it necessary to gear the car to a higher speed than 35 miles per hour on a level, it is quite probable that heavier motors would give a better service. (No. 8.)

28. *Providing cars are fairly standardized and in fairly good shape, how many men per car should there be employed in shops and car houses on an electric street railway system operating, say, four hundred to one thousand cars, in order to keep cars in first-class condition?*

One man for every two cars *in service* is a fair average. It is supposed that this question means all men engaged in car repairs. (No 2.)

30. *In building new paint shops, what is the best form of painter's scaffold to provide for use at the sides of cars?*

On attached sketch is shown a type of painter's scaffold suspended from the roof trusses. The scaffold can be put at any desired height by means of a tackle. (No. 13.)

31. *What is the best type of construction for car body hoists; shall they be operated below or above the car house floor?*

In shops with a single floor an overhead traveling crane can be used to great advantage. Besides being economical, it leaves the floor space between cars unobstructed, which facilitates handling of material. If at the same time space for handling trucks and motors is provided for at one end of the shop, this same crane can be used in replacing trucks on any car. Enough headroom must then be provided for to permit of carrying the trucks over the cars. In shops with two floors, where on the upper one car body repairs are carried out, and where the lower floor is intended for the repairs of motors and trucks, the installation of an elevator will facilitate the jacking of cars as well as the handling of trucks and motors. (No. 13.)

32. *Which is the more economical for the general lighting of shops and car houses, arc or incandescent lamps?*

1. The most economical means for general lighting of shops and car houses, whether by arc or incandescent lamps, depends upon a number of factors: The location of shops and car houses relative to the power house or source of supply and the amount of copper connecting them. Arrangement of space for storage, working, etc. Where extreme fluctuations of pressure are common it is not advisable to use arc lamps, as they will give considerable trouble and cost a large amount for maintenance, besides giving very poor light, so that in all cases where extreme fluctuations of pressure are encountered, incandescent lamps should be used, in clusters for illumination of large areas and as single lamps located with special reference to the work in shops and other places. Where there is no trouble due to fluctuation of pressure, arc lamps may be used for lighting large areas and incandescent lamps in shops, located with special reference to the work. (No. 8.)

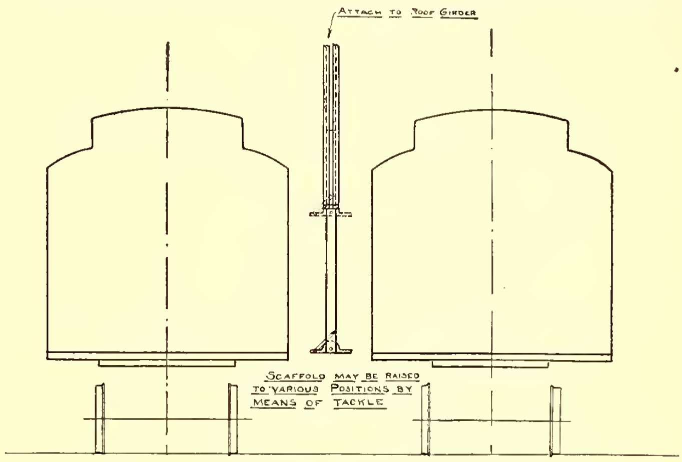
2. Incandescent lamps would appear to be more economical for the lighting of shops and car houses than arc lights, principally in consequence of their allowing us to distribute the light among such places as it is needed. Then, again, the incandescent lamps do not require the attention of electricians so frequently, and, in case of a burnout, any car house employee can substitute a new lamp, whereas, with the arc lights, the trimming should always be done by electricians. In car houses no great amount of light is required, except in special locations, such as in the pits or over work benches. It is, therefore, the practice in the borough of Manhattan so to arrange rows of incandescent lights between tracks that there will be one light for each car; in other words, the lights in each row will be two car lengths apart. (No. 9.)

3. We use both arc and incandescents for lighting our shop and believe that combination is the most economical. (No. 14.)

33. *What is the best method of pit lighting?*

1. In our shops we have found incandescent lamps located on both sides of the pits and spaced about 10 ft. apart as being the most satisfactory method of lighting pits. Each lamp should be put in a recess to prevent breakages of same. The wires should be carried in iron conduit pipes and a potential of not more than 120 volts should be used. (No. 13.)

2. The best method of lighting pits is by the use of incandescent lamps, the wires being placed in iron conduits, with the outlets



PAINTER'S SCAFFOLD

spaced at intervals of about 5 ft., either side of each pit. For a careful inspection of the underbody of a car, a lamp can be removed from socket and a portable light substituted. (No. 9.)

34. *What is the best system for heating car shops and pits?*

The best system for heating car shops and pits is with hot air heated by steam coils and circulated by means of fans. (No. 3.)

35. *Do automatic sprinkler equipments in car houses afford sufficient protection from spread of fire to pay for installation?*

Automatic sprinkler equipments in car houses, if properly installed, certainly do afford considerable protection against the spread of fire. As to the economy of installing sprinkler equipments, a decision must be reached in each individual case, based upon the cost of installation, the amount of protection afforded, etc. The rebate allowed by the insurance companies at present for a standard sprinkler equipment is from 30 to 40 per cent reduction in the insurance rates on the building. I deem it good practice if the amount of this reduction equals 20 per cent of the cost of installing the equipment to have the same installed. The cost of maintenance of a proper equipment, dry air system, is not great, and, in addition to the saving in insurance rates, it also gives additional protection to the property, and the protection to the property should be considered equal, in dollars and cents, to the allowance made by the insurance companies, for, although railroad companies are, generally speaking, co-insurers of 20 per cent of the amount for which property is insured, if the loss in business is considered, they are co-insurers to the extent of fully 50 per cent, if not more, of the value of the property, especially the rolling stock. I understand the board of underwriters is now considering the advantages of the so-called side sprinkler equipment, but after a careful inspection and test of that equipment, the writer does not believe that it is of sufficient benefit to pay for the additional expense of installation. There are several objections to their use, the main one being the difficulty of properly draining the pipes, for, even with a dry air system, water will collect at the bottom of the sprinkler system, and, unless proper provision is made for draining it off, there will surely be trouble in freezing weather. In the writer's opinion the ordinary automatic sprinklers give fully as much protection as do the side sprinklers. In a test held at Newark, N. J., the overhead sprinklers opened before the side sprinklers, and many of the side sprinklers failed to open at all, owing to the cooling of them by the spray from the automatic sprinklers. (No. 9.)

36. *What difference between wheel and track gage do you use, and where measured on your wheels?*

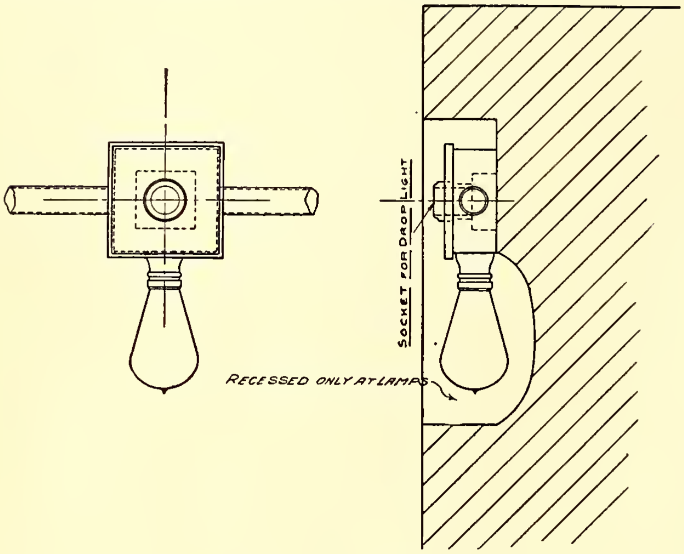
1. There should be ¼ in. difference between wheel and track gage if gage line is taken from wheel in gage line; namely, ⅛ in. upon flange, although, by making the wheel gage the same as track gage and measuring from wheel where flange starts to round it gives you the same results with less chance of allowing the gage to get out of place and making wide or narrow gage. (No. 4.)

2. The difference between the track and wheel gage should be ¼ of an in. for a 4 ft. 8½ in. track gage. The gage on the wheel should be measured from the root of the flange. (No. 3.)

37. *Which is the more economical arrangement for getting cars to and from car houses, transfer tables or turn outs?*

1. Turn outs. (No. 2.)

2. Turn outs should be more economical where an electric equipment is to be taken care of. The cars ought to be brought to the shops for inspection every third or fourth day. With a transfer



METHOD OF PIT LIGHTING

table handling only one car at the time, cars cannot be shifted fast enough to take care of the equipment. Another advantage of turn outs would be in case of a fire, when undoubtedly more cars could be gotten out of the shop than with a transfer table. (No. 13.)

3. The cost of maintenance of track and machinery is determined by depreciation. To install a transfer table in a car house 200 ft. in width will cost approximately $3,000, if installed when the house is constructed. In a car house of this width cars could be received or discharged from the car house on less than one-minute headway with four turn outs from the house to the main line. In a house of this width without a transfer table, fourteen or sixteen turn outs connecting with the main line would be needed, and this large number of turn outs connecting with the two tracks on the main line, even though half of them be turned in each direction, would necessitate a very complicated and very expensive set of track work, and the depreciation or cost of maintenance of this large amount of special work would far exceed the cost of the maintenance of the transfer table and the four plain turn outs needed with it. Furthermore, with overhead trolley work, the overhead wiring for so many turn outs would be a source of considerable expense for maintenance and a source of considerable annoyance, with cars leaving and entering the house on short headway. By the use of two transfer tables and four tracks or turn outs to the main line, cars could be discharged from the house on less than thirty-second headway with little or no danger of collisions; whereas, with a turn out from each house track to the main line, there is considerable danger of collisions, and, for this reason, the writer feels that, for emptying a house in time of fire, the transfer table is preferable to the usual system of having turn outs from each track to the main line. (No. 9.)

4. This company has turn outs at three of its car houses and a transfer table at one, and I think the turn outs are much better and quicker. (No. 5.)

38. *Does high carbon rail for street railway work give better results than rail with less than* 55 *per cent of carbon?*

1. Where rails are held rigidly to a solid foundation, and there is a minimum amount of strain at the joints, so that practically the only strain on the rail is the crushing strain caused by the wheel of the car, it is probable that the high carbon rail is more economical than the rail with lower carbon. In the borough of Manhattan, New York, the rails are supported rigidly at 5-ft. intervals. The joints are supported by cast-iron yokes. The joint plates become more or less loose, so that there is a motion to the rail at the joint, and there has been considerable trouble in consequence of the hammer blow on the drop rail breaking the head of the rail. This break begins on the gage line, about 2 ins. from the joint, and generally extends diagonally through the head of the rail for a distance of from 8 ins. to 15 ins. It does not occur often on rails having their joints suspended, but in this case, with the supports 5 ft. apart, the strain is so great on the rail through the joint that the web splits. (No. 9.)

2. In all work under the writer's supervision for the past 17 years the chemical analysis of rail for city tracks has been specified. "Illinois Steel Company's standard analysis, except carbon, which shall be 55 to 60 per cent." No trouble has been experienced on account of extra liability to break, sufficient to offset the additional life added to the rail. We believe this additional life a great advantage.

41. *What character of sand is best to use for sanding tracks? By what methods can it be dried? Which is most economical?*

1. With cast-iron chilled wheels on city streets, and especially under elevated structures, where the rail is inclined to be greasy, it seems necessary not only to use such sand as is carried in the sand boxes on the cars, but also to use considerable sand placed upon the rail by independent sand cars, though this is often put on by hand. For this purpose clean, sharp-screened sand, entirely free from mica or loam, should be used; in fact, sand used for this purpose should be washed sand, and the best results are often obtained by using sand dredged from the bottoms of rivers or harbors. This sand as it is delivered contains considerable moisture, and it is necessary that it be kiln-dried in order to have it run freely, especially from the sand boxes on cars.

The drying of sand has always been a problem with steam railroads, and a number of electric roads, and a number of electric roads are obliged to have drying facilities. Various sand dryers are used for the purpose. First, the old-fashioned sand-drying stove, which is a cylindrical stove around which an iron hopper is built. This hopper is filled with sand and as the sand dries it percolates through small apertures in the bottom. With this character of dryer, one man with two stoves can dry about ten yards per day, but it means the handling by hand of the sand several times. Then again, the sand, coming in contact with the hot surface of the stove, is likely to be burned, and this destroys its gritty properties. Rotary dryers, such as are used by the asphalt campanies, are used to a certain extent, but they also tend to heat the sand to too great a temperature and are expensive to operate and maintain. Various forms of steam dryers are used, but in electric car houses, steam is not often available, and to generate steam for the purpose of drying sand is very expensive.

There has been used with considerable success in the borough of Manhattan a so-called gravity dryer. The sand is delivered on the ground floor, runs through chutes to conveyors, is carried to elevators and hoisted to the top of a brick stack, about 6 or 8 ft. square, which stack is filled with iron bars, spaced a few inches apart, so that the sand in falling from the top of this so-called "slat-chamber" to the bottom drops from one bar to another, and so presents considerable surface to the heated gases with which it comes in contact. The fire is in a furnace adjacent to the slat-chamber. The gases are carried to the top of the slat-chamber, and, by forced draft, down through the slat-chamber, falling with the sand and discharging through a stack adjacent. The dry sand is then carried by elevators to the second floor, where it is placed in a storage bin, from which it can be loaded into sand cars through chutes. This would seem to be most the economical method of drying sand where any quantity is required. An experimental dryer of this kind which was in operation in the borough of Manhattan for something over a year averaged to dry about seventy-five yards of sand per day with two men. The fuel cost about 5 cents per cubic yard of sand, and it required about 20 hp to operate the conveying and elevating apparatus. (No. 9.)

2. We use a black river sand, which I think is sharp enough. For drying, we have a boiler, 36 ins. in diameter, fitted up with a 4-ft. grate and set up on legs. Behind the grate, the boiler is stopped up to a level with the grate, and with a 14-in. stack we get sufficient draft. Pieces are bolted to the sides on a level with the grate, which will hold a wagon load of sand, which, as it dries, runs through holes in the side pieces. We can dry a great deal more in this way with the same amount of fuel than we could with an upright stove. (No. 5.)

45. *Why, in a city where the streets are of ordinary width, cannot a pavement be laid abutting a "T-rail" with equal facility and with ultimately as good results, as where some types of grooved or tram girder rail is used?*

On any street where there is heavy traffic and a tendency of vehicles to follow the rails, no pavement will withstand the wear that is placed upon it. The advantage of the grooved or tram girder rail is that it carries the weight and wear of vehicles upon the tram. If traffic could be diverted from the tracks there is no reason why brick pavement, properly laid, asphalt blocks or sheet asphalt could not be laid abutting T-rail with good results. (No. 9.)

AT THE PHILADELPHIA CONVENTION

THE J. G. BRILL COMPANY had several exhibits in different parts of the Museum. On entering the hall, one saw at the left side of the main aisle the principal part of the Brill exhibit, occupying 179 linear feet. At this prominent point was shown a "grooveless post" semi-convertible car, one of an order of 200 cars being built at present for Baltimore. This car attracted unusual attention. As the "grooveless post" arrangement has been adopted since the last convention, it was the first opportunity most of the railway men have had to operate the sashes. The operation is exceedingly simple. Each pair of sashes is joined together with brass tongue-and-groove sliding connections and conducted into a pocket in the side roof by means of a pair of small metal roller brackets at the top of the upper sash, which move on bow-shaped steel guides, extending from the top plate to the lower ventilator rail and contained within the pocket. This improved system has made the type more successful than ever, and at present over 500 of the cars are being built. An examination of the sashes revealed the extreme simplicity of the whole system, and also showed the brass sash stiles with which ordinary beading is used to secure the glass. The car measures 8 ft. 2 ins. over the posts, and as the walls are but 2 ins. thick because of not having window pockets, 7 ft. 10 ins. interior width is obtained, which allows the seats to be 36 ins. long and the aisle 22 ins. wide. The air-space between the panels in the 2-in. wall air-jackets the car against cold fully as well as a pocket. The Baltimore cars are 30 ft. long over the body and are mounted on Brill No. 27 G-E-1 trucks.

Next in line was a Brill "grooveless post" convertible car, one of an order of six for the Schuylkill Traction Company. The large double-sash windows of the "grooveless post" convertible car slide into the roof pockets in the same manner as in the Brill semi-convertible car. The panels also slide into the same roof pockets by means of metal guides or sliding strips on the posts which are straddled by the projecting edges of the two sheets of thin steel which compose the panels. These metal sheets are held ⅝ in. apart by horizontal wooden slats and have air spaces between to enable the car to retain heat, which it does as successfully as a standard closed car. The Schuylkill cars are not fully convertible, the panels between the two pairs of posts on each side being stationary; this end of the car is partitioned off for the use of smokers. Every one seemed anxious to try for himself the raising and lowering of the sashes and panels. The car measures 28 ft. 4 ins. over the body and is mounted on Brill No. 27-G-1 trucks.

The next type was an all-steel car which was built for the New York City Railway Company. The car is 28 ft. over the body and mounted on Brill "Eureka" maximum-traction trucks. In appearance the car is so much like a standard wooden car that visitors found it difficult to believe that it was made entirely of steel. Its light weight and the fact that no pressed steel is used rendered it particularly interesting. The bottom framing is entirely composed of rolled channels and angles, and the posts are channels shaped in a bulldozer. The representatives of the company explained that one advantage of using structural material over pressed steel is on account of its being straighter; another, because the channels and angles are filleted at the bends. The rivets which secure the side plates to the posts are countersunk and ground flush with the plates. Many of the visitors expressed themselves as deeply interested in the car.

In another section across the aisle a car was shown which is one of 200 for the Chicago City Railway Company. These cars were fully described in the STREET RAILWAY JOURNAL for Sept. 16, 1905. The cars have the Stephenson semi-convertible system, in which the upper sashes slide into the roof and the lower sashes drop into covered pockets. The novel disappearing-step arrangement of the car caused considerable comment. The steps are mounted a fixed distance apart on guides under the platform. When the step on one side is out for use, the other one is under the car. The changing of the steps is easily accomplished by turning a shaft located beside the brake valve inside the vestibule, the controller handle being used for that purpose.

Outside the exhibition hall a Brill centrifugal sprinkler was continually operated. This sprinkler distributes water uniformly over the roadway 50 ft. each side of the track, the volume and direction of water being always under perfect control. Few features of the whole exhibition attracted more attention than this sprinkler.

The Brill system of trucks for every form of service, a complete set of solid forged side frames and the Brill patented specialties were also exhibited. At the office of the company's exhibit a variety of car seats were shown. The company not only builds the seats, but manufactures the rattan as well.

The names of the American Car Company, the G. C. Kuhlman Car Company and the John Stephenson Car Company were included upon the signs with the J. G. Brill Company and were considered to be coexhibitors. The representatives of the companies were G. Martin Brill, James Rawle, Geo. M. Haskell, J. Ellwood Brill, Wm. H. Heulings, Jr., E. J. Lawless, H. A. Heulings, S. M. Wilson, S. M. Curwen, D. B. Dean, F. L. Markham, Geo. H. Tontrup, A. N. Hargrove and Wm. M. Lycett.

THE ELECTRIC APPLIANCE DEVELOPMENT COMPANY, of Sacramento, Cal., has been manufacturing an electric track switch for some time, and was represented at this convention by Fred T. Kitt, general sales agent. This track switch, part of which was shown in operation, requires two electrical impulses to throw it for the curve when it is set for the straight line; this makes it possible for the motorman who wishes to take the straight line to keep current on while he is going under the trolley wire contact which operates the switch.

THE McGUIRE-CUMMINGS MANUFACTURING COMPANY, of Chicago, was unfortunate in not receiving the electric locomotive which it had expected to exhibit, but W. J. Cooke, vice-president, was in attendance.

THE BENJAMIN ELECTRIC MANUFACTURING COMPANY, of Chicago, had two excellent exhibits in the hall. One was the exhibit of wireless car-lighting clusters and steel shades at its booth, and the other consisted of these clusters on nearly all of the cars which were exhibited by car builders in the hall. Besides these wireless clusters, which are becoming so common in street railway cars, this company makes lamp guards and weather-proof sockets which are especially well adapted for portable pit lights, and lamp clusters with weather-proof features for yard lighting. Five light clusters are made to safely operate on 650-volt pressure. Basil G. Kodjbanoff, manager of the New York office, was in charge of the exhibit.

THE JOLT LUBRICATOR COMPANY, of Providence, R. I., which manufactures a new line of lubricators for use in railway motors which were originally built for grease lubrication, made an exhibit of a number of different sizes of lubricators for the various makes of motors. This lubricator, as its name implies, feeds oil by virtue of the jarring it receives when the car is in motion. A. B. Lisle, T. F. Peaver and A. W. Harris were in attendance.

THE INTERNATIONAL REGISTER COMPANY, of Chicago, exhibited the International single and double, the New Haven single, double and triple, square and round types of register, and showed some registers open so that the mechanism could be studied. Some special rod brackets, made for register rods on the cars at Memphis, Tenn., were a feature of the exhibit. This company also sells conductors' and motormen's bagdes, water-proof bell and trolley cord, and some miscellaneous fittings, which were also shown.

THE BUDA FOUNDRY & MFG. COMPANY and PAIGE IRON WORKS, of Chicago, represented by E. S. Nethercut and W. H. Bloss, made a special feature of the Paulus track drill with the Rich spindle and bit. With this spindle and bit a much longer life of the bit can be obtained, and the sharpening of the bit is easier than with the usual type. The spindle is something like an ordinary chuck, and has no set-screw extending to become broken off, making it impossible to remove the drill. The company also showed semaphore switch stands which are in general use on the high-speed interurban roads in the Middle West. The company cites some remarkable tests on the rapidity of drilling with the Rich flat drills in competition with other types of drills commonly used on this work.

THE NATIONAL CARBON COMPANY, of Cleveland, Ohio, was represented by N. C. Cotabish, James Partridge, A. D. Speer and A. G. Summerell. All kinds of carbon and combination carbon and metal brushes were exhibited. The most prominent feature of the exhibit was probably the Columbia treated brush, which is subjected to a process which fills the carbon with a high grade lubrication; this brush is giving satisfaction in some very difficult places.

THE W. T. VAN DORN COMPANY, represented by W. T. Van Dorn, of Chicago, had on exhibition a heavy type of coupler with draft rigging fastened directly to the car body bolster, such as used on the Indianapolis & Northwestern, Mohawk Valley, and other interurban roads with heavy equipment. This particular coupler gives a horizontal swing of 9 ft. 4 ins. Aluminum models were shown of the regular oval pin type of coupler, and also of the round pin type which Mr. Van Dorn has recently devised, which offers considerable advantage in increased life over the oval pin type. During the convention an order was received for the equipment of 40 cars for the Philadelphia Rapid Transit Company, to be operated on the elevated and subway divisions.

THE WHEEL TRUING BRAKE SHOE COMPANY, of Detroit, as usual, represented by its president and manager, J. M. Griffin, showed its abrasive brake-shoe used to grind down flat wheels on electric railway cars and locomotives. This company now has 800 regular customers among the electric railway companies of the country, and makes the claim that it has its product in regular use on a larger percentage of electric railways than any other one item of electric railway supplies.

THE ATLAS RAILWAY SUPPLY COMPANY, of Chicago, made its usual exhibit of Atlas rail joints, rail braces and tie plates. J. G. McMichael and Daniel Thompson attended the convention.

THE DEARBORN DRUG & CHEMICAL WORKS, of Chicago, which makes vegetable boiler compounds, had its booth decorated with artificial vegetables in a way which created quite a hit. Some "horrible examples" of boiler scale were on exhibition, and also samples of the lubricating oils which this company manufactures. W. B. McVicker, second vice-president and Eastern manager: Robert Carr, first vice-president and general manager; G. W. Speer, third vice-president, and Thomas Brannon made up this company's representation. Souvenir bonbon boxes were given to the ladies.

THE NATIONAL ELECTRIC COMPANY has been very active in designing new apparatus in the past few months. The new type N stationary motor is very much lighter and more compact for a given output than previous motors. On this motor ample ventilating spaces are provided. The company exhibited for the first time some of its new line of induction motors. These are made both with squirrel cage armatures and with armatures of the collecting ring type, where the insertion of armature resistance seems desirable. In the air brake line, the company has brought out a new combination alternating and direct-current compressor motor for use on single-phase alternating-current railways; this compressor motor is of the four-pole type with laminated field coils. This motor has an alternating direct-current governor with the contacts immersed in oil. An important improvement has been made in direct-current compressor motors, the latest type being entirely enclosed, so as to be virtually water and dust proof. This is the type recently placed upon 200 cars for the Chicago City Street Railway Company. A further exhibit of the company consisted of the 1400 air brake equipments used on the cars of the Philadelphia Rapid Transit Company. This company's representation included Chas. G. Burton and J. Frank Perry, of Chicago; Jos. Cunningham and Chas. Leet, of New York; W. Power, of Philadelphia; James Denton, superintendent; W. L. Waters, chief engineer, and S. I. Wailes, manager of sales.

GEO. S. HASTINGS & COMPANY, Cleveland, Ohio, exhibited the Radiant hot-air car furnace and also the Radiant hot-water heaters manufactured by the Germer Stove Company, of Erie, Pa., for which Hastings & Company are agents. Geo. S. Hastings was, of course, in attendance.

THE AMERICAN STEEL & WIRE COMPANY had a most interesting exhibit of bonds and bonding tools. Four types of bonds are now made by this company, the soldered, the expanded terminal, the compressed terminal and a new bond called the twin terminal. Special attention has been given to perfecting apparatus for applying bonds. Both hydraulic and screw compressors were shown, the latest screw compressor being arranged to avoid loss of time by revolving the screw in order to bring it up to the work after the compressor has been opened enough to pass it over the rail head. Gasoline torches for heating the rails for soldering are made with double burners, adjustable in all directions, so that hose is not necessary between tanks and burners. The new twin terminal bond is intended as a substitute for the soldered bond. In the head of the rail a bond with double terminals is inserted in cup-shaped holes drilled in the side of the rail head. The terminals are compressed into these holes and the edges of the holes upset with a tool to prevent the bond from pulling out. There was also exhibited a small gasoline motor, direct connected to a flexible shaft, running 3000 r. p. m. for grinding, cleaning, etc. A portable drill grinder was also exhibited. The company was represented by F. A. Keyes, of New York; R. K. Sheppard, of Philadelphia, and A. G. Greenberg, of Buffalo. C. R. Sturdevant, engineer of the Worcester works, who has been engaged in perfecting bonds and bonding material, was on hand to explain the special new features.

THE CURTAIN SUPPLY COMPANY, of Chicago, exhibited the Forsyth curtain fixture for open and closed cars, the Keeler eccentric and pinch handle closed car fixture, and the Acme and Climax fixtures. A new type of ring fixture does away with the cable for holding the curtain fixtures on open cars. A. L. Whipple, Eastern representative, and R. F. Hayes, Western representative, were in attendance.

THE CREAGHEAD ENGINEERING COMPANY, of Cincinnati, exhibited its overhead material, and a new changeable car sign of the type which contains a roll of different street names, which can be revolved so as to show the desired street. This sign has an indicator inside the motorman's cab, just under the hood of the car, which shows the motorman to what position he must turn the pointer to bring up any given sign, thus saving both time and trouble. The street names are printed on a dial, and the motorman has simply to turn the pointer to the proper name on the dial. In overhead material, the company showed a new malleable cast-iron bracket adapted to go on either round or flat surfaces, and also a new pin which can either be fastened to a pipe bracket or bolted on top of a cross-arm. The Bourbon strain insulator is a new insulator in which the pressure is taken by a hard piece of insulation fitted between two links, this indestructible insulation being held in proper position by being surrounded by a form of insulation similar to that used on their overhead railway material. The company is now doing considerable business in metal pins for high-tension work, having furnished some recently for 40,000-volt lines. Thomas J. Creaghead was in attendance.

THE RAILWAY JOURNAL LUBRICATING COMPANY, of Chicago, had samples of its lubricators arranged to be revolved by hand so as to show the remarkable way in which they bring oil up to a car journal bearing. Over 5000 of these lubricators are in service at the present time, and in the last thirty days 4000 more have been ordered, which is a remarkable record for a new device of this kind. The company sent out invitations to all those in attendance to make use of stenographer and typewriter service at its booth. Burton R. Stare, vice-president and general manager, who is now of the New York office; Wm. H. Stare, superintendent; Chas. S. Rea, Pittsburg district salesman, and W. H. Bauman, specialist, were all at the convention.

THE HEINE SAFETY BOILER COMPANY, of St. Louis, exhibited the model of a Heine boiler which was shown at the Louisiana Purchase Exposition; and also a water-leg and section of shell, showing the tube ends and fastenings. Those present from this company were H. M. Lyman, of Philadelphia, and L. G. Neiman, of the Phœnixville, Pa., works.

THE TROLLEY SUPPLY COMPANY, of Canton, Ohio, arranged an apparatus at its exhibiition, by which the action of the Knutson trolley retriever was shown. This retriever pulls the trolley pole down to the roof of the car the instant it starts upward upon leaving the wire. To reset the retriever, it is only necessary to pull a definite length of trolley cord out of the retriever, when it automatically catches and sets itself, so as to maintain a very light tension on the trolley rope, this tension being just enough to take up the slack. This method of resetting insures that there shall always be a certain amount of energy stored up in the spring which pulls the trolley pole down, hence the apparatus is always set right, if adjusted at the beginning. J. E. McLain, president, and R. K. Fast, secretary and treasurer of the company, attended the convention.

BERRY BROTHERS, LTD., of Detroit, showed panels finished in various woods with its varnishes, and a magnificent burl of California redwood. The delegates were given morocco-covered note books and ash trays, while fresh bonbon boxes were on hand each day for the ladies. F. W. Harmann, T. J. Lawler, G. M. Kerr and G. F. Klock represented the company.

THE ELECTRO-DYNAMIC COMPANY, of Bayonne, N. J., showed the inter-pole motor for use in driving machine tools in any location where different constant speeds are required. With this motor, a speed variation of 350 r. p. m. to 1400 r. p. m. can be obtained, the speed being constant at any point of the controller within this range. The motor shown was a 5-hp 550-volt, operated from the trolley circuit, and was belted to a small dynamo, which was worked through a resistance to give the motor varying loads. Among those present in the interests of the company were G. H. Condict, H. McL. Harding, F. G. Bell and Mr. Peck.

JOHN I. BEGGS,
First Vice-President

C. G. GOODRICH,
Second Vice-President

JAMES F. SHAW,
Third Vice-President

W. CARYL ELY,
President

W. B. BROCKWAY,
Representing the Street Railway Accountants' Association of America

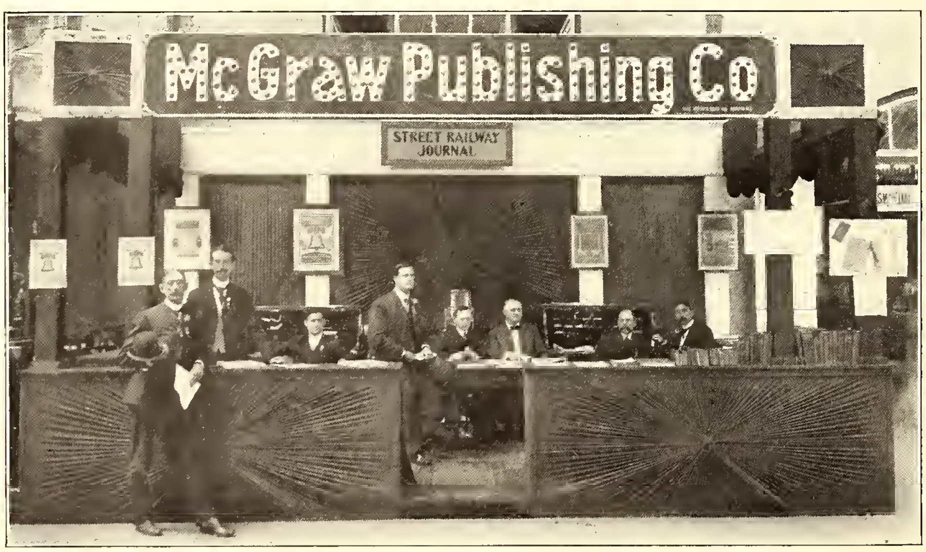
H. H. ADAMS,
Representing the American Railway Mechanical and Electrical Association

B. V. SWENSON,
Secretary and Treasurer

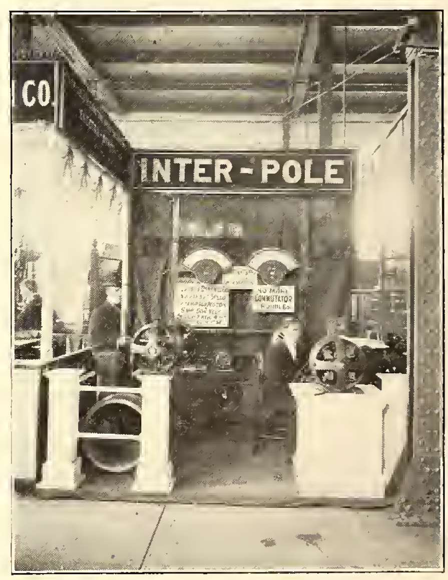
S. L. RHOADES,
Representing the American Association of Street Railway Claim Agents

OFFICERS AND EXECUTIVE COMMITTEE OF THE AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION

GENERAL VIEW OF SOUTH EXHIBIT HALL AT THE PHILADELPHIA CONVENTION, LOOKING WEST

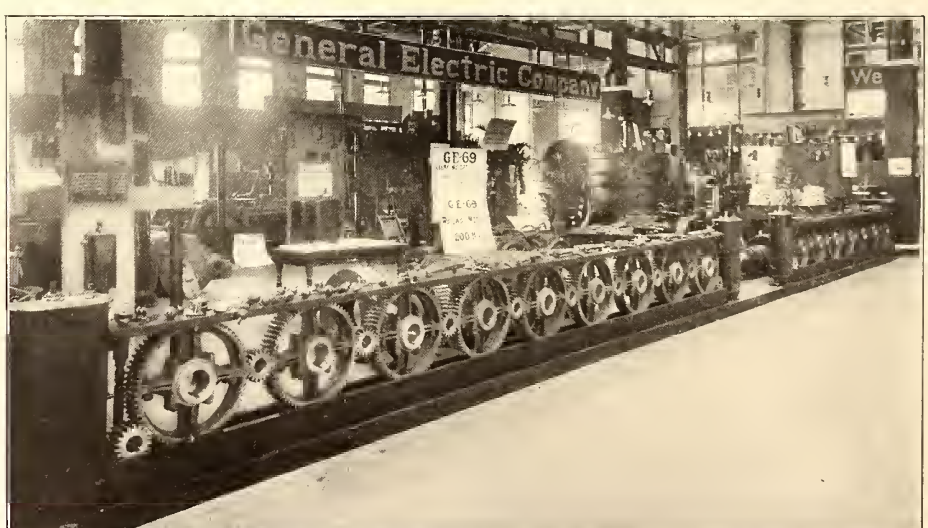


STREET RAILWAY JOURNAL



THE ELECTRO-DYNAMIC COMPANY

GILES S. ALLISON AND
SECURITY REGISTER COMPANY



GENERAL ELECTRIC COMPANY

NATIONAL ELECTRIC COMPANY

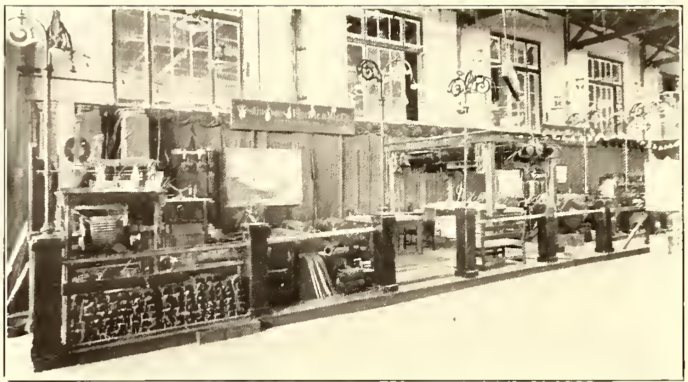
ALLIS-CHALMERS COMPANY

ELECTRIC STORAGE-BATTERY COMPANY

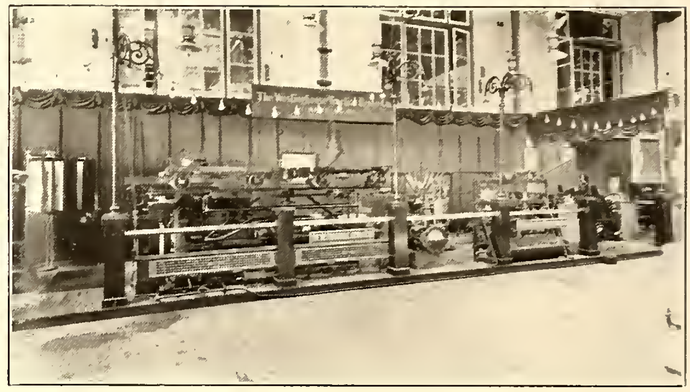
GOLD CAR HEATING & LIGHTING COMPANY

AMERICAN LOCOMOTIVE SANDER COMPANY—GOULD STORAGE-BATTERY COMPANY—U. S. METALLIC PACKING COMPANY—THE T. H. SYMINGTON COMPANY

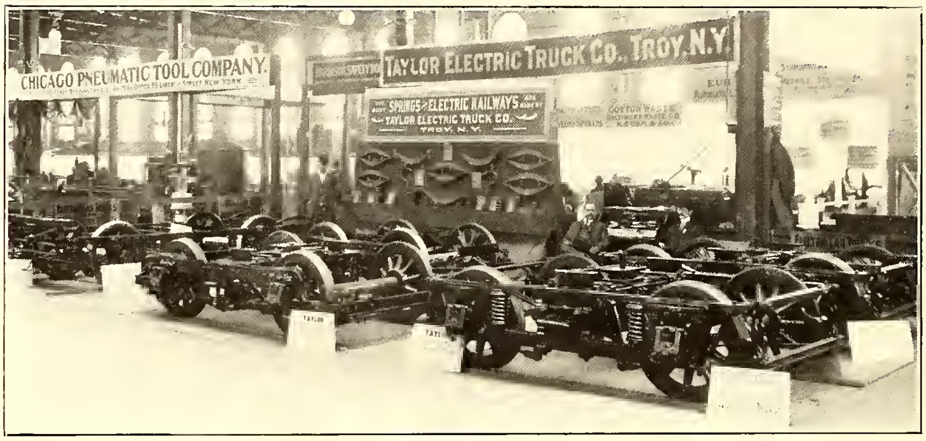
ALBERT B. HERRICK—CHAS. I. EARLL



WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

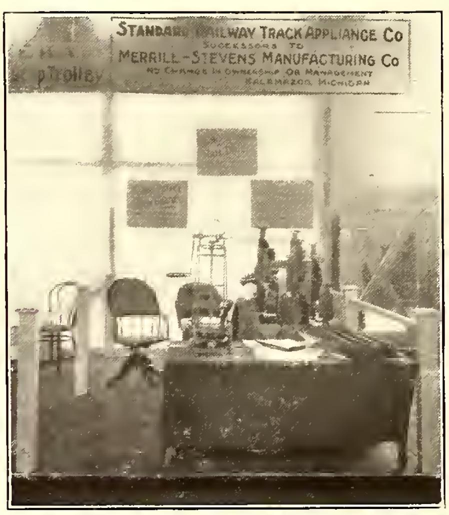


THE WESTINGHOUSE TRACTION BRAKE COMPANY



TAYLOR ELECTRIC TRUCK COMPANY

CROUSE-HINDS COMPANY



STANDARD RAILWAY TRACK APPLIANCE COMPANY

PECKHAM MANUFACTURING COMPANY

BALDWIN LOCOMOTIVE WORKS—STANDARD STEEL WORKS—ST. LOUIS CAR WHEEL COMPANY

ECLIPSE RAILWAY SUPPLY COMPANY

THE CHICAGO VARNISH COMPANY was represented by J. F. Olds, who was in attendance at the convention, looking after the street railway interests of this company. Mr. Olds is a son of E. W. Olds, superintendent of rolling stock of the Milwaukee Electric Railway & Light Company.

G. W. KNOX, president of the Knox Engineering Company, of Chicago, attended the convention and gave his friends some of the souvenirs given out at the recent opening of a splendid natural park on the Green Bay Traction Company's lines, of which he is general manager.

THE FALK COMPANY was represented by Otto Falk and E. A. Wurster. They report an unusual activity in cast-welding this year, the company having more contracts for welding rail-joints by this process than it has had for some time past.

THE GENERAL ELECTRIC COMPANY'S exhibit covered a large space in the main aisle of the large hall in the north of the building. The company displayed many of its latest products in the railway field, and for the first time at a street railway convention showed a Curtis steam turbine. The exhibit included a specially mounted car equipment for use on either direct or alternating current, with air compressor, motors and control in operation. The air compressor is designed for operation on alternating current and supplies air for the braking system. The equipment included GE 505 motors. The necessary alternating current for the motors was furnished by a 200-kw rotary converter running "inverted" from the 500-volt direct-current circuit. On another frame was shown a two-motor Sprague-General Electric multiple-unit control, similar to those in operation on the Boston Elevated Railway.

In addition to railway motor equipments, various General Electric railway single motors were shown, including the GE 80, GE 87, GE 66 and GE 69. A motor-driven air compressor of the General Electric direct-current type was also shown in operation. The exhibit also included railway supplies, a feature being made of field and armature coils, displayed in various stages of construction, giving a good idea of the care used in their manufacture as well as the general structure. The company's lines of catenary construction material was also to be seen, as well as the various types of rail-bonds.

Aside from car equipment material, a 500-kw Curtis steam turbine was shown dismantled, to show the general construction. A 25-kw turbo-exciter represented the company's development of this type of apparatus, and a voltage regulator an advance along another line. Various types of circuit breakers completed this general class of apparatus.

The entire exhibit was lighted by the new G. E. M. lamps and enclosed arcs. The Mercury arc rectifiers operating in parallel supplied current for the sign and general lighting effects.

A feature of this exhibit which particularly attracted the attention of practical electric railroad men was a pair of GE 69 (200-hp) railway motors, which were loaned by the Interborough Rapid Transit Company, of New York. These motors have been in continuous service since their installation on Oct. 2, 1903, and Dec. 10, 1903, respectively. One motor has been operated 45,248 miles and the other 53,005 miles. These motors were borrowed by the company for this exhibit in order to illustrate the wearing qualities of this type of motor, of which there are 418 in regular operation on the Interborough lines.

The General Electric Company's representatives at the Philadelphia convention included the following: Gen. Eugene Griffin, J. R. Lovejoy, W. J. Clark, W. B. Potter, B. E. Sunny, J. G. Barry, L. R. Pomeroy, C. C. Peirce, J. C. Calisch, G. D. Rosenthol, A. H. Armstrong, F. E. Case, H. L. Monroe, J. H. Livsey, J. W. Buell, W. G. Carey, J. J. Mahoney, S. W. Trawick, F. H. Gale.

The exhibit of a 500-kw Curtis turbine complete in the General Electric Company's space at the Museum, gave visitors an opportunity to inspect at close range the details of the machine, which attracted considerable interest among those who had not previously had this opportunity. The number of those to whom the sight of the Curtis turbine is a novelty is rapidly decreasing, due to its extensive and rapid introduction in all directions. The 500-kw unit seems to be the most popular size for the ordinary plant.

Among recent orders received for Curtis turbines are the following: The Jackson Electric Railway, Light & Power Company, Jackson, Miss., has ordered a complete new installation of General Electric apparatus to replace its old plant, which will be abandoned in favor of the new. This apparatus consists of two 500-kw 220-volt Curtis steam turbine alternators; two motor-generator sets, consisting of a 300-hp induction motor driving a 250-kw 660-volt direct-current generator; a 25-kw turbine exciter; a 25-kw induction motor exciter set; with other apparatus, switchboards and appliances. The Queen City Electric Light & Power Company, Clarkville, Tenn., has ordered with other apparatus a 500-kw 2300-volt alternating-current Curtis turbine generator with a 25-kw exciter. The Consolidated Light & Power Company, Deadwood, S. D., has purchased two 500-kw two-stage, and two 1500-kw four-stage three-phase 2300-volt Curtis turbine alternators, which will be installed in the main steam generating station at Deadwood. The Denver Gas & Electric Company has ordered a 2250-kw three-phase Curtis turbine alternator for its main generating station. The Fairmont & Clarksburg Traction Company, West Virginia, has purchased two 500-kw and one 1000-kw 2300-volt Curtis turbine alternators. The Public Service Corporation of New Jersey, at Newark, has ordered five 25-kw 125-volt non-condensing direct-current turbine generators complete with accessories. These will operate with 140 lbs. steam pressure and will be used for exciting purposes.

THE GOLD CAR HEATING & LIGHTING COMPANY, of New York, had a most attractive exhibit, occupying a corner so as to utilize two walls in displaying its heaters. The color treatment of the space was a soft green, and the booth was surmounted by a large electric sign. The company was represented by Edward E. Gold, John E. Ward, O. E. Robbins and B. H. Hawkins, who extended a most cordial hospitality to all visitors. A complete line of electric heaters was shown for street railway and interurban cars. Among these were panel type electric heaters of the style adopted by the largest systems in the country; also a new truss plank heater, the same as chosen by the Long Island Railroad for a large number of its cars. There were also shown a great variety of "Gold Standard" cross-seat heaters and a novel and ingenious heater which was recently adopted by the London Underground Railways. The Gold Car Heating Company reports that its electric heater business as well as the demands for its system of hot water circulation for heating railway cars are now much larger than ever before, and this state of affairs is undoubtedly due to the company's constant activity in perfecting its apparatus and in adapting it to the special requirements of all sorts of service.

The Gold Company has just issued a most elaborate and comprehensive catalogue on the subject of car heating. The catalogue is substantially bound in cloth, gold lettered and of a size sufficient to show large detail drawings of the several systems of car heating. The volume opens with a historical review of the progress made in car heating, and this is followed by an imposing list which comprises some of the more prominent railways that are using Gold systems. The descriptive matter proper commences with a description of Gold's "Universal Straight Post Steam Coupler" and a consideration of its use in car heating. All details are illustrated separately and are identified by a careful numbering of the cuts. Particularly valuable are the plan and elevation drawings, showing the proper location and connections of these couplers. Another feature which contributes largely to successful car heating is an efficient regulator, and the chapter devoted to the Gold "Improved Balance Valve Pressure Regulator" creates the impression that it is truly "a regulator that will regulate." The next feature treated is that of temperature regulation, and Gold's "Improved Temperature Regulator" receives extended description. Another chapter describes Gold's "Improved Direct System," and this is accompanied by an extra number of explanatory drawings. Gold's "Special Fittings" are shown in a variety of styles, and the "End Train Pipe Valve" is especially described.

Additional chapters treat at equal length with Gold's "Automatic Tee Trap," "Vertical Trap," "Hot Water Circulation," "Safety Valves" and Gold's "Improved Storage System for Heating Compartment Cars and Refrigerator Cars." Electric heating for elevated, suburban, underground and street railway cars is described as fully as possible. The various types of heaters are shown, their construction, the methods of wiring cars and the forms of switches used in the control of the current.

As the proof of claims is in the using, fac simile letters from many prominent users are convincingly appended.

THE WESTINGHOUSE EXHIBITS at the convention were notable for their feature of complete operative demonstration, and included a greater number of important new products than have been seen in Westinghouse displays for a considerable time. The natural interest shown in the exhibit of two types of Westinghouse single-phase railway motors—Nos. 107 and 108—with which a number of interurban lines in the South and West have been equipped in the past year, was enhanced on Wednesday upon the announcement of the epoch-making order of the New York, New Haven & Hartford Railroad for twenty-five 1600-hp Westinghouse single-phase locomotives for use, at first, over the New York Central's direct-current terminal system in New York, and, eventually, over long electrified sections of the New Haven's main lines. The various parts of the Westinghouse electro-pneumatic control for single-phase traction service were shown with the motors; and the Westinghouse multiple-unit control for direct-current railway service, with the latest type of rectangular switch group introduced in the equipment of the new cars of the Long Island Railroad, was shown in operation in a working arrangement of two No. 113 railway motors, each of 200-hp capacity, also of the type designed for the Long Island equipment. One of the most interesting features of the Westinghouse electrical exhibits was a 30,000-volt demonstration of the protection afforded by Westinghouse multipath—M. P.— lightning arresters to either direct-current or alternating-current railway systems, through a complete installation of apparatus for the equivalent spark-gap tests which have been used in the development of the arresters. Souvenir sheets of paper showing the pure static discharge, the static discharge with line voltage impressed on the multipath discharge block, and the static discharge and line current passing simultaneously over ordinary resistance were distributed during the demonstrations.

The most important new traction brake equipment shown in the space of the Westinghouse Traction Brake Company was the AMS type now in service on the Oak Square cars in Boston, automatic air application, with provision for straight air release, for motor and trailer service. A new type of combination equipment for motor and trailer service was shown also in the SMA brake, straight air, with an extra train line to provide for automatic brake application in emergencies, through the movement of the motorman's operating valve, or in the event of the separation of cars. Both equipments were shown in full operation, and the exhibits included also a rack arrangement of the standard combined automatic and straight air Westinghouse brake for traction service, and different types of air compressors, valves, blowing outfits and sanders. Both the electrical and the brake exhibits were brilliantly lighted with Westinghouse 500-volt direct-current arc lamps and with the incandescent globes of the Sawyer-Man Electric Company. Among the exhibits of the car building companies were a car for the Long Island Railroad, equipped with Westinghouse motors and with the Westinghouse AMR traction brake, an automatic type, with provision for gradual release; and one of the 160 new Brill cars for Baltimore, for which the Westinghouse traction brake is to be furnished.

The Westinghouse reception headquarters in the Bellevue-Stratford blue room was well filled throughout the week, and Walter M. McFarland, acting vice-president of the Westinghouse Electric Company, was in almost constant attendance to act as host. Joseph R. Ellicott, Eastern manager of the Westinghouse Traction Brake Company; F. M. Nellis, the New England representative, and Frederick V. Green, of the New York office, were prominent among those at the brake exhibits. Among the books and pamphlets given out by the Westinghouse Companies was a small map folder mentioning numerous Westinghouse engine and electrical installations in Philadelphia, and presenting in detail the figures of the leading part that has been played by the Westinghouse Companies in the equipment of the power houses and new sub-stations of the Philadelphia Rapid Transit Company.

THE ALLIS-CHALMERS COMPANY, finding it impracticable to erect and exhibit for one week a 6000-hp or 8000-hp engine and generator, or any of its larger apparatus, confined its efforts to welcoming visitors in a large and attractive reception room which it had fitted up at the foot of the stairs leading to the convention hall. Here, and also at the Bellevue-Stratford, where its representatives dispensed courteous hospitality throughout the several days of the meeting, the Allis-Chalmers badges and watch fobs, reproducing in oxidized silver the Liberty Bell and bearing the company's well-known "Four Powers" trade mark, were worn by hundreds of the visiting railway men. The Allis-Chalmers representatives at the convention were as follows: F. C. Randall, manager, New York office; G. B. Foster, manager, Chicago office; George H. Berg, manager, Boston office; J. W. Murray, manager, Pittsburg office; W. S. Doran, manager, power department, Milwaukee, Wis.; B. A. Behrend, chief electrical engineer, Cincinnati, Ohio; Charles E. Lord, electrical patent counsel, Cincinnati, Ohio; David Hall, assistant chief electrical engineer, Cincinnati, Ohio; A. H. Whiteside, manager, Philadelphia office; C. C. Buttenfield, Philadelphia office; H. A. Moore, Philadelphia office; D. W. Pulver, manager, Buffalo office; L. C. Marburg, Milwaukee, Wis.; Arthur Warren, manager of publicity, Milwaukee, Wis. At the company's booth were shown many photographs of interesting installations in which Allis-Chalmers apparatus has been used..

THE CONSOLIDATED CAR HEATING COMPANY exhibited its new truss plank heaters, with connecting wires in conduit, which extend into the heater cases, and panel heaters connected in the same manner; also a panel heater with flanged back and arranged for connecting lead wires from the front of the heater, designed for new cars for the New York City Railway, this wiring being in accordance with the latest rules of the National Board of Fire Underwriters; also several types of cross-seat heaters and several new types of switches, some of which were fitted with locks, and a complete switchboard for elevated cars. Consolidated heaters were installed in three classes of cars exhibited at the convention, as follows:

Long Island Railroad steel car, having twenty-four panel and two cab heaters, being a duplicate of the equipments furnished this road for 134 cars, and similar to the equipments used in all of the New York Subway cars.

Chicago City Railway car, having twelve truss plank and eight panel heaters. Duplicates of this equipment are being furnished the Chicago City Railway for 200 new cars, and similar equipments for 455 old cars. Duplicates of the equipments for these new cars are being furnished the International Railway, of Buffalo, for fifty cars, and similar equipments to the Philadelphia & Western Railroad for ninety cars.

United Railways, of Baltimore, car, having twelve of a new type of cross-seat heaters. Duplicates of this equipment are being furnished this road for 105 cars.

The Consolidated Company has sold since the 1st of March last more than 38,000 electric heaters for use in 3300 cars. The company was represented at the convention by Cornell S. Hawley, general sales agent; S. B. Keys, district manager, Eastern territory; C. C. Nuckols, from the Chicago office, and J. Arch Mears, from the New York office.

THE LORAIN STEEL COMPANY, of Philadelphia, had a very large but simply and tastefully arranged exhibit, comprised principally of well-known specimens of special work, together with some new and interesting features. One of the latter was a switch tongue with a ball-locking device, to prevent the switch tongue from being accidentally thrown by the passage of the front wheels of a car and derailing the rear trucks. These accidents have been so frequent on some interurban lines that orders have been issued for conductors to get out and watch the switch points in cities as cars pass over; cars to proceed over such joints only on signal from conductor. The new ball-locking device allows the switch point to be moved by a switch bar in the usual manner, but is held in one position or the other firmly enough so that it cannot be thrown accidentally. The switch is connected to a hollow weight containing an iron ball in glycerine. The throwing of the weight from one position to the other by the throwing of the switch point causes the ball to roll from one end to the weight to the other, and act as a gently restraining lock on the switch. Another new feature of the exhibit was a split switch for steam and interurban railroads with renewable tongues of manganese bolted to the rails. With this the whole switch does not need to be renewed when the tongues wear out, and farther, the tongues being of hard metal, will not wear out so rapidly. This company's new frog, with easily-removable manganese steel centers in cast-steel frames, was a part of the exhibit. The company is now doing some electric welding for the Public Service Corporation of New Jersey, in Camden, and those who wished had an easy opportunity to see this work going on by taking a trip across the river. Those in attendance were: Daniel Coolidge, president; P. M. Boyd, secretary; C. Burton, assistant to president; Major H. C. Evans, of New York; R. Clitz, of Cleveland; W. W. Kingston, of Atlanta; S. P. S. Ellis, of Pittsburg; A. S. Littlefield, of Chicago; S. P. McGough, of Chicago; H. F. A. Kleinschmidt, superintendent of track welding; H. B. Frye, Jr., and H. C. Stiff, of Johnstown; S. H. Merrill and F. J. Drake, of Philadelphia.

THE GARTON-DANIELS COMPANY, of Keokuk, Ia., labeled its booth "Headquarters for the Society for Prevention of Cruelty to Motors and Controllers." The "Automotoneer" for preventing fast feeding was, of course, the center of this expressive sign. The automotoneer was shown in several styles and adapted to several different types of controllers. It is now in use on a large number of cars, and is rapidly assuming a recognized place in the art. One style for slow acceleration is made, with a dashpot for determining the time that must be allowed between points. The other has no dashpot and simply requires the motorman to pause on each controller point. Considerable literature, both on the subject of controller handling and lightning arresters, was available at the exhibit, and can be had for the asking. The lightning arrester exhibit included arresters up to 5000 volts, part of which were connected up for demonstration purposes. J. V. E. Titus, president, and W. P. Cosper were in attendance.

THE CHICAGO PNEUMATIC TOOL COMPANY had on exhibition a very interesting line of new electric drills in addition to its pneumatic hammers and drills that have been standard articles for some time. This line of electric drills that has been developed is very light, corresponding closely in weight to the pneumatic drills. This is accomplished by using a small high-speed motor, geared by planetary gearing to the drill spindle. The housing of motor and gear is of aluminum. The motor is ventilated by a fan, otherwise it would be impossible to get such a large capacity of motor into such a small space and make it light enough for handling. The smallest electric drill weighs 13 lbs., and will drill holes up to 3/8 in. The next size weighs 15 lbs., and will drill holes up to 1/2 in., the gear ratio being 1 to 10. Two drills are made which weigh 30 lbs. One of these has a gear ratio of 2 to 12, and drills a 7/8-in. hole. The other has a gear ratio of 3 to 20, and drills a 1 1/4-in. hole. Two large drills are made with three motors inside the casing. They each weigh 50 lbs., and can be handled by two men. One with a large gear ratio will drill up to 2 1/4 ins. and another up to 1 3/4 ins. The motors are wound for 110 and 220 volts d. c. The company also exhibited its pipe-bending machine for bending steam pipe and conduit, which is something many electric railways are interested in, with the advent of car wiring in iron conduit, and the use of long bonds instead of elbows on steam pipes. A full line of air tools, a motor-driven compressor and a portable compressed air-driven emery grinder, which is direct connected to an air motor running 2000 r. p. m. completed the exhibit. J. W. Duntley, president; W. O. Duntley, vice-president; Thomas Aldcorn, of New York office; W. P. Pressenger, manager compressor department; G. A. Barden, manager Philadelphia office; J. L. Towle, of Boston; Julius Keller, of Philadelphia office;; Mr. Coats, in charge of electric drills; B. H. Tripp and F. G. Severin were in attandance.

THE OHIO BRASS COMPANY, Mansfield, Ohio, as usual had a large representation and a large exhibit. The Nichols-Lintern air sander, which has recently been acquired by this company and is very well known on interurban roads, was a prominent feature. This sander is also being used on recent large orders for city cars. It was shown in operation both with an independent sander valve and with a supplementary valve on the brake valve, by which the motorman can open the sanding valve by pressing a lever directly over the brake valve with the thumb of his right hand. The latter makes the brake and sander valve a complete unit in itself, operated by one hand. The exhibit included all the principal types of overhead and third-rail insulators and fittings made by the company, including some very interesting designs for high-tension, single-phase trolley lines, in which line of manufacture this company did some pioneer work. The company finds its soldered bonds as popular as ever, and showed grinding and soldering tools for applying them as well as screw compressors for applying compressed terminal bonds. Bell metal bearings; the company takes much pride in, and because of the excellence of metal used at its factory large government high-pressure valve contracts for navy use are being carried out by it. Brooklyn strain insulators are now made by this company, all patent difficulties having been settled. The company was represented by C. K. King, vice-president; A. L. Wilkinson, secretary; G. A. Mead, chief engineer; M. P. Wolcott, sander specialist; A. L. Price, manager foreign department; N. M. Garland, manager New York offices; F. H. Jameson, R. M. Campbell, J. E. Slimp, Max A. Berg and E. R. Mason, of Porter & Berg, Chicago agents; O. W. Uthoff, of St. Louis, and Burt Gellatley, of Pittsburg.

THE PETER SMITH HEATER COMPANY, of Detroit, had on exhibition a new invention for securing much more rapid circulation of hot water in a car piping system than is now common. By this arrangement a greater proportion of the radiating surface can be kept at a high temperature and more effect can be obtained from a given system of piping. A 50 per cent increase in rapidity of circulation is claimed. A heater was shown in operation with a section of glass pipe in the circulating system, to show the rapidity of circulation. This is the invention of W. P. Cosper, and the Peter Smith Heater Company has acquired the rights to use it. Two open fire heaters and three magazine coil heaters were shown, as well as the combination magazine coil and jacket built for the Metropolitan Elevated, Chicago. Peter Smith, president and manager, and E. J. Smith, secretary and treasurer, were present.

THE STAR BRASS WORKS, of Kalamazoo, Mich, represented by L. M. Crockett and H. E. Eckelston, exhibited samples of the Kalamazoo trolley wheels and harps which are in use on so large a percentage of the interurbans in the country. A full-sized model of the Champion fender was shown. This fender is both tripped and set from the platform, and is conveniently folded up.

HAROLD P. BROWN, of New York, as usual installed a motor generator and tested a bonded rail-joint by passing a current of 3000 amps. through it and measuring the drop with a multivoltmeter. The joint bonded with the Brown plastic plug bond showed conductivity equal to the unbroken rail. A knife switch that had its contacts amalgamated and coated with the plastic alloy, showed a drop of .0023 volts between its terminals with 3000 amps., while a duplicate switch, uncoated, showed .02 drop with the same current. The Brown plastic plug and washer types of bonds were shown. Mr. Brown was assisted by Julius Alsberg, engineer; Jas. Hollowood, superintendent; J. M. Coote and William Temple.

THE ADAMS & WESTLAKE COMPANY, of Chicago, exhibited combination arc and incandescent headlights, tail lights, hand lanterns, brake handles and bundle racks for cars. Ward B. Willits, president; Fred B. Jones, vice-president; E. L. Langworthy, Eastern manager; F. N. Grigg and J. A. Foster were in attendance.

THE KALAMAZOO RAILWAY SUPPLY COMPANY, which has recently acquired the Root track scraper together with the services of Mr. Root, had a full-sized exhibit of the latest spring scraper mounted on a push car, also the manufacture of this company. Kalamazoo track jacks, track levels and gages completed the exhibit. Many orders for scrapers were taken during the convention. J. W. Thorn and F. N. Root were present.

THE TOMLINSON COUPLER COMPANY, of Denver, showed a new automatic coupler, which is used on a number of cars inDenver. Chas. H. Tomlinson, of Denver, was in attendance.

CHARLES N. WOOD, president of the Charles N. Wood Electric Company, of Boston, was at the convention as usual. Mr. Wood's company made no exhibit, but Mr. Wood and Robert Mathias, who was also in attendance, spent the time with their many friends and introduced them to the exhibits for which the company is agent, including the following: R. D. Nuttall Company, Pittsburg, Pa.; Sterling Varnish Company, Pittsburg, Pa.; Empire Safety Tread Company, Brooklyn, N. Y.; Crouse-Hinds Company, Syracuse, N. Y.; Lyon Metallic Manufacturing Company, Chicago; General Electric Company (overhead material and bonds), and Garton-Daniels Company, Keokuk, Ia.

THE WILSON TROLLEY CATCHER COMPANY, of Boston, Mass., had as representatives at the convention Charles N. Wood, Charles F. Wilson and Robert Mathias.

JOSEPH P. DEVINE, of Buffalo, was present at the convention in the interest of the Emil Passberg system of vacuum drying and impregnating apparatus, of which he is the sole agent and manufacturer in the United States.

THE H. W. JOHNS-MANVILLE COMPANY, as usual, was well represented. Its exhibit was very attractively arranged, and included a complete line of overhead line material, a number of new devices of high potential design that have recently been brought out, a full line of "Noark" standard and national electric code standard fuses, blocks, service and subway boxes and accessories, and a diversified line of moulded insulating materials, consisting of Vulcabeston, Monarch and moulded mica compounds. In addition to this, the exhibit included some of the well-known asbestos and magnesia pipe coverings, asbestos roofing, asbestos, Vulcabeston and Kearsarge caskets and packings. Among the products which attracted particular attention were Transite asbestos fireproof lumber and Electrobestos fireproof insulation. The two latter materials are coming into very extensive use in the construction of electric railway cars, particularly in New York City, where all the details of fireproof construction of cars have been very carefully worked out. The company distributed a very complete catalogue devoted to these materials. The line of high-voltage insulators also attracted considerable attention. The exhibit was in charge of J. W. Perry, manager of the electrical department, New York, and the following gentlemen in addition were in attendance: H. E. Manville, secretary, New York; T. T. Lyman, general sales manager, New York; D. T. Dickson, manager, Philadelphia branch; H. M. Voorhis, manager electrical department, Philadelphia office; H. M. Clymer, Philadelphia office; J. B. Meek, general representative, New York, and C. N. Manfred, manager advertising department, New York.

THE JOHN SIMMONS COMPANY, of New York, had a very interesting and unique exhibit in the main part of the convention hall. It consisted of a main steam header with valve bend separator and throttle valve, showing position of valve as actually used in a power house. A novel feature of the exhibit was a steam separator which was used as a lemonade tank, supplying the friends of this company with a pleasant beverage. Some very attractive souvenirs were given out in the shape of a globe valve attached to a leather fob, and an attractive ash tray. Those present at the convention were: F. H. Simmons, C. H. Simmons, Joseph Simmons, Capt. and Mrs. G. A. Hurd and D.

A. Briggs. The exhibit was surrounded by visitors constantly, as a result of the novel methods used in advertising it, and "The Man" (Capt. Hurd) was a much-sought for personage.

THE AMERICAN RAILWAY SUPPLY COMPANY, of New York, had on exhibition a very attractive board, on which was displayed all the various specialties, including conductors' badges, buttons, ticket punches, etc., manufactured by this company. Walter Chur, as usual, represented the interests of the company at the convention.

THE LORD ELECTRIC COMPANY'S exhibit in section J attracted the attention of many railway men. In the space, which had been tastefully decorated in olive green and crimson, the company displayed a very attractive sample board about 4½ x 10 ft., made in the form of its trade mark; this sample board was finished in white enamel, and on it were shown samples of the various types and sizes of Thomas soldered rail-bonds made by this company. Around the booth were arranged a variety of rail sections to which bonds had been applied to illustrate the adaptability of the several types under different conditions where either plain angle-bars or improved joints are used; the installation of the bonds being especially shown in connection with the Continuous, Weber, Wolhaupter and Bonzano joints. A variety of loose samples were also displayed, and a number of standard 0000 bonds were distributed among the railway men. Another well-known specialty exhibited by this company and which attracted a great deal of attention and made favorable comment, was the Shaw non-arcing lightning arrester. Several sizes and types for the protection of railway power and lighting circuits were shown, including one of the large static dischargers which are used so extensively and which have proven so efficient on high potential a. c. circuits. Two new bulletins, a 24-page pamphlet on rail bonds, and a 16-page booklet on lightning arresters, were distributed. Both of these bulletins were properly illustrated and contained much valuable and practical information for those who have to specify, purchase or use material in these lines. The rail bond bulletin especially emphasized the installation of soldered rail bonds, of which the Lord Company has made a specialty, and to which it has given much time and thought in designing tools and equipment, making tests on flux solder and other materials used. The company has also made very exhaustive tests to determine the strain that should be applied commercially as a proof test to insure ample current capacity and mechanical strength. Many of the special tools required for the installation and test were exhibited.

Those in attendance at this exhibit were: Edwin M. Hamlin, general manager; Henry M. Shaw, New York office; George W. Smith, Baltimore office; W. R. Garton, Chicago office; George B. Crane, Boston office. The company reports a very heavy registration of railway men from all parts of the country who manifested unusual interest in the exhibit, with numerous favorable reports from those who have used the bonds and lightning arresters. The manner in which the railway men investigated even minute details indicated the care they are now exercising in obtaining all the facts and securing the best the market affords. The Lord Electric Company is well pleased with the result of its exhibit, and considers the exhibition and convention highly successful.

The company gave an informal banquet and theater party to its officers, agents and representatives on Wednesday evening.

THE LUMEN BEARING COMPANY, of Buffalo, N. Y., had a complete exhibit of its general line of motor bearings. Particular attention was called by E. P. Sharp, who represented the company at the convention, to a motor axle bearing cast in a metal mould. No machine tool work is needed on this bearing, and consequently the expense is very much lower, although the quality and serviceability of this bearing is not in the least degree lessened. A 6-in. trolley wheel, weighing less than 3 lbs. with bushings complete, was also exhibited. The strength and perfect balance of this wheel, although extremely light, are maintained in service.

THE GOLDSCHMIDT THERMIT COMPANY, of New York, had a complete exhibit in the convention hall of its thermit and thermit rail welding apparatus. Demonstrations of the actual rail welding process as used in this country were given daily at 4 p. m. The extent of the interest taken by the delegates at the convention in this simple process of welding rails was manifested by the number of street railway men who witnessed these daily demonstrations. Those present at the convention were: E. Stutz, vice-president, and R. F. Kelker, Jr., chief engineer.

THE MERCHANT & EVANS COMPANY, of Philadelphia, successor to Merchant & Company, made a joint exhibit with the International Sprinkler Company, and displayed samples of high-grade babbitt metals and solders. The company also had on view its Star tin plate ventilators in various sizes, designed for giving ventilation in car houses and power houses. This type is known as the stationary ventilator, in contra-distinction to an exhaust fan driven by power, or a ventilator of the revolving type. It consists of a tubular structure surmounted by a corrugated conical deflector in such a manner that no opening exists between it and the tube. The ventilator itself is surmounted by a conical cap, properly ornamented. Between the cap and corrugated deflector is placed another conical deflector. A cylindrical tubular band is fastened to the tube, deflectors and cap in such a manner as to encircle all three and leave a space between itself, the deflectors and the cap.

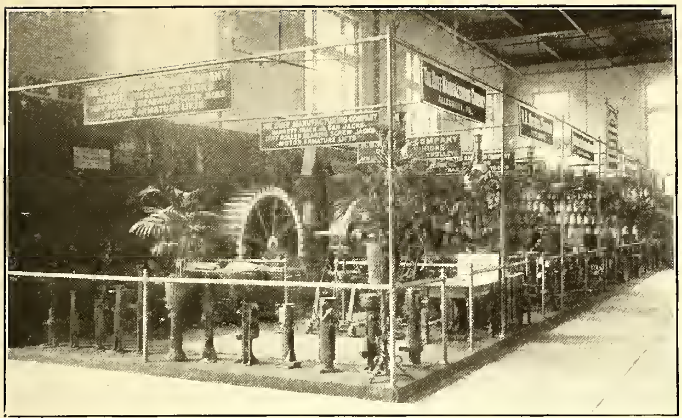
It will be understood that when the wind strikes the band, should it pass over the top edge and enter the band, it will either strike the intermediate deflector or the corrugated deflector at the bottom, and is thus directed upward, creating a partial vacuum in the tube or flue, and the wind is prevented from being blown into the tube. Should the wind pass under the lower end of the band or strike the corrugated deflector direct, the same result is occasioned, and thus the ventilation of the room or apartment is reliably effected, or an unobstructed draft is created in the chimney or flue, as the case may be. The intermediate deflector also acts as a guard for preventing the wind and rain blowing under the cap from being directed into the tube. Should the wind strike the surmounting cap from above, it descends around the outer edges of the intermediate and corrugated deflectors and creates a downward draft between the cap and the deflectors, which creates an upward draft in the tube or flue.

In order to prevent the lateral deflection of the wind, as it strikes the lower deflector, the latter is corrugated, forming a series of channels or pockets, which serve to catch the wind and direct it upward above the top of the tube or flue, thus creating a draft in the latter.

THE INTERNATIONAL SPRINKLER COMPANY had the only complete exhibit of automatic sprinkler fire protection systems for protecting car houses, power houses, mills, factories and other classes of buildings. The "International" apparatus includes sprinkler heads, the Evans dry pipe valves, mechanical and electrical alarms, the Evans combined elevated tank and gravity reservoir, and all special apparatus and all standard materials required to install complete automatic sprinkler systems. The protective installation advocated by this company consists of a series of lines of pipe hung from the ceiling of any building, running parallel and from 8 to 10 ft. apart, with sprinklers attached along these lengths of pipe at distances of 8 to 10 ft. Thus to every 8 to 10 ft square of area (164 to 100 sq. ft.) there is an automatic sprinkler head. This pipe system must have a sure source of water supply. There are two systems available, i. e., the wet and the dry. The wet system is for use in buildings in which there is no danger of freezing. In this all the pipes are all the time filled with water. The dry system is used in buildings in which freezing is possible, and with this method the water supply is intercepted at the point where freezing may occur by the Evans dry pipe valve. Between this valve and the sprinkler heads the pipes are filled with compressed air. The Evans automatic alarm is used in both systems, whereby electric or mechanical gongs, one or both, are sounded upon the opening of one or more sprinklers from fire or break in the piping.

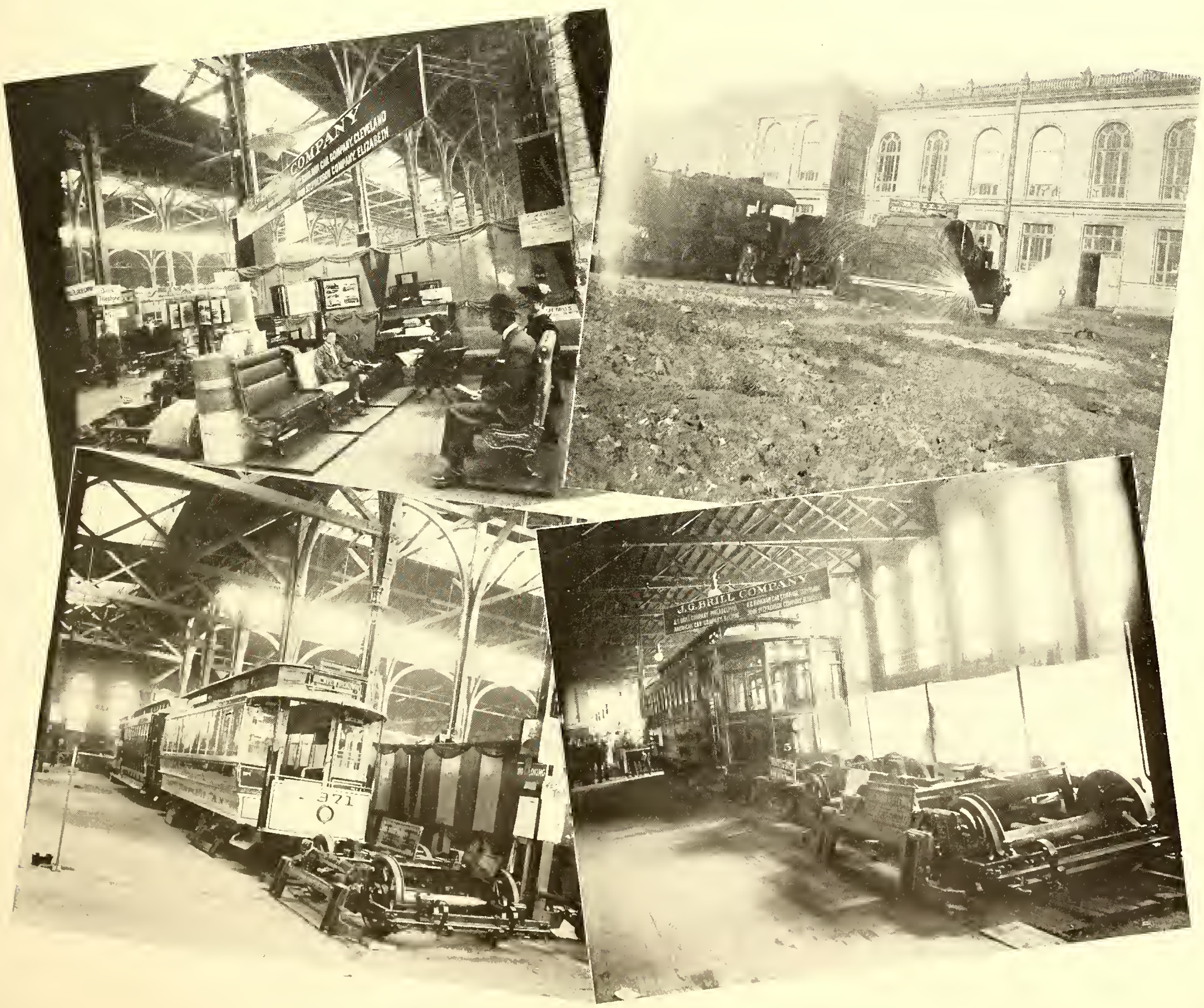
With the Evans dry pipe valve which was shown at the convention a relatively low air pressure of 30 lbs. pressure per sq. in. operating on the valve keeps it closed against any available water pressure. When one of the sprinklers opens and the air pressure is reduced to approximately 10 lbs., the dry valve opens automatically and floods the system with water. The claims advanced for this design are: First, the valve is incapable of being "water-columned"; second, with a comparatively low pressure which permits a reasonable leakage without tripping the valve, the device holds any available water pressure; third, the valve works satisfactorily under very low or very high or very irregular water pressure.

The International sprinkler head consists of a bronze frame threaded for attachment to the pipe system containing a water outlet, and opposite thereto a deflector normally rotating in action, but giving equally good distribution when stationary. The water outlet is kept closed by a bronze cap retained by two levers, whose ends are secured by a fusible link consisting of two bronze plates transversely corrugated and soldered together. If the temperature of the air about any sprinkler head reaches a pre-determined degree, usually 165 degs. F., the solder link melts, thereby releasing the valve cap and permitting the water to flow against the distributor, which spreads the water above, below, and for a desired distance around, in large drops. The company displayed a number of different styles of heads in various sizes for



TWO VIEWS OF EXHIBITS OF MAYER & ENGLUND COMPANY

(Included in the Mayer & Englund group were the exhibits of the Protected Rail Bond Company, R. D. Nuttall Company, Garton-Daniels Company, Sterling Varnish Company and Duff Manufacturing Company)



GROUP OF EXHIBITS OF J. G. BRILL COMPANY

THE OIL AND WASTE- SAVING MACHINE COMPANY

LEONHARDT WAGON MANUFACTURING COMPANY

FRANK RIDLON COMPANY

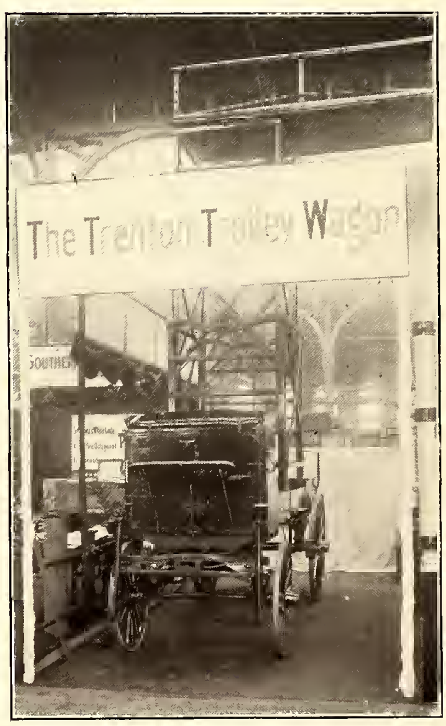
BUCKEYE ENGINE COMPANY

BLAKE SIGNAL & MANUFACTURING COMPANY

PETER SMITH HEATER COMPANY

THE O. M. EDWARDS COMPANY

MASSACHUSETTS CHEMICAL COMPANY



J. R. McCARDELL & COMPANY

THE CURTAIN SUPPLY COMPANY

SHERWIN-WILLIAMS COMPANY

CHICAGO PNEUMATIC TOOL COMPANY

BRADY BRASS COMPANY

ALBERT & J. M. ANDERSON MANUFACTURING COMPANY

THE LORAIN STEEL COMPANY

STANDARD AUTOMATIC LUBRICATOR COMPANY, AMERICAN FERROFIX BRAZING COMPANY AND DURKIN CONTROLLER HANDLE COMPANY

THE OHIO BRASS COMPANY

NATIONAL CARBON COMPANY
SPEER CARBON COMPANY
THE TROLLEY SUPPLY COMPANY
LUMEN BEARING COMPANY

HARRISON SAFETY BOILER WORKS
THE EGRY AUTOGRAPHIC REGISTER COMPANY
BENJAMIN ELECTRIC MFG. CO.
MERRITT & COMPANY

ATLAS RAILWAY SUPPLY COMPANY
WHEEL TRUING BRAKE-SHOE COMPANY
THE RECORDING FARE REGISTER COMPANY
RAILWAY JOURNAL-LUBRICATING COMPANY

different purposes. Attention was directed particularly to the outside, or eaves sprinkler head, designed for protecting the outside of buildings from exposure fires. An extra large head, known as the Jumbo, is made for use in dry kilns, oil houses or other hazardous portions of a plant.

The company was represented at the convention by A. M. Lewis, secretary; T. D. Pitts, contracting manager; J. C. Scott, superintendent manufacturing department; J. A. Lawrence, superintendent of construction.

THE RECORDING FARE REGISTER COMPANY, of New Haven, Conn., had an excellent exhibit of all its electric railway specialties. Some of the specialties exhibited were the recording fare register, trolley catchers and retrievers, overhead line material, trolley wheels and harps, punches of all types, car fittings of every description, sand boxes, the Kelsey trolley base, corrugated trolley poles, buttons, badges and trolley cord. Those representing the company at the convention were M. De F. Yates, F. B. Kennedy and W. Hartland.

JAMES H. FOGARTY, of New York, was represented at the convention by Emile Meterie. The unique sectional gear manufactured by Mr. Fogarty has, by its merits, won its way into the favor of a large number of street railway managers and master mechanics in the United States.

THE PEERLESS RUBBER MANUFACTURING COMPANY, of New York, had an excellent exhibit, showing practically all of the products it manufactures. Rainbow packing, Peerless piston valve rod packing, Eclipse sectional rainbow gaskets, knob threads, metal inverted step treads and inlaid rubber tiling were among the specialties displayed. W. J. Courtney, F. O. Donnell and J. L. McGilvray were present in the interest of the company.

THE PACKARD ELECTRIC COMPANY and the NEW YORK & OHIO COMPANY, of Warren, Ohio, were represented at the convention by J. W. Packard and W. D. Packard.

THE DEWITT SAND BOX COMPANY, of Troy, N. Y., had an exhibit of its various types of sand boxes. Mr. DeWitt was present to show the actual operation of the device and extend courtesies to the delegates to the convention.

C. I. EARLL, of New York, exhibited his well-known trolley catcher, showing all the fine points of the machine to a great number of delegates, who most of the time surrounded his booth. A pole was rigged up with a very stiff base and a pressure on the rope of 35 lbs., under which conditions the machine was constantly operated. The Earll machine is winning its way by actual merit into favor with many managers of high-speed roads throughout the country. It has been improved and complications eliminated to such an extent that at the present time it is as near perfect as a mechanical device of this kind can very well become.

THE PARMENTER FENDER & WHEEL GUARD COMPANY, of Boston, Mass., had a complete exhibit of the well-known Parmenter fender and wheel guard. Half of a car was shown equipped with the main fender and the wheel guard under the car next to the wheels. Demonstrations of the working of the fender and guard were given continually during the convention to the delegates who were interested in the fender problem. George A. Parmenter and H. H. Parmenter were present at the convention, representing the company. They report more sales during the present year than in any year in the history of the company and better prospects for more business still during the coming year.

JOHN E. LANE attended the convention in the interest of the "New England Street Railway Bulletin."

THE SHAW ENGINEERING & MANUFACTURING COMPANY, of New York, manufacturer of lifting jacks, has taken up the general railway supply business, particularly pushing Thomas soldered rail-bonds and Shaw non-arcing lightning arresters, under H. M. Shaw's agency for the Lord Electric Company in New York, New Jersey, Pennsylvania and West Virginia. The company was represented at the convention by H. M. Shaw, secretary and treasurer, and E. R. Hudders, general manager, who are looking for exclusive control of electrical and mechanical specialties of merit in the above-mentioned States. The sales department of the company is thoroughly organized, and will give prompt and careful attention to inquiries and orders.

GILES S. ALLISON, of New York, was very much in evidence at the convention, and represented his varied interests in the field with all his accustomed vigor, good humor and genial hospitality.

THE A. W. HARRIS OIL COMPANY, of Providence, R. I., manufacturer and dealer of national reputation in all kinds of oils for engines, cylinders, valves, etc., was represented at the convention by A. W. Harris, Arthur B. Lisle and T. F. Pevear.

ADAM COOK'S SONS, of New York, had a complete exhibit of the well-known Albany grease and the Alpha "electric motor grease," which are extensively for car motors and journals. The company was represented at the convention by Adam Cook and G. E. Tanberg.

DOSSERT & COMPANY, of New York, were represented at the convention by H. A. Bristol and M. R. Jarvis. A neat exhibit of all types of the Dossert cable joints was displayed. The latest invention by the engineers of this company is a Dossert type joint for lead pipe used in gas and water service. During the convention an interesting test of Dossert joints was held in the booth of Harold P. Brown. A melt-down test was made which consisted of placing two 1-ft. pieces of 00 stranded wire connected with a Dossert solderless wire connecter in circuit, and passing through it 3000 amps. of current, which caused the wire to fuse on both sides of the joint within 48 seconds. The joint itself, which is composed of rolled brass, showed not a trace of bluing or any other change. After cooling the joint, it was readily taken apart and showed no effects whatever of the intense heat to which it had been subjected.

THE CHASE-SHAWMUT COMPANY, of Newburyport, Mass., exhibited its flexible soldered rail-bond in the booth of the Frank Ridlon Company in the main part of the convention building. The company was represented at the convention by Frank D. Masterson.

THOMAS F. CAREY and C. H. CURRIER, of Boston, Mass., attended the convention in the interest of the extensive business connections of Mr. Carey in Boston and throughout the country. The genial hospitality of Mr. Carey was very much appreciated by his host of friends.

THE CONSOLIDATED ENGINE STOP COMPANY, of New York, manufacturer of the Monarch engine stop and speed limit system, exhibited photographs of recent installations made by the company in power and steam plants. The exhibit was in charge of Paul Muller, who reports enthusiasm shown by managers and delegates in the Monarch system.

CHARLES F. JOHNSON, of Buffalo, N. Y., attended the convention in the interest of his extensive second-hand business, and met his numerous customers and friends from various parts of the country.

THE PHILADELPHIA TOBOGGAN COMPANY, manufacturer of carousels, forest coasters and toboggan slides, made a unique and artistic display of its specialties. In addition to indicating the important adjuncts park and park amusements have become to trolley systems in promoting travel and increasing profits, the exhibit showed the great advancement made on these lines in the past few years. The rude old merry-go-round with tented top and caricature horses and wheezy hurdy-gurdy organ has passed into history, and in its place has come the elaborate "carousel," enclosed in palatial buildings, with magnificently hand-carved wood horses and other animals (often costing as much as live ones), and an orchestrion attachment of greater value than a dozen grand pianos. Similar progress has been made in coasters, toboggan slides, etc., and one of the fine points of this exhibit was a palace automobile toboggan car, upholstered, decorated and mounted generally like a genuine automobile. The star feature of the display, however, was the resplendent array of carousel animals, artistically and ingeniously carved and decorated in the highest skill of the painter and wood sculptor's art. Among them a bold African lion in plain wood finish challenged general admiration. A gaily caparisoned steed brought back the days of chivalry, and it only required a helmeted rider to form a correct reproduction of the famous picture of the mailed knight errant on his gallant charger. Three milk white horses, resembling marble sculpture, and two beautifully carved vaulting goats stood as sentinels at the entrance. A number of fine carousel paintings and a photographic display of the Toboggan Company's plants throughout the country completed the exhibit, which altogether was an original and striking one, and aroused great interest not only among railway men, but the old and young visitor in general.

THE AMERICAN LOCOMOTIVE SANDER COMPANY, of Philadelphia and Chicago, was kept busy extolling the merits of pneumatic track sanders for electric cars. The company called attention to the claims that the use of pneumatic sanders will save 70 per cent of sand and reduce tire and rail wear. The fact that cars are equipped with pneumatic track sanders will also be found of value in damage suits, because of the quicker stop made possible by their use and the ease with which the motorman can apply them. The value of pneumatic track sanding has long been understood by steam railroads, as proved by the fact that practically every locomotive engine built to-day is equipped with air sanders. In the devices exhibited by the American Locomotive Sander Company, sand from the sand box falls by gravity into the trap, and when air is turned on by the motorman, the sand is blown over the obstruction in the trap and through the hose to the point of contact of wheel and rail. The sand cannot jar out of trap of its own accord while running. The only part exposed to wear is the blast cap, which is readily renewed. The motorman's application valve is placed convenient to his hand, where with one movement instant application of the sand can be made. This is of the greatest value in case of emergency. This valve is made with a warning port in the handle, which gives continual notice by the escape of air that sander is on, and prevents possibility of sander being left on and emptying the box. The valve is made with removable handle.

THE UNITED STATES METALLIC PACKING COMPANY, of Philadelphia, showed its standard packing for stationary and marine engines, the design of the rings and cups being changed to suit the conditions of the service in which the packing is to operate. This is one of the company's strong claims—i. e., that packings are made to suit the requirements of the job, as every mechanical device should be, and the same packing is not expected to answer for all kinds and conditions of work. When once applied, these packings wear for a great length of time, and this fact makes them much cheaper than soft packings, even though the first cost is somewhat higher. When renewals are needed, they consist only of the babbitt metal rings, which are made in halves, and can be easily and quickly slipped into place. Of course, the length of time which elapses between renewals of babbitt metal rings varies with steam pressure and other influences bearing upon packing. The average length of time between renewals on stationary engines is in the neighborhood of two years. The ball and socket joint in United States packings, working in combination with the sliding face of the vibrating cup, renders the packing entirely flexible, so that it will adjust itself to rods not in line without any increase of friction and without in any way lessening its packing qualities. No difficulty is experienced in packing the highest pressure or in working with superheated steam. A design of this packing has also been successfully used on gas engine rods.

THE DUPLICATE TRANSFER & REBATE COMPANY was represented at the convention by H. N. Brown, general manager; T. C. Cary, traveling representative, and C. E. Horney, office manager. The company had a booth in the main aisle, where the representatives were kept busy explaining the line of work the company is doing.

THE MESTA MACHINE COMPANY, of Pittsburg, Pa., exhibited catalogues and large photographs of its specialties, which consist of Corliss and piston-valve engines for rolling mills, blast furnaces and power plants, rolling mill machinery, steel, sand and chilled rolls, steel castings and machine molding gears. This firm has built a number of large installations, notably one of five vertical cross-compound blowing engines for the Donora works of the Carnegie Steel Company, with steam cylinders 44 ins and 84 ins. and air cylinders 84 ins. in diameter by 60-in. stroke. Walter G. Tatnall has recently taken charge of the company's Philadelphia office, and reports late installations of Corliss engines at Wm. H. Grundy & Company's mills at Bristol, Pa., Lehigh Manufacturing Company's new mill in Philadelphia, the Alma Manufacturing Company's plant at Baltimore, Md., etc.

HERBERT W. SMITH, of Boston, Mass., looked after the interests of his New England supply business.

THE STUART-HOWLAND COMPANY, of Boston, the well-known New England supply house, was represented in the person of Harry De Steese, who is a veteran convention goer, and always has a cordial smile and hand-shake for his many friends and acquantances.

THE SECURITY REGISTER COMPANY, of New York City and St. Louis, had no difficulty in arousing interest in its exhibit, which consisted of single and double recording registers. These registers have now reached a state of development that leads the company to believe no further improvements or additions are necessary, inasmuch as the Security register can now be furnished to give all the information required by a street railway company regarding the work of its conductors, including positive records of all fares run up, the badge number of the employee who rang them, and complete half-trip and round-trip records. Where this register is used, each conductor is provided with a key bearing a number to agree with the number on his badge, and he cannot ring a fare on these registers until he inserts this key and such insertion prints his number on the recording sheet, and also the totalizer reading and the number of the register. When his relief time arrives, he extracts his key and again is printed the reading of the totalizer as it then stands, also his badge number and the register number is repeated. The half-trip records have in the meantime been shown by the resetting of the machine at the end of each half trip. Other than the simple inserting and removing of the key, the operation is identical with that of the ordinary machines. The perfected register provides a printed slip instead of the impression record given when the machines were first introduced, and these slips are as legible and satisfactory as first-class typewriting. Col. Giles Allison, who, as usual, represented the Security registers, reports numerous orders and many requests for trial machines, and expresses himself as more than satisfied with the outlook and the many expressions of approval volunteered by street railway men in general. Col. Allison also exhibited the new station indicator described in the Street Railway Journal for Aug. 26, and which received considerable attention during the convention. The colonel was assisted in his demonstrations by H. C. Donecker and F. A. Chapman.

THE JONES & LAUGHLIN STEEL COMPANY, of Pittsburg, Pa., was represented by G. C. Fogwell, and showed specimens of its cold rolled steel axles for electric railway use. In no other service is an axle required to meet such severe duty as in electric railway practice. To meet fully and successfully the demands of this service, the Jones & Laughlin Steel Company, after years of continuous experiments, has combined a mixture of irons from which is produced a quality of steel which, when finished with the company's cold rolling process, has met with entire success. These axles are claimed to be strong and tough, sufficiently elastic and at the same time so ductile that the heavy and persistent blows received in the service, the undue stress produced by the overloading of cars and the violent surges due to the sudden application of brakes do not crystallize and break them. The company distributed a hand book for engineers, including lists and diagrams of steel and iron shapes and sections. The book should be in the hands of every engineer.

WILLIAM D. GHERKY, of Philadelphia, Pa., who is handling the Voynow pole sleeve device used by the Philadelphia Rapid Transit Company for reclaiming iron poles, installed several poles in exhibition hall for the purpose of demonstrating the method of reclaiming iron poles that are badly corroded at the base. This process was fully described in the Philadelphia Convention issue of the Street Railway Journal. It will be remembered that in applying the sleeve the surface of the pavement around the pole is dug out to a sufficient depth by removing the concrete in which the pole was set, nicely squaring the opening. The pole is then thoroughly cleaned by special apparatus and the sleeve slipped over, centered, heated, and the intervening space between pole and sleeve filled with molten sulphur. The sulphur is roofed or beveled at the top, as shown. A concrete block is then formed about the sleeve, sloping upward to same so as to turn water away from the pole, and finished nicely with cement surface. The effect of this block is to preserve the life of the sleeve; but even in the course of time, should the sleeve become corroded, it may be renewed, thus attaining the end originally sought, of permanency for the poles. The sulphur sets up very hard and becomes as a part of the metal itself, and its insulating qualities retard further electrolytic corrosion. In cooling and shrinking, the sleeve encompasses the pole with considerable pressure, stiffening it greatly. By actual test, an old and badly corroded pole so repaired withstood greater strain than a similar new pole unprovided with the sleeve. The device is applicable, of course, to new poles also; and in this case it possesses the same advantage over a shrunken-on sleeve, or similar device, that the sulphur acts as an insulator, retarding further electrolytic corrosion, and that, even if destroyed in course of time, the sleeve may be renewed without taking out the pole. In other devices the joint between sleeve and pole is seldom a water-tight one; but the sulphur joint is always tight and moisture cannot enter.

THE PRESSED STEEL CAR COMPANY had on exhibition on one of the tracks in convention hall the pressed steel car built for the New York City Railway Company, and which was fully described in a recent issue of the Street Railway Journal. This car is No. 2356, and attracted wide attention as representing an entirely new departure in car construction for surface electric railways. During the convention announcement was made that the Pressed Steel Car Company had closed a contract for building a number of passenger cars of composite construction for the elevated and subway lines of the Philadelphia Rapid Transit Company. These cars will be built at the new passenger car department of the Pressed Steel Car Company at Pittsburg. The company was represented by the following force: O. C. Gayley, F.

N. Hoffstot, Peter M. Kling, F. H. Rapley, W. H. Wilkinson, John E. Turner and L. O. Cameron.

THE PARKER BOILER COMPANY, of Philadelphia, had on view one section of the Parker double-end boiler, which is attracting considerable attention from steam engineers. The boiler has been extensively adopted by the Philadelphia Rapid Transit Company. The method of firing the boiler from both ends gives great economy in boiler room area per unit of boiler capacity, and commends itself wherever power house space is limited. In connection with the section of the boiler shown, the company displayed a working model of the boiler, together with samples of scale, junction boxes, superheater headers, etc. The interests of the company were well handled by P. J. McBride.

MANNING, MAXWELL & MOORE, INC., of New York, made a combined display of the specialties supplied by the company it controls, including the Ashcroft Manufacturing Company, the Consolidated Safety Valve Company, the Hayden & Derby Manufacturing Company, the Hancock Inspirator Company and the Shaw Electric Crane Company. The exhibit included "Consolidated" safety valves, "Metropolitan" injectors, "Hancock" inspirators, "Ashcroft" steam and pressure gages, "Tabor" indicators, "Edson" recording gages and "Hancock" valves. Demonstations were made on testing apparatus, showing the high pressures that can be accumulated and maintained on "Hancock" valves. The company's representatives included Thomas G. Keogh, of the New York office; G. B. Gosman, of the Philadelphia office, and L. M. Brigham, general sales agent.

MERRITT & COMPANY, of Philadelphia, had a complete line of their various types of expanded metal lockers. These lockers are made of steel throughout, and the construction of the sides, front and bottom gives perfect ventilation. The company distributed a folder showing the "past," "passing" and "present" of locker construction. The "past" was well illustrated by a view of the dressing room of a public bath in the old city of Pompeii. The "passing" was impressively represented by a photograph showing a line of old-fashioned wooden lockers, which were unsanitary, unclean and unsightly. The "present" was represented by a view in an up-to-date wash room in a modern plant fitted with Merritt & Company's expanded metal lockers, which are compact, neat, clean and sanitary. The circular gives a very impressive idea of the progress made in locker design. The company was represented by Stephen Morris.

THE CONSOLIDATED CAR FENDER COMPANY, of New York City, had a complete display of the well-known Providence fenders, the merits of which were explained by E. C. Hall and George Wesson. The fenders shown include the Model A, designed for use on moderately high cars and open summer cars; Model B, for use on low box cars; Model C, which can be used equally well on either high or low cars; and Model D, which is made especially for use on interurban and suburban cars. The other specialties handled by this company, including the Campbell snow broom and the Millen car step lifter, were shown. The fenders were mounted on platforms, so that the details of construction and operation could be easily studied.

THE BALDWIN LOCOMOTIVE WORKS made a joint exhibit with the Standard Steel Works, and had on view several M. C. B. trucks, including a truck built for the South Side Elevated Railway Company, of Chicago, and one designed for heavy interurban electric railway service. In connection with the exhibit were shown a number of wheels for heavy duty, including cast-iron plate center wheels, cast-steel spoke center wheels with gear complete, as furnished to the Interborough Rapid Transit Company, of New York. A rolled-steel wheel, as supplied to the Japanese Government, attracted considerable attention. The exhibit also included spiral and elliptical springs. There were in attendance for the Baldwin Company: J. R. Dicky, Warren Thorpe, G. W. Hamilton and R. N. Campbell, and for the Standard Steel Works: E. S. Lewis. On one of the outside tracks the Baldwin Company had in operation a 30-hp electric locomotive built for service at the works of Yale & Towne.

THE NICHOLS-LINTERN pneumatic track sander was shown in connection with the exhibit of the Ohio Brass Company. The supplementary sander valve in this device is attached to the motorman's brake valve, and is interlocking with the handle of the brake valve, so that the sander can be manipulated with the brake valve in any position. This feature is noteworthy, as it gives the motorman control over the flow of sand at all times, and also serves to automatically shut off the flow of sand as soon as the pressure on the valve is released. When the brake valve is turned to the emergency stop position, the sander automatically operates and delivers sand to the track without any further attention on the part of the motorman. By means of an attachment, the sand hose is securely fastened at any predetermined point with respect to the wheel, and follows the wheel on either straight or curved track.

THE EMPIRE SAFETY TREAD COMPANY, of Brooklyn, N. Y., aroused general interest by its display of its safety treads, designed for providing a firm foothold and preventing slipping on car steps, elevated and subway stairs, sidewalks, and wherever there is danger to life or limb through persons slipping or losing their footing. The "Empire" tread is composed of carborundum strips set in channels of rolled steel or brass plate, and because of the fact that each particle of grit will wear independently the tread cannot wear smooth. As is well known, carbonundum is one of the hardest materials known, and as assembled by the "Empire" patent process, the tread insures a firm and reliable footing under all conditions. The courtesies of the company were extended by Frank H. Newcomb and J. W. Scott.

THE UNDERWOOD TYPEWRITER COMPANY had a popular booth, where stenographic services were at the disposal of the convention attendants, and where incidentally the merits of the Underwood model typewriters were explained. The exhibit was in charge of F. Williams, manager of the Philadelphia office.

THE CLEVELAND FROG & CROSSING COMPANY, of Cleveland, Ohio, was ably represented by George Stanton, sales agent, who made himself popular, and incidentally took occasion to explain the merits of the Lucas patent steel-rail frogs, crossings, switches, switch stands, etc., as made by his company.

THE CONTINUOUS RAIL-JOINT COMPANY, of Newark, N. J., made its usual interesting exhibit of "Continuous" joints for T-rail sections ranging from 35-lb. to 100-lb. rails; for girder rails ranging in height from 6 ins. to 9 ins.; for step joints and special girder joints, and for special shapes of trams. A portion of the exhibit was devoted to "Continuous" joints applied to various sections of rails, for the purpose of showing their application with all standard types of bonds. Another interesting feature was the application of "Continuous" joints in connection with T-rails in paved streets, as used by the Philadelphia Rapid Transit Company. The hospitality of the company was dispensed by L. F. Braine, general manager; B. M. Barr, W. A. Chapman, E. A. Condit and George W. Smith.

THE ACME AUTOMATIC SPEED INDICATING COMPANY, of Cleveland, Ohio, showed its device for automatically indicating the names of streets in succession. The device has been tried in Cincinnati, where it is said to fill the requirements. The representatives of the company were T. W. Small and C. W. Johnson.

THE STANDARD BRAKE SHOE COMPANY, of Aurora, Ill., was represented by Frank C. Pick.

DILWORTH, PORTER & COMPANY, LTD., of Pittsburg, Pa., displayed tie-plates and spikes. The tie-plates shown were of the well-known Goldie and Glendon flange types. The Goldie plate is known as the "rail-brace tie-plate," since it displaces the rail-brace in holding the heaviest curves to gage. The Glendon flange plate is used principally on tangents with soft-wood ties. Among the various makes of spikes was to be found the Goldie spike, driven in cedar ties showing its great adhesion in comparison with the chisel-pointed spike.

THE O. M. EDWARDS COMPANY, of Syracuse, N. Y., made its usual attractive display of car window fixtures, vestibule platform trap-doors and tin barrel spring rollers. These fixtures are rapidly coming into more and more favor with electric roads, especially for interurban service, and several companies have made these fixtures standard on their cars. Out of 25 different designs of the Edwards window fixtures, those shown were the ones most applicable to electric railway service. The Edwards trap-door is being largely adopted for covering steps in the vestibule, similar to passenger coach construction for steam roads. The company was represented by O. M. Edwards, G. G. Norris and E. F. Chaffee.

THE STANDARD AUTOMATIC LUBRICATOR COMPANY, of Philadelphia, made a very interesting demonstration of its "Star" oilers for armature and axle bearings. The record these oilers have made in prolonging the life of bearings and eliminating armature troubles commends them to the attention of street railway men. This company was one of the pioneers in securing oil lubrication for armature and axle bearings, and was one of the first to produce a self-feeding oiler for that purpose. Samples of bearings were exhibited that had made mileages of 22,000 to 30,000 miles and were apparently still in excellent condition when taken out. The cost of oil lubrication with the "Star" oilers has been reduced to 12 cents per 1000 car miles. The company took many orders for equipments during the convention, several being from the largest systems in the country. The company was represented by G. B. Kirkbride.

THE AMERICAN FERROFIX BRAZING COMPANY, of Philadelphia, showed samples of its work in brazing iron, and its exhibit proved of exceptional interest to practical railway men. Gear cases and other parts were exhibited which had been made as good as new after having been repaired by this process. The company feels that there need be no scrap pile with any road hereafter, because it will be a comparatively easy matter to repair practically all broken parts by the Ferrofix brazing method.

THE DAVID LUPTON'S SONS COMPANY, made an impressive demonstration of the urgent need for a fireproof and waterproof window that is really fireproof and waterproof. While the Lupton window has been on the market but a comparatively short time, it is by no means in the experimental stage, for in it is incorporated the accumulated experience of many years in making windows of this character. Every principle involved and every feature of construction has been subjected to the severest tests. The Baltimore fire afforded a costly object-lesson as to the value of the so-called fireproof buildings without fireproof wondows. Indeed the company believes that a building is not fireproof in any sense, unless the windows are designed to maintain a fire seal and air seal as well. The Lupton Company has turned its long experience in architectural sheet-metal work to good account in developing the Lupton window, which has hollow metal frames and sash glazed with wire glass. The windows are particularly for car houses and power houses, and are securable in almost all sizes and shapes. There are now being built for a large car house Lupton windows 15 ft. x 16 ft. 9 ins. in 9 sections. As showing the nature of the company's work in the sheet metal, two gigantic fish were shown moulded from sheet steel for decorative purposes. The exhibit was in charge of J. W. Walkins.

THE STANDARD PAINT COMPANY, of New York, had a very attractive exhibit wherein were shown samples of all its well-known P. & B. insulation, including "Rubberoid" roofing, "Rubberoid" motor wire insulation, S. P. C. flexible iron paint, and "Flexite" metal preservative paints. The S. P. C. flexible iron paint is a new product, and is a quick-drying glossy black paint for protecting metal work of all descriptions from corrosion due to atmospheric or chemical conditions. The paint is composed of a flexible base cut up with a solvent. It is highly elastic in nature and dries to a hard glossy surface. It is waterproof and weatherproof and is an excellent preservative for car sills, trucks, framings, steps, railings, trolley poles, fenders, machinery, etc. It is a thorough insulator and is used largely by electric and traction companies for that reason. The "Flexite" metal preservative paints are the result of twenty years of study and practical tests made with a view to producing a metal preservative coating for protecting metal surfaces as bridges, steel cars, car trucks, structural iron and all metal surfaces exposed to the weather, dampness, salt air, water or corrosive gases. For the first time these paints are now supplied in black, red, green, or olive colors. Those present at the convention for the company were Ralph L. Shainwald, president; Paul M. Wade, Charles Earnshaw and James N. Richards. The company had a much-sought for souvenir in the form of a leather card case.

THE DURKIN CONTROLLER HANDLE COMPANY, of Philadelphia, succeeded in attracting marked attention to its device for eliminating trouble arising from the misuse of street railway controllers. The device has been adopted on a number of large roads and it is claimed is doing much toward securing the proper handling of controllers by motormen. The company has termed its device "the watch dog" on the controller. The merits of the device were fully explained by John P. Durkin, who represented the company's interests.

THE NATIONAL BRAKE COMPANY, of Buffalo, maker of the "Peacock" brake, although a comparatively newcomer into the electrical supply family, was represented in full force, and made a very neat and attractive exhibit of all types of the "Peacock" brake. The brakes were shown mounted on stands to illustrate their construction and operation in actual service. Types A and B, for city service, and type C, for interurban and steam railroad work, were the chief features. The "Peacock" brake was also exhibited on one of the 200 cars recently built by the J. G. Brill Company for the Chicago City Railway, this brake having been specified for all of these cars. In addition to this order, the "Peacock" brake is used on over 500 cars on the Chicago City Railway. The brake was also installed on one of the Brill cars shown at the hall, 200 of which are being built for the United Railways Company, of Baltimore, all of which are to have this type of brake. When these cars are delivered there will be 700 "Peacock" brakes in service in Baltimore. The remarkable activity of this company is illustrated by the fact that, although it has been in business less than a year and a half, over 350 roads are now using its brakes on part or all of their equipments. The National Brake Company was well represented by G. S. Ackley, president and general manager; W. D. Brewster, secretary; W. W. Miller, J. A. Edwards, E. C. Rutherford, F. Miller and H. A. Clark.

JOHN LUCAS & COMPANY directed attention to their "Mirac" varnish and paint remover. This compound will remove any number of coats of old varnish and paint from wood, iron or glass, leaving the surface clean and ready for finishing. It has the advantage that it is entirely harmless to handle and will not iritate the eyes. It is also adapted for cleaning paint and varnish brushes. It is stated that 1 gal. of the remover will clean from 250 sq. ft. to 300 sq. ft. of old coatings. The booth was effectively decorated with treated panels and color samples, and was in charge of E. C. Monroe, A. S. Lucas, W. C. McMullin and F. H. Lovejoy.

THE GLOBE TICKET COMPANY, whose main office and factories are in Philadelphia, was represented by W. C. Pope, vice-president; P. C. Snow, manager of sales department; R. C. Osmun, W. P. Snow and J. Elliott. The company displayed samples of tickets, transfers, etc., and several new styles of transfers and cash-fare receipts. A line of special ticket designs for parks and pleasure resorts has recently been developed by this company. At the booth were shown in operation a ticket destroyer and a gate box for collecting and cancelling tickets of various kinds. A new foot-power transfer punch also attracted considerable attention. As a souvenir a beautiful hand-carved paper cutter, imported from Germany, was distributed, also a neat daily reminder desk calendar. The company's "punch factory" proved to be an attractive feature of the exhibit. The company is now making a full line of punches which are meeting with favor among street railway managements.

THE COLUMBIA MACHINE WORKS & MALLEABLE IRON COMPANY, of Brooklyn, N. Y., made a feature of the new Columbia brake for maximum-traction trucks. The construction and application of the brake was demonstrated outside the convention hall by an operating exhibit. As has been described in the STREET RAILWAY JOURNAL, the brake is located between the wheels, doing away with the brake beam and consequently saving much room under the truck. All long chains are eliminated. The adjustment of the brake is so made that the pressure of the brake-shoe on the large and small wheels is proportional to the size of the wheels, thus eliminating any tendency to buck. The brake-shoes wear equally on the wheels. A quarter turn of the handle will apply the brake, making it quick acting and positive. The brake exhibited was operated by the new ratchet Columbia brake handle. In the space of the company inside the convention hall was exhibited a patented boring device for boring motor bearings. With this device motor bearings are made to close fit an adjustment so that no machine tool work is necessary. The hospitality of the company was cordially extended by John G. Buehler, James Grady and W. R. Kerschner.

THE W. R. GARTON COMPANY, of Chicago, was represented by W. R. Garton, its president.

PORTER & BERG, of Chicago, sent to the convention M. A. Berg and E. R. Mason, who ably represented the many specialties for which this firm is agent. These gentlemen distributed a useful match box.

ARTHUR S. PARTRIDGE, of St. Louis, was in constant attendance at the convention.

THE NATIONAL LOCK WASHER COMPANY, of Newark, N. J., had its curtain fixtures and sash balances installed in the new pressed steel car for heavy service, shown at the convention by the American Car & Foundry Company. Many of the delegates to the convention appreciated the easy working of both the curtains and sash balances, and manifested great interest in these devices. The National Lock Washer Company also manufactures the National lock washer, of which over three hundred millions have been used in railroad track work. This is a simple, very effective device that is easily applied and adapted for use on all kinds of work. It is made of a high grade of steel, hardened in oil and tempered. When the nut is screwed upon the bolt, it first strikes a rib on the lock washer, which, being heing harder than the nut, progressively upsets and forces some of the metal of the nut into the thread of the bolt and positively locks the nut so that it cannot back off or jar loose. The washer is made for all sizes and any make of bolt or nut, a special bolt and nut not being necessary, and the same bolt, nut and lock washer can be used as often as required, advantages which will appeal to all track men.

PARKER BOILER COMPANY—OSBURN FLEXIBLE CONDUIT COMPANY—INTERNATIONAL SPRINKLER COMPANY

OHMER FARE REGISTER COMPANY — SCHOEN STEEL WHEEL COMPANY

W. T. VAN DORN COMPANY

INTERNATIONAL REGISTER COMPANY — PENNSYLVANIA STEEL COMPANY

JOHN LUCAS & SON

GEO. W. LORD COMPANY

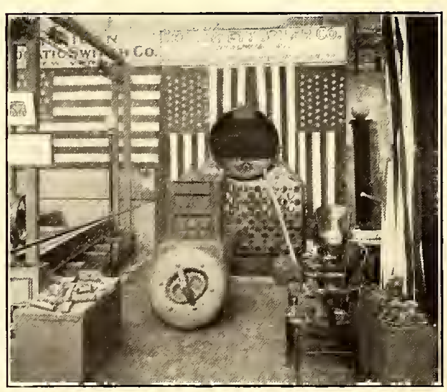
THE NATIONAL LOCK WASHER CO.

THE DUPLICATE TRANSFER & REBATE CO.

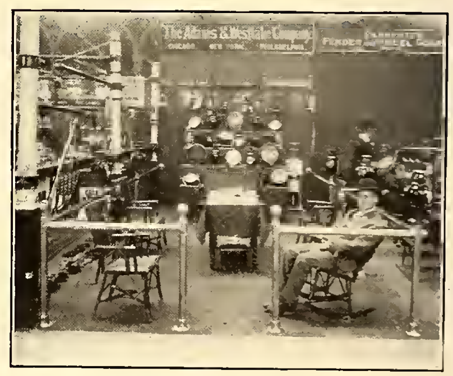
CREAGHEAD ENGINEERING CO.

DEWITT SAND BOX CO.

D. & W. FUSE CO.
AND WESTERN ELECTRIC CO.



HEINE SAFETY BOILER CO.

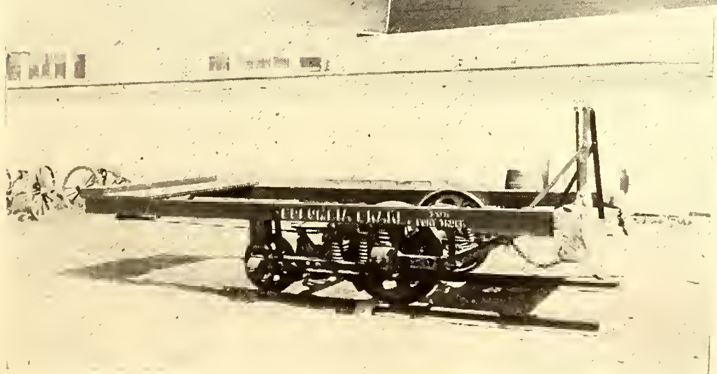


ADAMS & WESTLAKE CO.

BALTIMORE WASTE CO.

JOLT LUBRICATOR CO.

FRANK S. DERONDE CO.



AMERICAN CAR & FOUNDRY CO.

GALENA SIGNAL OIL CO.

CONTINUOUS RAIL-JOINT CO.

COLUMBIA MACHINE WORKS & MALLEABLE IRON CO.

PRESSED STEEL CAR CO.

HAROLD P. BROWN

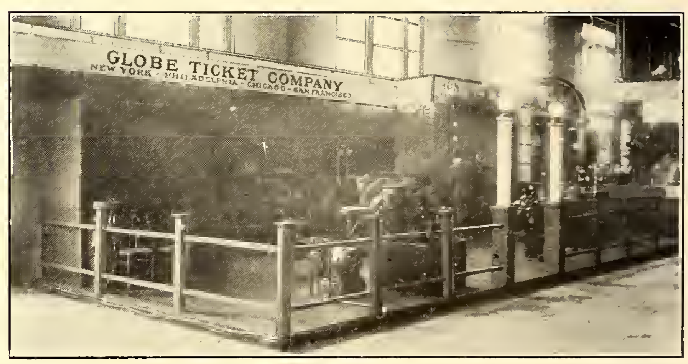
GARTON-DANIELS COMPANY

STANDARD PAINT COMPANY

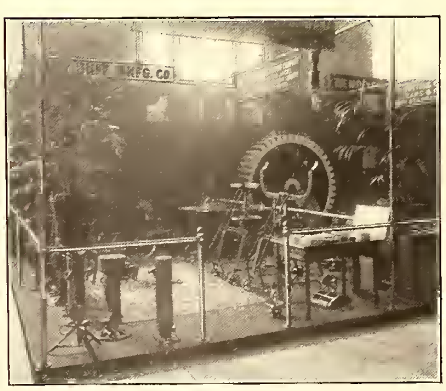
THE STERLING VARNISH COMPANY

NATIONAL BRAKE COMPANY

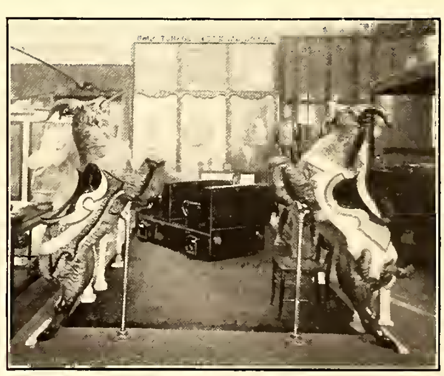
PHILADELPHIA AIR-BRAKE COMPANY AND NATIONAL CAR WHEEL COMPANY



GLOBE TICKET COMPANY



THE DUFF MANUFACTURING COMPANY



PHILADELPHIA TOBOGGAN COMPANY

R. D. NUTTALL COMPANY

THE SOUTHERN EXCHANGE COMPANY, of New York City, dealer in poles, railroad ties and cross arms, showed samples of white cedar and long leaf pine. The representatives in attendance included E. G. Chamberlin, president and manager; A. J. McKinnon, vice-president, and Walter E. Mitchell, manager of sales department. The company reports a heavy business for the past year and better prospects than any year previous. As a souvenir the company presented its friends with a nickle match-safe.

THE LEONHARDT WAGON MANUFACTURING COMPANY had one of its improved tower wagons on exhibition at convention hall, and this wagon brought forth favorable comments, especially from managers who have used the device for years. A special feature of the vehicle is the manner in which the tower folds up so that no part extends above the driver's head, thus permitting the wagon to pass under any doorway, bridge or overhead work. An additional advantage is in avoiding the tendency for the wagon to upset in turning sharp corners, as the entire weight is centered low down on the bed. The tower is adjustable in height, and can be placed in any position to the right or left, front or back. It is easily and quickly raised and lowered. Only a single gear wheel is used to operate the tower, and the tower is insulated so that current cannot leak through, even after exposure to heavy rains. The wagon is equipped with large and convenient tool lockers on both sides, in front as well as in the rear. The wagon is adapted to construction work as well as to repair and emergency work. It is claimed that the sun never sets on the Leonhardt tower wagons, for they are in daily use on every section of the globe. The features of the vehicle were well explained by George F. Faust.

THE ELMER P. MORRIS COMPANY, of New York, had on exhibition assembled commutators, armature and field coils, cross arms, iron insulator mountings, pulleys, register fittings, motor bearings and overhead line material. One of the new specialties was "Delos" white bronze, made by the United States Engineering Company, for replacing bell metal or brasses for motor and axle bearings. The Morris Company has just made arrangements for handling the Miller guy anchors and augurs. The company was represented by Elmer P. Morris, who was assisted by W. E. Sweeten, E. D. Himman and C. E. Loud.

THE BLAKE SIGNAL & MANUFACTURING COMPANY, of Boston, Mass., made demonstrations of the Blake standard semaphore signal systems for electric railways, and the exhibit was constantly surrounded by a crowd of interested street railway men, who evidenced much interest in this device for protecting single and double-track roads.

The company particularly calls attention to the six claims concerning the Blake signal, as follows:

1. When properly set up and adjusted, it is physically impossible for any other signal than the one desired to operate.

2. There is a positive answer back to the despatcher, indicating that the semaphore arm has been set in the horizontal position, and that until the arm has reached an angle of about 45 degs. it is a physical impossibility for him to get this answer back, and the danger of a false answer back is eliminated.

3. The power for operating the signal is obtained entirely through the despatcher's office, and there is no local circuit at each signal other than the signal lamp circuit.

4. There are no electrical contacts in series with the operating magnets at the various signals. The signal line is electrically continuous throughout, from the despatcher's office to the return circuit at the end of the line.

5. If one signal lamp burns out, a second lamp is automatically cut in circuit. This second lamp is in an interrupted circuit and gives a flashing light, so that any crew can report it and a new lamp can be put in the following day. This detail removes the necessity of having a daily inspection of all lamps, as well as danger from a new lamp being defective and burning out a very short while after it has been put in.

6. The widely varying voltage of trolley lines is taken care of by relays which draw up at different voltages, and cut in or cut out resistance as the voltage which is supplied at the despatcher's office rises or falls.

The demonstrations of the apparatus were made by E. J. Burke, president of the Blake Signal & Manufacturing Company, and C. Chandler Blake, vice-president and manager.

THE CYRUS BORGNER COMPANY'S exhibit consisted of samples of various shapes, sizes and grades of fire-brick, tiles and clay retorts, together with samples of the raw materials.

The company's works, located at Twenty-Third Street above Race Street, Philadelphia, are equipped with the most modern machinery and appliances for turning out refractories. Pieces weighing from 1 lb. to 3000 lbs. may be found in the large assortment constantly kept on hand and are handled with equal facility. Samples of the "Patent Bond Brick" were shown. This consists of a brick of standard size (9 ins. x 4½ ins. x 2½ ins.) and has eight knobs on top with corresponding sockets beneath. The sockets are just large enough to admit of the knob and a small amount of fire-clay mortar to effect a bond. A wall built of these "Patent Bond Brick" becomes one solid mass. The records show that where boilers have been set with these brick, repairs and renewals are exceeding small. In some cases settings have lasted five and six years. The company's "Electric" brick, samples of which were also shown, are made especially for boilers of electric light and street railway plants, and are made to withstand the hard scouring action in the fire-box. On account of the hard, smooth surface, clinkers cannot adhere as readily. The company constantly keeps in stock arch and pier blocks. C. A. Dickel was in attendance.

THE PHILADELPHIA AIR BRAKE COMPANY had a complete air brake equipment at its space in the Museum, the exhibit consisting of a motor-driven compressor, duplex jam cylinder, engineer's valve and automatic cut-off.

The Morse-Henley worm and gear used on this equipment furnishes an excellent power transmission. The amount of surface contact between the gear and worm is fully three times that between the ordinary gear and pinion, not only when new, but during the entire life. The life of the gear and worm is, it is claimed, at least three times that of the gear and pinion.. By placing the gear in the center of the crank shaft instead of at one end, better results are obtained on account of applying the power to the center of the work. The use of the worm and gear also reduces the noise and vibration of the pump to a minimum.

The armature shaft is 1¼ ins. in dia. throughout its entire length, with three large bearings. The use of large shaft and ample bearings does away with the bent and broken armature shafts, hot bearings, and greatly increases the life of the apparatus. The oiling arrangements are very simple. The crank shafts, connecting rods, plungers, cylinders, worm, gear and two back armature bearings are all lubricated from the main crank case which is kept partly filled with oil. The armature bearing has a separate well large enough to properly lubricate that bearing. All three bearings are provided with standard oil rings. The whole machine is designed to make all parts easy of access while at the same time compact.

The chief point claimed for the engineer's valve is in the inserted handle. When the handle is removed the valve presents a smooth, flat top, making it impossible to operate same with any device other than the proper handle. The exhaust muffler is contained in the valve, thus requiring but two lines of pipe through the platform.

The automatic cut-off operates the "break" movement with a magnet and operates the "make" movement by gravity. The magnet is cut out on the upward stroke of the switch and is in circuit for so short a period of time that it is practically impossible to be burned out. As the "make" movement works by gravity, the closing of the compressor switch is positive under all conditions. In case of any accident to the cut-off, the compressor is left running and can be regulated by the hand-switch on the platform, thus insuring full air pressure at all times. The cut-out is simple in design and positive in action. All the parts are large and strong and watchmakers' tools are not required to repair or adjust it. The cut-off has but one spring and one magnet, and has no valves, packed piston or packed rods to cause trouble through leakage.

The duplex jam cylinder is placed directly in the center of the car, one end connected to each truck. This gives a straight pull to each truck and equalizes the brakes on the two trucks by air pressure, doing away with the necessity of any complicated series of levers to accomplish this end. By the use of this cylinder much less air is required to make a stop and much quicker action is obtained. It also gives the operator two independent air brakes, so that if accident occurs to either end of the car one half of the air brake remains effective. By connecting the hand brake rods direct to the trucks the operator has three independent brakes to rely upon, thus reducing the chance of accident.

Those in attendance were T. F. Kelly, Col. W. W. Lambert, J. E. R. Lambert and F. S. Drake.

THE RIVERSIDE METAL COMPANY made a very interesting exhibit of phosphor bronze, German silver and other cupro alloys in manufactured metal, castings and ingots, at the Bellevue-Stratford. The casting exhibit included several pieces that had been in use and were loaned for this occasion, among them a toggle that had been in continuous service for eighteen months, tripping on an average 2500 times per hour, and subjected each time to 400 tons pressure in a coining press. All this wear had scarcely sufficed to obliterate the machine tool marks. Car journal boxes were also a conspicuous item in this exhibit. The manufactured metals exhibit included some beautiful specimens from the cold rolling mills, and from the rod, wire and rope mills that were much admired for the excellence in workmanship which they displayed; also a line of manufactured articles in white metal cuspidors, servers, etc., that the company makes in large quantities for the leading railways and car companies. The company claims for its products the highest degree of uniformity in the alloy, and the very best finish obtainable for the finished product. General Manager W. P. McGlynn attended the convention and gave some valuable information regarding the company's products.

THE KEYSTONE ELCTRICAL INSTRUMENT COMPANY, of Philadelphia, was represented by J. F. Stevens.

THE ROYAL MANUFACTURING COMPANY, of Lancaster, Pa., was represented by Park E. Shee.

THE DEMING COMPANY, of Salem, Ohio, was represented by Wm. L. Deming and W. P. Dallell, Philadelphia representative.

THE SOUTHERN CAR COMPANY, of High Point, N. C., was represented by E. R. Briggs, secretary and treasurer.

JOHN B. WATSON, engineer and broker, of Philadelphia, was in attendance with A. B. Sanders, manager electrical department.

THE CUTTER COMPANY'S interests were looked after by A. Edw. Newton and Wm. M. Scott.

THE FRANKLIN RAILWAY SUPPLY COMPANY was represented at the convention by Kenneth D. Hequembourg. It exhibited, in addition to its standard water heater, a new type of air jacket heater, which has a 50-lb. magazine coal capacity and an extended base for holding coal or coke. C. S. Ayres, of this company, also attended the convention.

THE GENERAL RAILWAY SUPPLY COMPANY was represented by Geo. W. Provost, president; J. P. Provost, vice-president; T. M. Cluley, secretary, and R. M. Kercher.

THE MACON-EVANS VARNISH COMPANY was represented by L. S. Macon and Cadwallader Evans. Arthur B. Weeks, who was previously connected with the Sherwin-Williams Company, of Cleveland, Ohio, will represent this company in the future in Chicago, where it has recently opened an office.

THE CROUSE-HINDS COMPANY, of Syracuse, had on exhibition guy anchors, changeable headlights, imperial combination arc and incandescent headlights, high-tension knife switches, and the Hawley time register. Those representing the company at the convention were Nathan Shute, Frank Buchanan and J. H. Hurd.

THE FRANK RIDLON COMPANY, of Boston, Mass., showed samples of all the various specialties manufactured and handled by the company. Some of the specialties of the exhibit were the Kilbourn sanding device, Ridlon incandescent headlight, malleable iron bearings, Ridlon babbitting and weld babbitting device, babbitt metal, two-way connectors, field coil winding machine, armature truck, armature coil winding machine, automatic bonding machine, Ridlon trolley catcher, armature coil tapping machine, armature winding stand, brass cleats, brass cable tags, assembled commutator segments, field coils, armature coils, register fittings and car trimmings, automatic lock for folding vestibule doors, Liberty trolley harp, Ridlon track drills, dust guards for standard journal boxes, journal brasses and linings, and a number of other labor-saving devices for repair shop work. Those present at the convention were Henry M. Kellogg, Jerry M. Hayes and George Daynor.

THE HARRISON SAFETY BOILER WORKS, of Philadelphia, made up an attractive display of Cochrane heaters and Cochrane separators. Delegates had a good opportunity for seeing the Cochrane feed-water heaters under operating conditions, as these heaters were in service in the exhibition power plant. Among those in attendance for this company were J. C. Jones, R. V. Jones, R. H. Eisenbrey and R. H. Ramsey.

THE STANDARD RAILWAY TRACK APPLIANCE COMPANY, successor to the Merrill-Stevens Manufacturing Company, of Kalamazoo, Mich., was represented by E. Cook, who exhibited jacks with Cook's patent easy-acting trip, Cook's standard rail drill, and Cook's patent cattle guards.

THE MILLER ANCHOR COMPANY, of Norwalk, Ohio, exhibited various sizes of the Miller anchors and augurs. G. H. Miller, president, was in attendance. The company announces that it has just placed its New York City agency and export trade in the hands of the Elmer P. Morris Company, of New York City.

THE OIL & WASTE SAVING MACHINE COMPANY, of Philadelphia, Pa., exhibited a machine for extracting oil from waste and other fabrics for the reclaiming of both. The company was represented by T. S. Patterson, consulting engineer; S. T. Lucas, sales agent, and J. W. Pittock.

THE T. H. SYMINGTON COMPANY, of Baltimore, Md., showed its dustproof journal boxes for M. C. B. high-speed trucks; also ball bearing, center and side bearings. The principal features of the Symington journal box are the arrangement of the ribbing on the inside to hold the packing in place, and the dustproof lid, both of which tend to eliminate the possibility of a hot box, and also reduces the cost of lubrication and brass wear at least 25 per cent, as shown by actual test. The prime feature of the ball bearings, center and side bearings is to eliminate friction between truck and car body, thus reducing the motive power necessary to carry cars around curves, with consequent wear and tear of flanges and rails, which in many instances causes the rails to spread with expensive results. Those in attendance were J. F. Symington, E. H. Symington, H. W. Baldwin, E. John Nichols, A. H. Weston and C. Tucker.

THE GEORGE W. LORD COMPANY, of Philadelphia, Pa., decorated its booth to give a most comfortable and homelike appearance. Every railway man that came into the booth was requested to register, and at the close of the convention the company's register contained over 2500 names. Numerous samples of scale formation, taken from all parts of the world, were displayed, and constituted a most interesting feature of the exhibit. Knives and pocket mirrors were given away as souvenirs, and the demand for these souvenirs was far greater than the supply. The representatives of the company at the exhibition were Lyman P. Clark, consulting engineer; Capt. J. E. Doughty, Philadelphia representative, and Col. Nat P. Lane, New York representative. Those who registered at their booth and who did not get a souvenir pocket knife will receive one by mail.

THE LAGONDA MANUFACTURING COMPANY, of Springfield, Ohio, at its space in convention hall, made practical demonstrations of its boiler-tube cleaners and reseating machines. These cleaners are made for all styles of water-tube boilers and for all sizes of tubes. The reseating machine is a device for cleaning header faces, nuts and caps of water-tube boilers. Among those present were H. F. Weinland, L. B. Mellor and George Greenwood.

F. E. KINSMAN, of New York City, was in attendance, representing the well-known Kinsman system of signaling, which has been used with such excellent success on the subway lines in New York and other important electric railway systems.

THE AMERICAN BRAKE-SHOE & FOUNDRY COMPANY, of New York and Mahwah, N. J., had an exhibit comprising all of the different styles of brake-shoes designed to meet different conditions of electric railway service, including the "U" chilled-end brake-shoe, "Corning" shoe, "Streeter" shoe, "Diamond S" shoe, the flanged steel-back "Streeter" shoe, the steel-back flanged "Diamond S" insert shoe, and the "Perfecto" steel-back brake-shoe. Particular attention was directed to the separable brake-heads and brake-shoes, designed to fill the numerous instances where the use of a combined head and shoe can be avoided, and a saving made by the use of a separate head and shoe. In this type the safety wire back forms a wrought lug and a strengthening rib of wrought metal along the flange and back of the shoe, preventing loss of the shoe by failure through the lug or body. This construction can be applied to almost any type of combined head and shoe, and to standard "Christie" heads. Among those present were O. H. Cutler, F. W. Sargent, W. S. McGowan, Jr., E. L. James, E. B. Smith, E. J. Searles, W. F. Walsh, H. S. Bradfield, J. S. Thompson and A. L. Streeter.

THE TROLLEY ELECTRIC VEHICLE COMPANY, of Philadelphia, showed one of its storage battery automobiles, arranged to be operated either on electric railway tracks or on ordinary roadways with equal facility. The vehicle is particularly suitable for handling freight and express matter on city or interurban electric railways. The good points of the wagon were explained by Geo. W. Goddard, general manager, who was assisted by Mathias Pfatischer and Geo. W. Goddard, Jr.

THE MAYER & ENGLUND COMPANY, of Philadelphia, had one of the most elaborate exhibits on the floor of the Museum, and took the opportunity of showing its own specialties, and in addition gave over a considerable portion of its space to the products of the leading manufactures which it represents. For the Mayer & Englund Company were displayed its general railway supplies, including overhead line material, pole brackets and pole fittings of every description, car fittings, registers, headlights, fenders, tail lights, shades, trolley catchers and other detail supplies. The Protected Rail-Bond Company had a complete line of protected rail-bonds and bond tools. Associated with the exhibit were the following: The Sterling Varnish Company, with a display of Sterling insulating compounds, insulating cloths and papers; the Garton-Daniels Company, of Keokuk, Ia., with lightning arresters and the automotoneer; the R. D. Nuttall Company, of Pittsburg, with its standard gears and pinions and Union standard trolleys; the Duff Manufacturing Company, of Allegheny, Pa., with a display of Barrett automatic jacks and Duff motor armature lists. There were in attendance representing the Mayer & Englund Company and the Protected Rail-Bond Company: Charles J. Mayer, president of both companies; A. H. Englund, secretary and treasurer of the Mayer & Englund Company, and treasurer of the Protected Rail-Bond Company; Edwin B. Ross, secretary of the Protected Rail-Bond Company; H. G. Lewis, Wm. A. Armstrong, Jr., Benjamin Haylar, Jr., John McSorley and H. J. Mayer, of the Philadelphia office; H. E. Beach, New York office; Edward Hammett, Jr., Pittsburg office; J. M. Gallagher, Chicago office; F. M. Laxton, Atlanta representative.

THE STERLING VARNISH COMPANY, of Pittsburg, Pa., was represented by Arthur Hartwell, W. Reddle, C. S. Cool and A. S. King. The company showed samples of Sterling compounds and insulating cloths and papers.

THE DUFF MANUFACTURING COMPANY was represented by T. A. McGinley, J. R. McGinley, G. A. Edgin and E. C. Fisher. The company showed Barrett automatic jacks and the Duff motor armature lift for removing and replacing armatures. A new specialty, consisting of a wheel and screw motor lift with ball bearings, was also on view. This lift is used for removing and transferring armatures from the motor frame where the conditions are such that the ordinary Barrett armature lift would not be so convenient. The screw motor armature lift consists of a wheel frame provided with flat or flanged wheels, arranged for a truck of 24-in. gage, mounted on a sliding base which has a side adjustment of 6 ins., and has a large hand wheel which revolves in ball bearings and raises or lowers the screw.

THE PANTASOTE COMPANY, of New York, had an artistic booth wherein were shown samples of pantasote car curtains, upholstered car seats and upholstery fabrics for headlinings. The interests of the company were looked after by D. E. Bowner, H. M. Grier and John M. High.

THE R. D. NUTTALL COMPANY, of Pittsburg, Pa., was represented by F. A. Estep, George W. Provost, J. M. Gallagher, Thomas M. Chuley and R. M. Kerschner. The company exhibited a full line of standard gears and pinions for railway motors, samples of special gearing, also the Union standard trolleys.

THE McGRAW PUBLISHING COMPANY took occasion to turn its booth into a sort of reception room, with comfortable chairs, tables, desks, writing materials and other conveniences for those who wished to avail themselves of a place to rest or work. The different publications published by this company, including the Street Railway Journal, the "Electrical World and Engineer," the "Engineering Record" and the "American Electrician," were on file. In addition, the book department for the first time at a street railway convention made a comprehensive exhibit of the many technical and engineering books published and handled by the McGraw Publishing Company. As a fitting souvenir of the twenty-fourth annual convention of the American Street Railway Association and its allied organizations, the company distributed copies of its issue for Sept. 23, including the Philadelphia Souvenir section of that issue, and these were in great demand. The McGraw Publishing Company was represented in force by the following: James H. McGraw, James M. Wakeman, H. W. Blake, T. C. Martin, C. B. Fairchild, Jr., J. R. Cravath, H. S. Buttenheim, C. A. Babtiste, H. B. Abbott, W. K. Beard, E. V. Clark, C. J. Doyle, Jr., Frank Meyers and A. S. McAllister.

THE BRADY BRASS COMPANY, of New York City, had a very attractive exhibit near the stairs leading to the meeting hall at the Museum. The exhibit included samples artistically arranged of "Cyprus" bronze for railway journal bearings, babbitt metals, motor bearings, trolley wheels, solder and other specialties handled by this company. "Cyprus" bronze is the result of many years of experiments and critical study of the "hot-box" problem on steam and electric railways. The company believes that where this bronze is consistently used, the mileage will not only be increased fully 90 per cent at less cost for lubrication, but hot boxes practically will be eliminated. The bronze is not claimed to be a self-lubricating frictionless "cure all," but it is a modern bearing bronze, made by scientific methods after a full consideration and careful study of the problems involved. This bronze is now used on 150,000 miles of steam and electric street railways in the United States. The babbitt metals as made by this company are manufactured for every conceivable service. A few of the special compositions to meet particular requirements are the Brady genuine babbitt metal, "Cyprus" anti-friction metal, babbitt metal in four different grades, known as No. 1, No. 2, No. 3 and No. 4; armature bearing, babbitt metal for electric railways, metallic packing metal, special packing metal and "Cyprus" tin for use as an addition to remelted babbitt metal.

In order to meet the growing demand for motor bearings, the electrical department of the Brady Brass Company has been equipped with special machinery of the most approved type, designed to turn out bearings in large quantities promptly and with no sacrifice of accuracy. The electric railway motor bearings made by this company are either cast-iron babbitted or solid bronze. In their manufacture, a fine quality of gray iron is used, and the linings are genuine babbit metal. The bronze used for the bearings is a special composition, which, after many trials and the experience of ten years, the company believes to be the best adapted for this particular purpose.

During the convention Daniel M. Brady, president of the Brady Brass Company, was in constant attendance, and in his usual happy manner greeted his host of friends and acquaintances. Incidentally, Mr. Brady was kept busy acknowledging the congratulations of those in attendance upon the most excellent and comprehensive exhibits, and upon the splendid manner in which the exhibit and entertainment features of the convention were handled, toward which end Mr. Brady, as chairman of the manufacturers' committee, has given fully and unstintingly of his time and thought for the past several months. Assisting Mr. Brady at the booth of the Brady Brass Company were Charles M. Reubens, D. H. Ruby and William MacKenzie.

THE NEW YORK SWITCH & CROSSING COMPANY, of Hoboken, N. J., had on exhibit one of its "anti-straddling" switches with self-locking tongue. The company was represented at the convention by W. C. Wood and A. W. Pratt.

THE AMERICAN CAR & FOUNDRY COMPANY had on exhibit one of the 122 cars under order for the electric lines of the Long Island Railroad. The car is of fireproof construction throughout. The framing is of steel angles and channels. The sides and ends are steel plates. The flooring is monolith cement, laid on steel plate, rendering the floor arc and fireproof. The framing is so designed as to provide ample strength for buffing and pulling stresses in center. The sides are proportioned so as to carry the full load of the car, which is transferred to them by special construction of cross bearers. The inside finish is of steel plate and metal moldings. The seats have metal frames, rattan cushions and fireproofed canvas backing. The car is equipped with Westinghouse quick-service graduated-release automatic brake system, manufactured by the Westinghouse Traction Brake Company.

W. R. KERSCHNER, of Allentown, Pa., is always in evidence at street railway conventions with the most agreeable kind of an exhibit—a hearty smile and a cordial hand-shake for his many friends. As is well known, Mr. Kerschner deals in an extensive line of new and second-hand electric railway equipment. An attractive and useful souvenir distributed by Mr. Kerschner was a steel tape measure bearing the name of the Columbia Machine Works & Malleable Iron Company, of which he is vice-president.

THE STANDARD STEEL WORKS made a joint exhibit with the Baldwin Locomotive Works, which see for description.

THE BULLARD AUTOMATIC WRENCH COMPANY, of Providence, R. I., showed many styles and sizes of Bullard pipe wrench, which are designed to give a torsional or twisting strain on a pipe, imitating mechanically the grip of a human hand. The wrench tends to turn the pipe without crushing the pipe. The exhibit was in charge of F. C. Thomley, manager.

THE WM. WHARTON, JR. & COMPANY'S exhibit consisted of samples of manganese steel special track work, showing a number of important recent improvements in the constructions of the different parts. The main part of the exhibit consisted of two tracks, on one of which was shown the various styles of switches and frogs, of girder rail and T-rail construction for street railways. One of the special features was the new heel-less tongue switch for girder rail work, in which the pivotal part of the tongue is entirely covered and protected by an overhanging part of the bed of the switch, notwithstanding which the tongue can easily be removed from the switch without lifting any cap or destroying the integrity of the switch itself. The pivot part is of very large size and is held by bearing boxes, similar to the crank shaft bearing of an engine, readily adjustable to take up wear. The tongue, as well as the bed of the switch, is made of manganese steel, the bed being ground true to give a perfect bearing for the tongue.

A pair of tongue switches designed for steam railroad tracks laid with heavy girder rail, in paved city streets, made to sustain the heaviest locomotives and cars, were also on view. Solid manganese steel tongue switches and also solid manganese steel frogs, for T-rail work on electric railways, attracted considerable attention. There was further shown the style of fastening of manganese steel centers in girder rail special work which this company brought out some time ago and by which the centers can be renewed easily, without disturbing the pavement. On the second track in the exhibit were shown a number of devices embodying unbroken main line track through switches.

On a siding track outside the Museum, which had been laid by the Wharton Company, was an unbroken main line switch for steam railroad and interurban railways, and the working of the switch in all its features was demonstrated by running a 100-ton Pennsylvania locomotive and also a Baldwin electric locomotive over the track at frequent intervals. On the same tracks was also located a Nichols patent manganese steel crossing for electric railways over steam railroad tracks. In this crossing the usual three rails and fillers are combined into one solid manganese steel casting. There are several hundred of these crossings in Philadelphit alone. Some of them have been in place for four or five years and show scarcely any signs of wear.

The company has just issued a new supplement to its catalogue No. 10.

The Wharton representatives included the following: Wm. Wharton, Jr., president; Victor Angerer, vice-president; J. C. Robinson, of Boston; Arthur S. Partridge, of St. Louis; W. McLain, of Pittsburg; J. W. Stringfellow, of Richmond; J. B. Robinson, of Boston; T. K. Bell, chief engineer; R. C. McCloy, sales agent; Louis Koppenhoefer; L. R. Ashhurst, Jr., W. Rodman ing. There are several hundred of these crossings in Philadelphia staff.

NOLTY & COMPANY, of Lancaster, Pa., showed the Lancaster track sander. This sander consists of but three pieces, the sand chest, the agitator, and the sand guide. The sand chest is placed under the seat of the car, with the agitator inside of it, and the sand guide is placed on the car gearing, alongside of the car wheel, so that the sand can run directly under the wheel when the lever is drawn. By opening the lever the sander will spray sand for a run of fully one mile before requiring further attention. The sand chest has an oblong hole in the bottom which the agitator goes through, and through which the sand runs into the sand guide and drops on the rail. When going up or down a steep grade, or when starting or stopping, the motorman can get a large or small quantity. When the sand becomes lumpy, by moving the lever backward and forward the agitator will break the lumps, so that the sand will run freely from the sand chest down to the sand guide. The company was represented by Henry Nolty, Jr., and Philip Nolty.

ALBERT H. HERRICK had in operation his autographic recording apparatus for recording electrical conditions on electric railway with respect to bonding, transmission losses, equipment economy, speed-time curves, motor duties and electrical inspection of equipment. This is the same apparatus as used on the Herrick testing cars A B and C.

THE ARNOLD COMPANY, of Chicago, was represented by B. J. Arnold and R. G. Arnold.

THE ST. LOUIS CAR COMPANY was represented by H. F. Vogel, W. S. McCall and A. H. Sisson.

J. R. McCARDELL & COMPANY, of Trenton, N. J., makers of the well known "Trenton" trolley wagon, were represented by M. J. McDonald. They showed one of their up-to-date two-horse tower wagons, which attracted considerable atteniton.

THE SPEER CARBON COMPANY, of St. Marys, Pa., had samples of Speer high-grade carbon brushes, which are used on a large percentage of the electric roads in America. John S. Speer and G. P. Fryling were in attendance.

THE OSBURN FLEXIBLE CONDUIT COMPANY, of New York, in connection with its Philadelphia agents, Vallee Bros. Electric Company, showed a line of lamps, and a standard line of "Flexduct." The company was represented by W. P. Ambos, C. E. Corrigan, and Gane Vallee.

THE JEWETT CAR COMPANY, of Newark, Ohio, was represented by C. E. Krebs.

THE FELT & TARRANT MANUFACTURING COMPANY, and Comptograph Company, represented by Arthur J. De Berard, of New York, demonstrated the working of the "Comptometer." The idea of mechanical devices for computing is very old, but not until recent years have there been developed any machines of practical value to the modern business world. Sixteen years ago the "Comptometer" was introduced and it has since been adopted in thousands of business offices. Previous to that time there were slide rules and special devices which were good for special purposes, but all proved unsuited to general use because they were not suitable to addition, there being more adding than any other kind of figuring in the ordinary business office. A machine to be useful commercially must be primarily a good adding machine. All other operations are performed as well on the "Comptometer." The company's representatives included J. C. Nevins, A. J. D. Deberrard, C. L. Metzgar and T. H. Brown.

WARREN WEBSTER & COMPANY, of Camden, N. J., were well represented, and in addition to the well-known "Star Vacuum" feed-water heater, they made an interesting display of Webster separators for steam and oil, Webster water-seal motors and other specialties manufactured by them for use in connection with the Webster system of steam circulation. They will be glad to send their literature to anyone who failed to obtain it at the convention. This company installed the heating system in the Commercial Museum, where the exhibition was held. The following were in attendance for the company: E. K. Lanning, M. P. Osborne, W. W. Morgan, Jr.

THE WESTERN ELECTRIC COMPANY showed its own specialties and made a joint exhibit with some of the companies for which it is agent. A full line of "Electros" overhead line material and other lines of railway supplies were exhibited. The D. & W. Fuse Company showed a full line of its various types of fuses, cut-out boxes, transformer cut-outs, service switches, etc. Special demonstrations were given daily at the booth, showing the strength and insulating qualities of "Deltabeston" magnet wire for street railway motors. This wire is now being widely used. Other specialties shown in this connection were Matthews "Stombaugh" guy anchors, Kearney cable clamps and the "boyless" bowling alley as made by Matthews-Fahl Manufacturing Company, of St. Louis. The Western Electric Company was represented by P. H. Coolidge, F. C. Jaeger, Frank D. Kilion and H. Harper. The D. & W. Fuse Company was represented by W. S. Sission, L. W. Downs and C. E. Harmon. W. N. Matthews & Brother was represented by W. N. Matthews.

THE D. & W. FUSE COMPANY, of Providence, R. I., made its exhibit in the booth of the Western Electric Company, for the description of which see under the name of the latter company.

W. N. MATTHEWS & BROTHER, of St. Louis, had its "Stombaugh" guy anchors on exhibition in the booth of the Western Electric Company. The company was represented by W. N. Matthews, who also exhibited a working model of the "Boy-Less Five Pin Alley," a description of which was published in the Street Railway Journal for Sept. 23. This new type of bowling alley is attracting much favorable comment as a money-maker for parks and pleasure resorts.

ERVING G. LONG, of New York City, was in attendance in the interests of his electric railway supply business. Mr. Long also represented the Van Dorn & Dutton Company and the Van Dorn-Elliott Electric Company, for whom he is Eastern manager.

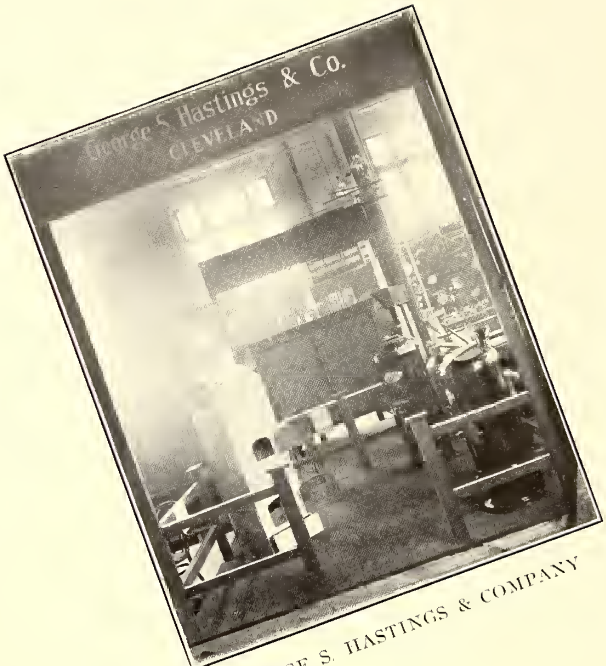
THE BUCKEYE ENGINE COMPANY, of Salem, Ohio, had a very popular booth, which was artistically decorated with palms and flowering plants. The company distributed to delegates, supply men and accompanying ladies a very acceptable souvenir in the form of fresh cut flowers, and the company's courtesies in this respect accounted for the large number of buttonhole nosegays and bouquets noticed in the convention hall and around the convention headquarters. The company extended a cordial invitation to each delegate and lady to call at its space each morning and receive a carnation or rose. The honors for the company were very happily extended by C. H. Weeks, vice-president; H. E. Troutman, of the Chicago office; A. H. Riddell, of the Philadelphia office, and C. A. Fitzgerald.

THE YALE & TOWNE MANUFACTURING COMPANY, of New York, is giving special attention to the electric railway field, particularly in the matter of supplying appliances for repair shops. The company took occasion during the convention to exhibit its triplex, duplex and differential chain hoists, overhead trolleys and electric hoist for shops and also adaptable for use on crane cars, wrecking cars, and general service and wrecking work. Particular attention was directed to the portable electric hoist which had been designed to meet the growing demand for a simple, convenient and durable power hoist that can be operated on electric railway current. The hoist is operated from the floor and is equipped with a telescoping controller rod, which enables the workman to control the movement of the load from a point

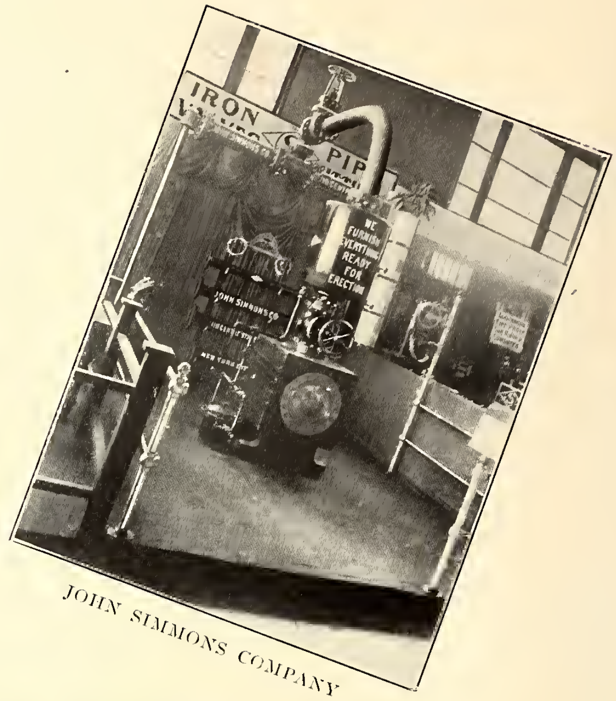
THE YALE & TOWNE MFG. CO.
THE HALE & KILBURN MFG. CO.
THE LAGONDA MFG. CO.
THE STAR BRASS WORKS

THE PANTASOTE COMPANY
AMERICAN RAILWAY SUPPLY CO.
SOUTHERN EXCHANGE CO.
STERLING-MEAKER CO.

THE CLARK ELECTRIC & MFG. CO.
WEBER RAILWAY JOINT MFG. CO.
E. W. BLISS COMPANY
STERLING-MEAKER CO.



GEORGE S. HASTINGS & COMPANY

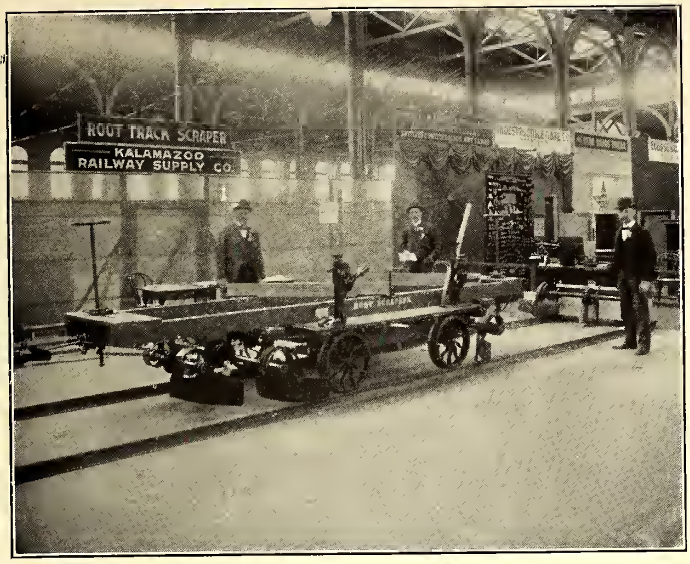


JOHN SIMMONS COMPANY

AMERICAN BRAKE-SHOE & FOUNDRY COMPANY

DOSSERT & COMPANY

DEARBORN DRUG & CHEMICAL WORKS



KALAMAZOO RAILWAY SUPPLY COMPANY

ELMER P. MORRIS COMPANY

PARMENTER FENDER & WHEEL GUARD COMPANY AND DUQUESNE STEEL FOUNDRY COMPANY

WM. WHARTON, JR., & COMPANY, INCORPORATED

U. S. METAL & MANUFACTURING COMPANY AND DRESSEL RAILWAY LAMP WORKS

A. C. STILES ANTI-FRICTION METAL COMPANY

THE CONSOLIDATED CAR FENDER COMPANY

GOLDSCHMIDT THERMIT COMPANY

LORD ELECTRIC COMPANY

ELECTRIC RAILWAY EQUIPMENT COMPANY AND NEW YORK SWITCH & CROSSING CO.

H. W. JOHNS-MANVILLE COMPANY

EMPIRE SAFETY TREAD COMPANY

EUREKA AUTOMATIC ELECTRIC SIGNAL COMPANY

CONSOLIDATED CAR HEATING COMPANY

in full view of his work without depending on signals to a crane operator. The hoist always balances properly on its single upper hook, whether loaded or empty, and pulls in a true vertical line throughout the lift. The working parts are enclosed in an oil-tight casing which excludes dust and water, at the same time insuring thorough lubrication. The company was represented by C. [illegible] Beaver, P. Kille and F. J. Ford.

THE A. C. STILES METAL COMPANY, of New Haven, Conn., although one of the newcomers into the electric railway field, aroused very considerable interest in its new self-oiling bearing. The object of this device is to provide a bearing which may be lubricated throughout substantially its entire surface and by which the lubricating material will be equally distributed. The bearing is of substantially the usual form, and at the crown is formed with a longitudinal groove from which oil passages lead transversely to longitudinal channels formed in the inner surface of the bearing at points considerably removed from the crown of the bearing. For this bearing is manufactured a special bronze metal which requires no babbitting and which is made by the A. C. Stiles Anti-Friction Metal Company. Samples of the bearing and the bearing metal were shown. The company was represented by Henry W. Toothe and George W. Smith.

THE PECKHAM MANUFACTURING COMPANY, as usual, proved itself a royal host, and its space at the convention hall and also its parlors at the Bellevue-Stratford were very popular with the company's many friends and customers. The company placed at the disposal of delegates and guests several automobiles, and this courtesy was very fully appreciated. At its booth in the Museum the company showed several Peckham trucks, including the No. 9-A extra long truck, the No. 6-B, M. C. B. double truck, the No. 100 diamond frame freight car truck as constructed for the Philadelphia Rapid Transit Company, the Brooklyn Rapid Transit Company, the Public Service Corporation of New Jersey, and other large systems. The Peckham No. 25 short-wheel base M. C. B. truck was also shown fitted with rolled steel wheels. Those in attendance for the company were J. R. Beetem, Geo. H. Bowers, Wm. Wampler and G. M. Hoadley. The company distributed a number of interesting circulars describing the various trucks included in the Peckham system, and the Ruggles single and double track electric rotary snow plows.

THE SCHOEN STEEL WHEEL COMPANY, of Philadelphia, had the same exhibit of heavy-duty rolled steel wheels which attracted so much attention at the Lake George convention of the New York State Street Railway Association. The company reports a constantly increasing interest in steel wheels for electric railway service, and a number of systems have adopted the Schoen wheel as a standard. For the company C. T. Schoen, N. B. Trist and W. Martin Johnson were in attendance.

THE PENNSYLVANIA STEEL COMPANY had one of the largest exhibits at the convention, and the company's various track and special work specialties were exhibited to excellent advantage. At one end of the company's space was shown a handsome display board, upon which were mounted some of the many sections of rails which the company has supplied, including girders, T, and high T-rails. In front of the board was a sample of steam railroad construction with renewable "Manard" steel ceiter for steam railroads laid in city streets. Next were shown mates for girder rails for street railway work, having a hardened center keyed in by the Pennsylvania Steel Company's patented method. Demonstrations were given during the convention of the facility with which the rapid renewable frog centers in the company's special work can be removed. In the samples shown the center is held in place by bronze bolts, and the strains are all from the center of the casting. A new device was shown in the form of a spring box, designed to prevent the accidental displacement of switch tongues while the car is passing. Various samples of hardened center mates and frogs for T-rails were shown with rapid renewable centers; also spring and sliding frogs for street railway work. Trackmen were also interested in the several types of switch stands, ground throws, targets, etc. Samples of "Manard" castings as made for crossing, stone crushers, and wherever extraordinary wearing qualities are required were shown. The Pennsylvania Steel Company is also one of the largest builders of structural steel work in the country, and is now working on a number of important bridges. The company also builds battleships and torpedo boats, and is also prepared to manufacture car axles for all classes of electric railway service. The company is just issuing a comprehensive loose-leaf catalogue that should be in the library of every street railway company. The Pennsylvania Steel Company's representatives included the following: H. F. Green, G. Smith, T. Blagden, Jr., John T. Hill, C. W. Reinoehl, Chas. A. Alden, R. W. Gillespie, C. J. Ellis, Chas. D .Clark, J. N.Sherer and S. W. Baldwin.

THE REAGAN GRATE BAR COMPANY, of Philadelphia, showed one of its improved grates for which the company claims that under similar conditions it will burn 25 per cent more coal per unit of area and thereby increase the steaming capacity 25 per cent over other methods. The particular claims advanced for the Reagan grates are that they are made of interchangeable units fitted together as they come from the foundry, and with no bolts or nuts exposed to the fire. The grate can be run indefinitely without stopping to clean; it cannot be burned or warped, and will work freely with all parts of it at red heat. The good points of the grate were explained by James Reagan, who was in constant attendance.

THE MASSACHUSETTS CHEMICAL COMPANY, of Walpole, Mass., had an excellent exhibit of its well-known insulating varnishes, insulating specialties and molded rubber goods. The company's interests were looked after by E. C. Green, L. O. Duclos, R. T. Elwell and W. R. Garton.

WATTS & UTHOFF COMPANY, of St. Louis, dealers in general supplies, were represented by S. R. Driffield, F. W. Hitchings, J. C. Cozzens and D. S. Hass. As a souvenir the company distributed a steel measuring tape.

THE NATIONAL CAR WHEEL COMPANY had samples of wheel on exhibit as follows: Single-plate wheel, open-plate center wheel with set screws adjustment, double-plate wheel, open-plate wheel and a spoke wheel. The representatives were J. H. Yardley, James D. Rhodes, E. H. Chapin and George C. Morse.

THE OHMER FARE REGISTER COMPANY, of Dayton, Ohio, in addition to the well-known Ohmer registers, created general interest in the "Ohmergraph," which is a new transfer issuing machine, and which, it is claimed, will do much to solve the transfer problem. The "Ohmergraph" is a small, light machine, to be worn on the side or chest of the conductor. The machine will perforate the month, day, hour and minute and the direction, and it issues and records each transfer in less time than the conductor could take a pad of transfers from his pocket. The details of the new device were explained by John F. Ohmer, J. H. Steadman, W. E. Hinman, C. W. Ketterman, H. E. Eckert and John Breen.

THE UNITED STATES ENGINEERING COMPANY, of Pittsburg, had an operative exhibit, showing the details of the Nachod automatic block signal. This system is designed to count fourteen cars in or out of a block, and requires but one line wire. The signals are automatically set by the trolley wheels coming in contact with an overhead control switch. The company was represented by its president, C. P. Nachod.

THE EGRY AUTOGRAPHIC REGISTER COMPANY, of Dayton, Ohio, had an exhibit somewhat out of the ordinary. The company showed transfer, way-billing, purchasing order and pay-roll systems, together with its despatching system. With the Egry method of way-billing, four full copies of each way-bill are issued at one writing without the handling of carbon or changing of stationery. As to the system of despatching, the company believes every road of sufficient length to require orders should use the Egry system, and urges the following reasons: It gives perfect security with the greatest simplicity of operation. It does away entirely with verbal messages and avoids the misunderstandings that they occasion. It places the blame for any disobedience of orders in the right place. It puts the management in touch with every detail, provides a secret copy of every order received and sent, and protects life and property. The details of the different systems were explained by Milton C. Stern, manager.

THE ALBERT & J. M. ANDERSON MANUFACTURING COMPANY, of Boston, sent to the convention a large variety of its overhead material. In addition to its regular line of insulators and overhead material and switches, was shown samples of a new third-rail insulator for the Metropolitan Elevated Railway, of Chicago. One of the company's new specialties is the Anderson time switch for automatically controlling window, sign and street lighting. The interests of the company were in the hands of Ernst Woltmann, John Anderson, W. W. Hincher and A. E. Meixell.

THE UNITED COPPER FOUNDRY COMPANY, of Boston, showed its new copper trolley wheels and bushings, which it is placing on the market as substitutes for composition wheels, believing that the copper wheel will give greater conductivity and non-arcing qualities. The company was represented by A. W. Mullin and A. L. Cole.

THE CLARK ELECTRIC & MANUFACTURING COMPANY, of New York City, exhibited different types of Clark insulator clamps for attaching transmission lines to insulators. This clamp is designed to securely hold cable or transmission conductor in the groove of the insulator. The insulator is constructed with an undercut recess on either side of the groove in the center of insulator top, so that when the clamp is in position it is interlocked under the projecting portion in such a manner that wire cannot be removed or the clamp separated from the insulator without unlocking the clamp.

The Clark Company also makes rail-bonds, splicing sleeves and overhead line material. The exhibit attracted a great deal of attention. Those in attendance were W. G. Clark, G. W. Kyburg, H. A. Wilson and John Graydon.

THE BLANCHARD RAILWAY SWITCH LOCK COMPANY, of Boston, showed a simple locking device for preventing switch tongues from "splitting" when a car is passing. The device is being used with good results on the Boston Elevated Railway. The company was represented by R. Roberts and F. W. Simonds.

E. C. ATKINS & COMPANY, of Indianapolis, Ind., exhibited a novel hack saw for street or shop use. Those in attendance for the company were A. S. Bailey, G. H. Newburg and A. M. Sinclair.

THE COIN COUNTING MACHINE COMPANY, of Chicago and New York, showed the practical workings of its machine for automatically counting coins of all denominations. C. H. Birdsall was in attendance.

THE GALENA SIGNAL OIL COMPANY, of Franklin, Pa., utilized its large space as a reception room and general headquarters for delegates and guests. Incidentally, samples of oils and the Galena oil cup were shown. The Galena Signal Oil Company is to-day successfully lubricating a very large proportion of all the steam railroads in the United States and Canada, and during the past few years has been giving attention to electric railway lubricating problems with great success. The company was represented in force as follows: C. C. Steinbrenner, L. G. Miller, George A. Barnes, E. H. Baker, F. B. Baker, Al. Greene, W. H. Pape, W. A. Trubee, L. J. Drake, Jr., C. H. Thomas, A. F. Miller, James Smith, R. C. Smith, S. A. Megeath, John A. Wilson and others. The representatives report themselves as well satisfied with the success of the convention and the general interest taken by the railway men in the exhibits.

THE INDESTRUCTIBLE FIBRE COMPANY, of Massena, N. Y., and New York City, exhibited samples of fibre headlinings, fibre boards, wainscoting and interior decorations. The exhibit was in charge of W. N. Cornell and E. H. Chapin.

THE ST. LOUIS CAR WHEEL COMPANY, of St. Louis, Mo., showed samples of wheels as taken from the molds. The St. Louis re-enforced spoke wheels are coming into greater and greater favor among electric railway managements. The hospitality of the company was extended by John W. Nute, J. L. Butterfield, W. W. Tolman and John J. Morse.

THE EUREKA AUTOMATIC ELECTRIC SIGNAL COMPANY, of Lansford, Pa., made demonstrations of its single-wire system of block signals for single-track electric railways; its Eureka single-wire system adapted to ring bells on bridges, and to operate semaphores to show danger or safety at steam railroad crossings; also the Eureka two-wire system of block signals for counting car in and out of blocks, and designed either for track or trolley operation. Especial attention was invited to the company's overhead contact controller, which embodies many novel features. The company was represented by W. B. Drumheller, N. W. Souder, John Earler and W. D. Zehner.

THE SHERWIN-WILLIAMS COMPANY, had an attractively decorated booth where were shown the company's railway specialties, including sections of car sides and panels illustrating the Sherwin-Williams systems of car painting and color combinations. The decorative scheme in the booth was enhanced by the artistic use of small chameleons, the little animals having been adopted as a sort of trade mark for Sherwin-Williams goods. The company was represented by E. M. Williams, H. E. Billou and F. A. Elmquist, who distributed a handsome watch fob as a souvenir.

THE GOULD STORAGE BATTERY COMPANY'S exhibit included type V 49 batteries in type V 49 lead-lined tanks, and type O 521 batteries in type O 521 glass tanks, 280 of which have been installed for the Chittenden Power Company, of Rutland, Vt. The company also showed sample plates and elements. The interests of the company were cared for by Dr. W. E. Winship and W. S. Gould.

THE ECLIPSE RAILWAY SUPPLY COMPANY, of Cleveland, had a sample fender of the well-known "Eclipse" type on exhibition. The company distributed a circular containing a statement of several hundred accidents in Cleveland, Kansas City and elsewhere, in which lives have been saved by the Eclipse life guard. The company was represented by Dr. C. B. Forward, B. Lev and J. W. Range.

TAYLOR ELECTRIC TRUCK COMPANY, of Troy, N. Y., exhibited several types of trucks. These included the latest 8-ft. wheel base single truck, containing all the company's latest improvements; a double truck now on order for the Consolidated Railways, of New Haven; a heavy high-speed double truck, on order for Worcester Consolidated Street Railway Company; an M. C. B. double electric spring truck; an M. C. B. triple electric spring truck for heavy cars and high speeds. The company also showed a full line of coil springs for electric railway purposes; also a full line of elliptic springs for Taylor and other trucks. These springs are made by the Taylor Company and are especially designed for severe service. Those in attendance were: John Taylor, president; C. H. Dodge, general Western sales agent; Thomas Thorns, general foreman, and Walter Taylor.

THE OLIVER MACHINERY COMPANY, of Grand Rapids, Mich., builders of lathes and shop tools, exhibited several new machines, including a speed lathe, single darbor combination saw table, with boring attachments and compound idler for obtaining compound leverage on the belt; type C hand planer and jointer; and type C band saw. The exhibit was in charge of Geo. C. Hubbard and R. O. Lovell.

THE BALDWIN & ROWLAND SWITCH & SIGNAL COMPANY, of New Haven, Conn., showed its double interlocking recording block signal. This system gives the indications both by position as well as light. The good points of the signal were explained by Geo. A. Simonds and H. Rowland.

THE STERLING-MEAKER COMPANY, of Newark, N. J., had space in the convention hall and also made demonstrations of its registers at its parlors in the Bellevue-Stratford. At the hall were shown a full line of registers, including the Sterling operating device with two printing registers for cash fares and transfers. The new steel car of the New York City Railway, exhibited by the Pressed Steel Car Company, was equipped with Sterling safety brakes, Sterling sand boxes, Sterling fenders and Sterling registers No. 1. The Company had in attendance Geo. Willis and J. Yount.

THE GRIFFIN WHEEL COMPANY, of Chicago, had in attendance F. L. Whitcomb and C. F. Kopf.

THE L. E. MYERS COMPANY, of Chicago, engineers and contractors, was represented by Mr. Myers.

THE DORNER MANUFACTURING COMPANY, of Chicago and Logansport, Ind., made no exhibit but was represented by Henry A. Dorner.

THE INDIANAPOLIS SWITCH & FROG COMPANY, of Springfield, Ohio, through W. H. Thomas, distributed its literature relating to crossings, frogs, switches, turnouts, curves and stands.

THE VAN DORN & DUTTON COMPANY, of Cleveland, Ohio, made no exhibit, but is well represented by W. A. Dutton.

THE GREEN ENGINEERING COMPANY, of Chicago, made no exhibit, but was represented by P. Albert Poppenhusen, gentleman and good fellow.

THE DUQUESNE STEEL FOUNDRY COMPANY, of Pittsburg, made a display of "Fowler" rolled steel wheels. This wheel is formed from a solid steel blank of special design and analysis. When properly heated the tire portion is embraced on all sides by driven rolls, which work and compress the steel into the desired form. The hub and plate remain as cast. The company had in attendance H. W. Fowler and L. A. Way.

THE BALTIMORE WASTE COMPANY made a unique exhibit, comprising piles of cotton waste. The company is prepared to supply waste of every description for every possible use. Chas. T. Jones, E. G. Garrison, Chas. E. Egan and A. J. Brannan were in attendance.

THE PHILADELPHIA RAPID TRANSIT COMPANY, at considerable trouble and expense, installed on one of the side aisles in the Museum a complete section of the Philadelphia Rapid Transit standard concrete track construction with special 137-lb. rail and Nichols-Voynow composite joints. The exhibit gave the delegates an excellent opportunity for studying the details of this heavy concrete construction as adopted for the important business streets in Philadelphia, and which has attracted much attention throughout the country. The construction was described fully in the Philadelphia convention issue of the Street Railway Journal. The courtesy of the Philadelphia Rapid Transit management in making this exhibit was fully appreciated by the delegates.

THE UNDERFEED STOKER COMPANY, of Chicago, confined its display to an exceedingly interesting collection of photographs and blue prints illustrating installations of Jones' stoker in plants ranging in size from 40-hp up to 12,000-hp. Among the electric railway stations in which these stokers are used may be mentioned Milwaukee, Toronto, Portland, Eastern Ohio Traction, and Old Colony, of Quincy, Mass. As a striking object lesson of what can be accomplished in the line of smoke abatement by the installation of suitable stokers, there was exhibited at the booth a series of twelve photographs taken at intervals of five minutes, showing the top of the chimney on the First National Bank Building, of Chicago. The photographs demonstrated the entire absence of smoke about the top of this stack, although five 400-hp boilers were in full blast when the views were taken. The boilers were fitted with Jones stokers. The company was represented during the convention by Fred A. Daley, Charles Bond, D. H. Hunter, Jr, and C. S. Crowell.

THE WEBER RAILWAY JOINT COMPANY, of New York City, had a comprehensive exhibit of the well-known Weber joint as applied to various sections of T and girder rails. The company kept open house at its artistic and comfortable booth near the stairs leading to the meeting halls. The hospitality of the company was extended by Jas. A. Greer, J. C. Barr, F. P. Thompson, A. K. Downs and H. C. Halloway.

THE UNITED STATES METAL & MANUFACTURING COMPANY had in attendance B. A. Hageman, Jr., F. Atwater and F. C. Dunham.

THE HALE & KILBURN MANUFACTURING COMPANY, of Philadelphia, had its exhibit immediately adjoining the post-office and telephone exchange. The exhibit proper comprised a full line of the well-known Hale & Kilburn reversible and walk-over seats, upholstered in all the various coverings, such as rattan, mohair, plush, real leather, imitation leather, etc. There were seats with armrests, and also without; others showed the company's patent grip handle and bronze backband features; also the patent single and double automatic foot rests, and oval-shape base forming the aisle end support of the seat. There were shown a number of new things in the car-seat line, among them being one or two styles of revolving chairs, suitable for parlor car or parlor compartment service on electric lines.

THE ELECTRIC STORAGE BATTERY COMPANY, of Philadelphia, had a large force on hand, including Chas. Blizard, E. L. Reynolds, H. B. Gay, G. H. Atkin and R. C. Hull. The company made its usual comprehensive display of sample cells, elements, plates and storage battery details, together with photographs and blue prints of installations and results secured. The company's booth was well filled with representative electric railway men most of the time and the company is well pleased at the interest manifested.

THE DRESSEL RAILWAY LAMP WORKS, of New York City, exhibited its lamp and other specialties, the good points of which were explained by F. W. Edmunds, F. W. Dressel, C. H. Dressel and Robt. Black.

THE JOS. DIXON CRUCIBLE COMPANY showed the Dixon products. The interests of the company were looked after by W. J. Coane, J. J. Tucker, Herman Price and R. M. Darling.

THE FRANK S. DE RONDE COMPANY was represented by J. P. Davison, J. G. Satterthwait, C. G. Dickinson and A. T. Holley, and made an exhibit of its specialties. Among these, special mention should be made of "Sacarbolate," a disinfecting and cleaning compound for washing the inside and outside of street cars, carriages, etc.

THE AMERICAN BOOK BRACKET COMPANY, of Philadelphia, showed a collection of book brackets for holding telephone books, telephone receivers, etc., and designed for home and office use. The merits of its devices were explained by J. F. Nachod, F. P. Deemer, W. A. Taxis and James Hurnes.

THE AMERICAN AUTOMATIC SWITCH COMPANY, of Newark, N. J., showed its new automatic track switch, which has been used successfully in New York City and other cities. In favor of its device the company urges the following claims:

1. It may be installed without interrupting car service more than a few moments when final connections are made.

2. It is operated by the motorman from his controller handle, and absolutely dispenses with the necessity of a switchman. Each switch installed earns one man's wages at no appreciable additional cost in maintenance over a hand-throw switch.

3. Cars are not required to come to a standstill.

4. The throwing of switch is accomplished by the simple turning of the controller handle.

5. All parts of the mechanism are thoroughly protected from the weather, and the switch operates in all seasons with no more attention than is required by the hand-thrown switch. The company had in attendance Robert Lozier, A. K. Warren, H. H. Pennock and R. A. Langworthy.

THE MORRIN CLIMAX BOILER COMPANY, of Brooklyn, N. Y., makers of the Morrin patent steam generators, was represented by Thomas F. Morrin, its president.

THE E. W. BLISS COMPANY, of Brooklyn, showed an exhibit of pressed steel pinions, machine-cut hammered steel motor pinions, and other of its products. The representatives in attendance included C. E. Porter, B. W. Stone and J. Mathews.

THE CARNEGIE STEEL COMPANY made an exhibit of steel cross ties and the Duquesne rail joint. The idea of using a steel cross tie to replace the present wooden tie is one which is not only consistent with good engineering, but which, from the growing scarcity and consequent increase in the price of wooden ties, is daily more forcibly presenting itself to those charged with the maintenance of railways in such condition as to economically and safely carry the heavy wheel loads imposed upon them by the advances of modern practice. The Carnegie Steel Company is submitting a steel tie of modified channel beam section which is believed to embody the maximum number of necessary requirements. The company was represented by W. B. Silbert, J. B. Bonner, N. M. Hench and H. W. Summers.

THE STANDARD UNDERGROUND CABLE COMPANY was represented by W. C. L. Eglin, T. E. Hughes, A. A. Anderson and H. P. Kimball, who distributed the company's literature.

THE ARMSTRONG OILER COMPANY, of Philadelphia, exhibited one of its truck journal oilers which utilizes a pad of cotton and wool held in place by buttons which press against the journal, allowing only the "pile" of the pad to brush it lightly. The company was represented by M. H. Brill and A. S. Vane.

THE ELECTRIC RAILWAY EQUIPMENT COMPANY, of Philadelphia, dealers in second-hand equipment, cars, trucks and electrical equipment, was represented by M. H. Brill and A. S. Vane.

THE ELECTRIC CAR SIGN COMPANY, of Philadelphia, made a display of its car signs. I. B. Brower and I. C. Brower were in attendance.

THE AMERICAN ROAD MACHINE COMPANY, of Kennett Square, Pa., was represented by O. D. Henry.

F. SCHUBERT, of Cincinnati, showed his street and station indicator and advertiser.

THE W. H. COE MANUFACTURING COMPANY, of Providence, R. I., was represented by S. H. Swallow, Frank Taylor and C. H. Bowers. The exhibit consisted of Coe's gilding wheels, ribbon gold leaf and high burnish bronzing powder for all classes of decorating, and particularly suitable for street car work.

THOMAS PROSSER & SON, of New York City, who represent the Krupp steel tired car wheels, made a display of these wheels. They also showed Krupp resistance wire and Krupp shafts. The company was represented by F. A. Barbery, George H. Haight and George H. Bryant.

THE H. G. VOGEL COMPANY, of New York, was represented at the convention by J. D. Coleman, secretary. The H. G. Vogel Company manufactures the well-known Esty automatic sprinkler equipments, and Mr. Coleman's presence at the convention was particularly opportune, on account of the interest displayed in fire protection at the meeting of the American Street Railway Association.

M. A. SINGER & BRO., of New York, handled the building and decorating of some of the most attractive booths in the exhibition hall. This firm has had a long experience at conventions, and its work may always be seen at the annual street railway exhibits.

THE BARBOUR STOCKWELL COMPANY, of Cambridgeport, Mass., was ably represented by F. F. Stockwell, H. R. Luther, W. W. Field, F. H. Ellis.

THE CROCKER-WHEELER COMPANY, of Ampere, N. J., made no exhibit, but was represented by Rodman Gilder, S. Russell, Jr., Henry Beyer.

THE DAYTON MANUFACTURING COMPANY, of Dayton, Ohio, was present in the persons of John Kirby, Jr., Joseph Leidenger, Peter Leidenger, Nelson Emmons, Jr.

FRED. T. LEY & COMPANY, of Springfield, Mass., was represented by Mr. Ley himself.

THE NILES CAR & MANUFACTURING COMPANY, of Niles, Ohio, had in attendance at the convention, F. C. Robbins, J. A. Hanna, A. W. Schall.

THE OKONITE COMPANY, of New York, whose product is so widely known as the "standard for rubber insulation," was present in the persons of W. L. Candee, Geo. T. Manson, H. D. Cheever, W. H. Hodkins.

THE PLATT IRON WORKS COMPANY, of Dayton, Ohio, manfacturers of pumping machinery, water-wheels, air compressors and power plant apparatus, was ably represented by J. H. Waterman, O. G. Smith, C. S. Munoz, Royal K. Fox, Jr.

THE RAILWAY STEEL SPRING COMPANY, of New York, was in evidence through its representatives, F. C. McLewee, F. F. Fitzpatrick, S. R. Hayes, A. S. Henry.

ROSSITER, McGOVERN & COMPANY, of New York, who handle such an extensive line of second-hand electric railway material and repair work, were represented by Frank McGovern, J. W. Archer, Charles McDonald, Daniel Killion.

THE STANDARD VARNISH WORKS, of New York, Chicago and London, had its interests ably cared for by John C. Dolph, E. A. Watrous, C. W. Upton, L. Robinson. A sterling silver pencil was distributed as a souvenir of the occasion.

THE TAYLOR IRON & STEEL COMPANY, of High Bridge, N. J., was present in the persons of Knox Taylor, S. H. Mattson.

WENDELL & MacDUFFIE, of New York, was much in evidence, being represented by Jacob Wendell, Jr., R. L. MacDuffie, John B. Embick, H. E. Oesterreich.

J. G. WHITE & COMPANY, of New York City, was represented by Prof. W. E. Goldsborough, W. E. Harrington, William Pestell and F. H. Reed.

THE CHICAGO SPECIAL

Many of the delegates from Chicago to the Philadelphia convention took advantage of the opportunity to travel together on the special train run by the Pennsylvania Railroad Company to Philadelphia. The "Pennsylvania Special" left Chicago Monday evening, Sept. 25, at 7:30 o'clock, in charge of Thomas R. Witt, local passenger agent. It consisted of five Pullman sleepers and one combination sleeper and observation car. A dining car was attached at Pittsburg Tuesday morning. The number of passengers carried on this train would have been larger, except that many delegates left Chicago on Saturday and Sunday in order to be in Philadelphia Monday morning when the convention opened. The Pennsylvania road sold over a hundred tickets to the convention from Chicago.

On the special train the passengers were delighted with the beautiful scenery, smooth riding and perfect service. The trip was greatly enjoyed.

ENTERTAINMENTS ON FRIDAY

An account was given in the last issue of the entertainments on Tuesday, Wednesday and Thursday of last week, at the convention. On Friday afternoon, by courtesy of the Fairmount Park Transportation Company, many of the delegates and attendants at the convention were taken for a trolley ride through Fairmount Park, and the trip was thoroughly enjoyed by all.

For Friday evening the entertainment committee of the Manufacturers' Association arranged a vaudeville entertainment, which was given in the ballroom of the Bellevue-Stratford. Many of the numbers were given by talent secured from the ranks of the supply men, and the performance was voted an entire success. The programme included music by the Electric Glee Club; dialect stories by J. H. Stedman, of transfer fame; a dramatic sketch in one act in which Jacob Wendell, Jr., of Wendell & MacDuffie, E. J. Wendell, George K. Denny and John T. Conover had the leading parts; character stories by Dwight B. Dean, given through the courtesy of the J. G. Brill Company; comic songs by E. J. Wendell; a lightning change sketch by Karl Andren, given through the courtesy of the Galena Signal Oil Company, and a sketch produced by courtesy of Keith's Theater. After the performance, the floor was cleared and dancing was enjoyed for the rest of the evening.

THE NEW SECRETARY AND TREASURER

At a meeting of the executive committee of the American Street & Interurban Railway Association held Friday morning, Sept. 29. Prof. B. V. Swenson, formerly of the University of Wisconsin, was elected secretary and treasurer of the association. It was also decided to secure offices in New York immediately, as directed in the new constitution. A biographical sketch of Prof. Swenson appeared in the STREET RAILWAY JOURNAL for Sept. 16, and he was the unanimous choice of the committee.

CITY FRANCHISE CONTROL IN NEW YORK

A report of the executive committee of the Board of Trade and Transportation, of New York, on the question of the control by the city of passenger transportation facilities, presented at a meeting of that body last week, is of especial interest because of the prominence of that body as a power in local affairs in New York. The report, after a lengthy discussion of the franchises granted to the various transportation companies, closed with the following resolutions, which were submitted for adoption:

Resolved, That passenger transportation facilities should not be granted by the city for terms longer than twenty-five years.

That at the expiration of grants the city shall have the option of recovering them on payment to the concessionaire of the appraised value of the physical plant at that time, exclusive of franchise value, provided such plant was originally constructed at the expense of the concessionaire.

That the city shall also have the option of resumption at any intermediate period on payment to the concessionaire of the appraised physical value of the plant, if constructed at the expense of the concessionaire, and in addition the appraised value of the franchise at the time of resumption not exceeding — per cent of the cost of the material structure, exclusive of equipment.

Resolved, That contracts for the use of any of the East River bridges by public service corporations be made to conform as nearly as practicable to the existing Brooklyn Bridge contract between the city and the Brooklyn Rapid Transit Company.

That power be reserved to the city to exact transfers under equitable conditions over all municipally governed lines.

That franchises granted along general trunk lines of communication be made to terminate coincidently with franchises for the subsidiary lines of each such system, and that during the next five years franchises be made to terminate on or before the expiration of the Sixth Avenue and Eighth Street grant to the New York & New Jersey Company.

That while it may be, and probably is, desirable that trains of the steam roads leading to New York City should have access to the city subways, the local subway travel should not be prejudiced as a consequence.

That adequate provision on a single fare basis should be made now for the extension northerly of the projected Bronx lines.

That north and south subways in Manhattan should be built near the surface, and as nearly as possible in straight lines from the Battery north, and that east and west subways in the same borough should be conducted on the next lower level through the principal lateral streets, from river to river, with a view of their ultimate extension to Long Island and New Jersey; and that a free transfer system between these two classes of subways, at intersecting points, should be provided for the future.

Resolved, That the Rapid Transit Commission and his honor, the Mayor, be requested, immediately upon the convening of the Legislature, and before the city shall grant additional transit franchises, to demand that the Legislature so amend the Rapid Transit law as to give the Rapid Transit Commision the following additional powers:

(1) To separate contracts for construction from operating contracts.

(2) To provide for pipe galleries.

(3) To contract for operating periods of less than thirty-five years.

(4) To enable the city to avail itself, if need be, of the power of municipal operation.

In the article on the new Chicago City Railway car, published in the issue of the STREET RAILWAY JOURNAL for Sept. 16 an omission was unintentionally made in not mentioning that these cars are equipped with the Curtain Supply Company's (Chicago) Forsyth improved No. 86 curtain fixtures, and the curtains are of Pantasote, pattern K-86. The fixture rod is reinforced with a washer on each side of the center lock, giving stiffness to the rod and preventing rattling.

THE FOUR PRESIDENTS FOR THE COMING YEAR

W. Caryl Ely, who has just been elected president of the American Street & Interurban Association, has served as president of the American Street Railway Association for two years, and was also presiding officer at the Saratoga convention of 1903, owing to the absence in Europe of J. C. Hutchins, who was president that year. He has been most prominently identified with the steps to reorganize the American Street Railway Association, and his election to direct the affairs of the amalgamated associations during the coming year is a well deserved tribute to the confidence and respect with which he is regarded by his associates.

Mr. Ely is a native of Otsego County, N. Y., where he was born in 1856. He studied law and was admitted to the bar at Ithaca in 1882. In 1885 he moved to Niagara Falls and continued the practice of law, first independently and later as a member of the firm of Ely, Dudley & Cohn. He was one of the original incorporators of the Niagara Falls Power Company, and was instrumental in securing the enactment of its charter. In 1895 he projected the construction of the Buffalo & Niagara Falls Railway, of which he was the president and which was one of the first high-speed interurban electric roads in the country. In 1898 he conceived the idea of consolidating all of the electric railways in Buffalo, Niagara Falls and adjoining territory, which was successfully carried out and Mr. Ely was elected president of the consolidated company. In 1901 he was a director, chairman of the transportation committee and member of the executive committee of the Pan-American Exposition. Early this year Mr. Ely resigned as president and director of the International Railway Company, but, as stated in a resent issue of this paper, has secured an interest in certain roads in southeastern Ohio.

S. L. Rhoades, who has been chosen to guide the affairs of the American Association of Street Railway Claim Agents during the coming year, is general claim agent of the Philadelphia Rapid Transit Company, with which he has been connected for a number of years. An account of the organization and successful methods followed in the conduct of this department in Philadelphia was published in the Sept. 23 of this paper. Mr. Rhodes is a native of Philadelphia, where he was born 30 years ago. His first street railway experience was in the claim departments of the West Chicago Street Railway Company, and the West End Company, of Boston, where he passed two years. He then moved to Philadelphia, where he joined the railway system first as an investigator, later as an adjuster, then as assistant claim agent, claim agent, etc. He has been in the railway business for fifteen years.

Harry H. Adams, M. E., who has just been elected president of the American Railway Mechanical & Electrical Association, has served as first vice-president of that body during the past year and has always been active in the interests of the association. Mr. Adams was born in Jersey City, N. J., Jan. 7, 1871. His early education was obtained in the Jersey City public schools, and later he attended Trinity Church School, in New York. He entered Stevens Institute and was graduated in the class of 1893. After graduation he entered the service of the Consolidated Traction Company, of New Jersey, which was later merged into the North Jersey Street Railway Company, and held in that company successively the positions of foreman of motor repair shops, assistant electrical engineer, and finally master mechanic. This last position he occupied until Jan. 1, 1902, when he entered the service of the United Railways & Electric Company, of Baltimore, Md., as superintendent of shops, in charge of the rolling stock and buildings. This position he now holds.

Walter B. Brockway, the president for the coming year of the Street Railway Accountants' Association of America, was one of the founders or that association, and was for a long time its secretary. Before engaging in electric railway work, Mr. Brockway had an experience of twelve years with steam railroads. This experience began in 1884 with the Chautauqua Lake Railroad and covered practically all departments, including the general office, operating and construction work. It was in 1896, when he was assistant to the paymaster, and assistant to the general bookkeeper of the Ohio Central lines, of Toledo, that he accepted the position of auditor of the Toledo, Bowling Green & Fremont Railway, which was an electric line. With that company Mr. Brockway occupied successively the position of assistant secretary and secretary until 1900, when he was elected assistant secretary and auditor of the New Orleans & Carrollton Railroad, which was at that time owned by Isidore Newman & Sons. Soon after Mr. Brockway's appointment to that company it was consolidated with the electric lighting interests in New Orleans and Mr. Brockway was elected assistant secretary and auditor of the new company. In 1902 he came to the New York office of Isidore Newman & Sons, and was placed in charge of the accounting of all of their numerous properties. Last year the operation of these companies was placed in charge of an organization known as Ford, Bacon & Davis' Operating Department, of which Mr. Brockway is auditor, and which includes seven large electric railway lines in the South and Southwest. Mr. Brockway served as secretary and treasurer of the Street Railway Accountants' Association of America from its organization in 1897 until the St. Louis convention, when he resigned on account of pressure of other business, but consented to act as secretary and treasurer pro-tem until his successor was appointed, which was the first of this year. Mr. Brockway was married in 1894 to Miss Elizabeth Priest, daughter of Johnathan Priest, founder of the Toledo Medical College, Toledo, Ohio, and is now a resident of Yonkers, N. Y.

DANIEL M. BRADY

There was a great deal of favorable comment at Philadelphia over the success of the exhibit and entertainment features at the convention, and many compliments were extended to the Street Railway Manufacturers' Association and to its chairman, Daniel M. Brady. This is the first year in the history of the association in which the conduct of this part of the convention has been in the hands of this association, and the success was secured only by the hardest and most consciencious work on the part of the executive committee of the association and its chairman. Mr. Brady, upon whose shoulders a large part of the responsibility fell, has been identified in a prominent way with the steam railroad business and steam railroad conventions for the past thirty-two years, and has served on many of the entertainment and other committees of the master car builders' and master mechanical conventions during this period. He is also one of the oldest members of the New York Railroad Club and has always been very prominent in its councils, having served a number of times on the finance and other committees of the club.

D. M. BRADY

Mr. Brady has also been a prominent figure at street railway conventions since 1884, at which convention he was an attendant. Since that year Mr. Brady has the record of having participated in eleven conventions and having an exhibit at seven. He has also attended every meeting of the New York State Street Railway Association since 1896. He was also a member of the entertainment committee at the time of the New York convention in 1901. Mr. Brady's first street railway order was in 1887, when he went into the metal business, and was given him by Charles E. Warren, at that time secretary of the Broadway & Seventh Avenue Railroad Company. Mr. Brady has retained the business of this company and its successors ever since.

Mr. Brady is a native of New York City, where he was born fifty-one years ago. His first railroad experience was in 1871, with the New York Central Railroad, in the office of General Manager John M. Toucey. He was afterwards chief clerk of the car department under Leander Garey, general superintendent of the car department of the company. Mr. Brady resigned from the New York Central Railroad in 1883, to join the then newly organized Paige Car Wheel Company, of Cleveland, Ohio, with which he was connected for fourteen years. He is the founder of the Brady companies to manufacture brass castings for steam and street railway use, and has been president of the Brady Brass Company since its organization. He was also for a long time a director of the Rochester Car Wheel Works. Mr. Brady is essentially a railway organization man, and in all his club and association affairs is ever ready to give liberally of his time and means to further any plans or work upon which the association may be engaged. He was a member of the Seventh Regiment, in New York, for seven years, and for the past twenty years has been a member of the Veteran Corps of that organization. He is also a member of the Manhattan Club, of New York; New York Athletic Club, Friendly Sons of St. Patrick, the Museum of Natural History, and the New England, New York, Central, Pittsburg and Canadian Railway Clubs,

WESTINGHOUSE AUTOMATIC BRAKE FOR SURFACE TRACTION

The prevailing use of the straight-air type of brake on surface traction railways is due to several evident advantages it has heretofore enjoyed over the standard quick-action automatic brake, so exclusively employed on steam roads, principal among which are its simplicity, with consequent lower cost, and its flexibility, or in other words, the feature that enables the operator to graduate the release of the brake as well its application. On the other hand, it has always been recognized that the factor of safety, even when trailers are never handled, is much lower with the straight air than with the automatic brake, since, in the former, a sudden rupture of the piping system totally destroys the power of applying the brake, and this is most likely to happen in a case of extreme emergency when full main reservoir pressure is thrown suddenly into the train pipe. The danger from this source is increased many fold where the piping is extended by means of flexible hose connections to operate brakes on one or more trailers. It follows, therefore, that an automatic brake of simple design and inexpensive construction, embodying the very desirable features of graduated release and quick recharge, at the same time insuring immunity from accident as a result of a damaged train pipe or bursted hose, should secure the unanimous indorsement of the operating and mechanical officers of surface traction systems. For about a year prior to the date of this publication an automatic brake, designed to meet these requirements, has been undergoing a thorough test in actual service on several motor car and trail car trains in one of the large cities of this country, and although the conditions appear to be exceptionally trying, its success has been gratifying and complete.

The brake was also on exhibition on a rack at the Philadelphia convention.

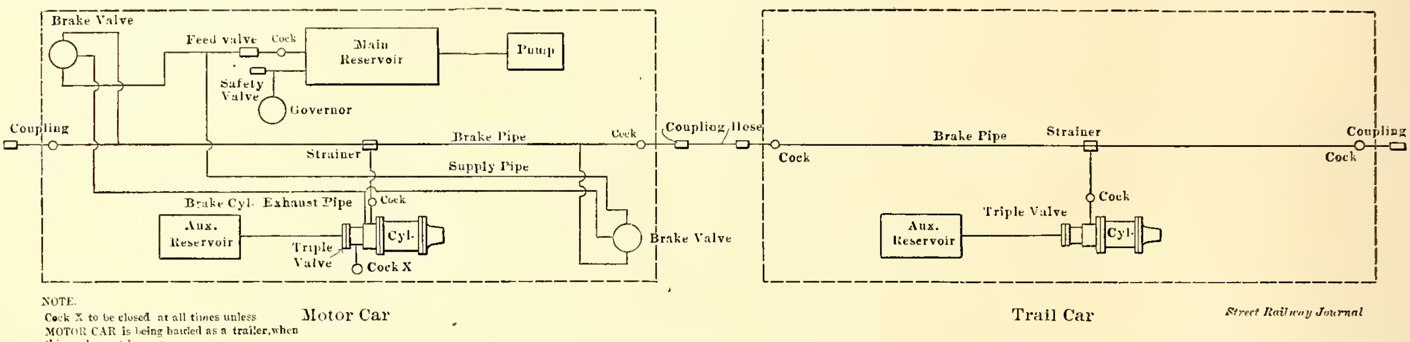
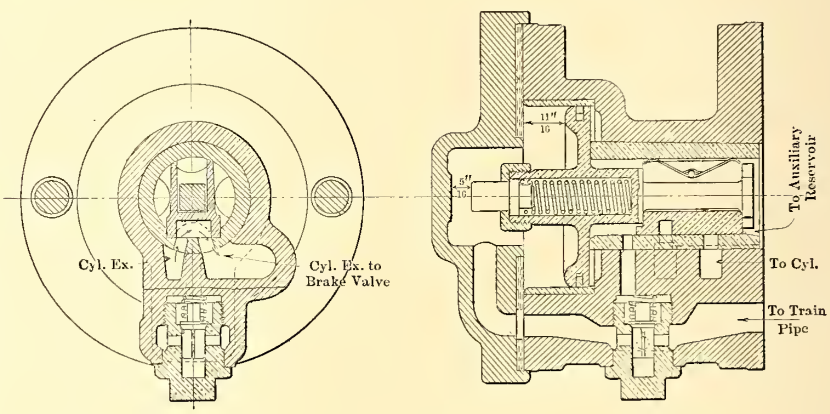
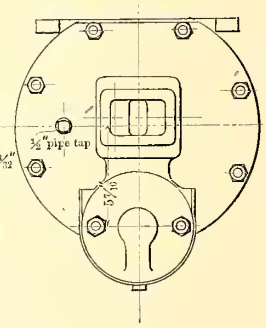


FIG. 1.—SHOWING GENERAL ARRANGEMENT OF BRAKE FIXTURES AND PIPING ON ONE MOTOR AND ONE TRAIL CAR





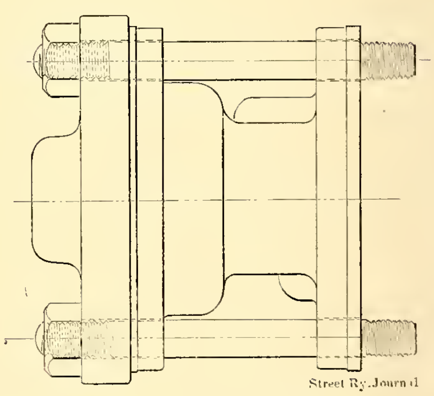


FIG. 2.—SECTIONS AND OTHER DETAILS OF SURFACE TRACTION TRIPLE VALVE

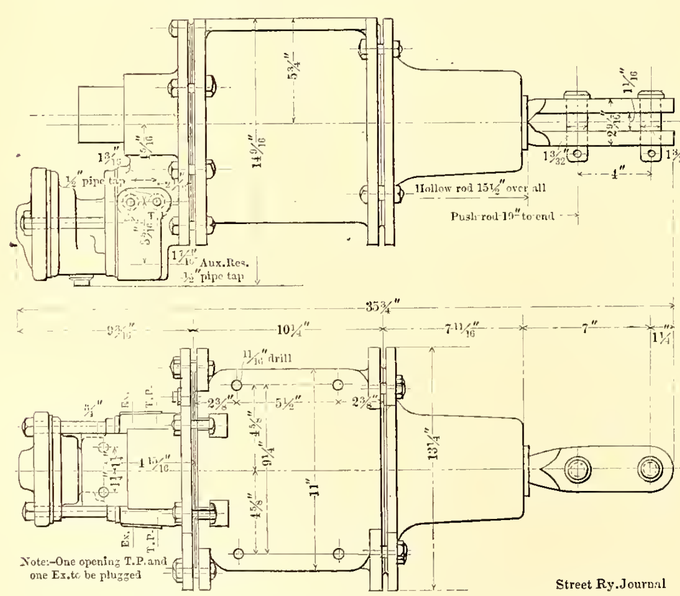


FIG. 3.—BRAKE CYLINDER FOR SURFACE TRACTION, INDICATING PIPE CONNECTIONS IN THE PRESSURE HEAD

The essential elements of the surface traction brake correspond in number and function to those of the Westinghouse standard automatic brake, the difference consisting in the modification of the triple valve, the employment of a very simple brake or operating valve with separate feed valve, and a new method of piping by which the brake on the head motor or operating car can be graduated off as well as on. In view of the limited number of trailers now handled by each motor car—more than one being very exceptional—the fact that the graduating release feature is confined to the motor car is beneficial rather than otherwise, since it causes the slack between the cars to run in gradually while the retardation on the head car continues. The accompanying illustration, Fig. 1, shows the general arrangement of brake fixtures and piping on one motor and one trailer car, the train pipe connection between them being made by means of special hose and couplings in the usual manner. The motor-driven pump, main reservoir and electric-pump governor, the respective locations of which are indicated, require no description or explanation. The governor, however, should be regulated to maintain about 90 lbs. pressure in the main reservoir instead of 60 lbs., which is the pressure ordinarily employed in straight-air brake work. A reducing valve, of the slide-valve type, inserted in the line between the main reservoir and the brake valve, maintains the pressure beyond it at 70 lbs., and thus prevents overcharging the brake pipe and auxiliaries, thereby eliminating the possibility of stuck brakes and other irregularities which make the operation of the standard automatic brake so unsatisfactory on single or two-car trains. At the same time, the excess main reservoir pressure of 20 lbs., being the difference between maximum main reservoir and maximum train-pipe pressure, serves as a surplus or reserve to restore standard train-pipe pressure and recharge the auxiliaries after one or more releases more promptly than would otherwise be possible.

Reserving a detailed description of the brake valve and triple valve for the present, it will be noted by reference to the diagram that the former is connected by suitable ports and piping with the main reservoir, the train line, the brake-cylinder exhaust and, of course, with the atmosphere. Placing the brake-valve handle in the proper (release) position, compressed air from the main reservoir, reduced to 70 lbs. pressure, flows through the train line and through the large feed ports of the special triple valve on each car into the auxiliary reservoir, rapidly charging it to the predetermined limit. The brakes are then applied alike on both cars, and to any extent desired, by reducing the train-pipe pressure more or less rapidly through the manipulation of the brake valve and the corresponding automatic action of the triple valve. When releasing the standard automatic brake, train-pipe pressure is restored, forcing the triple-valve piston to a position in which the auxiliaries are quickly recharged and the air in the brake cylinders is allowed to flow to the atmosphere through the exhaust port of the triple, releasing the brakes. This is exactly what happens on the trailer of this new equipment when piped as indicated, but on the motor car the exhaust from the brake cylinder is piped to the brake valve, and the release of the brake on that car depends on the position of that valve, and can be graduated to any extent desired by the absolute control of the exhaust thus obtained. In brief, this automatic brake can be graduated both on and off as easily and smoothly as "straight air," but by a directly opposite process, train-pipe pressure being reduced to apply the brake and restored to release it. The protection afforded by this feature, which insures the automatic application of the brake to the highest degree of power, in emergencies, where the straight-air brake would be absolutely useless, has secured the universal adoption of the automatic brake in steam railway service; and while many conditions on surface traction roads are quite different, the heavier equipment and higher speeds now common and the increasing use of trailers during rush hours would indicate the necessity of giving the matter of safer brakes for traction service more thoughtful consideration than the subject has heretofore received.

Notably safer and equally "flexible," it only remains to show that the "complication" of the automatic brake in general, and of the surface traction form in particular, is more apparent than real, while the slight additional expense involved should not be considered for a moment in view of the immunity from accident which it insures. The chief merit claimed for a "simple" device is that it is more certain to perform the work for which it was designed. The standard Westinghouse triple valve is built up of many related parts, but the certitude of its performance, even under abnormal conditions, is recognized as marvelous. Referring to Fig. 2, it will be observed at a glance that the surface-traction triple is extremely compact in form and has few parts as compared with the standard, while retaining all that nature of the service in which it will be used requires. The elimination of the so-called "quick-action" feature does not indicate that the new triple performs its functions less speedily than the older form; on the contrary, the employment of larger ports and passages and the use of a check valve in place of the usual feed groove insure the more prompt recharge of the auxiliary and reapplication of the brake than is possible with any other type. The standard "quick-action" valve was originally designed for fifty-car trains, and therefore necessarily provided with a device for locally venting train-pipe pressure at each triple, in order to induce serial "quick action"—hence the name. The entire absence of pipe connections on the new triple will also be observed with interest, since this arrangement permits the removal of the valve for examination and cleaning without disturbing the piping. This valuable feature is shown more clearly in Fig. 3, which illustrates the brake cylinder designed for this service, and indicates the pipe connections in the pressure head. These connections are drilled and tapped on both sides symmetrically so as to facilitate erection and simplify the piping. As already stated, the triple valve can be removed without breaking pipe connections, and since the cylinder is cleaned by the removal of the other or non-pressure head, after the original installation is completed, the piping need never be disturbed. The cylinder head is also designed to accommodate the Westinghouse automatic slack adjuster, which has proved to be a most valuable accessory in brake service, both as a means of saving air and reducing expense. The short-stroke—8-in.—cylinder has proved extremely satisfactory in traction work.

The controlling or brake valve illustrated in Fig. 4 is one of the simplest devices of the kind that has ever been used in automatic service. It is of the rotary-valve type, with a suitable handle that can be removed when the valve is "on lap" only, and this feature, in conjunction with the construction of the valve stem itself, prevents any interference and insures the proper operation of the brakes by means of the brake valve at the opposite end of the car.

Fig. 5 shows the reducing valve already mentioned, and which

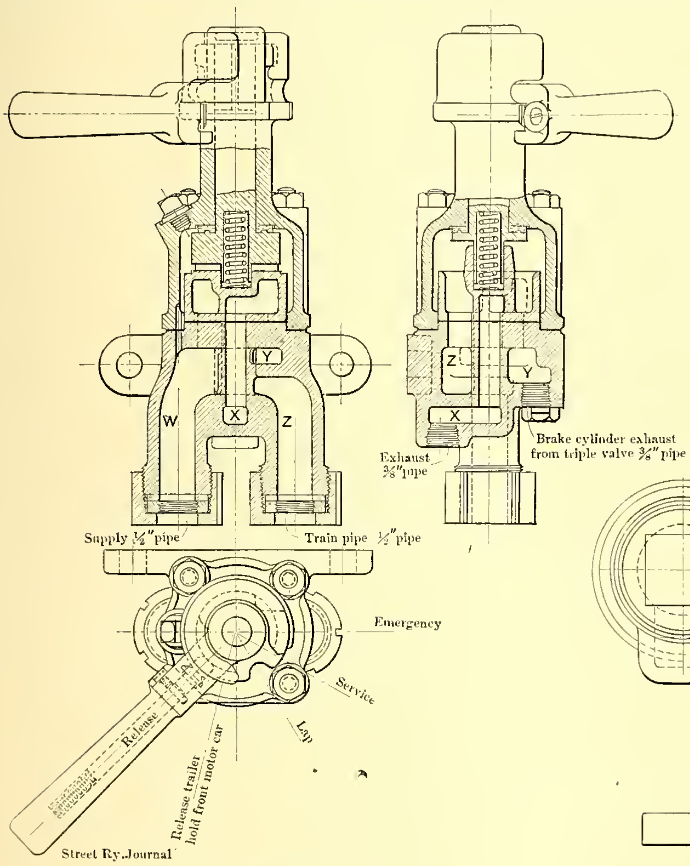


FIG. 4.—DETAILS OF CONTROLLING OR BRAKE VALVE

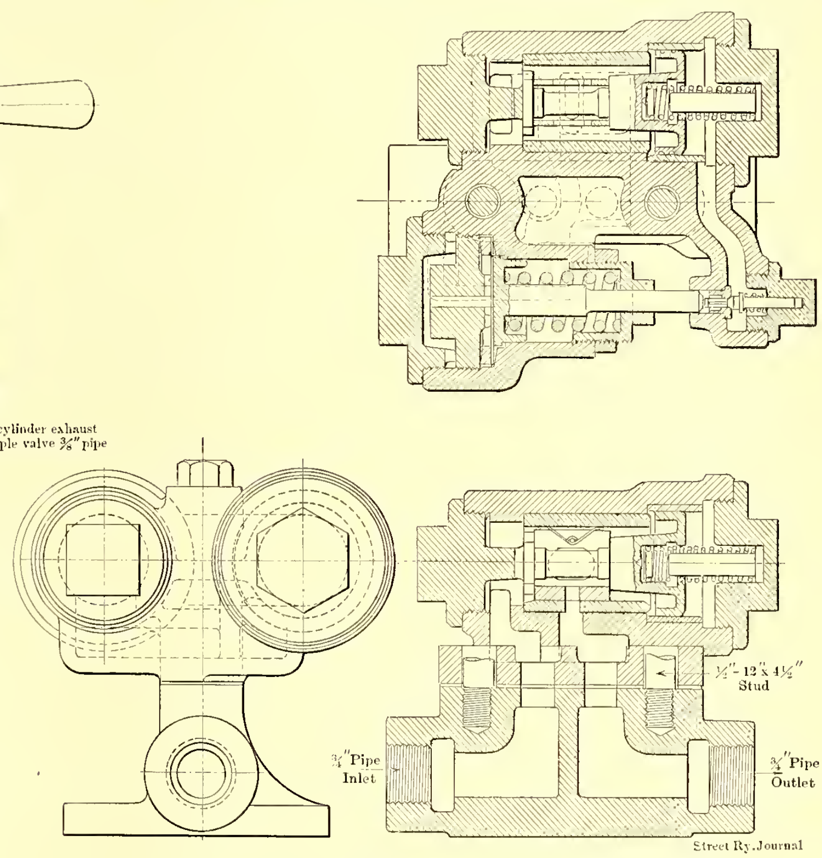
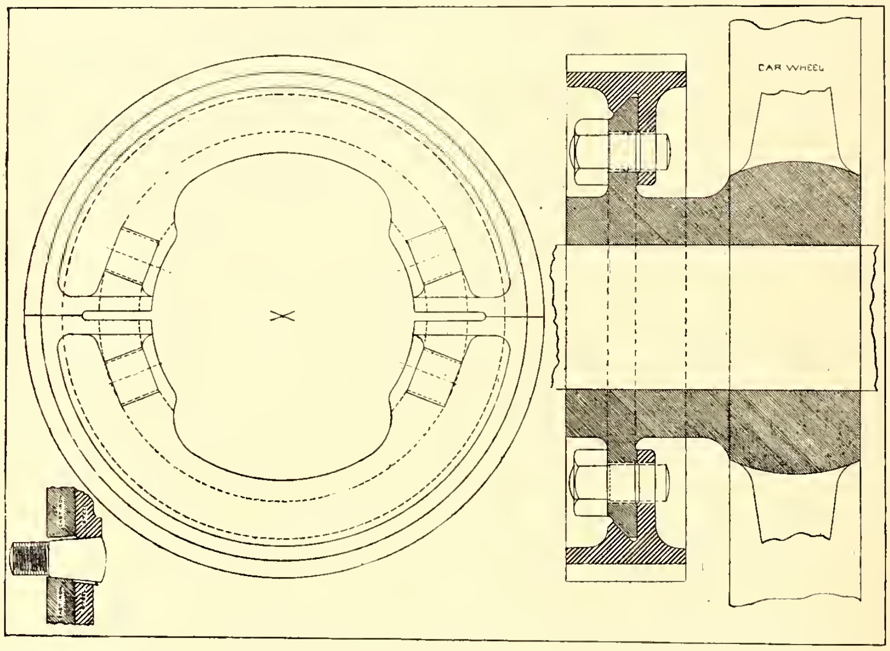


FIG. 5.—DETAILS OF REDUCING VALVE FOR SURFACE TRACTION AIR BRAKE SYSTEM

so closely resembles the standard slide-valves feed valve, both in construction and operation, that no extended description seems necessary.

NEW DETACHABLE RIM GEAR WHEEL

In addition to the sectional gear-wheels with interchangeable, rims made by James H. Fogarty, of New York, this manufacturer has brought out another type, in which the hub or permanent part of the gear-wheel forms an extension of the hub of the car wheel of any size. A detachable gear can then be placed on this extension and removed when worn out without disturbing the car wheel in any way. The use of solid gears makes it necessary to take the car wheel off the axle every time a new gear is substituted, and since the life of the car wheel is from four to six times longer than the gear, it is evident that detachable rim gears must effect a great saving in time and labor, aside from the fact that their use avoids the necessity of scrapping the entire gear-wheel. As a built-up gear must have its parts exceptionally well fitted to withstand



ILLUSTRATIONS SHOWING DETACHABLE RIM GEAR APPLIED TO EXTENDED HUB OF CAR WHEEL

severe vibrations, the rims are held by four 1⅜-in. bolts passing through round holes with some draw. This insures their being drawn tight into the V at an angle of 45 degs., so that in addition to the strength of the bolts, the friction on the V will make a perfect fitting rim. When a rim is worn out it can be replaced by another within an hour's time, using the old bolts over again.

These detachable rim gears are now in service on quite a number of city and interurban lines, including Canton, Pittsburg and Boston. On one large system near New York, the hubs of these gears have been in continuous satisfactory service for three years.

CONSTRUCTION OF BALTIMORE & FREDERICK RAILWAY BEGUN

James E. Ingram, Jr., president of the Baltimore & Frederick Electric Railway Company, is authority for the statement that plans are making for beginning the construction of this new line within a few days. The company has secured, either by purchase or donation, practically all of the right of way, and the engineers have completed the location. The road will be built for high speed, and although it goes through a hilly country, the maximum grade will not exceed 1 per cent. The road will be 51 miles long, and will establish a much shorter route from Baltimore to Frederick than either of the two steam roads. In connection with the plans of the company, the Frederick & Middletown Electric Railway has been purchased. This includes about 13 miles of track, and was bought because of the ownership of Braddock Heights, which the Baltimore & Frederick Electric Railway Company will develop as a pleasure resort. The Frederick & Middletown Electric Railway connects with other lines which finally reach Hagerstown. With the building of the Baltimore & Frederick line it will be possible to travel by electric railway from Baltimore to Hagerstown by changing cars at Middletown.

A NEW EDITION OF RAILWAY LAWS OF MASSACHUSETTS —AN INDEX-DIGEST TO DECISIONS FROM 1870 TO 1904

Within a few days the Massachusetts Railroad Commission will issue a new edition of its official compilation of the railroad and railway laws of Massachusetts, to take the place of a similar work published in 1904, which is now out of print. The new volume will not include the changes in the law which may be suggested by the special committee on railway and railroad law which is to report to the next Legislature, but it is calculated to fill in the period that must necessarily elapse before that committee's recommendations can be carried into effect. The new compilation has been made by Charles E. Mann, clerk of the Commission, and will be somewhat larger in size of page than the Commission's annual reports, but will be bound in black, the standard of those reports. About fifteen or twenty pages are necessary to insert the statutes passed by the Legislatures of 1904-05. These additional sections will be interleaved with the old plates and folioed alphabetically with the number of the preceding page of the old volume as a key. It is in the index that the new volume makes a great gain over the old. On the assumption that it is as important to be able to find a given law quickly, no matter which word of its title first occurs to the mind, as it is to have the law itself in print, Mr. Mann has expanded the index so that each title or subject appears from three to six or eight times for the sake of having it readily accessible.

It is on the same broad lines that Mr. Mann has recently issued the new "Index-Digest of the Reported Decisions, Precedents, and General Principles Enunciated by the Board of Railroad Commissioners from 1870 to 1904 Inclusive." The only previous volume of the sort for this Commission was the digest prepared by John H. Wiggin, covering the period from 1870 to 1888. There were no street railway decisions of importance as early as that, and the volume was not adequately indexed. The new digest, with its three hundred titles all indexed and cross-indexed, and its numerous rulings on the vital questions affecting street and electric railroading, is eagerly sought after. Aside from the splendid index, convenient features of the new edition are a list of the board's chairmen, with the dates indicating their terms of service, and a citation of all rulings and Supreme Court decisions in connection with each case where that kind of material is of bearing. The index-digest itself occupies ninety pages, two columns to a page, and the various indices to assist ready reference to a particular matter fill twenty-four pages.

THE BOSTON & NORTHERN MAY LIMIT TRANSFERS

The Massachusetts Railroad Commission issued an order Sept. 27, approving the petition of the Boston & Northern Street Railway Company for consent to withdraw certain transfer privileges in Reading, Wakefield, Melrose, Stoneham and Saugus. The board pointed out that the company earned a dividend of less than 2 per cent in the last fiscal year; and stated that against any local loss from the combination of paying and non-paying lines be weighed the fact that it was only through the consolidation of properties and of management that the public could have secured the quicker, more comfortable and larger service, with connecting lines and through cars, which exists to-day over the greater part of the system. The consolidated company has expended hundreds of thousands of dollars more than the component companies could have afforded, in improving roadbed, equipment and service. An advance of 12 per cent in wages has taken place in the past three years, and the board states that this was a wise and proper increase in expenditures. No company can give good service unless it is reasonably prosperous, and if the Boston & Northern is to become reasonably prosperous, receipts must in some way be increased. The board acquiesces in cutting down transfers to a point which makes possible for one fare a ride between town centers, or between any part of one town and the center of the next; but not from any part of one town to any part of the next. The board questioned the advisability of doubling the rates of fare, and suggested that possibly through the use of tickets or in some other way a less radical change might be made.

LONDON LETTER

(*From Our Regular Correspondent*)

At the meeting of the large steam railway companies of Great Britain, the cry still seems to be against the serious competition of electric street cars in the vicinity of large cities. Recently Lord Allerton, at the meeting of the Great Northern Railway Company, stated that they had carried 350,000 less passengers in the districts in Lancashire about Leeds and Wakefield, whereas the number of passengers in the suburbs of London about Wood Green and Finsbury Park, both of which suburbs have been served by the Great Northern Railway Company, has fallen off to the extent of about 150,000. At a meeting of the London & North Western Railway Company, Lord Stalbridge made the statement that there was a decrease in its passengers to the extent of about 740,000, and that he considered the bulk of this decrease was in suburban traffic drawn from the railways by tramways. Lord Rathmore had also a formidable statement to present to his shareholders in the decrease in the receipts of the North London Railway, for which he largely blames electric traction. All these gentlemen appear to consider that the blame is attachable to the municipalities which have entered into competition with them, and which yet tax them to the very highest extent in the way of rates. Such a statement, while undoubtedly true, is not liable to influence the result, and many of the chairmen of these railways seem utterly to ignore the fact that the competition of electric tramways is a permanent competition, and the reason that they are feeling the competition so much is simply on account of the fact that the tramways were not in existence a few years ago, whereas they ought to have steadily grown with the various districts through which they are now running. In other words, the laxity of the municipalities in not providing electric traction years ago provided an immense amount of suburban traffic for these railroads to which they were not really entitled, and which they would never have had had adequate tramway facilities been provided at the proper time. To argue in favor of electric tramways for the short suburban distances out of a center like London seems almost waste of time, the advantages are so apparent, as no man is going to go considerably out of his way to reach an important railway station, perhaps have to wait for a train or get one at a certain specific moment, have to get out at a station which may not be conveniently situated near his home, and so waste considerable time and pay a higher price, when he can get an electric car which will take him almost from his office door to his home. The chairmen of these important railways had better look to other means of increasing their traffic and recognize the fact that this suburban traffic has permanently passed away from them to a very large extent. Most of the railway companies are undoubtedly doing excellent work in the way of providing independent motor carriages on short outlying tracks, so that they may give frequent service in sparsely settled localities. They are also doing good work in the electrification of certain of their lines in the vicinity of cities. All this work is distinctly in the line of progress, but the continued reiteration of the hardships which they endure at the hands of municipalities seems to be utterly wasted.

It is pleasing to note that two more corporations in England have come to a sensible business arrangement by which there can be intercommunication of traffic between the two cities—namely, the linking up of the Sheffield tramways system with that of the Corporation of Rotherham. For a number of years the termini of both systems have been within a few feet of each other at Tinsley, and all passengers necessarily had to change cars at that point. Hereafter there will be a through service, which will be a great deal of assistance to the thickly populated district through which these cars pass. With reference to this matter of intercommunication of tramways, even the city of Wolverhampton has now made arrangements with the neighboring local authorities at Bilston, Coseley and Sedgley. This is all the more interesting, as it will be remembered that the Wolverhampton Corporation electric tramways are equipped with the surface-contact system, there being no overhead wires on the whole of that system. It will therefore be necessary for those cars of the Wolverhampton Corporation which are to go outside of their own system to be equipped with trolleys, whereas the cars of the other authorities, which will now have permission to go into the center of Wolverhampton, will in turn have to be equipped with skates and other apparatus necessary for them to pick up current from the Lorain surface system.

An interesting experiment is now being made between London and Brighton, a distance of 52 miles. The London Motor Omnibus Company has just put on a petrol motor 'bus to run every day from the Hotel Victoria, Northumberland Avenue, to Brighton. The journey will occupy about four hours, and the fare is a little more than ordinary third-class railway fare. In fine weather this experiment should prove successful as a pleasure trip.

The work of reconstructing the steam tramway from Dewsbury to Batley, Birstall and Gomersal is now being proceeded with. This line, one of the first in England, was opened in 1873, the cars for several years being drawn by horses. The undertaking now belongs to the British Electric Traction Company. From Gomersal the line will be continued to Birkenshaw, to within a very short distance of the terminus of the Bradford city tramways. When the line is reopened there will be a service of electric cars to almost every part of the district. The two Soothills are yet untouched, but it is hoped that the Wakefield & District Light Railway Company may be induced to make a line from Ossett, through Earlsheaton, and on to Dewsbury.

A service of motor 'buses from Mirfield to Bradley on the one hand, and Ravensthorpe on the other, is proposed, with a view to connecting the town with Huddersfield and Dewsbury. The Huddersfield tramways run to Bradley, and the British Electric Traction Company's system extends from Dewsbury to Shepley Bridge, Ravensthorpe. The motor 'buses, it is suggested, should run between these two points, and thus give through communication.

Recently the Erith Urban District Council Tramways were declared open by F. A. Stone, chairman of the Council. The tramways, which are on the overhead trolley principle, traverse 4¾ miles of roadway, the total length of track, worked out on the equivalent of single line, being 8½ miles. The total capital expenditure sanctioned by Parliament for the tramways proper was £113,500. The work has been carried out under the supervision of Hawtayne & Zeden, the Council's consulting engineers. R. W. Blackwell & Company, Ltd., were contractors for the permanent way; the overhead equipment was provided by the Brush Electrical Engineering Company, and the rolling stock by the British Westinghouse Electric & Manufacturing Company. The rails were supplied by Bolckow, Vaughan & Company, of Middlesborough, and the Hadfield Steel Foundry Company, of Sheffield, supplied all the necessary points, crossings and special track work. The cars are double decked, a number of them being fitted with top deck covers, and all are equipped with the Westinghouse magnetic track brake, in addition to the ordinary hand brakes. The current is supplied from the Council's electricity works, which have been more than doubled in size to house the additional plant. The district which the tramways will serve directly is a considerable one, the population of Erith at the present time being over 30,000, and increasing rapidly; in 1891 its people numbered only 13,400. But a peculiar importance attaches to the system from the fact that it will form an important link in a chain of tramways and light railways which will very shortly, it is expected, extend from London to Gravesend. The London County Council is under an obligation within a year or so to connect its lines at Plumstead with the Erith tramways at Abbey Wood, and from the Bexley tramways a connection will shortly be obtained with Dartford by light railways, the construction of which has been begun.

Parliamentary sanction has been given to a provisional order granted to the Gorton Council authorizing the laying of new tramways in the district. The new system is to be along Reddish Lane, Wellington Street, Gorton Lane, thus connecting Stockport with Reddish, Gorton, Openshaw, and so on across the circular route to Oldham Road and Cheetham Hill. The lines are to be laid and the system worked by the Manchester Corporation Tramways Committee, which is taking a lease on the same terms as the tramways which already run through the Gorton Urban District and connect Denton with the Manchester system.

The Oxford City Council is now busily engaged in considering the question of electric tramways. Experts have been called in to give advice, and Stephen Sellon has sent in a strong report to the Council in favor of the electrification of the existing tramways system. The arguments in favor of electrification are now so well known that it is not necessary to reiterate them here. Mr. Sellon has given an unusually strong plea for electric tramways in the interesting old university city. He recommends the doubling of certain of the tracks in various portions of the town and the adoption of the overhead system, with the exception of a comparatively small portion between the east end of Magdalene Bridge and the west end of Queen Street, and between the north end of St. Giles Street and Folly Bridge, where he recommends the surface-contact system, as it is understood that the Council will not entertain in these localities any scheme involving the erection of posts and overhead wires. Mr. Sellon's estimate amounts to something over £93,000, and he calculates that there ought to be a net profit of over £3,000. On the other hand, W. Worby Beaumont, of London, has submitted a lengthy report in which he advocates the use of petrol motor omnibuses, as he considers that a system which would be permissible in a striving manufacturing town would not necessarily be either acceptable or desirable in Oxford. Mr. Beaumont recommends the installation of sixteen or eighteen motor omnibuses, ten or twelve of them to carry twenty-four passengers and others to carry sixteen passengers. He estimates that the total cost of the cars to put in service would be £14,000, and the expenditure on the track about £6,000, making a total of about £20,000. He also brings forward the argument that these 'buses could be put into service when procured, so that there would be no delay in waiting for the electrification of the tramways.

The new large generating station which the London County Council is building at Greenwich for its tramway electrification schemes is now well on toward completion, though it will not be ready for actual operation until some time next year. Now that the London County Council has decided to proceed immediately with the electrification of the North London system, which has for the past few years been operated by the North Metropolitan Tramways Company by horses, it has now been decided to proceed with the erection of the second portion of the Greenwich station, which will thus be made large enough to furnish current for the whole of the London County Council tramways system, though this portion of the station will probably not be in readiness for another two years. In the meantime the work of the electrification of the portions of the routes over which it has powers is proceeding well, and various extensions are continually being completed and put into operation. The London County Council recently invited tenders for 360 electric cars and equipments for various extensions, and has now placed orders for 150 of these. The car bodies are to be manufactured by Hurst, Nelson & Company, of Motherwell; the trucks by Mountain & Gibson, of Bury, and the equipments by the British Westinghouse Electric & Manufacturing Company.

The work of constructing the Dundee & Broughty Ferry tramway is being pushed forward rapidly by the contractors, J. G. White & Company. The track is being laid with 91 and 97-lb. rail, mounted on concrete. The power station will contain two 200-kw sets of Bellis engines and Bruce Peebles generators.

A portion of the Leith electric tramways has now been formally passed by the Board of Trade and the system was recently opened to the public. The system has been constructed by the Leith Corporation, with James More, of Edinburgh, acting as consulting engineer. The electric system will supersede the old system of horse-drawn cars, but its advent has not as yet solved what is known in Edinburgh as the "Pilrig muddle," as no arrangement has yet been effected between the Leith Corporation and the Edinburgh Tramways Company for interchange of traffic, so that passengers between the two cities have still got to change at Pilrig. So far as the service of the Metropolitan District Railway is concerned, the electrical equipment is now practically complete, with the exception of the trains which are operated by the London & North Western Railway Company about every half hour between its city terminus at Broad Street and the Mansion House station, and the Inner Circle trains, which make the complete circle, both of the Metropolitan District Railway and the Metropolitan Railway. The London & North Western trains, however, will soon be operated by electricity, as a number of electric locomotives have been specially supplied for hauling these trains between Earl's Court and the Mansion House. From Broad Street to Earl's Court these trains will be operated by steam locomotives as in past years, this portion of the railway being all in the open air. At Earl's Court the steam locomotive will be changed for an electric locomotive, as it has been considered that this is a more economical arrangement than providing a complete system of new electric trains, which, in any case, would not be able to get into the Broad Street terminus until a more general electrification scheme has been evolved. The Inner Circle trains, which run on the tracks of both the Metropolitan District and the Metropolitan Railway Company, are not yet in electrical operation, and the little difficulty between the two companies does not yet appear to be settled. It is hoped, however, that before many weeks this will be arranged, after which all of the steam trains will have entirely disappeared from the Underground Railway.

A. C. S.

PARIS LETTER

[*From Our Regular Correspondent.*]

Line 3 of the Paris Metropolitan Railway has been in service for about a year, and it is of interest to note that the receipts of this railway have increased in a greater ratio than the mileage added. The total mileage is now about 20, of which only 5 are due to line No 3. The average daily number of passengers over the Metropolitan lines is about 400,000, but as the present season is vacation time, this figure is now not over 300,000.

As anticipated in the columns, there is about to start in France an active period of construction, due to the establishment of interurban roads in several of the French departments in which water-power is more or less plentiful. The General Councils of the various departments are generally prepared to grant concessions for light railways and to bear some part of the expense. The main condition is a share in the profits when exceeding a certain sum, and the reversion of the track and line material at the end of the concessions, which are granted for periods of 40 to 60 years. Several departments are therefore seeking borrowing powers with this end in view, and among others may be quoted Drôme (borrowing Frs. 1,550,000), Manche (Frs. 13,000,000), Aisne (over Frs. 3,000,000), Vendee (Frs. 800,000), Doubs (Frs. 150,000), Ardennes (Frs. 1,330,000).

The Paris General Omnibus Company is but slowly recovering from the effects occasioned by the opening of the several lines of the Paris Metropolitan Railway. The company has modified to a considerable extent the service of omnibuses, and in some instances the longer lines have been discontinued. The receipts for the first thirty-seven weeks, to Sept. 16, 1905, amount to Frs. 892,-630 less than those for the corresponding period of 1904 (Frs. 31,-088,865), but those for the week ending Sept. 16, 1905, show a slight increase over those of the same week in 1904 (Frs. 2,212). Nothing short of a complete rearrangement of the company's affairs, as proposed by the traffic commission now sitting, will, it appears, ameliorate its present state.

A scheme for a short-tube railway in Madrid is being met with favor by the financiers of that town. The type of railway proposed is a double-track underground line, made mostly on the cut and cover system, and uniting Mediodia station with Place Cebada. An engineer of the name of Sanchiz is the author of the scheme and has finished the design of the line.

NOTES FROM AUSTRIA-HUNGARY

(*From Our Own Correspondent.*)

From the report recently published by the management of the Vienna tramways for the year 1904, the following particulars are taken: The total receipts amounted to Kr. 24,837,777; operating expenses, Kr. 15,374,107, not including Kr. 533,937 expenditure for the well-being of the employees. The working expenses amounted to 32.5 hellers per car-kilometer (10.5 cents per car-mile). The operating ratio was 62.2 per cent, which is somewhat larger than in other European cities. This may be largely accounted for by the very low fares, the small maximum running speed allowed (10 km per hour), the large number of stops and the many grades. In 1904 the length of route was 185.2 km, and the length of track was 354 km, of which 15.6 km (29.8 km of track) was equipped with the conduit system, the rest with overhead wires. There were in operation 955 motor cars and 880 trailers for passengre traffic. The motor cars and trailers accommodated in all 63,912 persons—37,763 seated and 26,149 persons standing. It should be borne in mind, however, that passengers are allowed to stand only on the platforms. The number of employees was 6843. The number of car-kilometers amounted to 48,953,044, that of the passengers carried to 171,903,099. There were 336 persons injured when passing over the track. Of these 117 injuries were slight and thirty-four serious. Ten persons were killed. About double this number of accidents resulting from persons jumping into or out of the cars. There were 3611 collisions of cars with street vehicles.

The Buda-Pest Street Railway Company, Ltd., in the year ending 1904 had about 143.7 km track in electrical operation, of which 33 km were equipped with the conduit system. There were 350 motor cars and 82 trailers; 160 motor cars were equipped with air brakes.

The municipal officials of Ekatterinoslaw, in Southern Prussia, have decided to construct an electric city railway, the contract for which has been awarded to Ganz & Company, of Buda-Pest. The line is double track, 6 km in length, of 1 m gage, and with grades up to 7 per cent. For the present ten motor cars, with thirty-two seats and room for eight passengers standing, have been ordered. These cars will be equipped with two 25-hp motors each.

Ganz & Company are also equipping rather a novel electric railway between Miskolvz and Diósgyör, an important steel manufacturing center. The road will be operated partly by electric cars and partly by steam locomotives. This selection was made because of the wide variations in traffic during the day, caused by the workmen going to and returning from their work. An electrical equipment to cope with those peaks would be idle a greater part of the day. For this reason three steam locomotives are used during the rush hours.

On July 15 last, the narrow-gage railway extending from the Southern Railway station at Innsbruck to Wilten, on the Imperial Royal State Railways, and thence to Berg Isel, was put in operation. The electrical equipment of the line was supplied by A. E. G. Union Company.

THE CHICAGO CITY COMPANY'S PROPOSAL

In the Street Railway Journal of Sept. 30, brief mention was made of the proposal of the Chicago City Railway Company to the City Council for a twenty-five year extension of its franchise with the waiving of all rights by the city under the ninety-nine year act and ordinance. This proposal, as previously stated, carries with it a plan for the rehabilitation of the system and returns to the city on the graded scale plan, and was concurred in by the Union Traction Company. Representing as it does the ultimatum of the companies to the city, it has been deemed advisable to publish the proposal in detail. The proposition follows:

The company will agree to enter into any reasonable arrangement covering the rearrangement of its tracks to perfect a comprehensive loop and through routeing system in the downtown district, and will further agree to carry passengers from any point on the lines of street railway owned, leased or operated by it to any other point on its lines for a single fare. It will also enter into such reasonable arrangement of through routeing of cars or transfers with surface railway companies now operating within the area described as will permit a passenger to ride over both systems for one fare; provided that the City Council will adopt such legislation as will prevent the abuse of the transfer privilege.

Upon the acceptance of a satisfactory grant by this company, it agrees that it will proceed at once to put its roadbed, plant and equipment in first-class modern condition; and will remain the same so as to render first-class service for the full term of the grant. It will subject itself to all general ordinances of the city relating to street railways at any time passed not inconsistent with the terms and conditions contained in the grant made to the company. All work of construction, reconstruction and repair shall be subject to the supervision and approval of the Commissioner of Public Works. All electrical work shall be subject to the supervision and approval of the city electrician.

Rails laid in streets paved with asphalt, granite, brick or creosoted blocks shall be modern improved grooved rails of the type prescribed by the City Council.

Tracks unused or not required shall be removed from the street at the company's expense.

Cars shall be of the best and most approved style, finish and design; and shall conform to the specifications as contained in the committee's report.

Adequate night service will be provided. The company will operate on all its lines a sufficient number of cars to reasonably accommodate passengers. Cars shall be operated singly unless otherwise authorized by the City Council.

The City Council may reserve the right to regulate the running of cars, the laying down of tracks, the transportation of passengers thereon, the kind of rail to be used; and the right to pass and enforce ordinances to protect the public from danger or inconvenience, and to make such regulations as may be needful to secure adequate and sufficient accommodation for passengers, and to insure their comfort and convenience.

Answering that portion of this section which relates to the term of grant, the company will accept a grant for a period of twenty years, and in consideration therefor will agree that all its rights in the streets of the city of Chicago shall terminate at the expiration of such period, and in this connection, answering the additional questions specially propounded by the committee, the company will consent (1) that in any settlement agreement it shall be provided that at a determined period during the life of the agreement the city may purchase the property and rights of this company, and that the method of fixing the price and the time of fixing the same shall be therein provided; and (2) the date for such purchase may be fixed by the city, subject only to the condition that a reasonable time be allowed the company to enable it to comply with the requirements of the agreement.

The company expresses its willingness to enter into an agreement with the city by which all of its licenses, franchises or grants, or permission and authority, from whatever source derived, to use the streets of the city of Chicago, shall expire or be terminable at the same time.

The company will bind itself not to make any transfer, sale, lease or enter into any consolidation which will in any manner affect the right of the city to take over the property of the company at the period agreed upon.

Under proper limitations upon the exercise of the power, the company will agree to make such extensions as the city may require.

The company will agree to abandon the use of the cable and substitute therefor electricity as the motive power for the propulsion of its cars. The company does not recommend the use of underground trolley, but if desired by the city will install a line in State Street, and should it be found practicable the company will bind itself to install underground trolley in such streets in the downtown district as may be agreed upon.

As there is nothing tangible or definite relating to subways upon which the company can make any sort of estimate, and as the city itself has nothing definite in view upon this subject, the company does not think it practicable to make any agreement covering this point.

The company is willing to accept the provision relating to the sweeping and sprinkling of streets.

The company is willing to accord the city the right to make such limited use of its trolley poles as suggested.

The company will agree to fill, grade, pave and keep in repair, and sweep, sprinkle and keep clean, 16 ft. of every street where it has a double track and 8 ft. where it has a single track. It will also keep the portions of the streets used by it free from snow, and in removing the same will comply with the conditions prescribed.

The company will repair the portion of the streets occupied by it whenever it may be reasonably required to do so by the City Council. And whenever the rest of the street not embraced in the company's 8 ft. or 16 ft. shall be newly paved or repaved, the company will, when necessary, repave its portion in the manner to be defined in the grant accepted by the company.

The company will agree to carry free policemen and firemen, while in uniform, and city detectives, upon written request of the general superintendent of police.

The company will agree to make annual reports to the City Council in such forms as will give full information to enable the city to determine as to whether the terms of the grant are fully performed by the company, and such reports may be verified by an examination of the books of the company.

It is assumed that this provision relates to other companies than the Chicago City Railway Company.

The rate of fare shall be 5 cents, with transfers as hereinabove provided for. The compensation to be a percentage of the gross receipts, as follows: Three per cent for each of the first three years, 5 per cent for each of the next two years, 7 per cent for each of the next ten years, and 10 per cent for each year during the remainder of the term. Compensation to be in lieu of all license fees and taxes other than taxes on tangible property.

The company agrees to indemnify and save harmless the city from all damages, judgments, decrees, costs and expenses which the city may incur by reason of the making of a grant to this company.

The company will agree that the grant shall contain a provision to protect the city against the failure of the company to comply in good faith with all of the requirements of such grant.

The proposition of the Chicago City Railway was indorsed by the receivers of the Union Traction Company, who sent to the transportation committee a letter to that effect. They expressed willingness to approve and to recommend to the court for acceptance an ordinance containing similar grants, terms and provisions, so far as applicable to the Union Traction Company system. The letter says:

"The receivers will approve and are prepared to recommend as part of such settlement the acceptance of a provision (which is not contained in the Chicago City Railway Company reply) that the companies using the tunnels under the Chicago River shall, on such terms as may be agreed upon, lower the same to such a depth as is or may be required by act of Congress, and keep the same in good condition and repair. The receivers, however, beg to suggest that the work of lowering the tunnels and of making some arrangement therefor and for adequately caring for the necessities and convenience of the traveling public dependent upon the lines of street railway using the tunnels while this work is going on, cannot wait for the consummation of the proposed ordinance settlement, but will require now to be taken up before and in anticipation and as a part of such complete settlement, and should first be provided for and arranged on such terms as may be just, and in such a way that it may be made a part of such complete settlement.

"The receivers therefore suggest that, with the above assurance of their position, the arranging of the matter of such tunnel lowering and the providing for the travel now using the tunnels while the work is going on be immediately taken up and considered."

DECISION OF ARBITRATORS IN ALBANY WAGE DISPUTE

The board of arbitration appointed to decide the question of wages in dispute between the United Traction Company, of Albany, N. Y., and its employees has rendered its decision, awarding to motormen and conductors wages at the rate of 22 cents per hour. The wages of other employees of the company will be increased proportionately. This refers to pitmen, linemen and others who come within the scope of the agreement between the company and the men.

The rate of wages established by the board of arbitration goes into effect at once, and the men will be entitled to wages at the new rate from the first week of July under the terms of the agreement under which the arbitration was effected. The decision of the arbitrators is final and binding on both the company and the employees for a period of one year.

The men originally requested the company to increase the rate of wages for motormen and conductors from 20 to 25 cents per hour. Subsequently they agreed to accept 22½ cents as a compromise. The company declined to grant the request, offering 21 cents per hour. Suggestion was also made that the men accept a certain percentage of the earnings of the company when the total of wages was less than 25 per cent of the gross earnings. The men declined to accept either proposition, and the company then offered to pay 21 cents or to submit the matter to arbitration. The men agreed to arbitration. A controversy then arose as to the maximum rate at which the arbitrators might fix the wages of motormen and conductors. It was at length agreed that it should not be greater than 22½ cents. The decision places the rate at a figure between that offered by the company and that requested by the men.

The arbitrators were former Judge John T. McDonough, former Judge J. Rider Cady and Lewis E. Carr.

EXTENSION OF SINGLE-PHASE ON THE CINCINNATI & INDIANAPOLIS LINE

The surest indication that the single-phase system is believed by the owners and engineers of Indianapolis & Cincinnati Traction Company to be more satisfactory for that property than a direct-current system is the fact that the company has decided to equip its line from Indianapolis to Shelbyville with the system. This line is at present a direct-current road which has been in operation several years and was recently bought by the Indianapolis & Cincinnati Traction Company. The decision to replace the direct-current system on the Shelbyville line with the single-phase, alternating-current system was reached only after full consideration by the management of the company and upon recommendation of Sargent & Lundy, consulting engineers. Although this change involves the throwing out of considerable direct-current apparatus, the advantages of the single-phase system were considered by the engineers as ample justification for this move. When the Shelbyville division is changed and the extensions now under way have been completed the company will own over one hundred miles of single-phase line.

CARRYING LIVE STOCK ON THE DAYTON, SPRINGFIELD & URBANA RAILWAY

In the Sept. 16 issue an illustrated notice was published regarding the carrying of a horse on one of the combination cars of the Dayton, Springfield & Urbana Railway. It is interesting to learn from Theodore Stebbins, general manager of this railway, that 119 horses were carried within the last month to and from the various fairs held in the company's territory, from which the revenue to the company was nearly $500, and that these horses were carried without accident or delay of any description. The horse owners prefer the electric line because of quicker service, no waiting in freight cars, or bumping around of cars. The steam railroads did not get any of this business to any points that the company could reach by its own or connecting lines. A number of the shipments were delivered to connecting lines for further transport. The company could have handled other stock, had rolling stock been available also for the purpose.

INDIANA ELECTRIC RAILWAY ASSOCIATION MEETING

The Indiana Electric Railway Association will hold the first regular monthly meeting of the fall at the Claypool Hotel, Indianapolis, on Oct. 12, 1905, at 10:30 a. m. E. E. Carpenter of the Indiana Union Traction Company will read a paper on "Claims and the Adjustment of Same."

COLORADO ELECTRIC LIGHT, POWER & RAILWAY ASSOCIATION

The third annual meeting of the Colorado Electric Light, Power & Railway Association, held at Glenwood Springs, Col., Sept. 18 to 20, was well attended, about two-thirds of the members being represented at the convention. An important action taken at the meeting was the adoption of an amendment to the constitution whereby eligibility to membership in the association was extended to residents of Utah, Wyoming, Idaho, Nevada, New Mexico and Arizona. Members from these States will be given full privilege under the active membership clause. Following are the officers of the association elected for the ensuing year:

F. W. Frueauff, Denver, president; William Mayher, of Greely, vice-president; George B. Tripp, Colorado Springs, secretary and treasurer; J. A. Beeler, of Denver, and J. F. Vail, of Pueblo, were elected additional members of the executive committee. The members of the finance committee are: D. F. Harper, of Trinidad; P. R. Stout, of Central City, and H. M. Gilbert, of Pueblo. The membership committee is composed of J. J. Cooper, of Denver; J. E. Blackall, of Denver, and B. K. Sweeney, of Denver. The five members of the advisory committee are William T. Wallace, of Canon City; E. J. Temple, of Boulder; R. L. Goodale, of Colorado Springs; A. M. Ballou, of Denver, and W. J. Barker, of Denver. Paper were presented at the meeting as follows: "Notes on an Up-to-Date Sub-Station," by A. M. Ballou; "A New High Candle-Power Incandescent Lamp," by C. B. Mahaffey; "The Application of Electric Power to Gold Dredging," by J. F. Dostal; "Isolated Plants," by H. L. Wolfenden; "Getting New Business," by R. L. Goodale; "The Mercury Arc Rectifier," by G. N. Robinson. A feature of the convention was the "Question Box," which was a printed programme comprising 66 questions on the subjects of management, boilers and engines, lightning arresters, pole lines, meters and miscellaneous.

THE NEW YORK & PORT CHESTER FRANCHISE

The statement published in the issue of Sept. 23 to the effect that the New York & Port Chester Railroad Company's franchise in New York City had been finally granted, is not technically correct, as the final granting can only be done after the Comptroller lays the franchise before the Board of Estimate and Apportionment, which he will do shortly, after which the board finally and formally acts upon it. The Comptroller, to whom the franchise has been referred, is now in consultation with representatives of the railway company deciding upon the details of the franchise, and as soon as these are agreed upon the franchise will be presented to the Board of Estimate and Apportionment for approval.

OREGON WATER POWER & RAILWAY COMPANY

Orders have been placed in New York by the Oregon Water Power & Railway Company for machinery, costing $150,000, to be installed in the new electric power plant under construction at Cazadero. Transformers, generators and turbine wheels comprise most of the order. They were sold for delivery at Portland by Jan. 1, 1906. It is promised that not later than April 1, 1906, electrical energy to the extent of about 20,000 hp will be supplied from a plant supplied from the Clackamas River. A contract has been entered into between the company and the Portland General Electric Company by which the latter is to receive the benefit of all power not required by the owners of the plant. This power will be delivered to the power lines of the Portland General at the Waverly golf links station, south of Portland, and from there distributed to the city and elsewhere. Two sub-stations are already finished, one at Eagle Creek and the other at Gresham, and a third is in course of erection at the links. The fourth will be built at Oak Grove, on the Oregon City branch. G. I. Brown, chief engineer for the Oregon Water Power & Railway Company, has a force of over 150 men working at Cazadero building the big dam, which will retain water in a reservoir covering 90 acres. It is estimated the enterprise will cost approximately $1,250,000 and require four years' time to complete the entire work, including the permanent dam.

REPORT AGAINST SUBWAY IN CLEVELAND

The Chamber of Commerce committee appointed to investigate the advisability of building a subway system in the downtown section of Cleveland recently made a report in which it stated that it did not see the necessity at this time of subways. It was stated that the Public Square is badly congested only for an hour or two during the day, and that it does not look like a good business proposition for the city to spend several millions of dollars to relieve a condition that exists for so brief a time. It is believed the condition can be relieved if the street railway company institute a system of loops in the downtown section and keep the cars away from the center of the Public Square, which is the point of worst congestion. The Chamber of Commerce may decide to recommend the subway to the city in spite of the adverse report, but this is considered improbable. The committee, however, submitted two reports as to the kind of subway that could be constructed if one is decided upon. One of these suggests that the cars dip underground at distances about half a mile from the Public Square, and the other that the subway section embrace only the Public Square.

Neither Mayor Johnson nor the Cleveland Electric Railway Company is pleased with the recommendations of the Chamber of Commerce relative to the advisability of building subways in the congested district of the city. As previously stated the body recommended that subways were not yet necessary and suggested that surface loops be placed around all four corners of the Public Square, and that all cars traverse these loops instead of running through the Square and across the city as at present. Mayor Johnson believes that the plan would increase the congestion rather than improve it, because of the immense amount of transferring that would be done at the center of the Square, whereas many people now ride clear through. General Manager Stanley, of the company, takes exceptions to the opinion expressed by Chairman Warner, of the Chamber committee, to the effect that the four loops would accommodate 2000 cars an hour. He says that on each loop every car would have to discharge passengers and load again, and that it would be impossible to run more than 3 cars a minute with safety, or 12 cars the four loops, making the total capacity 720 cars an hour. It is hoped that the city may still be induced to take up the subway project.

NEW POWER HOUSE FOR HARRISBURG

The directors of the Pennsylvania Traction Company have selected Mason D. Pratt, of Harrisburg, Pa., as the engineer to make the plans for the new power plant in South Harrisburg and to superintend its erection. Mr. Pratt has had charge of the new car houses which the company is building on North Cameron Street near Herr, which were described in the Street Railway Journal of Sept. 2. Mr. Pratt was formerly chief engineer of the frog, switch and signal department of the Pennsylvania Steel Company. Prior to that he had charge of important civic and railroad work in the West. The new power plant will be erected on the site of the old car houses, erected by the East Harrisburg Passenger Railway Company about twenty years ago, on South Cameron Street, and will adjoin the present plant, according to the statements of officers of the company. The present plant will supply the power until the new one is completed, which will be early in 1906.

LAKE SHORE OBLIGATIONS LIQUIDATED

The daily papers recently published a report to the effect that the Citizen's Savings & Trust Company had made application to the courts to be discharged as receiver for the Lake Shore Electric Railway. It was stated that the trust company had $800,000 of the company's money which would be turned over and that with this money the company expected to make extensive improvements. The facts of the matter are, that at the time of the discharge of Albion E. Lang as receiver, which took place about three years ago, the Citizen's Savings & Trust Company was appointed a disbursing agent to pay off the debts of the company. Recently the trust company reported to the court that it had liquidated all claims to the amount of $968,262.74, and that it had left about $8,000. It asked that it be discharged as agent and that the balance be turned over to the company. As stated, the Lake Shore Electric has been out of a receivers hands for three years. The road is in better physical and financial condition than ever before, and is making splendid gains in earnings.

PERSONAL MENTION

MR. OREN ROOT, JR., general manager of the New York City Railway Company, has returned from a tour of the Continent.

MR. GEORGE E. BENDER, for some time assistant secretary of the Cleveland, Painesville & Eastern Railway Company, has been appointed superintendent of the London Street Railway Company, London, Ont.

MR. WALTER PEARSON has resigned as electrical engineer of the New York City Railway Company to become connected with the Toronto & Niagara Power Company. Mr. Pearson will ashume his new duties Nov. 1.

MR. L. J. PERRY has resigned as superintendent of the Los Angeles & Redondo Railway Company, of Los Angeles, Cal., to accept the position of general manager of the Vallejo, Benicia & Napa Valley Railway Company.

MR. CHARLES GARLAND has recently resigned the position of secretary of the Westinghouse Machine Company to become prominently identified with the Pittsburg Fireproofing Company in the official capacity of vice-president and treasurer.

MR. E. C. FOLSOM, formerly superintendent of transportation of the Ft. Wayne & Wabash Valley Traction Company, has just been appointed general superintendent of the Atlantic City & Suburban Traction Company, with headquarters at Pleasantville, N. J.

MR EDWARD HILBORN, who has for several years served as deputy surveyor-general of Sacramento, Cal., under Surveyor-General Victor H. Woods, has been appointed manager for the Central California Traction Company, which is engaged in some important electric railway work in the vicinity of Sacramento. Mr. Hilborn's headquarters will be at Stockton.

MR. JOHN K. PUNDERFORD, who has been general manager over the local lines of the Consolidated Railway Company at New Haven, has been made general manager of the entire Consolidated system, with offices in New Haven. The Consolidated Company operates the electric lines in Massachusetts and Connecticut owned by the New York, New Haven & Hartford Railroad.

THE ALLIS-CHALMERS COMPANY has made a number of important additions to and changes in its staff. One of these is the advancement to the position of sales manager of Mr. O. A. Stranahan, who joined the Allis-Chalmers Company on Dec. 1, 1904, to become manager of the power department. Mr. Stranahan assumed the duties of his new place on Sept. 1. His headquarters are at Milwaukee.

MR. M. J. KENNEDY has resigned as superintendent of the Flatbush and Greenwood divisions of the Brooklyn Rapid Transit Company. As a result the following appointments have been made: Superintendent E. F. Davis, in charge Southern, Twenty-Third Street and Greenwood divisions. Superintendent William Siebert, in charge Ridgewood, Bergen Street, Bridge Operating Company and East New York divisions. Superintendent George Stone, in charge Canarsie and Flatbush divisions.

MR. WILLIAM BIRCH RANKINE, a director of the International Railway Company and prominent in the development of power at Niagara, died of pneumonia Saturday morning, Sept. 30, at Franconia, N. H., where, accompanied by Mrs. Rankine, he had gone on a vacation. Mr. Rankine was born in Owego, N. Y., Jan. 4, 1858, educated at Herbert and Union Colleges, was admitted to the bar in 1880, and practiced in New York City 10 years. Fifteen years ago he became interested in the development of the power of the Falls of Niagara, and ever since had devoted his energies and ability to that field in connection with the Niagara Falls Power Company and the Canadian Niagara Power Company, of which company he was vice-president.

MR. WILLIAM PESTELL has just resigned from J. G. White & Company to accept the position of general manager and engineer of the Worcester Steel Foundry Company, of Central Exchange Building, Worcester, Mass. This company does a general foundry business and manufactures castings of steel and alloys, but will make a specialty of electric fittings, among which is a new type of rail-bond. This will be a copper bond with soft cast-steel terminals, which can be made in any style which may be desired. These terminals are cast around the copper strands composing the central portion of the bond, and the object of using steel is to make a contact at the rail web of steel against steel, instead of copper against steel at this point. Recent tests of the return circuit on the railway system at Worcester and other places, it is said, show that some of the old style rail-bonds in which steel pins soldered to a copper wire were used, are extremely durable, and it is thought that the same principle in a more modern style would prove very satisfactory. The present bond has been subjected to very careful tests.

MR. J. R. HARRIGAN, general manager of the Columbus, Buckeye Lake & Newark Traction Company, and the Columbus, Newark & Zanesville Railway, has been appointed a member of the executive committee of the Ohio Interurban Railway Association. Mr. Harrigan has long been recognized as one of the ablest and most progressive managers of interurban properties in the Central West. The properties under his charge are among the most prosperous in that district. They are all operated at a low per cent operating expenses to gross receipts, and are paying dividends. Mr. Harrigan's appointment will greatly strengthen the position of the association in that part of the State.


J. R. HARRIGAN

MR. FRANK B. HOSKINS, president of the Eastern Wisconsin Railway & Light Company, of Fond du Lac, Wis., ex-Mayor of that city and a prominent business man, is dead. Mr. Hoskins was born in Chenango County, New York, Aug. 25, 1850, and came with his parents, Mr. and Mrs. D. Everett Hoskins, to Fond du Lac in December of that year. His first commercial experience was as a clerk in the First National Bank. In 1898 he was elected Mayor of Fond du Lac, and was re-elected in 1899. Probably no other citizen had more business interests in the city than Mr. Hoskins. Besides being president of the Eastern Wisconsin Railway & Light Company, he was president of the Harrison Postal Bag Rack Company, with which he had been connected for about 20 years as secretary and president; secretary of the Fond du Lac Canning Company, vice-president of the Fond du Lac Improvement Company, secretary and treasurer of the Citizens' Building Company, a director in the Commercial National Bank, and a stockholder in the Fond du Lac Land Company, and the Nehrbrass Casket Company.

TABLE OF OPERATING STATISTICS

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	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Available for Dividends
AKRON, O. Northern Ohio Tr. & Light Co	1 m., Aug. '05	102,718	50,210	52,508	23,267	29,241
	1 " " '04	95,962	46,696	49,267	22,467	26,800
	8 " " '05	628,245	336,152	292,094	184,136	107,959
	8 " " '04	588,929	322,330	266,599	180,995	85,605
AURORA, ILL. Elgin, Aurora & Southern Tr. Co	1 m., July '05	47,505	22,550	24,955	9,172	15,782
	1 " " '04	46,480	21,472	25,007	9,172	15,835
	12" June '05	454,308	258,573	195,735	111,224	84,511
	12" " '04	456,100	274,797	181,303	110,676	70,627
BINGHAMTON, N. Y. Binghamton Ry. Co.	1 m., Aug. '05	30,767	12,877	17,891	7,035	10,856
	1 " " '04	27,379	12,097	15,283	6,967	8,316
	2 " " '05	62 379	26,479	35,900	14,317	21,583
	2 " " '04	56,499	24,592	31,907	13,975	17,933
BUFFALO, N. Y. International Tr. Co.	1 m., Aug. '05	479,891	224,925	254,965	140,953	114,012
	1 " " '04	434,035	192,405	241,631	140,230	101,401
	8 " " '05	2,986,798	1,578,368	1,408,430	1,098,655	309,775
	8 " " '04	2,739,836	1,643,419	1,096,418	1,053,211	43,207
CHICAGO, ILL. Aurora, Elgin & Chicago Ry. Co	1 m., Aug. '05	71,373	33,117	38,256	------	------
	1 " " '04	53,553	26,129	27,424	------	------
	2 " " '05	146,204	66,046	80,158	------	------
	2 " " '04	112,071	53,260	58,811	------	------
Chicago & Milwaukee Elec. R. R. Co	1 m., Aug. '05	67,838	25,181	42,657	------	------
	1 " " '04	55,087	17,253	37,834	------	------
	8 " " '05	347,074	150 069	197,005	------	------
	8 " " '04	270,565	108,348	162,217	------	------
CLEVELAND, O. Cleveland & Southwestern Traction Co.	1 m., Aug. '05	55,540	29,282	26,258	------	------
	1 " " '04	51,488	27,093	24,395	------	------
	8 " " '05	347,738	206,478	141,261	------	------
	8 " " '04	306,783	198,231	108,552	------	------
Lake Shore Elec. Ry. Co.	1 m., July '05	87,649	*40,786	46,863	20,404	26,459
	1 " " '04	74,089	*38,497	35,592	20,404	15,188
	7 " " '05	414,278	*238,918	175 860	142,829	32,531
	7 " " '04	345,091	*257,187	87,904	142,795	†54,891
DETROIT, MICH. Detroit United Ry.	1 m., Aug. '05	511,942	*281,865	230,077	92,395	137,682
	1 " " '04	451,381	*247,651	203,730	90,005	113,725
	8 " " '05	3,365,011	*2001572	1,363 439	736,211	627,228
	8 " " '04	2,992,972	*1840119	1,152,853	713,267	439,586
DULUTH, MINN. Duluth St. Ry. Co	1 m., Aug. '05	63,497	28,791	34,706	17,468	17,238
	1 " " '04	57,413	27,228	30,185	16,538	13,647
	8 " " '05	432,700	226,293	206,407	135,408	70,999
	8 " " '04	410,935	222,822	188,113	131,961	56,152
FINDLAY, O. Toledo, Bowling Green & Southern Tr. Co.	1 m., Aug. '05	28,693	14,518	14,175	5,879	8,296
	2 " " '05	55,785	28,720	27,065	11,758	15,307
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co	1 m., July '05	93,855	59,322	34,533	------	------
	1 " " '04	88,804	53,654	35,150	------	------
	7 " " '05	520,014	326,825	193,189	------	------
	7 " " '04	459,781	304,594	155,187	------	------
FORT WORTH, TEX. Northern Texas Traction Co	1 m., Aug. '05	59,244	35,724	23,520	11,188	12,332
	1 " " 04	48,626	26,128	22,498	10,100	12,398
	8 " " '05	421,698	239,012	182,686	88,023	94,663
	8 " " '04	359,840	201,652	158,188	80,855	77,333
HANCOCK, MICH. Houghton County St. Ry. Co	1 m., July '05	21,391	13,083	8,308	3,732	4,576
	1 " " '04	20,600	10,415	10,186	3,432	6,754
	12" " '05	166,349	164,196	2,153	41,985	†39,833
	12" " '04	192,166	131,837	60,329	37,813	22,517
HOUSTON, TEX. Houston Electric Co.	1 m., July '05	47,903	26,823	21,080	8,783	12,297
	1 " " '04	18,344	43,281	†24,936	8,185	†33,121
	12" " '05	459,130	286,495	172,636	102,055	70,580
	12" " '04	355,330	322,199	33,131	93,015	†59,884
MILWAUKEE, WIS. Milwaukee El. Ry. & Lt. Co.	1 m., Aug. '05	277,813	124,960	152,853	79,677	73,176
	1 " " '04	272,844	129,258	143,586	77,580	66,006
	8 " " '05	2,106,708	1,034,355	1,072,353	609,003	463,350
	8 " " '04	2,094,579	1,064,618	1,029,961	598,791	431,170
Milwaukee Lt., Ht. & Tr. Co	1 m., Aug. '05	69,724	24,265	45,459	23,636	21,823
	1 " " '04	50,336	19,511	30,826	18,517	12,309
	8 " " '05	397,207	170,746	226,461	165,409	61,052
	8 " " '04	300,120	147,318	152,803	131,693	21,109
MINNEAPOLIS, MINN. Twin City R. T. Co	1 m., July '05	435,105	187,053	248,052	103,208	144,844
	1 " " '04	385,769	179,680	206,090	92,425	113,665
	7 " " '05	2,606,575	1,226,580	1,379,995	690,592	689,403
	7 " " '04	2,445,031	1,165,553	1,279,477	632,866	646,611
MONTREAL, QUE. Montreal St. Ry. Co.	1 m., Aug. '05	262,009	136,199	125,810	35,469	90,341
	1 " " '04	236,245	122,991	113,254	30,255	82,999
	11" " '05	2,443,829	1,531,038	912,790	267,389	645,401
	11" " '04	2,224,858	1,404,204	820,654	231,263	589,391
OAKLAND, CAL. Oakland Traction Consolidated	1 m., Aug. '05	125,761	62,225	63,536	33 360	30,176
	1 " " '04	106,653	56,035	50,618	26,525	24,092
	8 " " '05	929,921	480,916	449,005	255,345	193,660
	8 " " '04	814,358	423,490	390,868	212,443	178,424
PEEKSKILL, N. Y. Peekskill Lighting & R R. Co	1 m., July '05	12,334	*5,883	6,451	------	------
	1 " " '04	10,808	*5,736	5,071	------	------
	12" June '05	119,165	*68,568	50,598	------	------
	12" " '04	110,740	*66,311	44,429	------	------
PHILADELPHIA, PA. American Rys. Co.	1 m., Aug. '05	159,775	------	------	------	------
	1 " " '04	140,257	------	------	------	------
	2 " " '05	322,219	------	------	------	------
	2 " " '04	287,277	------	------	------	------
ROCHESTER, N. Y. Rochester Ry. Co.	1 m., Aug. '05	169,315	85,700	83,615	28 529	55,086
	1 " " '04	137,775	70,128	67,647	27,921	39,726
	8 " " '05	1,163,721	619,174	544,548	220,651	323,897
	8 " " '04	987,825	543,604	444 221	212,850	231,370
SAN FRANCISCO, CAL. United Railroads of San Francisco	1 m., July '05	576,863	------	------	------	------
	1 " " '04	535,186	------	------	------	------
	7 " " '05	3,963,358	------	------	------	------
	7 " " '04	3,742,118	------	------	------	------
SAVANNAH, GA. Savannah Electric Co.	1 m., July '05	56,411	30,037	26,374	10,554	15,820
	1 " " '04	51,464	25,741	25,722	10,691	15,032
	12" " '05	570,911	330,687	240,224	126,934	113,291
	12" " '04	535 167	303,631	231,535	124,809	106,727
SEATTLE, WASH. Seattle Electric Co.	1 m., July '05	225,218	132,711	92,507	24,801	67,706
	1 " " '04	197,392	127,019	70,373	25,291	45,082
	12" " '05	2,423,152	1,643,746	779,406	301,190	478,216
	12" " '04	2 242,341	1,560,853	681,489	275,938	405,550
SYRACUSE, N. Y. Syracuse Rapid Transit Ry. Co.	1 m., Aug. '05	79,932	44,683	35,248	20,351	14,897
	1 " " '04	71,328	40,192	31,136	20,131	11,005
	2 " " '05	162,481	88,728	73,753	40,772	32,981
	2 " " '04	146,625	81,075	65,550	40,453	25,097
TERRE HAUTE, IND. Terre Haute Tr. & Lt. Co	1 m., July '05	55,991	35,051	20,941	10,747	10,194
	1 " " '04	54,213	30,958	23,255	9,624	13,631
	12" " '05	598,224	391,125	207,099	115,811	91,288
	12" " 04	538,462	358,240	180,222	108,422	71,799
TOLEDO, O. Toledo Rys. & Lt. Co.	1 m., Aug. '05	176,350	*87,958	88,392	42,635	45,757
	1 " " '04	155,367	*77,958	77,409	41,899	35,510
	8 " " '05	1,244,139	*636,568	607,571	339,557	268,014
	8 " " '04	1,139,603	*612,743	526,860	333,435	193,425
YOUNGSTOWN, O. Youngstown-Sharon Ry. & Lt. Co	1 m., July '05	47,353	*23,786	23,567	------	------
	1 " " '04	40,020	*22,905	17,115	------	------
	7 " " '05	304,779	*166,846	137,933	------	------
	7 " " '04	264,288	*159,663	104,625	------	------

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NOTICE TO SUBSCRIBERS

REMITTANCES.—Remittances should be made by check, New York draft, or money order, in favor of the Street Railway Journal.

Change of Address.—The old address should be given, as well as the new, and notice should be received a week in advance of the desired change.

NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

Of this issue of the Street Railway Journal 8000 copies are printed. Total circulation for 1905 to date, 335,950 copies, an average of 8194 copies per week.

Lunch Rooms on Interurban Lines

While some of the more important interurban lines are putting on limited buffet and dining cars on which the traveling public can obtain something to eat while on a journey, the great majority of such roads are not situated so that they can adopt these refinements, and it is in order for every road operating over long routes and making connections at small towns with other companies to look well after the restaurant facilities, especially at terminal points. The lunch problem, wherever continuous trips of several hours are to be made, is in about as unsatisfactory a stage of development on interurban roads as it was on steam railroads twenty-five years ago. There are not a few routes in the country requiring a ride of two and a half to three hours continuously where a passenger must go hungry if he should be so unfortunate as to plan his trip so as to cover a meal time. To be sure, the passengers on many local trains on steam railroads are not better provided for, but two wrongs do not make one right. The passenger department of a company should make it a part of its business to see that proper provisions are made for passengers who are making continuous trips. It is bad enough for passengers to have to change cars when making through trips when changing from the lines of one company to another without, in addition, having to suffer the discomfort of being obliged to wait for a connection at some point about mid-day with no chance of getting anything to eat. It is not to be expected that regular, first-class restaurants can be maintained at all points where a passenger might possibly be stranded, but present conditions can be vastly improved in many cases by a little attention to the matter on the part of the railway company.

One feature of English steam railroad practice, which for some reason has never been started this side of the Atlantic, as far as we know, is the basket lunch which travelers can purchase at various points along the lines at very reasonable figures. This might be the solution of the problem on a number of long interurban runs where a buffet car could hardly be maintained at a profit.

Brake-Shoe Pressures

The brake-shoe that is most desirable for electric railway service is commonly considered to be the one with the longest life, irrespective of its other qualifications, and in this probably the common opinion is right. There is considerable difference in the amount of brake-shoe pressure required to produce a given retarding effect with different brake-shoes, the general rule being that the harder shoes have a lower coefficient of friction, and thus require more pressure than the soft shoes. The soft shoe, on the other hand, wears faster. On electric roads where the maximum brake-shoe pressure is not fixed by the train-line pressure, as it is with the automatic air brake used on steam roads, the question of whether it takes a little more or a little less brake-shoe pressure to produce a given result is not of great importance. On electric cars equipped with straight air brakes there is usually more than enough pressure in the storage reservoir to put the brakes on hard enough to skid all the wheels. The only influence that the coefficient friction of the brake-shoes has on the cost of operation (leaving wear out of account) in such a case is the cost of pumping the air required to supply a little extra brake-shoe pressure, but this cost is so small as to be negligible. It is therefore, with air brakes, plainly a case of selecting the shoe which will wear the longest. Where cars are equipped with hand brakes, of course every pound of additional pressure required to brake a car either adds to the pull which the motorman must exert on the brake handle or adds to the time required to apply the brakes. In such a case, however, it is a question whether the difference between the pressure required with different brake-shoes will be enough to make much difference in operation. On elevated roads where cars are operated in trains and equipped with automatic air brakes, it is, of course, desirable to have a uniform kind of brake-shoe throughout the whole train, unless the brake leverages on each individual car are adjusted to compensate for any important differences there may be in the retarding power of the different brake-shoes, and the latter is impracticable.

One other question which has been considered sometimes is the wear on steel-tired wheel with hard brake-shoes. We have in mind one interurban road which was having excessive brake-shoe wear and was using a soft brake-shoe because it was feared that a hard shoe would wear the steel tire too rapidly. An experiment was tried of putting a pair of wheels in a lathe, setting the brake-shoes against them as on a car, and running the wheels until an appreciable weight of metal had been worn off the shoe and wheel. The estimated value of the metal on the wheel, including the labor of turning down and replacing, was balanced against the cost of metal in the brake-shoe, including labor of renewals. It was found in this particular case that the brake-shoes could be much harder and throw considerably more of wear on the steel tires without bringing the balance on the wrong side of the account. It is quite likely that the same thing would hold true on other roads. If it is true with steel-tired wheels it certainly would be much more true with chilled cast-iron wheels. The hardest shoe is not necessarily the most desirable, but it is tolerably certain that hardness is desirable if it is not carried to the point of causing early breakages and shortening the life of the shoe.

The Pit and Motor Question Again

As we have noted from time to time in the past three or four years, certain companies operating double-truck cars have been moving in the direction of abandoning pit work in their repair shops as far as possible and working on motors from above after having removed the trucks from under the car body. This movement has been based on the sound theory that work done by a man in the pit is not likely to be as well or as rapidly done as if it were performed in the open on a shop floor. A certain amount of pit work is unavoidable, however, and the question of how much work shall be done in the pit and what kind of motor shall be adopted gives a chance for much profitable discussion. Street railway motors can be classified under five heads: (1) Those opening from below and arranged to lift out of the truck; (2) those opening from above and arranged to lift out of the truck; (3) those opening from above and arranged to lower out of the truck; (4) the box type of motor, which cannot be opened at all while it is in the truck, and is arranged to lift out; (5) motors which can be opened from either above or below, and arranged to lower into the pit. The latter type is now rarely found, although it was once common. The discussion, therefore, is confined to the first four types.

The first type, which is arranged to lift out of the trucks, but on which the lower half of the casing opens down into the pit, is the most common type among street railway motors at present. With this type a motor can be opened when standing over any pit, and thus ordinary inspection of the inside of the motor case can be made, and, if necessary, armatures and fields can be removed without taking the motor out of the truck. If the motor is to be taken out of the truck, the truck must be taken out from under the car so that the motor can be hoisted out of the truck, since it cannot be gotten out from below.

The second type of motor, which opens from above and lifts out of the truck, has been developed within the last three years to meet the demands of those who wish to do all work on motors from above and do away with pit work. With such motors it is manifestly necessary to run the trucks out from under the car before the motor casing can be opened up for inspection. Those who favor this class of motor believe that enough better work will be done inspecting a motor on an open floor rather than in a pit, so that it is worth while to hoist a car body and run the trucks out from under the car whenever a motor casing must be opened. It is manifestly impossible to remove armatures or fields from such motors in the ordinary car house unless provisions are made for hoisting car bodies and then hoisting armatures out of the motor casing. Such hoisting apparatus, however, need not be very expensive, and, in fact, we doubt whether it would differ materially in cost from the pit jacks and armature hoists needed to remove armatures from motors via the pit. It would appear to be mainly a question of whether the advantages of good and rapid work which could be obtained by taking a motor out from under a truck were sufficient to counterbalance the time required to get the truck out from under the car. With the motor opening into the pit, it is simply a question of swinging down the lower half of the casing to open it up, either for inspection or renewal of armatures and fields. With motors which open from above, there must be added to the time required to open up the motor, the time required to hoist the car body, disconnect the motor leads and brake rigging and run the truck out from under the car. The question then is, can the men work faster and do enough better work when once the truck is out from under the car to make up for this loss of time? Right here is where master mechanics differ. We should very much like to see comparative figures on the time required for these different operations from car houses well equipped for both methods of handling.

The third type of motor, which lowers out of the truck into the pit, is also worth considering in this connection. It is especially well adapted for single-truck cars, as the motors can be removed without taking the trucks from under the car body, which is a more troublesome operation with single-truck cars than with double-truck. With such motors, the logical thing is to do all work from the pit, never taking the trucks out from under the car bodies except on rare occasions. By removing motors through the pit and by renewing wheels with the aid of a sectioned pit track, the necessity for hoisting car bodies is almost done away with. To handle motors and wheels rapidly by this method, good pit jacks are essential and the facilities for handling material in the pits must be good. With the third type of motor the whole motor must be lowered before the armature can be taken out, as the motor casing opens from above—that is, unless the old-fashioned method of hoisting out armatures through the car body is employed; but this latter is hardly considered good practice at the present day, not only on account of the liability of damage to the inside of the car, but because of its slowness. When a motor has been lowered into the pit it must be run out to some part of the pit over which is located a hoist for getting out the armature. In fact, whatever plan is used, there must be something to hoist the armature, in one case, out of the pit, and in the other case, out of the motor. If the trucks must be taken out from under the car bodies whenever work is to be done, a car-hoisting apparatus must be provided. If they are not to be taken out from under the car bodies, a pit-hoisting apparatus for motors must be provided.

The fourth, or box type of motor, is used mainly in heavy work, and was designed as a result of an attempt to get as much motor capacity as possible into a given truck space. With this motor it is necessary to have hoisting apparatus which can promptly lift a motor out of a truck, after which it can either be set on end and the armature hoisted out by means of a hook on the pinion, or the armature can be placed on centers and the motor casing slid off from it with a special apparatus. With this type of motor there is no question as to what must be done, as pit work on the motor is impossible except as regards daily inspections and measurements of clearance. With city companies the choice usually must be made between the first three types of motor, and must depend somewhat upon the facilities which the company has for handling and hoisting motors and car bodies, unless it is decided that a change is worth while.

If the second type of motor, which opens from above, is adopted either all repairs must be done at a general repair shop where there are facilities for hoisting car bodies, motors and armatures, or facilities for hoisting car bodies and armatures must be provided at each car house in sufficient numbers so that armatures and fields can be renewed at the car houses. If the first type of motor, which opens from below, is adopted, facilities for hoisting car bodies need be provided only at the general overhauling shop, as small repairs and renewals of armatures can be made in any car house pit with the aid of a pit hoist and a hoist for getting the armatures out of the pit. It is maintained by those who favor the first type of motor that there are times when, on account of unusual weather conditions, a large number of armatures and fields must be renewed about the same time, and that this can better be done at any car house with the aid of a pit hoist than by taking the truck from under the car, because the latter involves loss of time in hoisting car bodies or getting the car bodies into a place where they can be hoisted. On a large system it is too much of an expense to run cars through a general repair shop for all small repairs, and it may be that the cost of equipping all car houses with hoisting apparatus for rapidly taking the trucks out from under cars would exceed the cost of equipping with pit-hoisting apparatus to do the same work. First cost is secondary, however. This is a matter about which it will not do to theorize until figures are at hand on the time required to do work by these two methods and on the cost of equipment. We should much like to see this matter taken up at some of the future master mechanics' conventions.

Concerning Feeders

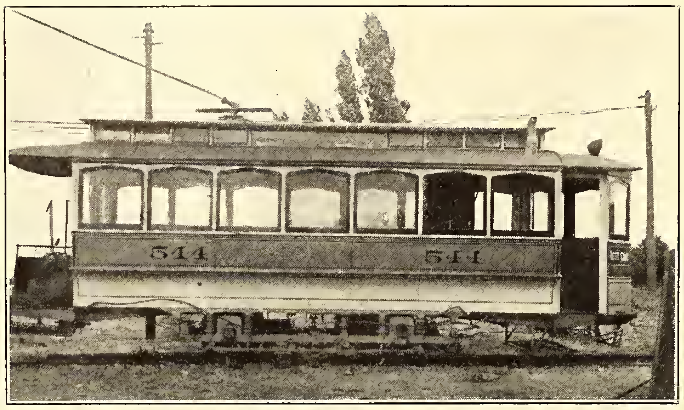
We are not disposed to cast any aspersions on that hard-worked class, the electricians of tramway systems, but, as a matter of interest, we would really like to know: *A.* How many superintendents of electric roads can tell offhand what percentage of their total energy is lost in transit? *B.* How many can get a prompt and accurate reply by asking the head of the electrical department? *C.* How many of the latter have really full data on the subject, from which they could compile a reply within a week? Now, everybody knows that the electrical department of a busy road is up against troubles of its own quite apart from such searching, not to say impertinent inquiries, but, nevertheless, it is somebody's business to know how much of the power generated is being lost, else it will be impossible to say when additional feeders should be installed, or the general system overhauled. The good old way was to wait until the motormen began to kick about not getting "juice" enough, and then put up something or other. There have been great improvements of late years, and some roads show very skillful handling of the feeder problem, but as a rule even now the losses are guessed at rather than known, and are very much larger than they are supposed to be. If the actual facts as to the energy lost in direct-current lighting from central stations were known, it would stagger the average engineer, and electric railway stations are often in little better case.

It is no joke to transmit energy 3 or 4 or 5 miles at 500 volts or 600 volts, and when it comes to long runs across country the case is much worse. In systems using polyphase transmission to rotaries, there is certainly no tendency toward crowding sub-stations too close together, and the result is that one finds heavy losses in the distributing system superimposed and large average loss in transmission lines and rotaries. Not a few roads have rushed into the transmission work very hastily, and are now repenting at their leisure, and wondering why the total amount of power required to run the road increases so much faster than the receipts, while they are using the "most modern and approved" method. When one puts on fine, long interurban cars with four-motor equipments in place of the worn-out veterans, something must be done to the feeders, or there will be lamentations at the power house. Extra load has a particularly gentle and insinuating way of increasing by imperceptible degrees until a system once entirely adequate has become abominably overloaded. Of course, there are cases in which overload could not easily be foreseen. Still, there is many a road that is chronically on the limit of both its feeder and generator capacity, and knows it year by year. This is true even of some of the largest and best managed systems in the country, with shrewd foresight in nearly every other particular.

Now, in dollars and cents, it is just as bad to lose money from an inefficient feeding system as it is to lose it at the hands of dishonest employees. Yet the same road that has an elaborate bookkeeping and inspecting system to keep its conductors from knocking down fares and selling transfers, may be losing thousands of dollars a year in wasted energy along its circuit and never know it. If one put "spotters" on the energy losses instead of on the employees, he would often make money. It is, of course, pretty serious business to find out the losses on an extensive system, when no information is initially available; but if the work is undertaken in a perfectly systematic manner and kept up, a very complete control of the whole matter can be maintained at relatively small cost. It is merely a matter of the intelligent use of recording instruments from time to time at various points upon the system. Casual voltage measurements are of comparatively little use save when the system is really in desperate case, but continuous readings give very complete information and enable losses of maximum and average load to be very quickly determined. The amount of labor involved is comparatively small, and even if it were large would often be worth the while. It is easy enough to lose 50 kw or 100 kw for a good many hours per day without the fact being obtrusive, and that is annually equivalent to losing the fares of many thousand passengers in its effects on the net earnings. A railway feeding system, on account of variable load, can rarely be kept up to the fine point of economy that can be reached on uniform load, but it can, nevertheless, be prevented from becoming the seat of severe and unnecessary loss.

NEW OPERATING FEATURES IN CLEVELAND

E. J. Cook, chief engineer of the Cleveland Electric Railway Company, has been for some time past paying particular attention to the matter of bonding and return circuits. Formerly, as on the majority of large systems, this work came under the supervision of the engineer of maintenance of way, and while



TEST CAR USED ON THE CLEVELAND ELECTRIC RAILWAY

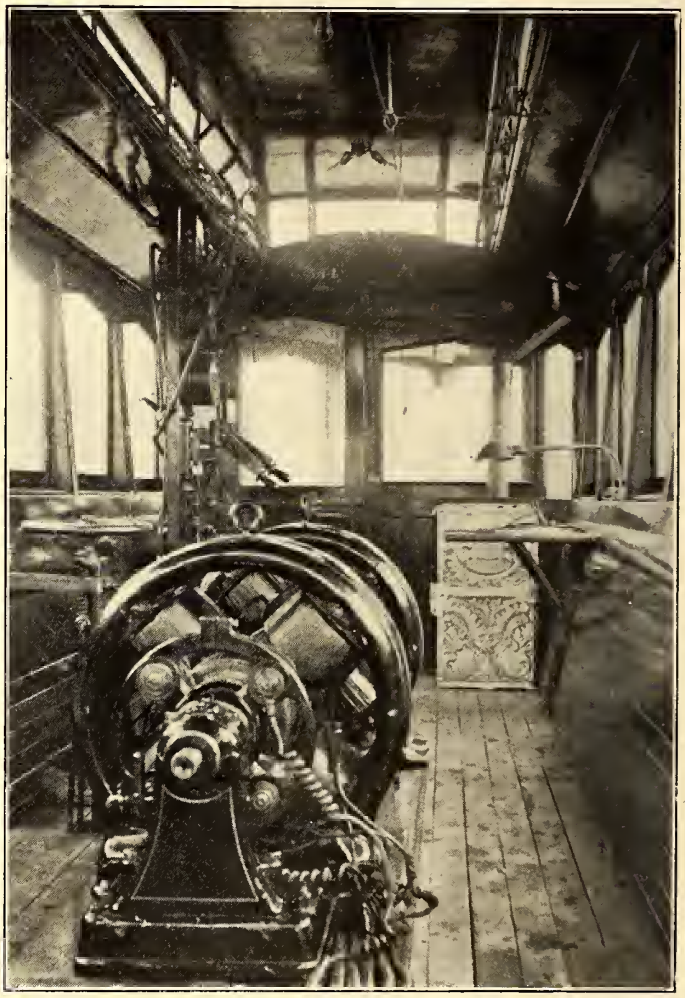
the electrical engineer was responsible for the maintenance of proper power conditions, he had no supervision over this important portion of the distribution system. It is a work which is apt to be neglected by inferior or ignorant workmen, because deficiencies are covered up and are not readily discovered. It is an easy matter to leave out a bond here and there, to twist a bond around a bolt instead of making the proper

STONE CRUSHER

connection, and it is common practice in many cities to ground to a handy water pipe instead of putting in the necessary amount of labor required to do a first-class job. So Mr. Cook organized a department known as the return circuit department. It comes directly under the supervision of the electrical engineer and has no connection with the track department. It has charge of all electrical work below the overhead, including the maintenance of electric switches, signal outfits and telephone returns, in addition to the bonding and return circuits. All work affecting these branches must either be done or passed upon by members of this force.

An important adjunct to this department was the equipping of a test car. He used an old single-truck car equipped with one motor for propulsion. It was provided with a 7½-kw motor-generator set, formerly used in a battery sub-station. The generator has an output of 12 volts and 600 amps., and by forcing current between any two given points, the difference of potential is accurately determined. There is a small switchboard for operating the two machines, and a desk provided with switches, millivoltmeters and other instruments. On either side of the car between the wheels is a pair of copper brushes on arms for contact to the rails. Inside the car is a wheel-raising device for operating either or both of the sets of brushes. The instruments on the table may be connected to either or both of these brushes, so that it is possible to read both sides at once where broken joints are used. One axle on the car is thoroughly insulated to reduce as much as possible the resistance on the car. There are terminal plugs at the sides of the car, so that leads may be brought out where tests other than bond tests are to be made.

Besides serving as a test car, the outfit is in use much of the time in another direction, so that on the whole it is a very



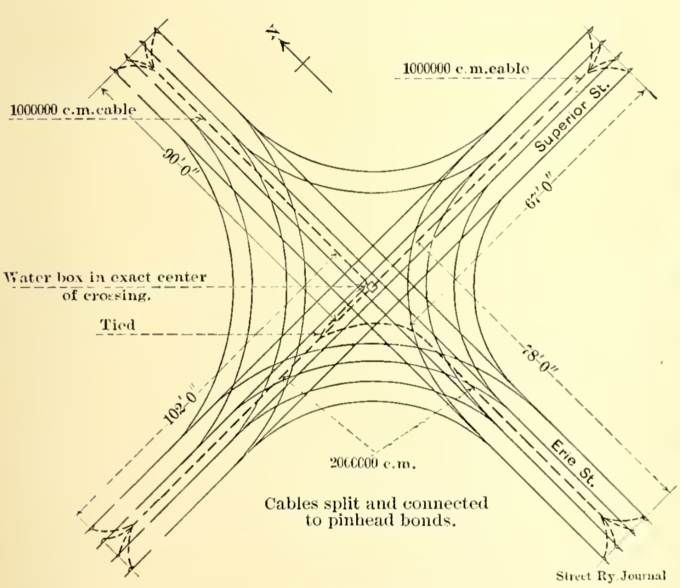
INTERIOR OF CLEVELAND TEST CAR

valuable outfit. The company has five storage-battery sub-stations for taking care of peak loads in various parts of the city. Whenever any of the cells in these batteries becomes "sick" or falls below the average, the test car is sent to doctor it up. Each station has a side-track, and the car is run along side and a lead is carried to the terminal of the disabled cell. Each battery station attendant is versed in the operation of the car, so that a constant attendant is not necessary for this work.

Every foot of track in Cleveland has been gone over during the past few months and the return circuit system has been brought up to a very high state of efficiency, and it will be maintained in this manner. This will be simplified through the fact that an immense amount of electric welding of joints is being done; in all there are about 25,000 of such joints (60-ft. rail). About 12,000 joints were put in last fall by the Lorain Steel Company, and incidentally it is interesting to note that only forty or fifty of these have thus far broken open. About 3000 thermit welds are also in use, and these are giving good satisfaction. As an experiment, the company is also putting on several hundred U-shaped copper bonds, soldered to the side of the rail, the work being done by the Electric Railway Improvement Company, of Cleveland. The standard bond, however, is a 12-in. No. 0000 copper bond with compressed head, this being used on all 9-in. girder and 80-lb. T-rails. All old feeders

HANDLING CRUSHED STONE WITH A CRANE

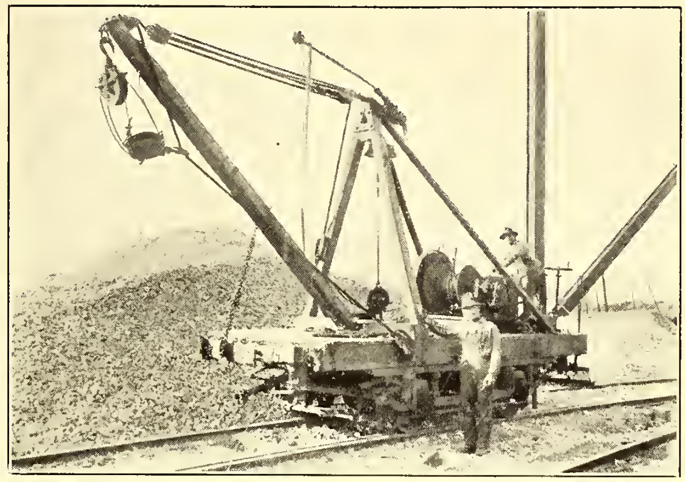
under 1,000,000 circ. mils have been taken down and used in bonding. Particular care has been taken at all curves, railroad crossings and bridges and near power stations to lay more than sufficient carrying capacity to take care of future requirements, and special attention has been paid to cross-bonding. A diagram is made of every piece of special bonding installed, and prints are bound in a loose leaf ledger. Reports of all changes are made daily to the head of the department and corrections



METHOD OF BONDING CROSSING AT SUPERIOR AND ERIE STREETS, CLEVELAND

are made so that the record shows the exact condition of every detail of the ground return. The size of feeder is indicated in each report, while the variety of connection is shown by a common code; a square block representing a welded joint, a round block one variety of mechanical connection, a half circle another, etc.

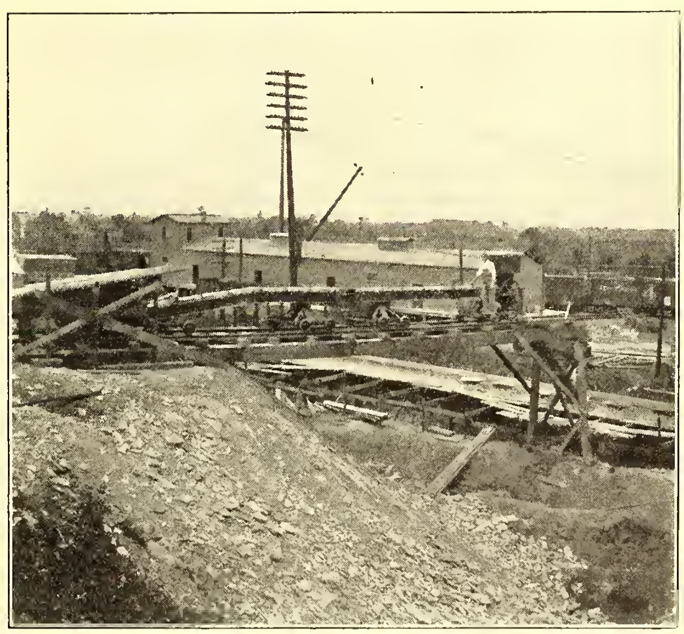
The effect of this work is not only noticeable through better power conditions and reduced station output, but it has greatly reduced the number of complaints and damage claims for electrolysis. Mr. Cook is now satisfied that a large proportion of so-called electrolysis trouble is due to careless work and ignorance on the part of employees of light and gas companies, waterworks employees, telephone employees and city authorities, and he has discovered a large number of cases proving this. On the city viaducts, water and gas pipes have been strung on the structural work of the bridge instead of on the stone piers designed for them. Circuits from motors on the bridges were found grounded to pipes. Lighting circuits to



DERRICK CAR

parks were found similarly grounded. A ground was found leading from a telephone conduit to a track rail, and it was proven that it was the work of a telephone employee. Yet in practically all cases where trouble has resulted from such carelessness the blame is laid upon the railway company.

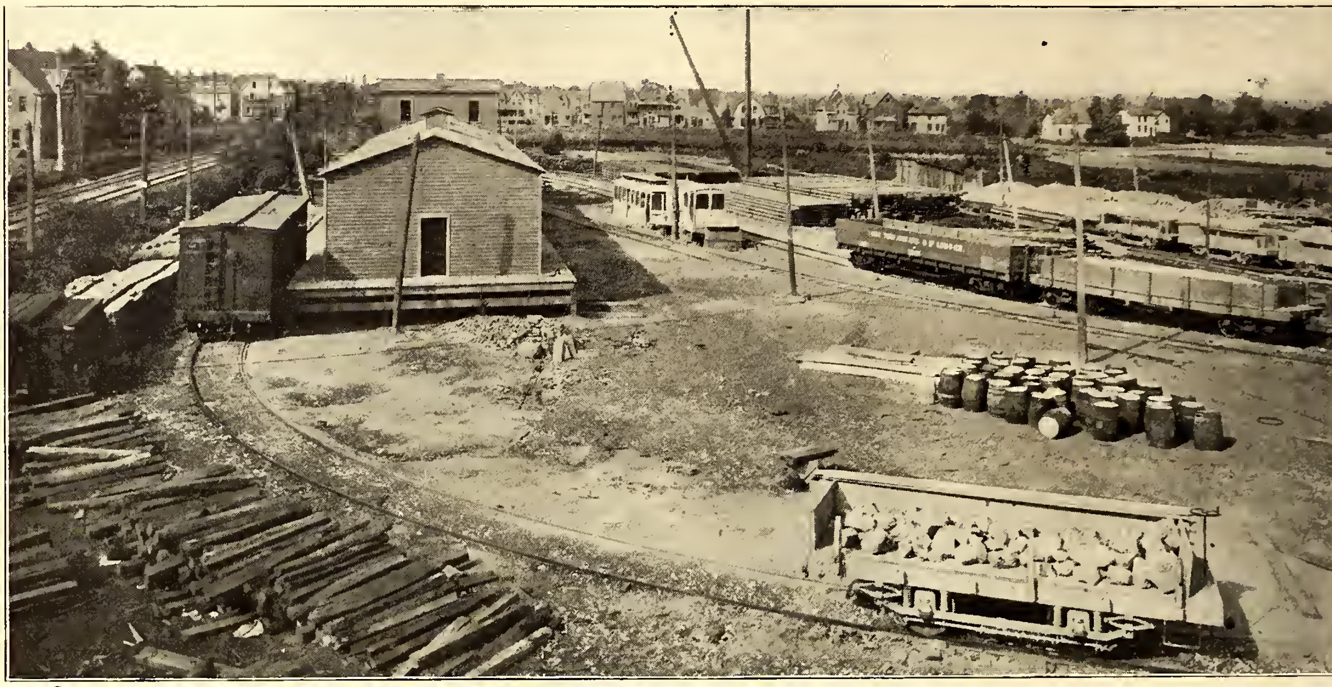
Mr. Cook believes that much current leaves the rails on ac-



CONCRETE CONVEYOR

count of the great amount of exposed surface on the rail. Some months ago, when some new rail was being laid in the market house district, which is quite damp, he tried the experiment of painting the webs and bases of the rails. One long section was covered with two heavy coats of asphalt paint, and on another section heavy black plastic insulating paint was used. Of course, this paint is bound to rust off in time, but at present there appears to be about 50 per cent less loss in these rails than in unpainted rails.

The company is laying some new rail on the Doan Street line, using a new metal tie recently brought out by the Carnegie Steel Company. The tie is substantially a 6-in. I-beam with 5-in. top and 7-in. base. The rail is held in place by steel clips on either side, which are held by ¾-in. bolts. The punching is accurate, so there is no possibility of variation in gage. Broken stone ballast covers the lower flange, which it is claimed will hold the track in perfect alignment. The rail is insulated from the tie by a fibre bushing under the clips. The tie weighs 167 lbs., and costs $2.50 each. Including labor for installing, it costs $6,120 per mile, and it is claimed the life is thirty years, at the end of which time they should be worth $900 per mile for scrap. The manufacturer claims that wood tie renewals for a period of thirty years would cost at least $13,000 per mile. The illustration of a section of this track herewith also shows clearly the Lorain Steel Company's method of welding joints by the bars.

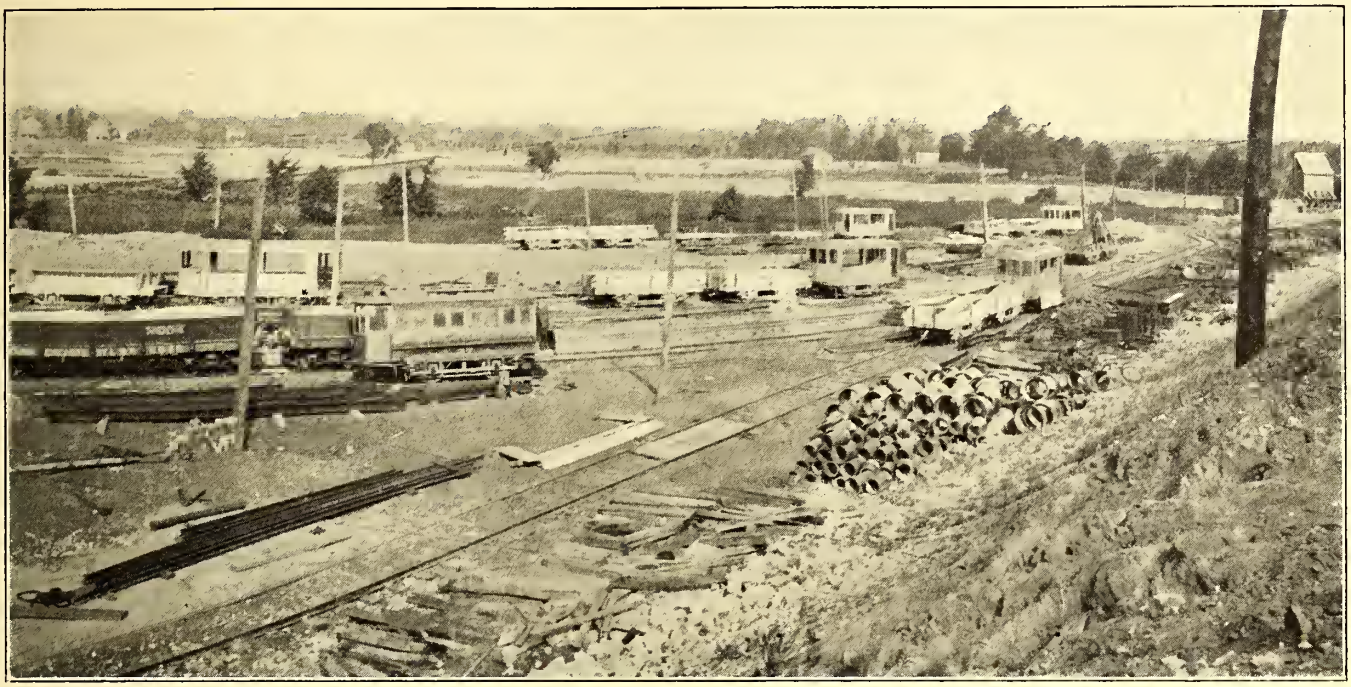


STOCK YARDS OF THE CLEVELAND ELECTRIC RAILWAY

HOLDING THE RETAINING WALL

NEW TRACK CONSTRUCTION WITH STEEL TIES

The Cleveland Electric Railway has a very complete yard for handling and storing material. Formerly this work was scattered all over town. Some time ago the company bought a number of acres of property adjoining its Windermere car house and battery station on its Euclid Avenue line at the point where the Collinwood line branches off on to private right of way. The Nickel Plate Railway (steam) extends along the south side of the yard and the Collinwood line faces it on the east, the grades of the two lines being separated by an overhead. This gives the yard track connection with the steam road in one corner and with its own line in the opposite corner. The accompanying illustrations show the layout in a very complete manner. There is ample space for storing large quantities of material of all kinds. There is a large revolving crane covering a considerable portion of the yard, and this is provided with hooks for handling rails and other heavy material, and it also may be fitted with a clamshell bucket for handling broken stone and other similar material. This is operated by motor and windlass in the small house shown. At one end of the yard is a large motor-operated stone crusher, illustrated. All track is now being laid with crushed stone, and the company buys and breaks up worn out paving stone for this purpose. There is a large warehouse in the yard, with platform surrounding it, and equipped with a crane for unloading heavy material. A track scale adjoins the building. The company makes a practice of keeping large stocks of material on hand all the time, the average receipts of late being 400 cars a month. Cars are handled about the yard by a flat-car locomotive fitted with four 50-hp motors. Much transferring of material about the yard is being done by the motor-operated derrick car, illustrated. This is also used on construction work about the city, and it has been used to advantage on wrecks. A home-made concrete mixer is illustrated in another view.



STOCK YARDS OF THE CLEVELAND ELECTRIC RAILWAY

Recently the company built a concrete retaining wall along the railroad tracks adjoining its Windermere car house, and as the surrounding property where material could be unloaded was considerably higher than the retaining wall, a motor-operated belt conveyor was rigged up. The material was dumped into a hopper and automatically prepared and conveyed to platforms below. The outfit will come in handy in other similar work.

A new sand car has been rigged up for use this winter. It has an air tank and motor-driven compressor outfit at one end of the car, while the balance of the space is given up to sand, loaded about as heavy as the car will stand. The sand feeds down an incline at each end into the receivers of Nichols-Lintern air sanders, sand being fed to the rail through pipes in front of each pair of wheels. One man can operate the car and the sanding device.

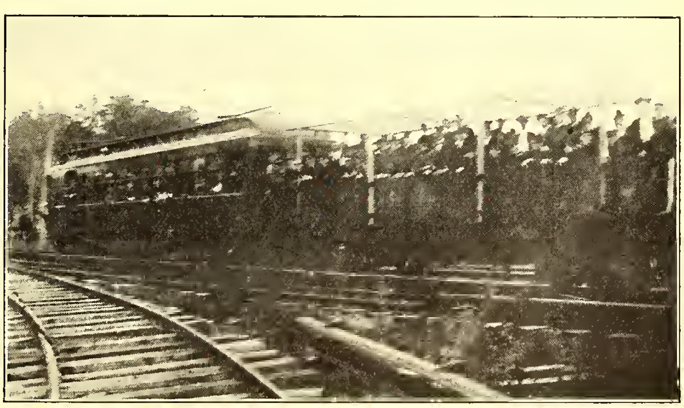
Chief Engineer Cook is much pleased with the results obtained from oil lubrication of journals, which was started some months ago, the lubrication bills having been reduced to one-third what they were with grease. He is now using the Westinghouse No. 101-B (40-hp) motor as standard, and is fitting other motors with the oil cup used on this type. Their latest convertible cars weigh 38,000 lbs., and it has been found desirable to fit them with four of these motors instead of two, as planned.

S. S. Neff, formerly superintendent of the street railway system in the City of Mexico, is associated with a number of Americans and Mexicans in the project of building a system of elevated and subway electric lines for the City of Mexico. Application for a concession for the proposed system has been made to the Mexican Government and is now under consideration by a commission of government engineers, who are investigating the project with a view of deciding as to its feasibility. Mr. Neff, who is in New York, says he does not care to make public his plans.

NOVEL METHOD EMPLOYED IN TRANSPORTING 3000 PEOPLE

On Aug. 10 President Roosevelt visited Wilkesbarre, Pa., and all of the railroad and traction companies, anticipating heavy traffic, prepared for the occasion. The Wilkesbarre & Hazleton Railway, the short line between Hazleton and Wilkesbarre, which naturally is not equipped to transport a very large number of people in a short time, took up the question with the Lehigh Valley Railroad and asked the privilege of hiring three of its coaches to be used as trailers. This was practicable, because the Wilkesbarre & Hazleton road is built with heavy track and for M. C. B. standard wheels. The coaches were promised and the road arranged its schedule to use them.

On the afternoon of Aug. 8, at 5 p. m., word reached the



MOTOR CAR HAULING IMPROVISED TRAIL CARS AT WILKESBARRE

company that the coaches could not be furnished, as the steam railroad company anticipated heavy traffic itself on the main line and would consequently need every available coach. The company then tried to secure the loan of some low-sided gondolas or flat cars, but these were also refused. Fortunately, just at this time, six coal cars loaded with rice coal reached the company's power house at St. Johns and were placed at the Wilkesbarre & Hazleton junction. Mr. Houck, the general superintendent, immediately ordered these cars dumped and that the empties should be placed on the company's shop siding in Hazle Park. The following morning, at 7 a. m., a gang of workmen, with lumber and unbleached muslin, fitted up the coal cars. The ends were taken out, wooden side and center seats were added, and a canopy or canvas or muslin was spread over the top. Brakes were placed at either end on temporary framework. By 10 p. m. on the night of Aug. 9 brakes had been adjusted, the journals oiled and the inspection completed, and the company was ready for business.

In the meantime the Lehigh Valley Railroad Company had ordered eighteen coaches, two engines and crews to Hazleton, expecting that they would be wanted to handle the business on its road between Hazleton and Wilkesbarre. At 1 a. m. on the morning of Aug. 10, these cars were placed on the siding.

At 7:05 a. m. the following day, the electric road connected up the remodeled coal cars to its standard motor cars and ran them down town, and from that time until late at night kept up a half-hour service, running coach and gondola every thirty minutes. The Lehigh Valley coaches and engines did not leave the siding, nor did they carry a single passenger between Hazleton and Wilkesbarre on this occasion. The electric road, on the other hand, carried 3000 people, who traveled between these points in the standard coaches or the converted coal cars.

NEW INTERURBAN FREIGHT HOUSES AT INDIANAPOLIS TERMINAL

After the handsome, large interurban terminal depot and office building at Indianapolis for passenger service was completed last year, plans were drawn up for a union freight terminal adjoining the entrance yards of the present passenger train shed. The four engravings from photographs herewith give a good idea of the freight houses and their location relative to the station. Fig. 5 is a view taken from Ohio Street, showing the passenger train shed in the middle, the traction and terminal building at the left, and one end of one of the three new freight houses at the right. Fig. 2 is a view taken further east on Ohio Street at the corner of Capitol Avenue, showing portions of the three freight houses, with the passenger train shed and terminal building in the background. Fig. 3 is a view taken from Ohio Street looking between two of the freight houses, showing a car and teams receiving and discharging freight. These three freight houses, located side by side, are each 195 ft. long by 24 ft. wide, except at the north

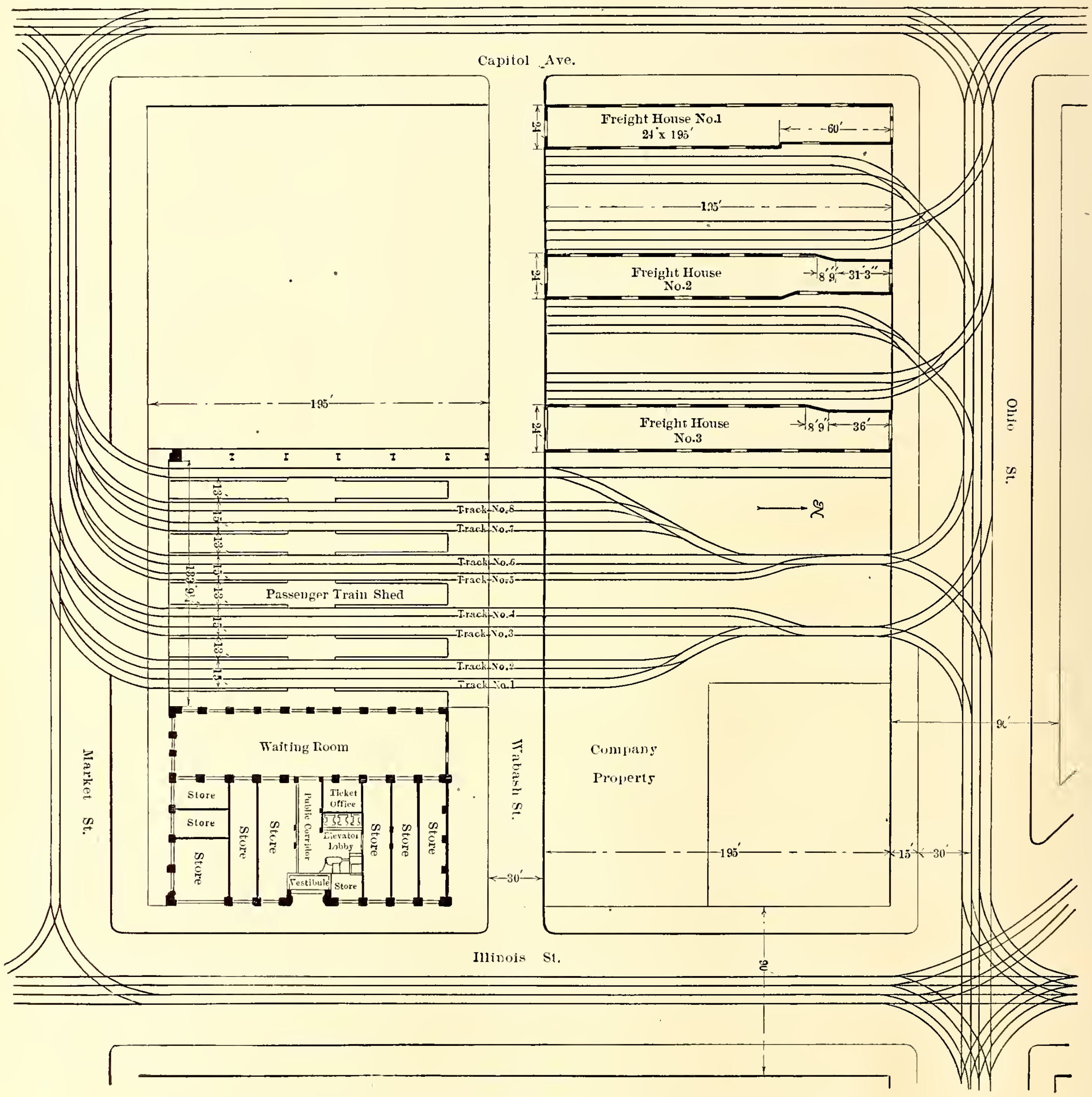


FIG. 1.—GENERAL PLAN OF TRAIN SHED AND OTHER BUILDINGS, INDIANAPOLIS

ends, where offsets in the wall of a few feet were made necessary to give clearance for cars on the curves with the track layout adopted.

The north end of shed No. 1 and the south end of shed No. 3 are both two stories high, and the upper story of each building is 60 ft. long. These upper floors will be utilized as offices for the express departments of the interurban companies. The second story of shed No. 3, which is located next to the passenger train shed, will also be used as headquarters for passenger car inspectors. All of the freight buildings are covered with slate roofs and have brick walls carried on concrete foundations. Pressed brick is used for the exposed walls, as the proximity of the State Capitol made an attractive appearance desirable.

Each building has five side doors and end doors, 8 ft. in width and 10 ft. in height, all of the Kinnear steel rolling type. Over each door is placed a transom with wire

FIG. 2.—ENDS OF FREIGHT HOUSES

FIG. 3.—METHOD OF RECEIVING AND DISCHARGING FREIGHT

glass set in iron frames. The floors are laid with 3-in. oak planks carried on 3-in. x 12-in. joints 11 ft. long, spaced 14 ins. between centers. In addition to the office room mentioned, there is at the south end of shed No. 3 a basement room 100 ft. long for storing car supplies. The three freight buildings are served by nine tracks, which consist of 70-lb. T-rails of A. S. C. E. section. Lorain special work is used.

All interurban lines entering the city will use this terminal. The charges for the service rendered by the Traction & Terminal Company are 75 cents for each car entering the station, and 15 cents per car-mile.

Fig. 4, which shows the entrance to the passenger train shed from Market Street, shows an improvement which has been made since the description of this train shed appeared in the Street Railway Journal. This improvement is the placing of gates to keep pedestrians and teams out of the train shed. These gates are of the ordinary railroad grade crossing type, with the addition of steel frame work to prevent persons from crawling under the gates. The Indianapolis Traction & Terminal Company now owns the greater part of the space on the two city blocks upon which the passenger and freight terminals are located. The terminal station was when built just at one side of the retail shopping district of Indianapolis. This district, however, is rapidly moving in the direction of the interurban terminal station, and there has been a most decided change and improvement in the character of the stores along Illinois Street near the Terminal Building. These stores were formerly occupied by a cheap class of tenants, but have been rapidly refitted and rented to a higher class of stores

FIG. 4.—ENTRANCE GATES TO PASSENGER TRAIN SHED

at much better prices. The interurban terminal in Indianapolis has certainly been a great benefit to the property near where it is located.

PROPOSED COUNTERBALANCE ELECTRIC RAILWAY

The Orange Mountain region in the northeastern portion of the State of New Jersey has long been famous for the natural beauty of its landscape and its many evident advantages as a residential section. Up to the present, however, these advantages have been somewhat nullified owing to the inaccessibility of the location. The Orange Mountain has an elevation of about 600 ft. above sea level, and although the foot of the mountain is easily reached from New York and the surrounding parts of New Jersey, the slopes and summits have been practically available only to those few who had carriages or automobiles in which to enjoy the magnificent drives of the region. At Eagle Rock, located on the north side of the range, there has been in operation for some time an electric railway which reaches the summit by a long winding incline, and this has been the only means other than driving for reaching the extensive plateau at the top.

About twelve years ago a cable incline was built up the eastern slope of Orange Mountain at considerable expense, but owing to the many obstacles in the way of continuous and satisfactory operation by cable, the road was not a success, and the ideas of the promoters for developing the country along the slopes and on the top were not realized. The cable road was operated spasmodically up to a few years ago, when it was abandoned altogether.

Some years since, the road and a tract of adjacent land passed into the hands of new owners, who are now engaged in building an electric road over the old cable road roadbed, and the road will be operated in connection with a simple counterpoise or balance system.

The roadbed to be utilized for the new line starts at the Valley Road, about ½ mile from the Highland Avenue station of the Lackawanna Railroad, in Orange. It extends in practically a straight line to the top of the mountain, a total distance of 3800 ft. Beginning at the lower end, the road rises on a grade of 14.75 per cent for about 700 ft., then changes to a grade of 7.75 per cent for about 1500 ft., and then rises for the rest of the distance up the mountain on a grade of 14.75 per cent. Two tracks are being laid for the entire distance, the old 60-lb. T-rails of the cable road being utilized for this purpose. The track rails will be laid to standard 4-ft. 8½-in. gage. The cars for the road will be equipped with two 40-hp motors each, and will climb the grade with their own power in conjunction with the counterbalance system. The details of the counterbalance system have not yet been fully decided upon, but will include a tail rope, by means of which the weight of the descending car will be utilized for helping the ascending car to climb the grades. It will be evident that the motors of the two cars will be required to furnish only sufficient power to overcome friction and the difference in the weights of the loads. If the descending car is more heavily loaded than the one that is ascending, no power will be required and the brakes will be brought into requisition to control the speed. It is anticipated that connection will be made both at the lower end and at the upper end of the incline with level tracks, so that passengers may be conveyed from the Highland Avenue station in Orange to various points on the upper part of the mountain without change of car. It is the intention to have three different landing points on the incline; and the two cars will make the three stops on each trip. A system of signaling between the two cars will be installed, so that simultaneous action with regard to starting and stopping will be secured on the part of the respective motormen. The details of this signal system have not yet been decided, but it is expected no serious difficulty will be encountered in utilizing an ordinary telephone circuit for this purpose. Power for the operation of the cars on the incline and on the level tracks at the top and at the

FIG. 5.—VIEW TAKEN FROM OHIO STREET, INDIANAPOLIS, SHOWING THE PASSENGER TRAIN SHED IN THE MIDDLE

bottom will be either rented or will be generated in the company's own power plant at the top. If it seems desirable to put in an independent generating plant, the old building at the summit, formerly used for the cable machinery, will be utilized.

The promoters of the original cable line laid out a recreation resort at the head of the incline, which was then known as Highland Park, and was the starting point for the many fine drives and walks through the Essex and Eagle Rock reservations, covering several thousand acres on the top of the mountain region. It is expected this location will be utilized for a first-class hotel, which it is believed will receive a large patronage from New York and the surrounding region. The new company, in conjunction with the plans for the inclined electric railway, purchased a tract of land extending along the slopes adjacent to the road, and has been disposing of this with the idea of building up the territory.

The road is being built and the other improvements carried out by the Orange Mountain Traction Company, of West Orange, N. J., of which Frank Brewer, associate member of the Institute of Civil Engineers, is president. The other directors are: James R. Williston, member of the New York Stock Exchange; Edward W. Jackson, ex-Surrogate of Essex County; Jay Teneyck, of Coult, Howell & Teneyck, Newark, N. J., and D. D. Sutphen, of A. D. Julliard & Company, of New York.

INDIANA UNION TRACTION NOTES

The Indiana Union Traction Company has in operation its 10-mile extension from Anderson to Middletown.

The company is now going ahead with the erection of a $50,000 terminal station at Muncie, plans for which were made two years ago. This station will be occupied jointly by the Indiana Union Traction Company and other companies entering Muncie.

The company has just put on eighty new motors on its city cars. These are Westinghouse No. 92, replacing various old types of motors in the different cities in which the company operates.

A traffic agreement has just been entered into with the Clover Leaf Railroad for the sale of interline coupon tickets from points on the Indiana Union Traction lines to points on the Clover Leaf, and vice versa.

PROPOSED LINE FOR GUADALAJARA, MEXICO

The stockholders of La Electra Company of Guadalajara have authorized the issuance of $2,000,000 in mortgaged bonds for the purpose of providing funds for the construction of the electric street railway system in Guadalajara. The bonds will be issued in blocks of $500,000 and will be taken, it is stated, by banks in this city. By the purchase of the Kunhardt lines, which were acquired recently for $500,000, La Electra secured control of the street railway situation in Guadalajara. In connection with the purchase of the Kunhardt system by the Bermejillo interests, the state concession granted La Electra for electric street traction in Guadalajara was revised by Governor Ahumada so as to prohibit the construction of paralleled street railway lines within two blocks of any line of the Bermejillo company. The new power house that the company will build in connection with the electric system will cost, as previously announced, the sum of $500,000. It will be located a short distance from the falls of the Santiago River at Juanacatlan, and will be equipped with machinery for the generation of electric current to the extent of 7000 hp. In the present power house at Juanacatlan, which will be abandoned after the completion of the new plant, about 2800 hp. is generated. The cost of the street railway system and the new power house will be between $2,500,000 and $3,000,000.

TREATMENT FOR PERSONS SHOCKED BY ELECTRICITY

A pamphlet on the treatment of persons injured by electric shock has recently been published by the United Gas Improvement Company for the benefit of the many systems in which that company is interested. Through the courtesy of the company, privilege has been secured for reproducing the text and illustrations herewith.

To give proper assistance to persons shocked by electricity,

FIG. 1.—EMERGENCY KIT

it is necessary to have on hand the following materials, contained in the company's emergency kit for electric shock cases, as shown in Fig. 1:

(a) A bottle of aromatic spirits of ammonia;
(b) A bottle of ordinary ammonia, with sponge attachment;
(c) A package of bicarbonate of soda (ordinary baking soda);
(d) A tin cup;
(e) A pair of tongue pliers;
(f) A towel;
(g) A package of antiseptic cotton;
(h) A roll of antiseptic bandaging;
(i) A roll of adhesive tape.

In case of electric shock, instantaneous death or only tem-

FIG. 2.—FIRST POSITION OF PERSON UNDER TREATMENT

porary unconsciousness may result. The treatment in both cases is as follows, and it should be carried out in every instance, even though the person is apparently dead, for he might be only temporarily unconscious.

Treatment.—*Send for a doctor at once*, in the meantime acting as follows: Carry the patient immediately into fresh air. Place him on his back on a flat surface, with a coat rolled (not folded) under the shoulders and neck, in such a way as to allow the head to fall backward enough to straighten the wind-pipe, as shown in Fig. 2; at the same time open the shirt wide at neck and loosen the trousers and drawers at waist, and have an assistant rub his legs hard.

(The sleeves and trouser legs should be rolled up as far as possible, so that the rubbing may be done on the bare skin, and the shirt and undershirt should be torn down the front so that they may be thrown back, leaving the chest and stomach bare, as shown in Fig. 10.)

Open his mouth, forcing the jaw if necessary.

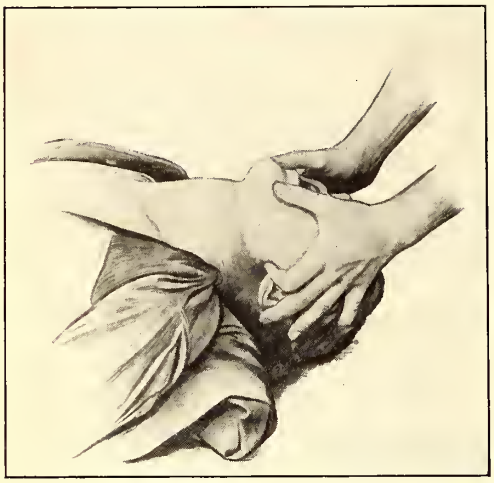


FIG. 3.—METHOD OF OPENING JAW WHEN RIGID

(If the jaw is rigid it can be forced open by placing the forefinger back of the bend of the lower jawbone and the thumbs of both hands on the chin, pulling forward with fingers and pressing jaw open with thumbs, as shown in Fig. 3.)

Place something (piece of wood shown in Fig. 1) between the teeth to keep the jaws open and to prevent the patient biting his tongue, using something large enough to prevent any danger of his swallowing it accidentally; grasp the tongue with the tongue pliers, as shown in Fig. 4, having an assistant hold it out while you are helping the patient to breathe, as described below.

(In the absence of tongue pliers, the tongue may be grasped between the index and second fingers, after they have been covered with a handkerchief.)

FIG. 4.—METHOD OF INSERTING BLOCK IN MOUTH

Clear froth from the mouth by putting in your forefinger as far as possible and bringing up the froth with a scooping motion. Have the assistant who is holding the tongue slowly pass the bottle of ammonia, with sponge attachment, under the patient's nose about once a minute when the patient is breathing in, and when his arms are extended above his head, as shown in Fig. 10.

While you are preparing the patient as just described, an assistant should force the air out of the lungs by pressing the *base of the ribs* together about once every four seconds, as shown in Fig. 5. Do not press vertically, put press on the patient's side (palms of hands over lower ribs) in such a manner as to force as much air out of the lungs as possible.

After the clothing has been loosened, the jaw forced open, as shown in Fig. 4, the froth cleared from the mouth and the tongue grasped, begin artificial breathing at once as follows:

FIG. 5.—FORCING AIR OUT OF LUNGS

ARITICIAL BREATHING

Kneel far enough behind the head of the patient to prevent interference with the man holding the tongue. Bend the patient's arms so that the hands meet on the chest; grasp the patient's forearms firmly, as close as possible to the bent elbows.

1. Firmly press the patient's elbows against the sides of his body so as to drive the air out of the lungs, as shown in Fig. 6; then

2. Raise the arms slowly with a sweeping motion until the patient's hands meet above (or behind) the patient's head, as shown in Fig. 7; then

3. While you have the patient's arms stretched out in line with his body, give them a slow, strong pull, until you have expanded or raised his chest as high as it will go, as shown in Fig. 8; then

4. Bring the arms, with bent elbows, down against the sides, and press them firmly as before, as shown in Fig. 6.

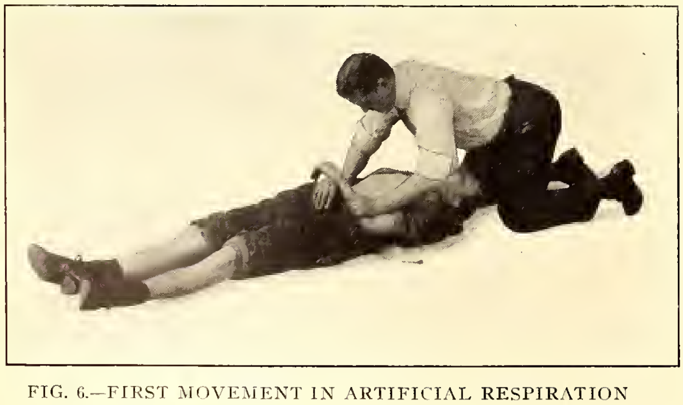


FIG. 6.—FIRST MOVEMENT IN ARTIFICIAL RESPIRATION

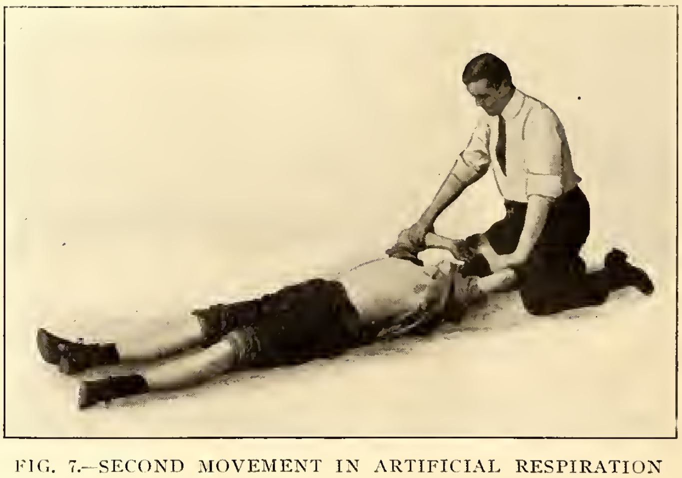


FIG. 7.—SECOND MOVEMENT IN ARTIFICIAL RESPIRATION

This action should be continued about fifteen times a minute until the patient begins to breathe. You must guard against a tendency to make these motions too fast; they must be done

FIG. 8.—THIRD MOVEMENT IN ARTIFICIAL RESPIRATION

slowly. A good plan is to count four slowly—"one," as the pressure is given on the sides, as shown in Fig. 6; "two," as the arms are being extended above the head, as shown in Fig. 7; "three," as the strong pull is given, as shown in Fig. 8, and "four," when the arms are again being bent and returned to the sides, as shown in Fig. 9.

Do not let your hands on the forearms slip away from the elbows; the best result comes from grasping close to the elbows, as shown in Fig. 9.

The operator must appreciate the fact that this manipulation must be executed with methodical deliberation, just as described, and never hurriedly or half-heartedly. *To grasp the arms and move them rapidly up and down like a pump handle is both absurd and absolutely useless.*

Each time the arms are pulled above the

FIG. 11.—TREATMENT AFTER PATIENT BECOMES CONSCIOUS

head and the chest expanded, the assistant who is holding the tongue should pull the tongue out and downward, and another assistant should, from time to time, slap the chest with a towel or cloth wet with cold water, as shown in Fig. 10.

When the patient is breathing by himself, the process of artificial breathing can be stopped, but the process of pressing the sides *every other* time he breathes out, should be started as follows:

FIG. 9.—FOURTH MOVEMENT IN ARTIFICIAL RESPIRATION

Do not press vertically, but press on the patient's side (palms of hands over lower ribs) in such a manner as to force as much air out of the lungs as possible, Fig. 5. You can carry

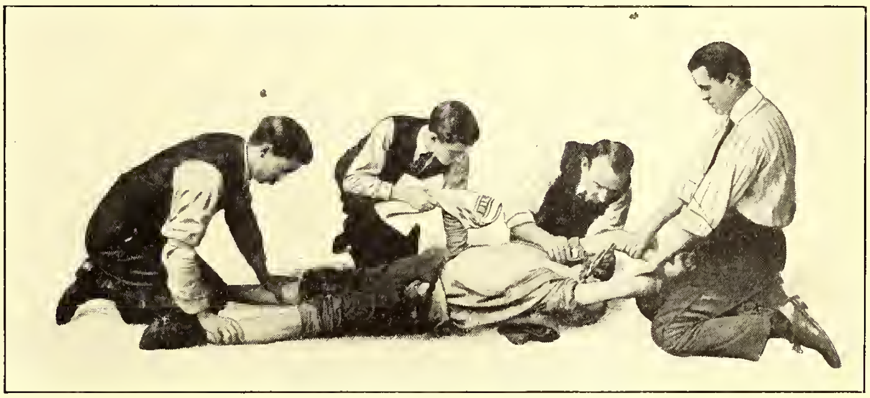


FIG. 10.—POSITION OF ASSISTANTS

out this pressing action most successfully, if, on beginning, you move your hands in and out with every breath, pressing very lightly, until you have established a rhythmical motion of your hands in unison with the patient's breathing; then you can begin to press hard at every other outgoing breath.

(The object of doing this is to strengthen his breathing. By making the pressure every other time he breathes out, you give him an opportunity to take a breath himself, and this natural effort to breathe is in itself strengthening to the action of the lungs.)

Continue this pressing action until the man is conscious and breathing well by himself.

The rubbing of the legs and arms should continue as long as the artificial breathing, or pressing action, is necessary, and the holding of the tongue, and the passing of the bottle of ammonia with sponge attachment under the nose, as long as he is unconscious, as shown in Fig. 5.

After he becomes conscious, give him a half teaspoonful of aromatic spirits of ammonia in a third of a glass of water. After you have brought him around, surround him with bottles of hot water.

(Beer bottles are easily obtained, and should be filled with hot water and covered with a paper or cloth to prevent burning the flesh. Hot bricks, also covered, or gas bags filled with hot water will answer as well.)

Then cover him with a coat and watch him. See Fig. 11.

In performing artificial breathing, if the patient does not show any signs of coming to life promptly, you should not be discouraged, but should continue the motions regularly for *at* *least one hour,* summoning such assistance as you may need. Cases are known where patients showing no signs of life after an hour's work have still recovered, and their recovery was due entirely to the faithful persistence of the person in charge.

Persons shocked by electricity need *fresh* air; therefore, bystanders should not be permitted to crowd around a patient, and no one should be allowed to approach him except those carrying out these instructions.

The recovery of a person unconscious from electric shock may be hastened by the use of oxygen, which should be administered at the discretion of the doctor.

BURNS CAUSED BY ELECTRICITY

Electric shocks are often accompanied by various types of burns, which should be treated as follows:

Have the injured attended by a doctor as soon as possible. In the meantime cover the burned surface with cotton, saturated in a strong solution of bicarbonate of soda and water (as much soda as the water will absorb), and then wrap with light bandaging. In the absence of soda, carron oil may be used in the same manner.

(Even apparently slight burns should be treated by a doctor, as the injuries are likely to prove more serious than those resulting from ordinary burns.)

Should the articles contained in the company's emergency kit for electric shock cases not be on hand when needed, after sending for a doctor, every effort should be made to revive the patient, by following the course of movements described until the doctor arrives and the necessary articles are secured.

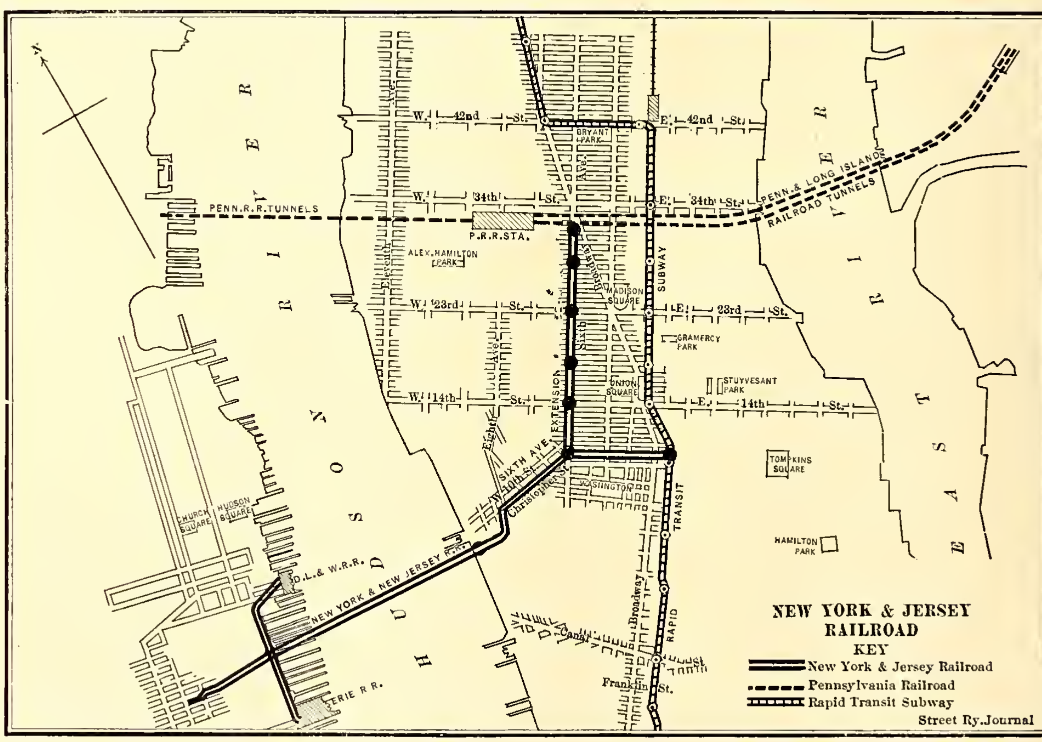
COMPLETION OF HUDSON RIVER TUNNELS OF THE NEW YORK & NEW JERSEY RAILROAD COMPANY

An important event in the history of New York City's traction facilities occurred on Friday, Sept. 29, with the completion of the double-tube tunnel system of the New York & New Jersey Railroad Company under the Hudson River between Hoboken and New York. The uncompleted south tube of this company's tunnel system, which has been under construction from the Jersey side of the river, reached the wall of the working shaft on the New York side at Morton Street and the river front a few days ago, and this wall was forced through on Sept. 29, in the presence of the officials and directors of the above company and also of the Hudson Companies, the construction company directly in charge of the prosecution of the work. The event was attended with considerable ceremony. The officials, together with a party of invited guests, entered the south tube through the entrance shaft near Fifteenth Street, Jersey City, from which all of the work of construction has been carried on, and rode through to the barrier wall at the New York end, where W. G. Oakman, president of the Hudson Companies, operated the hydraulic jacks which forced the final opening through the wall and permitted the party to make the first complete trip through the tube.

Among those in the party representing the New York & New Jersey Railroad Company were W. G. MacAdoo, president; E. F. C. Young, director; C. W. King, secretary, and A. B. Conger, treasurer. The Hudson Companies, the construction company, was represented by W. G. Oakman, president; Pliny Fisk, director; W. N. Barnum, director; W. C. Kinney, treasurer; Wm. H. Barnum, assistant treasurer; Chas. M. Jacobs, chief engineer; J. V. Davies, deputy chief engineer; G. D. Snyder, principal assistant engineer; H. M. Sperry, consulting signal engineer; R. S. Courtney, works manager; F. K. Hilt, division engineer, and Dr. A. J. Loomis, medical director at the tunnel. L. B. Stillwell, consulting electrical engineer, was represented by Hugh Hazleton, his assistant.

The completion of these tunnels marks the culmination of an enterprise that was projected over thirty years ago and, although regarded at that time as an impracticable undertaking, was carried well along toward completion before engineering difficulties and lack of financial support compelled an abandonment of the work. At the time work was stopped, in 1892, the north tube was nearly half completed and work had been begun on the south tube. Work was again taken up by the present company in 1902, after a delay of ten years, and has been pushed to completion in record time. The north tube was finished in March, 1904, and the work of lining it with concrete and installing the cable ducts at the sides is well advanced. Now that the south tube is completed and the air pressure necessary with the shield method of construction is removed, similar work will be vigorously prosecuted there also. Work is progressing so rapidly upon the approaches that it is confidently expected that cars will be running upon the system early in 1907.

The length of the tunnels between the shafts at Fifteenth Street, Jersey City, and Morton Street, New York, is 5780 ft., and the interior diameter of each of the tubes is 15 ft. 3 ins.



MAP SHOWING TUNNELS NOW COMPLETED OR BUILDING OF THE NEW YORK & JERSEY RAILROAD AND THEIR CONNECTIONS

The tubes are laid nearly parallel and are separated only about 50 ft. toward the middle of the river. They have no cross communication at any point between the shore shafts. The greatest depth below mean tide is near the middle of the river, where the tubes are 15 ft. below the bed of the river; the depth of water at that point is 65 ft. Each tube will provide for a single track. The north tube will carry the westbound traffic and the south tube the eastbound or New York traffic.

The New York approaches to the tunnels have been extended to some distance eastward from the Morton Street shaft. Construction upon these tunnels is being carried out upon the shield and hydraulic jack method, similar to that for the tubes beneath the river, and the shields for the approaches have now reached Christopher Street. The present plans for the New York terminal call for a line running up Fourth Avenue as far as Thirty-Second Street, with stations at Fourteenth, Eighteenth, Twenty-Third and Twenty-Eighth Streets, and a branch through Ninth Street, to make connection with the Interborough Subway at Astor Place, as shown in the accompanying map. The plans for the terminals upon the New Jersey side of the river have not been definitely determined, but it is probable that connections will be made with the principal ferry terminals, so that incoming passengers may have the advantages of direct connections with the principal points of the city without the delays and inconveniences of the present ferry accommodations.

During the work of excavation both tunnels were equipped with a cable-hauling system to facilitate the removal of the excavated earth. That in the north tube was supplied by the John A. Roebling's Sons Company, that in the south tube by the Cockburn Barrow & Machine Company.

CORRESPONDENCE

DISCUSSION ON ARTICLES IN THE STREET RAILWAY JOURNAL

WEST PENN RAILWAYS COMPANY

Connellsville, Pa., Sept. 8, 1905.

Editors Street Railway Journal:

We have recently adopted the practice of using your paper as a text for discussion in our staff meetings, and think that others among your readers may be interested in this method of conducting staff meetings. The meeting held last week was handled in the following manner: The subject taken for the day was "Accidents; Their Cause and Their Prevention." The preceding issue contained Dr. Rockwell's article on the cause of accidents, and this was considered and discussed by sections. For instance, the author makes the statement that curves are a fruitful source of accidents, and that when engineers learn that a straight line is the safest as well as the shortest distance between two points, much will be accomplished in the reduction of accidents. This brought forth some recommendations on the part of the different superintendents relative to getting clearer vision on the part of the motorman at several points along the line where the growth of high weeds and bushes partially obstructed the view. This resulted in a request being made on the roadmaster's department to cut away all obstructions of this nature. Another point brought up in connection with curves was that the striking of curves at high speed by the cars was causing the track to get wide to gage at some points, and everyone made a mental note to look up the curves on his respective division to see whether they need any attention. The remarks on grade crossings brought some discussion as to the best means of preventing accidents at those points. The operation of summer cars, the keeping clear of running boards, the careful checking up of the accident records during the summer months to ascertain the number of accidents happening directly traceable to the use of summer cars followed, were considered in turn, and so on all through the article. After this, purely local matters were taken up, and in this manner a very interesting two-hour session was held. After these meetings the whole party lunches together and then separate, each to his work again.

The meetings are held at no regular stated intervals, the time being governed by local conditions. J. W. Brown,
Superintendent of Transportation.

A NEW TRANSFER CHECK FOR PREVENTING THE FRAUDULENT ISSUANCE OF TRANSFERS

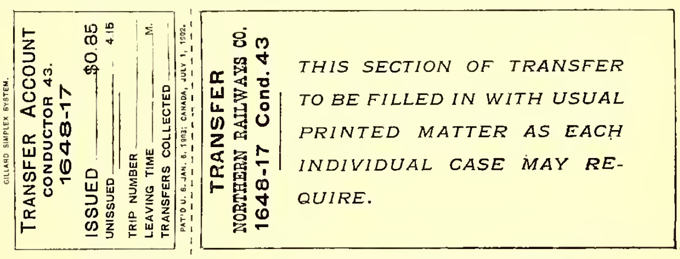
Among the exhibits of the Globe Ticket Company at the street railway convention in Philadelphia, was a new transfer check patented by Frederick W. Gillard, of Steubenville, Ohio, the prominent feature of which is the accounting stub, as shown in the illustration, which represents the seventeenth ticket and stub of a pad of 100 tickets. The number and value of each ticket—plus the total value of all preceding tickets—is printed on the stub of each ticket, as is also the value of the unissued tickets remaining in the pad. The inventor's plan for the operation of this system is as follows:

To begin with, the company should adopt and post the following rule governing transfers in its cars:

"Passengers desiring transfers must procure same at time of paying fare or forfeit their right to them."

and the conductors should be instructed that when collecting fares they must ask whether or not a transfer is required. The conductor enters his trip number and leaving time on the first stub of each trip.

Where a single register is used and no transfer is wanted, he rings up the cash fare on the register. Where cash fares are paid and transfers wanted, instead of ringing them up on the



SPECIMEN OF COMPLETE TRANSFER CHECK

register, he accounts for them by the stub of the last transfer issued, but transfers taken up for fare are rung up on the register together with straight cash fares. The difference between the face of the register and the number of transfers collected shows the straight cash fares and the stub of the last issued transfer shows the number and value of transfers issued. The trip being finished, the conductor enters his trip number and leaving time, together with the number of transfers taken up, in the space indicated by "Transfers Collected," detaches the stub at the perforation near the binding and turns it in, with his cash, as his transfer report, taking no notice of the stubs between the first and last ones of the trip.

Where two registers are used, one for cash fares and one for transfers, the cash fares without transfers are rung up on the cash register; transfers issued and transfers collected are also rung up on the transfer register. The cash register thus shows all cash fares without transfers and the transfer register the total of transfers issued and collected; the difference between the face of the transfer register and the stub of the last transfer issued is the number of transfers collected, and the stub itself shows the number and value of transfers issued. The inventor's preference, however, as perhaps a more simple and absolute check, would be to omit ringing up transfers issued and ring only those taken up, as the stub of the last issued transfer accounts for them in the first instance.

The following advantages are claimed:

The prevention of the fraudulent issuance of transfers by conductors; the number of passengers actually taking transfers and those riding on straight cash fares is readily ascertained; the conductor cannot ring up fares collectively in advance of their receipt, but must issue transfers as demanded and ring up cash fares as received; transfer agents at junction points may be dispensed with; the cash register being relieved of recording the fares for transfers issued, the conductor's chances of "knocking down" on straight cash fares are lessened in the proportion that the total amount of straight cash fares bears to the total of cash received for fares with and without transfers. The stubs are an absolute check on the cashier receiving the conductor's returns and a ready record of his trips.

The total number of transfers collected and returned to the company should agree closely with the number of transfers issued during the day. The collection will thus afford a check upon the number of transfers actually used by passengers during the day, and the number should, of course, correspond closely with the number issued. An excess in the number used over the number issued would mean that unauthorized or counterfeit transfers were in circulation. No extra transfer tickets are required where transfers are given on transfers, as the original ticket can be provided with detachable coupons bearing the same serial number as the body of the ticket for each transfer required, thus providing the conductor with a voucher for each passenger so carried.

IMPROVED CABLE CLAMP

The accompanying illustrations show the construction and application of the Kearney cable clamp, which has just been

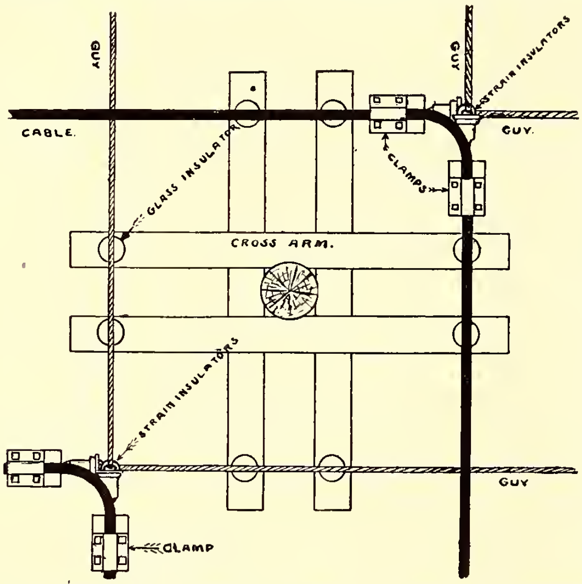


FIG. 1.—SHOWING APPLICATION OF CLAMP AT CORNERS

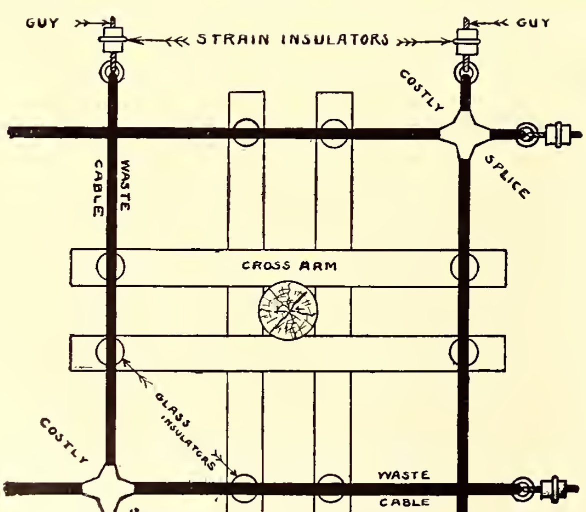


FIG. 2.—OLD METHOD OF MAKING SPLICES AT CORNERS

placed on the market by W. H. Matthews & Bro., of St. Louis. This clamp is made in one size, but is adaptable to any diameter cable from No. 0000 to 1,000,000 circ. mils. Its manufacturers claim that by its use as much as $10 to $15 can be saved at each turn, corner or dead end.

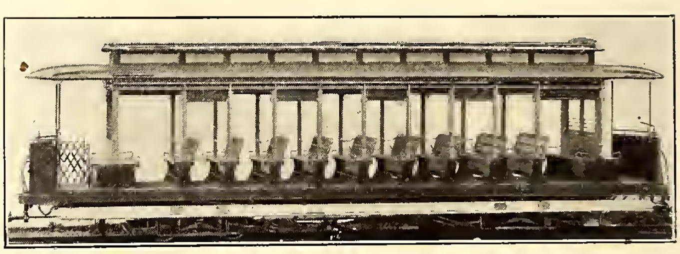
By referring to the illustration marked Fig. 1, the use of this cable clamp can be seen at a glance. In Fig. 2 is shown the

FIG. 3.—NEW CABLE CLAMP

old method of turning a corner, necessitating expensive splicing, large waste of cable and a loss in time and labor, besides sacrificing neatness and strength. Where splicing is used the copper losses are higher and the scrap value of the cable is greatly reduced. Fig. 3 is a perspective view of the clamp.

TWENTY OPEN CARS FOR MEMPHIS

Twenty standard open cars mounted on Brill No. 27-G short-base double trucks have recently been delivered to the Memphis Street Railway Company by the G. C. Kuhlman Car Company. The railway company operates over 200 cars on about 90 miles of trackage in the city and suburbs of Memphis. The seating capacity of the new cars is 65 passengers. The seats have reversible backs, with the exception of four, which are against the bulkheads. The bulkheads not only give good support to the roof, but also afford protection on cool days from the wind caused by the speed of the car. Whenever desired, the bulk-



TYPE OF OPEN CAR USED BY THE MEMPHIS STREET RAILWAY COMPANY

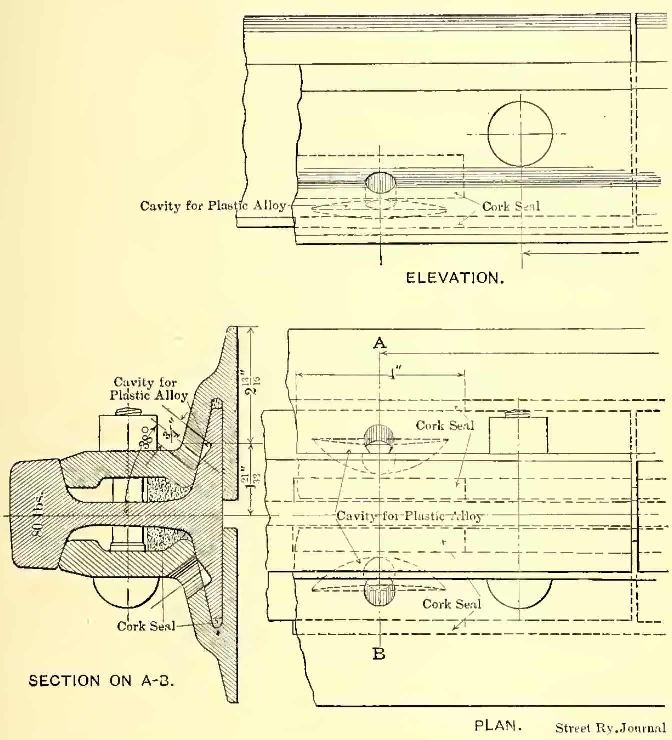
head sashes may be dropped into pockets which are provided for them between the seats so that passengers may have the benefit of the rush of air from the front. Round-corner seat-end panels are used, which not only make it easier to get in and out of the car, but permit the curtains to be drawn to the floor without difficulty, a continuation of the grooves of the posts being formed in the exterior surface of the panel. The interiors of the cars are finished in ash with ceilings of birch. Three-bar window guards are used in front of the bulkhead sashes. The truck has a 4-ft. wheel base and 24-in. wheels.

The general dimensions of the cars are as follows: Length over the end posts, 29 ft. 7¾ ins., and over the crown pieces, 39 ft. 1¼ ins.; width over the posts at the belt, 7 ft. 6 ins.; sweep of the posts, 2½ ins.; distance between the center of the posts is 3 ft. 8⅛ ins. The side sills are 5 ins. x 8 ins., and the end sills are 5 ins. x 7⅛ ins. The thickness of the corner posts is 3⅝ ins., and of the side posts, 2¾ ins.

A NEW PERMANENT PLASTIC RAIL BOND

A new form of plastic rail bond that can be applied to almost any rail section, whether A. S. C. E. standard or special, has just been placed in the field by Harold P. Brown, of New York. In this latest type of plastic bond the angle plate is made to carry the current. On either side of the joint between the first and second bolt holes from the end of each rail a hole is drilled through the angle plate. Under each hole a cavity running lengthwise with the rail is milled out in the top of the rail base. This is clearly shown in the accompanying illustration.

The holes in the angle plates and the cavities in the rails, as well as the lower surface of the angle plate over the cavities, are amalgamated by the Brown process for absolutely preventing rusting. Each hole and the cavity under it are filled with



SPECIAL PLASTIC BOND FOR 80-LB. RAIL AND CONTINUOUS JOINT

a new kind of plastic alloy. This alloy does not harden nor permit the liquid mercury to run out, and being absolutely inelastic, will not jar out of the hole. It adheres tenaciously to the amalgamated rail surfaces, forming an unbroken flexible conductor of extremely low resistance between the rail and the angle plate. To exclude dirt, the holes are sealed with composition cork discs which are weatherproof, and on account of their great lightness will not jar out. These discs can be easily removed, leaving the bond free for inspection or repair without removing the angle plates.

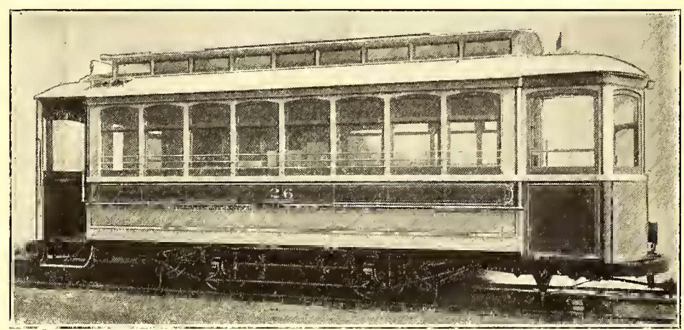
To prevent dirt from creeping into the holes or cavities, a cork seal is placed between the web of the rail and the angle plate opposite the cavities, as is shown in the illustration. In addition, before placing the angle plates on the rails, the upper surface of the base of the rail around each cavity is coated with a viscous, non-hardening and weather-proof compound which completely seals the crack between the angle plate and the rail. In making up these joints, the angle plates are drilled and amalgamated before being distributed along the road, thus shortening the time of application. The cavities are quickly milled out by a portable hand-power milling machine at a very small expense.

When the weight per yard of the two angle plates is about equal to that of the rail and the rail joint is double bonded, the conductivity of the joint is practically equal to that of an equal length of unbroken rail. Though the rails and the angle plates may have excessive motion, the plastic alloy will always maintain the contact between the rails and the angle plate unbroken and keep the conductivity of the joint unimpaired even after long years of service.

This bond was exhibited at the Philadelphia convention on a joint of 70-lb. rail, transmitting 3000 amps. After a few minutes' run the rail was hotter than the bond. It is therefore appropriately named the Permanent Plastic Bond.

CLOSED CARS FOR JACKSONVILLE, ILL.

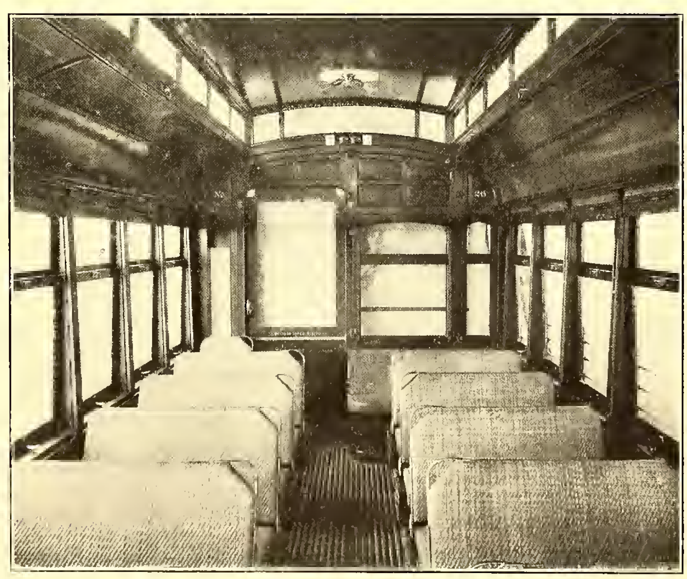
The American Car Company has lately completed five of the cars illustrated for the Jacksonville Railway Company, Springfield, Ill. This road is a part of the Illinois Traction system



SINGLE-TRUCK VESTIBULED CAR USED IN JACKSONVILLE, ILLINOIS

and this car shipment is a duplication of a former order. The length over the end panels is 20 ft. 8 ins. and the width over the posts at the belt, 8 ft. $3\frac{1}{2}$ ins. The cars are mounted on the Brill No. 21-E single trucks, which are claimed to carry the car body 2 ins. lower than any other single truck.

The view of the interior shows the transverse seating arrangement and the type of doors used in the ends, known as the



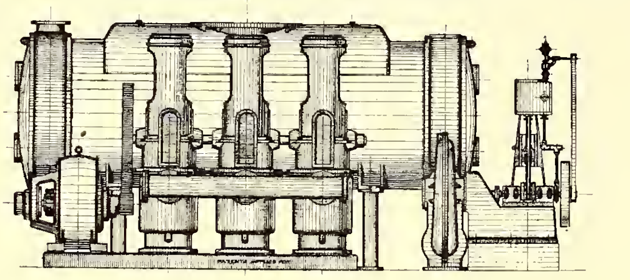
INTERIOR OF JACKSONVILLE CAR

Brownell Patents Company's semi-accelerator. The advantage claimed for this style of door in connection with entrance from one side of platform is the greater facility with which passengers may enter and leave the car, the position being close to the platform step, and the fact that the arrangement in a large measure prevents passengers from standing upon the platforms in such a manner as to obstruct the passage. The seats are of the Brill tilting style with grab handles attached, and the seating arrangement provides for thirty-two passengers. The lower sashes are arranged to drop into pockets in the side walls, the openings of the pockets being closed with hinged covers, and the upper sashes are stationary. The interior finish is of cherry and the ceilings are of birch.

The length over the crown pieces is 30 ft. 1 in., and from the panel over the crown piece, 4 ft. 8½ ins. The width over the sills is 8 ft. 1 in.; sweep of the posts, 1¾ ins.; distance between the centers of the posts 2 ft. 5 ins. The side sills are 4 ins. x 7 ins. and the end sills are the same. The sill plates are 7 ins. x ½ in.; thickness of the corner posts, 3¾ ins. and of the side posts, 2¾ ins. The length of the seats is 35 ins. and the width of the aisle, 19¼ ins. The height of the steps is 14 ins. and of the risers, 15⅞ ins. The No. 21-E trucks used have a wheel base of 7 ft. 6 ins. and 33-in. wheels.

A NEW HIGH VACUUM SYSTEM FOR STEAM TURBINES

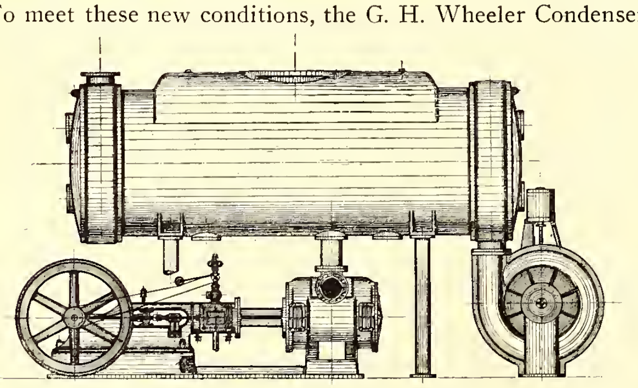
The development of the steam turbine to its present high state of efficiency may have wonderfully improved the conditions existing along certain lines in the many power plants in



IMPROVED CONDENSER WITH TRIPLEX SUCTION VALVELESS AIR PUMP AND CIRCULATING PUMP

which it has been installed, but its evolution has also called for greater improvements in auxiliaries to meet these conditions. Among the most important is the condenser, as it becomes absolutely necessary to secure the highest vacuum and efficiency obtainable for the successful operation of the turbine.

To meet these new conditions, the G. H. Wheeler Condenser

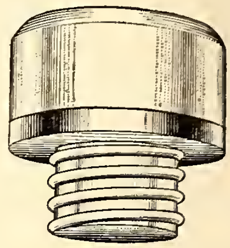


IMPROVED CONDENSER WITH SUCTION VALVELESS AIR PUMP AND CIRCULATING PUMP

& Pump Company, of Philadelphia and New York, has designed a new high vacuum system, especially designed for steam turbine service. The arrangement of the condenser provides from 30 ft. to 40 ft. of the lineal travel of the condensing water which first enters the upper tubes, with final discharge from its lower section, thus permitting rapid circulation of the injection and the water of condensation to leave the condenser within a few degrees of the temperature due to the vacuum. Working in conjunction with this new apparatus is the Mullan suction valveless air pump, crank and fly-wheel design, an apparatus that insures the highest vacuum obtainable, at the least cost for operation.

WEATHER-PROOF SOCKET PLUG

The socket plug shown in the accompanying illustration has been designed as a substitute for an incandescent lamp in places where light is not needed throughout certain portions of the year, as in parks, summer resorts, and for sign work. Under ordinary circumstances when the lamps are removed, the sockets, which are left exposed to the elements, become badly corroded and cracked. The breakage resulting from this cause frequently amounts to a very large proportion of the total installation of sockets and receptacles, and the cost of new ones, together with the price of labor necessary to replace them, forms a considerable item of expense. The socket plug illustrated is thoroughly weather-proof. A soft rubber gasket is interposed between the plug and socket, thus making an absolutely water-tight joint. These plugs are manufactured by the Weather-Proof Socket Plug Company, Philadelphia.



WEATHER-PROOF SOCKET PLUG

NEW PIPE WORKS

The Ball & Wood Company, of 17 Battery Place, New York, has recently added to its works at Elizabethport a plant for turning out welded flanged pipe and pipe bending. The company, in its steam engine work, has noted the growing demand of contractors and engineers for a pipe joint to withstand the higher steam pressures coming into use and the increasing preference for superheated steam, and its purpose is to meet these requirements. It will not do pipe fitting and will undertake no piping contracts, but is prepared to quote prices and fill orders for the material used in this work.

Not only in the use of steam, but in air, gas and water, modern engineering finds its most economical applications in high pressures, and a joint in which the flange is neither screwed nor expanded on the pipe, but is welded to it and a part of it, appeals to the reason and common sense of engineers. The flanges are made of wrought steel of the same grade of metal as the pipe, insuring homogeneity in the flange and pipe after welding. This process is more expensive than in making the common forms of joint. The best of anything follows this law, but in this new plant the Ball & Wood Company has endeavored to avail itself of the latest improvements in every line of equipment, not only in making the joints and bends but in handling the material. A new building has been erected, in which all the tools are driven electrically. Heavy, high-speed lathes, facing tools and multiple drills have been installed and through the use of the new tool steels the largest flanges are faced and drilled quickly and accurately. Electric cranes, oil furnaces and modern hammers complete the equipment for turning out work promptly. After this work is completed, every joint is tested under hydraulic pressure to the required specification before it is shipped, and this test is stencilled on the pipe. The joint has been well received, and the works have been busy ever since the plant was started. To distinguish it from the others in the market the company has given its trade name, "Ballwood," to this joint, and all communications referring to this work should be addressed to the Ball & Wood Company, welding department.

The Detroit, Ypsilanti, Ann Arbor & Jackson Railway has issued a time card containing on the reverse side a schedule of the University of Michigan (located at Ann Arbor) football games for this season, which is simplicity itself. The cards are in great demand by patrons and football cranks.

STORAGE BATTERY INSTALLATION OF THE SYRACUSE & SUBURBAN RAILROAD

The load on the Syracuse & Suburban Railroad is extremely variable, as the line is 14 miles in length and the main service is carried on by four 14-ton double-truck passenger cars which make six trips a day and one freight car which makes two trips a day. In addition, there is a 4-mile extension near Syracuse, upon which a single-truck car is run on a half-hour schedule and on which a 14-ton double-truck car is run three trips a day. The power station is at Edwards Falls, at the farther end of the line, and contains a 600-hp Leffell overshot water-wheel driving two 225-kw G. E. generators. In addition, there is an auxiliary steam plant which is used during the winter months at the time of low water, and which consists of a 500-hp Brown engine driving a 600-kw G. E. generator. The line is a very hilly one, and a number of turn-outs occur on steep grades, and the stopping and starting of the cars on these turn-outs adds to the fluctuations of the load.

As originally operated, the voltage was subject to extreme variations with the fluctuations in load, and in some cases dropped as low as 200 volts. To remedy these conditions two propositions were considered, one to use a. c. distribution and the other to install a storage battery. The latter was adopted. The battery is located in Orville, about 10 miles from the power station and 4 miles from the Syracuse end of the line. It contains 240 cells of type W-9 accumulators of the National Battery Company, and acts as a balancing governor. The battery has greatly reduced the fluctuations on the line, and has actually permitted an increase of the service on part of the line from an hour to a half-hour schedule.

ENTERPRISE IN ZANZIBAR RAILROAD

It is worthy of note that off the east coast of Africa on the Island of Zanzibar, where spices and ivory are the principal products, where the native has never seen a street car or locomotive, and rarely a carriage, the dawn of "rapid transit" is rising.

The city of Zanzibar is situated on the west coast of the Island of Zanzibar. The island is under the protection and control of Great Britain, but nominally under the sway of the Sultan, who occupies his palace and supports his numerous wives according to ancient customs. Zanzibar is a city of 125,000 souls. The exports are ivory, skins, spices and fruits, and this business is largely in the hands of American, English and German merchants. The main land as well as the neighboring islands contribute to this industry.

Arnold, Cheney & Company, of New York, realizing the immense advantage to the island and her commerce of a railroad, obtained some time ago the concession from the government to construct a railroad from the upper end of the island to the port—the city of Zanzibar—a distance of about 22 miles, and for a city belt line in the city of Zanzibar. The latter will be operated with mules, and the interurban line by steam. The interurban line connecting the city of Zanzibar with Bububu has an anticipated extension to Kokotoni, on the north coast of the island, which furnishes a harbor for the small vessels bringing merchandise from the island of Pemba and more northern points. It was thought best to make the rolling stock of the street and interurban roads interchangeable, and an engineer, Geo. R. Brown, was at once sent from New York to make necessary surveys for determining the best possible gage for tracks and the material available for construction. On his report a 36-in. gage was chosen as the widest possible for the narrow city streets. Cars for both lines were purchased from the J. G. Brill Company, and locomotives for the steam line from the Porter Locomotive Works. It was also decided to ship all material, including tools for construction, from this country, and for this purpose a vessel was chartered and loaded with 25-lb. rails and steel ties for the roadbed, the locomotives for the steam line and mules for the motive power. From plate girder bridges with cement for concrete abutments, down to a conductor's lantern, a conglomerate of a whole city railroad with supplies for a year's operation, was packed into one huge ship, the steamship "Ras Bera," which left New York on April 12 last.

The passenger cars were described in the Street Railway Journal for March 18, 1905, and those for the interurban traffic are of a special design suitable for that climate. They are of open platform construction with two slat seats placed back to back longitudinally down the center, with a light wooden top carried on posts fastened to sides of car and provided with canvas curtains. A foot of running board extends along each side of the car. The city mule cars are of similar design, only much shorter, but two club cars were furnished for the Sultan's use, fitted with removable wicker table and chairs, a Brussels carpet for the floor and plenty of gilt trimmings.

In addition, the contractors shipped on the same steamer several miles of portable track, with frogs and switches, to be used as feeders from the plantations en route between Zanzibar and Bububu. It was expected to start the city line in operation early in October, and the steam line by Jan. 1, 1906.

AUTOMATIC HEADLIGHT SWITCH

The usual method of connecting up an incandescent electric headlight is by means of a three-way switch, which is thrown in one direction or the other, according to the direction in which the car is going. If the motorman or conductor should forget to throw this switch the headlight is either not lighted or is burning at the wrong end of the car. In either case, a considerable source of danger is introduced.

To avoid this trouble, and taking the switching of the headlight out of the hands of the motorman and conductor, a patent for an automatic headlight switch has recently been awarded to R. D. Apperson and A. J. Kohler, of Lynchburg, Va. Mr. Apperson, one of the patentees, is president of the Lynchburg Traction & Light Company, and the automatic switching device has been used on his line for over two years with no cost for repairs or maintenance. The switch is very simple in construction and consists of two semi-circular strips at each end of the trolley base, with a contact device carried on the trolley pole. The lamp circuit for each end of the car is carried through the set of plates at the same end of the trolley base, so that when the trolley pole is reversed the headlight at one end of the car is automatically extinguished and that at the other end lighted. At the same time that the front headlight circuit is closed the rear hoodlight is lighted and the front hoodlight is extinguished. The inventors have worked out a system for applying the device not only on a trolley car, but also on third-rail and underground conduit electric cars. In all of these cases the construction is simple and can be installed on the car in less than 3 hours by any of the car-shed foremen. The Chicago car shown by the J. G. Brill Company at the convention was equipped with this automatic headlight switch.

The Cleveland Electric Railway Company has been awarded a medal for its showing in industrial betterment work by the Liege (Belgium) Exposition. The company was not aware that any information regarding its work had been given out. A similar medal was received from the St. Louis Exposition some months ago. Reference has been made in these columns to the club rooms and entertainments given at the various car houses.

AN INVESTIGATION OF MUNICIPAL OWNERSHIP

Considerable progress has been made by the special committee appointed recently by the executive committee of the National Civic Federation to investigate public ownership and operation of such utilities as gas, water, electric lighting and street railways. A general meeting, which was largely attended by representative men, was held at Earl Hall, Columbia University, New York City, Oct. 5, when, in the absence of President August Belmont, the meeting was called to order and addressed by Samuel Gompers, first vice-president of the Federation. In a letter regretting his absence on account of sickness and an operation, Mr. Belmont said:

The subject of municipal ownership and operation of public utilities is forcing itself upon the attention of all thoughtful persons. Unfortunately, the very lack of comprehensive and authoritative data and information leaves the discussion to theorists, who often advance arguments which can neither be accepted nor rejected, for the very reason that no authoritative data exist. The National Civic Federation will now try to obtain true and reliable facts to guide the student and legislator in seeking the best means to establish peace and maintain co-operation between capital and labor. To the accomplishment of this purpose I have encouraged this movement and advocated the missions of the sub-committees.

The relations of capital and labor are vital to the prosperity of the individual and to the State. It is proper, therefore, that arguments should be based on correct facts and known conditions. The Civic Federation has no greater work among its varied duties than to secure these data. The committee, which it purposes to send abroad, represents every shade of thought and opinion on the subject. This committee, when it returns, will report to a larger commission men at home, likewise from every part of the country and representing every phase of life. The Civic Federation has no interests to serve and no arguments to make on the subject, but to present the facts and conditions as they may exist abroad and at home, for the use and benefit of the entire country, without respect to special interests.

The general question was discussed throughout almost the entire day, and it was decided not to take up any of the large questions connected with governmental ownership and operation of steam railways, telegraphs, etc., but to limit the inquiry, at least at this stage, to municipal utilities. There was considerable discussion as to how far even this limited inquiry should go, but a consensus of opinion was manifested as to the subjects mentioned above as being those particularly desirable for study. Special emphasis was laid upon street railways as perhaps the matter that was most deeply interesting to the population of some of the largest American cities at the present time.

Before the close of the day the following officers and committees were elected and appointed:

Officers.—Melville E. Ingalls, president, Big Four Railroad, Cincinnati; John Mitchell, vice-president, president United Mine Workers, Indianapolis, Ind.; John G. Agar, second vice-president, president Reform Club, New York City; Edward A. Moffett, secretary, editor "Bricklayer and Mason," New York City.

Executive Committee.—The officers ex-officio and Alexander H. Revell, merchant, Chicago, Ill.; E. E. Clark, grand chief Brotherhood of Railway Conductors, Cedar Rapids, Ia.; Isaac N. Seligman, banker, New York; E. Rosewater, editor "The Bee," Omaha, Neb.; William Wirt Howe, lawyer, New Orleans; Samuel Insull, president Chicago Edison Company, Chicago; John Bancroft Devins, editor New York "Observer," New York; Frederick N. Judson, attorney, St. Louis, Mo.; Carrol D. Wright, president Clark University, Worcester, Mass.; Hamilton Holt, editor "The Independent," New York; Walter MacArthur, editor "Coast Seamen's Journal," San Francisco, Cal.; D. L. Cease, editor "Railroad Trainmen's Journal," Cleveland, Ohio; Franklin MacVeagh, merchant, Chicago, Ill.; Henry M. Farnam, Yale University, New Haven, Conn.; George H. Harries, Washington Railway & Electric Company, Washington, D. C.; Louis D. Brandies, lawyer, Boston, Mass.; Marcus M. Marks, manufacturer, New York City; James O'Connell, president International Association of Machinists, Washington, D. C.; Lawrence F. Abbott, editor "The Outlook," New York City; R. R. Bowker, editor "Publishers' Weekly," New York; Alexander C. Humphrey, president Stevens Institute, Hoboken, N. J.; J. W. Jenks, Cornell University, Ithaca, N. Y.; John Tobin, president Boot and Shoe Workers' Union, Boston; Frank A. Vanderlip, National City Bank, New York City.

Committee on Investigation (to investigate the subject in America and foreign countries).—M. E. Ingalls, Big Four Railroad Company, Cincinnati, Ohio; Talcott Williams, editorial writer, "The Press," Philadelphia, Pa.; W. D. Mahon, president Amalgamated Association of Street Railway Employees, Detroit, Mich.; Frank J. Goodnow, Columbia University, New York City; Walton Clark, United Gas Improvement Company, Philadelphia, Pa.; Dr. Albert Shaw, editor "Review of Reviews," New York City; Edward W. Bemis, superintendent waterworks, Cleveland; John H. Gray, Northwestern University, Chicago, Ill.; Walter L. Fisher, Municipal Voters' League, Chicago, Ill.; Timothy Healy, international president Stationary Firemen, New York City; William J. Clark, General Electric Company, New York City; H. B. F. MacFarland, president Board of Commissioners, District of Columbia, Washington, D. C.; Daniel J. Keefe, president International Longshoremen's Association, Detroit, Mich.; Frank Parsons, president National Ownership League, Boston; John R. Commons, University of Wisconsin, Madison, Wis.; J. W. Sullivan, editor "Garment Workers' Bulletin," New York; Leo S. Rowe, University of Pennsylvania, Philadelphia; F. J. McNulty, president International Brotherhood of Electrical Workers, Washington, D. C.; Albert E. Winchester, manager South Norwalk Electric Plant, South Norwark, Conn.; Charles L. Edgar, president the Edison Electric Illuminating Company, Boston, Mass.; Milo H. Maltbie, franchise expert and former editor "Municipal Affairs," New York City.

At the adjournment of the meeting of the commission, fifteen members of the committee on investigation met informally to confer upon means for carrying out effectively the purpose of the movement, and a sub-committee of this investigation committee, consisting of Messrs. Goodnow, Walton Clark, Bemis, Sullivan and Maltbie was appointed to prepare a set of questions designed to cover all the vital points on which information is desired in this country and abroad. These questions will be taken up at an early date in November by the larger committee on investigation for such action as may then be deemed advisable. During all the discussions there was a strict avoidance of the polemical aspects of the question and a strenuous insistence upon the desirability of securing by the work of the committee the absolute facts and data irrespective of the interpretation that might subsequently be put upon them. Inquiries will be carried on by the committee, not only in this country but in Europe, it being necessary, for example, to cross the Atlantic to secure figures with regard to municipal street railway operation, there being virtually no roads of that character in the United States. It will be some months before the work of the commission can be completed and brought to public attention.

The Detroit United Railway, at its shops, is building twenty-four new cars for the Trumbull Avenue line. They are to be equipped with single trucks of an improved style, air brakes, fenders, and a new heating apparatus operated from the vestibule. In a general way, they conform to the pattern of the Fourteenth Avenue cars, except where improvements are made by having no side door, wider aisles and greater space between the seats, making the car much roomier. Each will seat thirty people and is provided with a generous rear platform for the accommodation of smokers.

LEGAL DEPARTMENT*

INCOMPETENT MEDICAL ATTENDANCE

One of the stock defenses to indictments for murder is the claim that the deceased was killed not by the defendant, but by his doctors; in other words, that the wound inflicted was not necessarily, or even probably, fatal, but that death resulted because of incompetent medical treatment. The criminal courts deal with this contention according to common sense, and rarely does it prevail if the injury inflicted was of a very serious character.

A defense of the same kind is often raised in accident cases. The law upon the subject is that a person injured by the negligence of another is bound to use reasonable care to effect a speedy cure, and must exercise reasonable care to employ physicians of ordinary skill, but he is not an insurer of the skill of the physicians employed, or required to employ the highest medical skill available; and the fact that the physicians employed make a mistake in the treatment, and thereby fail to effect a cure, does not preclude the person injured from recovering for the entire injury sustained, so long as the requisite care has been used in the employment of the physicians.

The question whether or not plaintiff's condition is the result of defendant's negligence or of an inherent disease or tendency to disease, is a question of fact, and the circumstance that injuries caused through negligence of another were aggravated by an organic tendency to disease, which was developed by the injuries or through treatment applied by the physicians, does not preclude a recovery. These points have recently been reiterated by the Supreme Court of Illinois in a well-considered opinion in the case of Chicago City Ry. Co. vs. Saxby (December, 1904, 72 N. E., 755). The general rules governing the subject are formulated as follows in the American and English Encyclopedia of Law (Vol. VII. 2d Edition, p. 338).

"In cases where the defendant's negligence caused a disease, aggravated a prior disease, or led in immediate sequence to disease, the defendant must respond in damages for such part of the diseased condition as his negligence caused; and if there can be no apportionment, or if it cannot be said that the disease would have existed apart from the injury inflicted by the defendant, then the defendant is responsible for the diseased condition."

LIABILITY FOR NEGLIGENCE

ALABAMA.—Carriers—Injuries to Passengers—Pleading—Wilful Injury—Contributory Negligence.

1. In an action against a carrier for injuries to a passenger, an allegation that defendant negligently operated its train, and that thereby or in consequence thereof plaintiff was injured, etc., sufficiently charged defendant's negligence.

2. A count alleging that plaintiff informed defendant's conductor of his desire to alight at a certain point; that it then became the duty of defendant's servant, after slackening the speed of the car, not to increase the speed until plaintiff had alighted, or had a reasonable opportunity to do so, but that, notwithstanding such duty, defendant's servant negligently, suddenly, and greatly increased the speed of the car before plaintiff had alighted or had a reasonable opportunity to alight, in consequence of which negligence plaintiff's body was thrown from the car, etc., though faulty in assuming, instead of alleging, that defendant's servant slackened the speed on being informed that plaintiff desired to alight, was nevertheless good as against a demurrer on the ground that it failed to allege increase of speed at the time plaintiff was in the act of alighting.

3. A count, after stating plaintiff's relation as a passenger, and the duty of defendant's servant not to increase the speed of the car after being advised that plaintiff desired to alight, alleged that defendant's motorman, well knowing that plaintiff was seeking to alight, and that a sudden jerk would probably throw plaintiff from the car, with wanton, wilful and reckless negligence suddenly increased the speed of the car, and, as a proximate consequence thereof, plaintiff was thrown from the car and injured. Held, that such count did not present a charge of wilful injury, but tendered an issue of negligence only.

4. Where a street car passenger stepped off a car while it was going at a high rate of speed, with his face toward the rear of the car, he was guilty of contributory negligence.—(Birmingham Ry., Light & Power Co. vs. Glover, 38 S. Rep., 836.)

ALABAMA.—Street Railroads—Collision with Teams—Wanton Negligence—Instructions—Questions for Jury.

1. In an action against a street railroad for injuries to a mule, caused by a collision with a car, whether the railroad was guilty of a wanton or wilful wrong, held, under the evidence, a question for the jury.

2. In an action against a street railroad for injuring a mule, a charge that the motorman had the right to assume that travelers would look and listen for approaching cars before attempting to cross the track, and the jury might consider that fact in determining whether or not the motorman was guilty of a wilful wrong, singled out and gave undue emphasis to a particular fact, and was properly refused.

3. The fact that a street car which collided with and injured a mule was not being run faster than 5 miles or 6 miles an hour does not show, as a matter of law, that the motorman was not guilty of a wilful or wanton wrong in striking the mule.

4. In an action against a street railroad for injuring a mule, a charge that defendant was not guilty of a wilful or wanton wrong if the car was being run at the rate of 5 miles or 6 miles an hour, was properly refused, because it did not limit the question of speed to the time of the injury.

5. A charge calling on the trial court to declare that there is no evidence of a particular fact is properly refused.

6. In order that one may be held guilty of wilful or wanton conduct, it must be shown that he was conscious of his conduct, and conscious, from his knowledge of existing conditions, that injury would likely or probably result from his conduct, and that with reckless indifference to consequences he consciously and intentionally did some wrongful act or omitted some known duty which produced the injurious result.—(Montgomery St. Ry. vs. Rice, 38 S. Rep., 857.)

ILLINOIS.—Carriers—Injury to Passenger—Negligence—Question for Jury—Evidence—Admissibility—Harmless Error.

1. Where there is any evidence tending to support the allegations in the declaration it is not error to refuse to direct a verdict for defendant.

2. Where the conductor of a street car knew that the car would swing around a corner, and knew that it was near the corner when he told a passenger to walk through the car so as to obtain a seat in another car, it was his duty to inform the passenger of the danger of the car making the turn, or to so control the car that there would be no danger in the passenger passing from one car to the other.

3. Whether it is negligence for a passenger on a street car to ride on the platform of the car in a case where other passengers are on the platform and people are holding onto the straps inside and the seats are filled is a question for the jury.

4. Whether a passenger on a street car, who passed from one car to another for the purpose of procuring a seat, pursuant to the direction of the conductor, was negligent, held, under the evidence, a question for the jury.

5. Where on the examination of a witness the counsel for the adverse party stated that he did not object if witness did not go any further, and the examination along that line was discontinued, the adverse party could not assign as error the admission of the evidence.

6. Where, in a personal injury action, competent evidence was admitted showing plaintiff's nervous condition, the error in permitting a witness to state that he knew, without plaintiff telling him, that she was nervous, and that he knew nothing about it except from her statement, without requiring an explanation of the conflicting statements, was not reversible error.

7. Where, in a personal injury action, an injury to the nervous system is claimed, it is not error to permit a physician to testify with reference to plaintiff's nervous condition, for he can testify on the subject without relying on what plaintiff says in reference thereto.—(Chicago City Ry. Co. vs. McCaughna, 74 N. E. Rep., 819.)

INDIANA.—Street Railroads—Employees—Fellow Servants—Negligence—Employer's Liability Act—Applicability—Pleadings—Complaint—Allegations—Sufficiency—Change of Venue—Record—Amendment.

1. Burns' Ann. St. 1901, Section 417, requires the clerk of the court from which a change of venue is taken to transmit the papers and a transcript of the proceedings to the clerk of the court to which the venue is changed, and makes it the duty of the latter to

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docket the action in its order. The clerk of the court to which a case had been sent upon a change of venue certified that the record on appeal contained a full and true transcript of all papers filed, including pleadings. It did not affirmatively appear that the original papers were filed in the court to which the case was sent, nor did it affirmatively appear that they were not so filed. Held to sufficiently appear that the record contained a copy of all pleadings in the case.

2. Where, after a change of venue, the parties appeared in the court to which the case was sent, and the court overruled demurrers to the complaint, and the cause proceeded to trial and final judgment without any objection that the original pleadings were not on file, the appellate court is authorized to treat the copy of the pleadings set out in the copy of the transcript made on the change of venue as a sufficiently certified copy of the original pleadings.

3. On a motion for a nunc pro tunc entry showing the actual ruling of the court on separate demurrers to the different paragraphs of a complaint and the exceptions taken thereto, there was a written memorandum of the court's action stating, "Demurrer to complaint overruled; answer filed." There was no demurrer to the whole complaint. Held sufficient to admit parol proof showing the actual ruling of the court.

4. The court to which a cause was transferred on a charge of venue has jurisdiction after the expiration of the term in which the judgment was rendered to amend the record on motion for a nunc pro tunc entry on notice being served on the adverse party.

5. A motion to correct a judgment by a nunc pro tunc entry need not be filed before the notice of the motion is served on the adverse party, nor at any specified time preceding the date named in the notice for making the motion.

6. An employee of an interurban electric railway company, repairing its tracks, when carried to and from his work, or from point to point along the line in a car of the company, is not a passenger, but an employee, and a fellow servant of those in charge of the car.

7. Where the complaint in an action by an employee of a street railway company, repairing the tracks, to recover for injuries sustained while riding on a car, showed that when he was injured he was a fellow servant of the motorman in charge of the car, the allegation that the work in which the employee was engaged was not connected with the employment of the motorman, did not change the legal effect of the fact that he was at the time of the injury a fellow servant with the motorman.

8. Employers' Liability Act, March 4, 1893, p. 295, c. 130, Section 1 (Burns' Ann. St. 1901, Section 7083), providing that every railroad or other corporation shall be liable for damages for personal injuries suffered by an employee, where the injury was caused by the negligence of any employee having charge of any signal, telegraph office, "locomotive engine, or train upon a railroad," does not apply to employees operating electric cars, such a car not being a "locomotive engine" or a "train upon a railroad," within the meaning of the statute.

9. The complaint in an action by an employee of an electric railway company for injuries sustained while on a car of the company, which proceeds on the theory that the injury was caused by the negligence of a boy, whom the company had placed in charge of a switch, and which avers that the boy was inexperienced, and of insufficient age and discretion to be intrusted with such work, is insufficient for failing to aver that the employee had no knowledge of the incompetency of the boy prior to the injury.

10. Employers' Liability Act, March 4, 1893, p. 295, c. 130, Section 1 (Burns' Ann. St. 1901, Section 7083), providing that every railroad shall be liable for a personal injury suffered by an employee where the injury was caused by the negligence of any person in the employ of the company in charge of any signal, telegraph office, "switch yard, shop," etc., creates no liability for injuries to employees caused by negligence of persons in charge of a switch.

11. A complaint in an action for personal injuries sustained by an employee of a street railway company while riding on a car, which avers that the car was old and dangerous, which was known to the company and unknown to the employee, is defective for failing to show that the condition of the car was the proximate cause of the injury.—(Indianapolis & G. Rapid Transit Co. vs. Andis, 72 N. E. Rep., 145.)

IOWA.—Street Railroads—Collisions with Teams—Negligence—Instructions—Evidence—Bankruptcy—Suits by Bankrupt—Prosecution with Trustee's Consent.

1. In an action against a street railroad for injuries from a collision, instructions directing a verdict for defendant if plaintiff failed to prove freedom from contributory negligence, and enumerating the acts of negligence relied on in the petition, except that of failing to stop the car after the motorman saw plaintiff's danger, and charging that, if the jury failed to find any of the acts of negligence, their verdict would be for defendant, were inconsistent with a charge that, though plaintiff was negligent, yet defendant would be liable if its employees saw plaintiff, and knew of his perilous position, and failed to use ordinary care to prevent injury.

2. It is proper to submit defendant's theory of the case, although it is supported by the testimony of but one witness.

3. In an action against a street railroad for injuries from a collision, a charge that, if the motorman slowed up the car, expecting that plaintiff's team would pass in front, and thereupon noticed the team turn as if to pass behind the car, and believed that it was plaintiff's intention to pass behind the car, and moved the car forward to give plaintiff more room in which to pass, when plaintiff's horses became frightened and started suddenly in front of the car, and the accident occurred without defendant's negligence, the verdict should be for defendant, did not assume the facts recited therein, and was not erroneous.

4. Where a motorman observed, on moving the car forward, that a team of horses became frightened, and was undertaking to pass in front of the car, it was his duty to stop the car, if it could be done in the exercise of ordinary care, in time to avoid an injury.

5. In an action against a street railroad for injuries from a collision, municipal ordinances requiring employees of the railroad to use reasonable care to prevent injury, and to stop the car on the appearance of danger to any one near the track, and to use proper care to prevent injury to teams, state merely general rules of law, and are properly excluded from evidence.

6. Where, after a trial resulting in a verdict for defendant, plaintiff was adjudged a bankrupt, and his trustee substituted, plaintiff could, nevertheless, prosecute an appeal on the trustee's filing written consent thereto, and defendant had no ground of complaint.—(Christy et al. vs. Des Moines City Ry. Co., 102 N. W. Rep., 194.)

KENTUCKY.—Street Railroads—Crossing—Accident—Alighting Passenger—Instructions.

1. In an action against a street railroad for the death of a passenger who had alighted from a car and was run over by one of defendant's cars coming from the opposite direction, the plaintiff's proof tended to show that when the car struck deceased it was going at the rate of 15 or 18 miles an hour, and carried deceased across one street and 30 ft. beyond. Defendant's testimony was that deceased was carried only 30 or 35 ft., and its motorman testified that he saw deceased when within about 50 ft. of him, and that he appeared to be about to cross the track; that he noticed deceased halt as though he had determined to let the car pass; that witness turned on the power, but at that moment deceased went on the track, and that witness then used every effort to prevent the car from striking deceased, but failed. Held no error in refusing peremptory instruction for defendant.

2. A charge requested, which particularizes and gives undue prominence to facts proved, is properly refused.—(Louisville Ry. Co. vs. Hartman's Adm'r, 83 S. W. Rep., 570.)

MAINE.—Street Railroads—Injury to Passenger—Negligence—Evidence—Custom—Exceptions

1. When the evidence is conflicting, and the question of liability and damages is one that is peculiarly within the province of the jury, and the evidence does not convince the court that the jury were clearly wrong, a motion for a new trial will be overruled.

2. A requested instruction, although proper, may be rightfully refused when the presiding justice has covered the whole ground of the instruction in his charge. He is not required to give it again.

3. In an action against a street railway company to recover damages for personal injuries received by the plaintiff's intestate, testimony is admissible upon the question of the negligence of the defendant to show that it was the custom of the defendant to permit passengers to ride on the running board of its cars, although there was no claim that this custom was known to the plaintiff's intestate.

4. Exceptions do not lie to the exclusion by the court of photographs. It is in the discretion of the presiding justice to admit or exclude photographs.—(Stone vs. Lewiston, B. & B. St. Ry., 59 Atl. Rep., 56.)

MARYLAND.—Contributory Negligence—Question for Jury—Carriers—Injury to Passenger.

1. Where the nature of the act relied on to show contributory negligence can only be determined by considering all the circumstances attending the transaction, it is within the province of the jury to characterize it.

2. The question of contributory negligence will not be taken from the jury unless the conduct of the plaintiff relied on as amounting in law to contributory negligence is established by clear and uncontradicted evidence.

3. In an action for injuries to a passenger, evidence examined, and held, that whether plaintiff was guilty of contributory negligence was a question for the jury.—(Strauss vs. United Rys. & Electric Co. of Baltimore, 61 Atl. Rep., 137.)

MARYLAND.—Master and Servant—Master's Duty to Inspect — Sufficiency — Inspection — Evidence — Presumptions — Question for Jury.

1. Where, according to the custom of a street railroad company, a car, after arriving at the barns, was inspected about 2.30 in the morning, and then left to stand on a side track, unlighted and unguarded, for several hours, a servant was entitled to recover for injuries arising from a defective condition of the car, owing to such method of inspection.

2. Where, in an action for injuries to an employee of a street railroad company from a defect in a car, it appeared that the night before the car had been standing outdoors for several hours on a side track, it would be presumed, in the absence of evidence to the contrary, that the car was, while so standing, unlighted and unguarded.

3. In an action for injuries to a street car conductor from the giving way of a handhold on a car, held, a question for the jury whether the injury occurred to the handhold before plaintiff was assigned to the car, or after he was placed in charge of it.—(Crawford vs. United Railways & Electric Co., of Baltimore, 61 Atl. Rep., 287.)

MARYLAND.—Street Railroads—Injuries to Passengers While Alighting—Negligence—Contributory Negligence.

1. A street railway company discharging its passengers on its private way is bound to the utmost degree of care in procuring a safe place for the passengers to alight.

2. In an action against a street railway company for injuries to a passenger while alighting from a car on the company's private way, evidence examined, and held sufficient to show that the company was negligent in failing to provide a safe place for the passenger to alight.

3. The question of contributory negligence is for the jury, except in a case where the facts are undisputed, and where only one reasonable inference can be drawn therefrom.

4. Carriers of passengers are held to the exercise of the highest degree of care consistent with their undertaking, but passengers are required to exercise ordinary care only.

5. In determining the question of the contributory negligence of a passenger alighting from a street car on the company's private way, the fact of the conductor stopping the car for the passenger to alight must be considered.

6. On the issue whether a street car conductor invited a passenger to alight at a place where the car stopped on the company's private way, evidence held to show that the conductor invited the passenger to alight.

7. In an action against a street railway company for injuries sustained by a passenger while alighting from a car on the company's private way, evidence held not to show contributory negligence precluding a recovery.—(Topp vs. United Rys. & Electric Co., of Baltimore, 59 Atl. Rep., 52.)

MASSACHUSETTS.—Electric Street Railways—Negligence—Injuries to Driver of Vehicle—Contributory Negligence—Evidence—Sufficiency of.

In an action against an electric street railway for injuries to plaintiff, caused by one of defendant's cars running into the wagon plaintiff was driving, evidence examined, and held to justify the conclusion that plaintiff listened carefully for the approach of the car, and that his conduct showed due care.—(Shea vs. Lexington & B. St. Ry. Co., 74 N. E. Rep., 931.)

MASSACHUSETTS.—Master and Servant—Relationship of Parties — Sub-Contractor's Servants — Injuries — Assumed Risk —Contributory Negligence—Care Required—Release.

1. Where plaintiff was working on defendant's elevated railroad structure as an employee of a sub-contractor, he was a licensee to whom defendant owed the duty of using due care to prevent his being injured from exposure to unusual dangers, not known to him, that might be caused by the negligent running of defendant's surface cars beneath the platform where plaintiff was working.

2. Where plaintiff, an employee of a sub-contractor engaged at work on defendant's elevated railroad, was thrown from a platform by the trolley pole of a car as it passed under the platform, while the car was being operated around a curve at a high and unusual rate of speed, on a loose trolley wire, and it did not appear that plaintiff voluntarily exposed himself to such danger with a full appreciation thereof, whether he assumed the risk was for the jury, though he had knowledge of the existence of such danger.

3. Where plaintiff, an employee of a sub-contractor, was injured by the negligence of defendant's servants, he was not a fellow servant of the latter.

4. Where a servant of a sub-contractor of defendant railway company was injured while working on its elevated structure by the negligence of defendant's employees in operating a street car under the structure, plaintiff was not guilty of contributory negligence, as a matter of law, in placing himself in the position in which he was injured; his place to work having been furnished him by his employer.

5. The rule that a servant impliedly agrees to take things as he finds them, and assumes the ordinary dangers incident to the service, does not apply to or include concealed risks or subsequent negligence of the master.

6. A contract creating an exemption from liability for injuries caused to a servant by the master's negligence during the employment is in violation of Rev. Laws, c. 106, Sec. 16, and is unenforceable.

7. A contract for the construction of an elevated railroad, providing that defendant railroad company would not be responsible for any accident caused by the trolley, feed, or other wires to men or materials on or about the work in connection with the performance by the contractor of his work under the contract did not relieve the railroad company from liability to a servant of a sub-contractor for injuries caused by the negligent operation of a surface car under the elevated structure, by which the servant was knocked from a platform by the escape of a trolley from a loose wire.—(Wagner vs. Boston Elevated Ry. Co., 74 N. E. Rep., 919.)

MASSACHUSETTS.—Negligence—Dangerous Premises—Use—Invitation—Servants—Scope of Employment.

Where plaintiff, a policeman, was called by one of defendant's conductors to a discarded horse car, used for shelter only, for the ostensible purpose of arresting certain "crooks" as a mere joke on the policeman, and he was injured by reason of a defect in the platform as he boarded the car, the conductor's act was not within the scope of his authority, and defendant was not liable, though the act was performed on its premises.—(Berry vs. Boston Elevated Ry. Co., 74 N. E. Rep., 933.)

MASSACHUSETTS.—Street Railroads—Collisions—Injury to Traveler—Right of Traveler—Negligence—Contributory Negligence—Evidence—Questions for Jury.

1. An individual traveling on a street and a street car operated thereon have equal rights, except as modified by the fact that the car cannot leave the track; so that the individual must not unreasonably interfere with its progress.

2. A traveler on a street on which street cars are operated has the right to travel on any part of the street, but if the path he selects subjects him to the liability of being struck by a passing car he is bound to use reasonable care to avoid a collision, and he has the right to expect corresponding care on the part of the motormen in charge of the cars.

3. In an action by a traveler on a street for injuries sustained in a collision with a street car, evidence examined, and held, that the questions of defendant's negligence and plaintiff's contributory negligence were for the jury.—(Kerr vs. Boston Elevated Ry. Co.)

MASSACHUSETTS.—Elevated Railroads—Adjoining Property Owners—Damages—Elements—Frightening Horses—Instructions—Appeal—Exceptions—Waiver.

1. Exceptions not argued will be considered waived.

2. In an action by a property owner for damages caused by the operation of an elevated railroad, fright of horses caused by the operation of the railroad is not an element of damage, where it was an inconvenience of a general character, and was not confined to the horses of those having occasion to trade with the tenants of petitioner's property.

3. Where, in a proceeding to assess damages to complainant's property by the operation of an elevated railroad, the court charged that there was some testimony that sometimes the horses of customers of tenants of one of the buildings in question were frightened by the elevated trains, and that defendant was not liable for anything the horses did by reason of the running of such trains, defendant was not prejudiced by the refusal to charge that the fact that horses of customers of tenants might be or were frightened by elevated trains did not constitute an element of damages which could be considered by the jury as diminishing the value of petitioner's property.—(Swain et al. vs. Boston Elevated Ry. C., 74 N. E. Rep., 672.)

MASSACHUSETTS.—Master and Servant—Injury to Servant—Electric Lineman—Method of Work—Instructions—Assumption of Risk—Expert Evidence.

1. Plaintiff, a lineman in defendant's employ, was injured by being thrown from a pole by the recoil of a cable while lifting it from one insulator pin to another. In order to do the work, plaintiff stood on a tower wagon underneath the arm of the pole on which the cable rested, with one foot on a brace supporting the

arm, and the other foot on the rail attached to, but some two feet higher than, the platform of the tower wagon. The cable at that point was being strung on a sharp turn, and there was nothing to prevent plaintiff from releasing his grasp on the cable as it recoiled. Held that since the danger under such circumstances was open and obvious, defendant was not guilty of negligence in failing to instruct plaintiff with reference thereto.

2. Where a lineman was substantially familiar with the manner in which a cable was being raised and attached to the arms of posts at the time he was injured, and the method then employed to adjust the cable to the pole did not differ from that previously followed, he assumed the risk of injury from the use of such method.

3. Where a lineman was thrown from a pole by the recoil of a cable while he was lifting the same from one insulator pin to another, the process employed, being a matter of common observation and knowledge, was not a proper subject of expert testimony.—(Meehan vs. Holyoke St. Ry. Co., 72 N. E. Rep., 61.)

MASSACHUSETTS.—Street Railroads—Collisions With Teams — Negligence — Contributory Negligence — Vicarious Negligence—Question for Jury.

1. The right of one who has intrusted himself to the care of another, with whom he is driving, to recover for injuries caused by the negligence of a street car company, is dependent on the exercise of due care by his companion.

2. In an action for injuries to a person in a wagon, caused by collision with a street car, whether the driver of the team was in the exercise of due care, held under the evidence, a question for the jury.

3. In an action for injuries to a person in a wagon, caused by collision with a street car, whether the motorman of the car was guilty of gross negligence, within the meaning of Rev. Laws, c. 171, Section 2, authorizing a recovery for the death of a person caused by gross negligence, held under the evidence, a question for the jury.—(Evensen vs. Lexington & B. St. Ry. Co., 72 N. E. Rep., 355.)

MICHIGAN.—Street Railroads—Highways—Injuries to Travelers—Negligence—Contributory Negligence.

1. Where a railway track was laid in the street so that only 12 ft. and 7 ins. of driveway was left between the west rail and the curb, and the car by which plaintiff was injured projected 22¼ ins. beyond the track, defendant's motorman, approaching the vehicle in which plaintiff was riding from behind, and seeing other vehicles in such narrow space, and that plaintiff's horse appeared to be frightened, was bound to immediately bring his car under control, so far as it was possible for him to do so.

2. Plaintiff, a girl 15 years of age, was riding with her sister in a buggy drawn by a horse, ordinarily gentle, but which became frightened at the approach of a street car at a high rate of speed, causing dust and leaves to fly into the air. Plaintiff, who was obliged to act quickly, and not knowing the speed of the car or its exact distance from her, attempted to alight, to hold the horse by the head until the car passed, when the car struck her. Held that plaintiff was not guilty of contributory negligence, as a matter of law.—(McVean vs. Detroit United Ry., 101 N. W. Rep., 527.)

MICHIGAN.—Assault—Special Officers—Liability of Employer—Same—Presumption—Evidence.

1. Where a special deputy sheriff, paid by a street railroad company, acts solely in his capacity as an officer in assaulting a passenger, and not by the direction of the conductor in charge of the car, the street railway company is not liable for the act.

2. When a disorderly person is arrested by a police officer, the presumption is that the officer is acting in his official capacity, and not as an agent for the party who pays him.

3. In an action against a street railway company for an assault upon a passenger by a special deputy sheriff, who was paid by the company, and whose duty it was to ride upon the cars and prevent disturbances, the evidence showed that plaintiff had refused to pay his fare, that the conductor told him that if he did not pay he would put him off, and that the deputy then interfered, and in the course of the ensuing altercation struck plaintiff. It was not claimed that plaintiff was guilty of any breach of the peace; the only cause of the deputy's action being plaintiff's refusal to pay his fare. Held, that the action of the deputy in assaulting plaintiff was upon the express or implied request of the conductor, so that the street railway company was liable.—(Foster vs. Grand Rapids Ry. Co., 104 N. W. Rep., 380.)

MICHIGAN.—Carriers—Street Railroads—Injuries to Passengers—Evidence—Subsequent Conversations with Servant—Instructions.

1. Where, in an action for injuries to a passenger, the defendant sought to show that he was not seriously hurt, and there was evidence that his early complaint was confined to small injuries, and that he attended to his business, walked considerable distances, was not confined to the house, etc., it was error to charge that the defendant did not dispute that plaintiff's ribs were broken, and that his wrist was twisted, etc.

2. In an action for injuries, it was improper for the court to intimate in the charge that "plaintiff could best describe his injuries."

3. An instruction that the jury must believe the theory and evidence of one side or the other "right through" was objectionable, where the jury might properly have found with the plaintiff as to the incidents of the cause of action, and yet disbelieved his testimony as to the extent of his injuries.

4. In an action for injuries to a passenger, evidence of a conversation between the witness and the motorman some time after the injury was not admissible as substantive testimony.

5. In an action for injuries, it was prejudicial error for the court to say that the cause had been twice tried before, that some unfortunate remark or ruling had given the judge the idea that it should be tried again, and that "we would like get to the end of this case and * * * reach the just rights of the parties."—(Butler vs. Detroit, Y. & A. A. Ry., 101 N. W., Rep., 232.)

MISSOURI.—Street Railroads—Injuries to Property—Actions—Negligence — Willfulness — Joinder — Pleading — Demurrer —Objections—Waiver—Instructions.

1. Where a petition for injuries to plaintiff's horse and wagon by defendant's street car alleged that the injury was negligently, willfully, and carelessly done and inflicted, and that defendant's agents and employees willfully, carelessly, and intentionally ran the car upon plaintiff's horse and wagon, etc., the petition was demurrable for improper joinder of causes of action, as provided by Rev. St. 1899, Section 598, since negligence and willfulness cannot concur in a single act, and evidence tending to show one would disprove the other.

2. Under the express provisions of Rev. St. 1899, Section 602, where defendant joined issue and proceeded to trial without objecting to the petition on the ground of misjoinder of causes of action, the objection was waived.

3. A sole instruction for plaintiff that, if the jury found the issues for him, they should consider, in estimating his damages, such injury as he sustained in the striking of his horse and wagon by defendant's car, and the expense he necessarily incurred in repairing the wagon, if the injury was inflicted, not exceeding the sum sued for, was defective, in failing to indicate the issues in the case, or specify the facts necessary to warrant a verdict for plaintiff.—(Boyd vs. St. Louis Transit Co., 83 S. W. Rep., 287.)

MISSOURI.—Street Railroads—Indignities to Passenger—Damages—Excessiveness.

Where a conductor of a street car declined to accept from a passenger a transfer check, and demanded fare, and forcibly resisted his efforts to leave the car, detaining him while the car journeyed several miles, and threatening to take him to a police station, though he explained the conditions under which he received the check from a conductor on another line, a verdict for $25 compensatory damages, and $500 for punitive damages was not so excessive as to warrant the court on appeal in interfering with the refusal of the trial court to set it aside.—(Mueller vs. St. Louis Transit Co., 83 S. W. Rep., 270.)

MISSOURI.—Street Railroads—Injury at Crossings—Evidence—Instructions—Petition—Sufficiency.

1. A petition in an action against a street railway company for injuries sustained in a collision on the company's tracks, alleging that a car was negligently caused to run into his vehicle, is insufficient as against a motion to require the specific acts or omissions constituting the negligence complained of to be set forth.

2. Where, in an action against a street railway company for a collision with a car at a crossing, the evidence showed negligence in the running of the car at excessive speed, in the failure to sound the bell or to attempt to stop the car after discovering the danger, instructions authorizing a verdict for plaintiff on a finding that the car was negligently run against his vehicle, and stating that it was the duty of the motorman to exercise ordinary care, and any failure to do so constituted negligence warranting a recovery unless plaintiff was negligent, were erroneous, because not restricting the jury to the acts of negligence shown by the proof.—(Sommers vs. St. Louis Transit Co., 83 S. W. Rep., 268.)

MISSOURI.—Carriers—Injuries to Passengers—Damages—Future Sufferings—Earnings—Instruction.

1. In an action for personal injuries, an instruction authorizing damages for pain of body and mind that plaintiff had suffered or would suffer by reason of her injury, and directly caused thereby, etc., was not objectionable as authorizing an award for future suffering without requiring the jury first to find that plaintiff would suffer pain in the future.

2. Where, in an action for personal injuries, there was evidence that plaintiff would be disabled in the future, and he testified that his foot still hurt him, and that he could not use it like the other, which condition interfered with his getting employment, it was

proper to permit a recovery for loss of future earnings.—(McCarthy vs. St. Louis Transit Company, 83 S. W. Rep., 298.)

MISSOURI.—Street Railways—Collision with Team—Negligence—Contributory Negligence—Medical Attendance—Instruction.

1. One who in the nighttime drove along a street railway track when he could as well drive to the side of it, having looked back a minute before he was struck by a car from the rear, and seen no car, was not guilty of such negligence as to authorize the court to say as matter of law that he could not recover.

2. It is not enough for an instruction, in an action for injuries from a street car running into a team which was going along the track, to state the duties of the persons in charge of the car and the team, without stating the legal consequences of a neglect of duty by either party.

3. It cannot be said that there was no evidence warranting the jury in finding that the motorman of a street car, by keeping a sharp lookout, would not have seen a team going along the track in time to have avoided a collision, where the conductor testified that the headlight of the car threw its rays forward twice the length of the court room.

4. An instruction that if plaintiff, driving along a street car track, knew, or by ordinary care might have known, of the approach of the car in time to have avoided the collision, he could not recover, unless the motorman knew, or by ordinary care might have known, of plaintiff's danger in time to have averted the collision, and negligently failed to do so, is erroneous in authorizing recovery under such condition.

5. An instruction, in personal injury case, authorizing recovery for medical attendance, in the absence of evidence that plaintiff paid or was obliged to pay for any such attendance, is erroneous. —(Kimble vs. St. Louis & S. Ry. Co., 82 S. W. Rep., 1096.)

MISSOURI.—Street Railways—Wrongful Arrest of Passengers —Liability of Company—Act of Conductor—Authority—Malicious Prosecution—Instructions—Evidence—Express Malice —Harmless Error.

1. A street railway conductor demanded a second fare from a passenger, who refused to pay or get off. Later the passenger attempted to alight, but was prevented by the conductor, who called a police officer, in the car, to arrest the passenger. The officer refused unless the conductor would prefer a charge, which he agreed to do. When the car reached a police station, the conductor went to it, and made a formal charge of disorderly conduct against plaintiff, who was tried and acquitted. Held, that the charge was made by the conductor while in the discharge of his duties, making the company liable for malicious prosecution.

2. Though Rev. St., 1899, Secs. 1074, 1163, only authorize a street railway conductor in charge of a car to eject a passenger for refusing to pay fare, for disorderly conduct, etc., a conductor can call on a police officer to arrest a passenger, when necessary for the protection of other passengers, and the company is liable to a passenger wrongfully arrested on charges preferred by the conductor while acting within the scope of his authority.

3. Where a street railway company was liable to a passenger wrongfully arrested on charges preferred by a conductor, error in admitting evidence that the company ratified the conductor's act was harmless.

4. An instruction which refers to the petition for the purpose of identifying a thing about which an issue was raised is not open to the objection that it refers the jury to the petition to ascertain what the issues are.

5. Where the servant of a corporation acts maliciously when acting within the scope of his authority, the corporation is chargeable with malice.

6. An instruction in an action for malicious prosecution authorizing the jury to assess the damages in such sum as will compensate plaintiff for "any shame, mortification, mental anguish and pain, and injury to feelings," is not open to the objection that it authorizes a recovery for physical pain.

7. Where, in an action for malicious prosecution, the evidence shows that, without any cause, plaintiff was arrested, charged with an offense, and forced to undergo a trial, express malice is shown.—(Dwyer vs. St. Louis Transit Co., 83 S. W. Rep., 303.)

MISSOURI.—Injuries to Passenger—Damages—Expense of Medical Treatment—Instructions—Punitive Damages—Conduct of Counsel—Exceptions.

1. Where, in a personal injury action, the jury awarded compensatory damages only, an error in an instruction as to punitive damages was not prejudicial to defendant.

2. Where, in a personal injury action, the petition alleged that plaintiff had been compelled to expend money for medical treatment, and the evidence admitted without objection showed that he had only incurred an obligation for the treatment, it was not error to instruct that the jury might include in the damages expenses incurred for medical treatment, as the petition could have been amended if an objection to the testimony had been made.

3. The course of the trial court when statements of an attorney in argument are objected to is largely one of discretion, so that it is necessary to direct the court's attention to the language complained of, and to an exception to the court's action, in order to obtain a review thereof.—(Spengler vs. St. Louis Transit Co., 83 S. W. Rep., 312.)

NEW JERSEY.—Carriers—Injury to Passenger—Negligence of Motorman.

1. It is not sufficient evidence of negligence in the motorman of an electric street railway, when about to start or to increase the motion of a heavily loaded passenger car, that he turned on the power and released his brake so as to cause a passenger standing on the front platform to "swing to the side a little bit," or "fall a little to the side." From such a result alone the jury cannot reasonably and legitimately infer negligence of car operation against the carrier.

2. The actual management of the car in such cases, not the resultant effects, should determine the question of the carrier's negligence.

(Syllabus by the court.)—(Faul vs. North Jersey St. Ry. Co., 59 Atl. Rep., 148.)

NEW YORK.—Appeal—Reversal—Weight of Evidence—Carriers —Passengers—Authority of Employee—Questions for Jury.

1. Where the number of defendant's witnesses exceeds those of plaintiff, and common knowledge and experience show no inherent probability in the version given by either, the verdict for plaintiff will not be disturbed as against the weight of the evidence.

2. Where a newsboy boarded a street car to sell papers without intending to become a passenger by paying his fare or traveling to any particular point, he was not entitled to the rights of a passenger.

3. In an action for injuries sustained in being ejected from a moving street car, where it appeared that plaintiff boarded the car to sell papers without intention of becoming a passenger, and was ejected by the motorman, who lunged for him the moment he discovered him, without inquiring whether he was a passenger, or ordering him inside or off, it was a question of fact for the jury whether the motorman was acting within the scope of his authority; and, if he was not, the defendant was not liable. Patterson, J., dissenting.—(Barry vs. Union Ry. Co., of New York, 94 N. Y. Sup., 449.)

NEW YORK.—Street Railroads—Operation—Injury to Passenger —Instructions.

An instruction, in an action against a street railway company for injuries to a passenger while alighting from a car, that the company was bound to carry passengers safely and to use the utmost care and skill of a cautious person in doing so, was erroneous.—(Atkins vs. New York City Ry. Co., 94 N. Y. Sup., 500.)

NEW YORK.—Street Railroads—Operation of Cars—Control of Passengers—Assault by Conductor—Evidence.

1. Where the seats of a street car are occupied and a passenger is obliged to stand on the running board, the conductor has no right to compel the passenger to change his position so as not to stand in front of a particular passenger.

2. Evidence in an action against a street railway company for an assault committed by its conductor on a passenger examined, and held not sufficient to support a verdict for the passenger.—(Guariello vs. Union Ry. Co. of New York City, 94 N. Y. Sup., 538.)

NEW YORK.—Street Railroads—Actions for Injuries—Pleading —Admissions—Injuries to Pedestrians—Contributory Negligence.

1. Where an answer to a complaint against a street railroad for injuries denies that defendant's car injured plaintiff, an admission of the answer that defendant operated "certain" cars on different thoroughfares, including that where the accident happened, is not an admission that it was defendant's car which caused the injury, and does not excuse plaintiff from showing that the car which injured him was owned, operated, or controlled by defendant.

2. One who stands on a street car track, with knowledge that a car is rapidly approaching, and without taking any precaution to avert injury to himself, is guilty of contributory negligence.—(Gargano vs. Forty-Second St., M. & St. N. Ave. Ry. Co., 94 N. Y. Sup., 544.)

NEW YORK.—Injury to Employee—Question for Jury—Negligence of Superintendent.

1. Where there is evidence that plaintiff's decedent, when last seen, was about to make a coupling betwen a car and an engine;

that no one saw him come out; that the coupling was made, and that his body was found at about the place where it was made—the time when and the manner in which the accident happened to him through alleged negligence of defendant railroad company in starting its train is a question for the jury.

2. Where one, in the absence of the regular train despatcher, had been accustomed for three years to perform his duties, his act in starting a train while plaintiff's decedent was coupling or attempting to withdraw to a place of safety was not a mere detail of work, under the employers' liability act (laws 1902, page 1748, chap. 600, sec. 1), but that of a superintendent, for whose negligence the railway would be liable.)—(McHugh vs. Manhattan Ry. Co., 72 N. E. Rep., 312.)

NEW YORK.—Carriers—Injury to Passenger—Instructions—Taking Question from Jury—Instructions.

I. Where, in an action against a street railroad company for injuries to a passenger, neither negligence nor contributory negligence appeared as a matter of law, an instruction that if the motorman started the car with a sudden jerk while plaintiff was attempting to board the same, and plaintiff was injured thereby, the verdict should be for the plaintiff, was erroneous, as taking negligence and contributory negligence from the jury.

2. In an action against a street railroad company for injuries to a passenger, owing to the alleged negligence of the motorman in starting the car while plaintiff was boarding it, an instruction in effect characterizing the motorman's conduct as negligence was erroneous.—(Ward vs. Metropolitan St. Ry. Co., 90 N. Y. Sup., 897.)

NEW YORK.—Street Railroad—Personal Injury—Collision—Questions for Jury—Contributory Negligence—Imputed Negligence.

1. In an action against a street railroad for personal injuries received in a collision between a wagon in which plaintiff was riding and one of defendant's cars, alleged to have resulted from the negligence of defendant's motorman, the act of the defendant in permitting the case to go to the jury without objection at the close of the case is a tacit concession of the sufficiency of the evidence to require a submission to the jury of the questions of the motorman's negligence and the plaintiff's contributory negligence.

2. In an action against a street railroad company for injuries received in a collision between a wagon in which plaintiff was riding and one of defendant's cars, alleged to have resulted from the negligence of the defendant's motorman, it appeared that the plaintiff was riding gratuitously in the wagon at the time of the collision, on the invitation of the driver, who was also its owner. The driver was engaged in the business of carting ice for the plaintiff and his customers and others, and it did not appear that plaintiff did or was authorized to exercise any control over the wagon. Held, that the driver was not a servant of plaintiff, and hence the negligence of the driver could not be imputed to plaintiff.—(Scarangello vs. Interurban St. Ry. Co., 90 N. Y. Sup., 430.)

NEW YORK.—Street Railroads—Persons on Track—Infants—Death—Negligence—Question for Jury—Infants—Non Sui Juris—Negligence of Parents.

1. In an action for death of an infant six years of age while crossing a street railway track, evidence reviewed, and held to require submission to the jury of the question whether defendant's driver saw, or by exercise of due care could have seen, deceased on the track, or about to cross, in time to have stopped the car or to have avoided the accident.

2. Where decedent was only six years of age at the time he sustained injuries in a collision with a street car, from which he died, it will be presumed, in the absence of evidence to the contrary, that he was non sui juris, and could not, therefore, be guilty of contributory negligence.

3. Decedent's mother on the afternoon of his death accompanied her three children to a park, and permitted decedent to accompany his older brother and play with other boys within the park, but cautioned them not to go near East River, which was adjacent thereto. The boys disappeared from her view in the park, and went near the river, and, in returning, decedent was killed while crossing a street car track. Held, that decedent's mother was not guilty of contributory negligence, as a matter of law, in not exercising proper care for the safety of the child.

Van Brunt, P. J., dissenting.—(Kaplan vs. Metropolitan St. Ry. Co., 90 N. Y. Sup., 585.)

NEW YORK.—Street Railroads—Persons on Track—Children—Death—Negligence—Contributory Negligence—Non Sui Juris.

1. In an action against a street railway company for the killing of a child, evidence reviewed, and held to require submission of the question of defendant's negligence to the jury.

2. A child nine years and three months of age, killed while crossing a street railway track by being struck by a car, is only required to use such care for his own safety as is usual in children of his age when playing in the streets under similar circumstances.

3. In an action for the death of a child nine years and three months of age, while playing in the street, by being struck by a street car, plaintiff is entitled to the presumption that the child was non sui juris.

Jenks, J., dissenting.—(Dempsey vs. Brooklyn Heights R. Co., 90 N. Y. Sup., 639.)

NORTH CAROLINA.—Railroads—Animals—Care Required—Street Railroad—Killing Dog—Liability.

1. A dog is not within code, sec. 2326, making the killing of any cattle or other livestock by its engine or cars prima facie evidence of negligence on the part of the railroad company.

2. A dog is a species of property for an injury to which an action at law may be sustained.

3. A dog, in respect to the care which locomotive engineers owe to them and their owners, is on the same footing with that of a man walking on or near a railroad track, and the engineer is warranted in acting on the belief that the dog will get out of the way, where the dog is apparently in the possession of his faculties.

4. A street railway company, when its cars are properly equipped, is not liable in damages for the killing of a dog by one of its cars, unless the killing was done under such circumstances as to justify the conclusion that it was either willful, wanton, or reckless.

5. In an action against a street railway company for damages for the killing of plaintiff's dog, which was run over by a car, it was error to permit plaintiff to testify that he had measured the fenders on one of defendant's cars, and found it 25 ins. from the track, and that he saw several fenders that were about the same height.

6. In an action against a street railway company for damages for the killing of plaintiff's dog, which was run over by a car, it was error to receive the testimony of plaintiff that there were several different kinds of fenders on the cars, and that those on the big cars were different from those on the little ones, and that a little car killed the dog.—(Moore vs. Charlotte Electric Ry., Light & Power Co., 48 S. W. Rep., 822.)

RHODE ISLAND.—Street Railroads—Personal Injuries—Person on Track—Negligence—Degree of Care—Contributory Negligence—Intoxication.

1. The operation of an electric car in the country at such a rate of speed that the motorman was unable to stop it in time to avoid injury after the headlight revealed plaintiff's intestate crawling toward the car on his hands and knees between the rails, was not negligence.

2. Where plaintiff's intestate was struck and killed by defendant's street car while he was crawling toward the car on his hands and knees between the rails at a point where the car was visible at a distance of 800 ft., his contributory negligence was a bar to recovery.

3. Intoxication does not relieve a man from the degree of care required of a sober man in the same circumstances.—(Vizacchero vs. Rhode Island Co., 59 Atl. Rep., 105.)

WASHINGTON.—Street Railroads—Injury to Passenger—Intoxication—Instruction—Action by Community—Award of Compensation for Wife's Nursing—Verdict—Conflicting Evidence.

1. As it is the province of the jury to determine the weight and credibility of testimony, the court on appeal will not, as a general rule, set aside a verdict where there is substantial conflict in the evidence, especially where the trial court, who heard and saw the witnesses, has declined to interfere.

2. In an action against a street railway company for injuries to a passenger who was thrown from the running board, where he was riding, the court charged that intoxication was not negligence, and that, if plaintiff used that degree of care incumbent on him "under the circumstances," his intoxication would not prevent a recovery; that defendant, in order to prove contributory negligence, must show that the passenger did not exercise ordinary care, without reference to his intoxication, as the question was not whether he was intoxicated, but whether he exercised ordinary care; and that if the passenger was intoxicated, and in a place of danger, and the company's motorman knew it, the motorman was bound to exercise more care. Held not erroneous, as eliminating the question of the passenger's intoxication, or as imposing on the passenger, if intoxicated, the duty of using only the care required of intoxicated persons.

3. Where, in an action by the community for personal injuries sustained by the husband, there is no evidence of the value of the services of the wife in nursing the husband, the jury cannot award any compensation therefor, even if a recoverable item.—(Lawson et ux. vs. Seattle & R. Ry. Co., 76 Pac. Rep., 71.)

FINANCIAL INTELLIGENCE

Wall Street, Oct. 11, 1905.

The Money Market

All branches of the money market developed decided firmness this week, rates for all maturities advancing to the highest figure recorded thus far this year. The principal influences have been the active demand for funds at all of the principal interior points, and the heavy losses in cash sustained by the local banks in the interior movement and in their operations with the sub-treasury. For the week ending Oct. 6 the shipment of funds to the West and South for crop-moving purposes amounted to more than $10,000,000, and there is every reason to believe that the outflow of funds will continue heavy for some weeks to come. Additional engagements of gold in the London market for import to this country have been announced during the week, but the amount of gold obtainable in that market is limited, and is not sufficient to have the slightest influence upon rates. The engagements of the yellow metal to date amount to about $9,500,000, most of which has been received. Foreign exchange has ruled firm, around 4.8540 for prime demand sterling, despite the strength in the money market, the explanation for this being the unusually light movement of cotton at this season of the year. The bank statement, published a week ago, showed a loss in cash of $8,454,700, or nearly a million dollars more than was generally expected. Loans decreased $11,889,400, as a result of the shifting of loans to the trust companies. Deposits decreased $21,203,400. The surplus reserve decreased $3,153,850 to $4,286,175, as compared with $12,636,900 in the corresponding week last year, $16,577,125 in 1903, $1,527,350 in 1902, $17,483,175 in 1901, and $4,463,025 in 1900. The European markets have ruled firmer, especially at London, where discounts and money rates have displayed a decided upward tendency. In the local market call money loaned as high as 8 per cent and as low as 3 per cent, the average for the week being about 6 per cent. Time loans are quoted at 5¼ per cent for sixty days, 5 per cent for ninety days, 4¾ for four months and 4½ per cent for six months. Practically all of the transactions were made at these figures. At the close the market displayed a firm tone, and, according to leading bankers, the present rates are likely to be maintained for some time to come.

The Stock Market

Monetary conditions have largely governed the stock market the past week, but the chief effect of the advance in the call-loan rate on the Stock Exchange to 8 per cent, the highest figure of the year, has been more to restrict the volume of business than to bring about any material reaction in prices; as a matter of fact, at those periods when money rates were the firmest, security values tended to a higher range, showing conclusively that there was no fear of a stringency in the money market, such as has been talked of for some time past. It is another noteworthy fact that when the rate for call loans eased off from the high figure noted, prices for stocks did likewise. The explanation for this, however, is found rather in the present low state of our bank reserve, as disclosed by the statement issued on Saturday last. Another explanation for the reactionary tendency was the selling of stocks bought to protect values during the period of firmer money. These stocks, however, found ready takers, and in consequence the market, toward the close, not only recovered from its temporary depression, but also moved to a higher level for many shares than that reached earlier in the week. There was no great accession of outside buying, but purchases were freely made for insiders and professionals, the chief incentives being contained in the development of the long-promised melon-cutting by the Great Northern Railway, and the publication of the Government crop report, as of October 1, indicating among other things a probable yield of corn of 2,700,000,000 bushels, a record-breaking out-turn in the history of the country. Additional incentives were supplied in the way of some very gratifying reports of railway earnings for the fiscal year and other periods, the declaration of regular dividends by several railroad and industrial corporations, as well as by the inauguration of profit distribution in at least one case, that of the United States Cast Iron Pipe Company, which declared 1 per cent on its common stock. Other factors operating in the same direction were the continued unprecedented prosperity in the iron and steel trade, the pronounced strength in the copper metal industry, the reports of car shortage, not only among the Western lines, but also those in the anthracite and bituminous coal fields, indicating enormous traffic in all these lines, and further general improvement in practically all lines of trade. Noteworthy features of the speculation during the week have been the so-called Northern Securities group, the Gould issues, which were benefited by the signal victory of the present management of the Wabash over the Ramsey faction; Erie, which derived strength from the very favorable annual report; the railroad equipment stocks, which were aided materially by the enormous orders all of these concerns are receiving; the United States Steel shares, for reasons already noted, and the Southern railroad stocks, in response to the general prosperity of that section of the company.

Pronounced strength, and at times exceptional activity, characterized the market for the local traction issues. One reason for this, and a very potent one, was the realization that the movement for municipal ownership in Greater New York would prove even a greater fizzle than it did in Chicago, and that the present dominant political power would be perpetuated in office at the coming election. The statement of earnings of the Metropolitan Street Railway system for the quarter and fiscal year were made public during the week, and while the showing was unfavorable, it had no effect upon the securities, partly for the reasons above stated, but more particularly, perhaps, on account of the fact that the causes which operated to bring about the decreased earnings in the periods referred to are known not to exist at present.

Philadelphia

Moderate activity developed in the local traction stocks during the week, and although prices displayed more or less irregularity, the general tendency was toward a lower level. Interest centered largely in the speculative group, of which Philadelphia Company common was the feature, both as to activity and firmness. Opening at 48¾ the price ran off to 48¼, but subsequently the price advanced to 49 on heavy buying, and maintained nearly all of the advance. Nearly 20,000 shares of the stock were traded in. Very little interest was manifest in the preferred stock, of which about 300 shares changed hands at from 48½ to 49. Philadelphia Rapid Transit was under pressure nearly all of the week, the price fluctuating between 28⅜ and 27¾, closing at the lowest. Upward of 5000 shares were dealt in. Consolidated Traction of New Jersey held firm, with sales of about 300 shares at 83¼ and 83, and about 350 Union Traction brought 62¼ and 62⅞. Philadelphia Traction was very quiet and steady, upwards of 300 shares selling at from 100¼ to 100. In the lower priced issues American Railway was a prominent feature, about 300 shares selling at 53 to 52½ regular, while a block of 800 shares brought 52⅞ for cash. Railways General sold at 3⅞ and 4, and Fairmount Park Transportation brought 17. Rochester Railway & Light advanced 3 points to 96, on the purchase of about 100 shares. Other transactions included 400 Fort Wayne Traction at 21, 100 Union Passenger Railway at 241, and 300 Union Traction of Indianapolis at 32½ and 32¼.

Baltimore

Extreme dullness prevailed in the Baltimore market, and apart from a loss of ¾ in the price of United Railway free incomes to 65½ on the exchange of about $85,000 bonds, price changes were insignificant. United Railway 4s held steady, about $60,000 changing hands at 93¼ and 93, while $2,000 certificates for incomes deposited brought 66. A small amount of deposited stock brought 16½. North Baltimore Traction 5s were more active, $10,000 selling at 121½ and 121¾. Norfolk Railway & Light 5s sold at 94¾ and 96 for $9,000. Other transactions included $8,000 Lexington Street Railway 5s at 106, $4,000 Macon Railway & Light 5s at 99½ and 99¾, $2,000 Ausgusta Street Railway 5s at 104½, $6,000 City & Suburban 5s at 114¾, $1,000 Toledo Electric Railway 5s at 101⅛, and $1,000 Washington City & Suburban 5s at 105½.

Other Traction Securities

Trading in the Chicago market was light, and was accompanied by rather violent price fluctuations. North Chicago Railway broke from 85 to 81 on the sale of 530 shares, while West Chicago declined 3 points to 60 on the exchange of twenty shares. Chicago Union Traction sold at 13½ for twenty-five shares. Metropolitan Elevated common sold at 25¼, and seventy-five shares of the preferred brought 72 and 70. South Side Elevated held firm at 97½ and 97, about 600 shares changing hands at those prices. Other sales were 250 Northwestern Elevated at 23 and 23¼, thirty-one shares of the preferred at 62⅝ and 63, ten shares of Chicago & Oak Park at 5¼, and a small lot of the preferred at 18. The Boston market was dull and generally lower. Boston & Worcester sold at 28¾ and 28 for sixty shares, and ten shares of the preferred sold at 73. Massachusetts Electric, at the opening, declined from 14 to 13, but subsequently there was an advance to 14½. About 550 shares were dealt in. The preferred was weak, 275 shares changing hands at from 59 to 57. Boston Elevated lost a point to 153, on sales aggregating ninety-two shares. West End common ran off from 99½ to 98¼, and the preferred sold at 113¾ and 113½. The 4s of 1917 sold at 103½ for $2,000. Interborough Rapid Transit was active and strong on the New York curb market, over 7000 shares selling at prices ranging from 210 to 213¾, and closing at 213½. American Light & Traction rose from 104 to 106⅛, on the purchase of 214 shares. New Orleans Railway brought 36 and 36½ for 800 shares, and a small lot of the preferred brought 78. Washington Railway sold at 43¼ for 100 shares, and 500 shares of the preferred 93¼ and 90½. The 4s sold at 91½ for $2,000, and $27,000 New Orleans Street Railway 4½s sold at from 90¼ down to 88½ and back to 90.

Cincinnati, Newport & Covington was active at Cincinnati, about 1500 shares of the common selling up from 39½ to 40¾. The preferred made a fractional decline to 95⅞. Cincinnati Street Railway sold at 147, Cincinnati, Dayton & Toledo at 25, and Toledo Railways at 35. Cleveland Electric was very active in Cleveland. This was due to several rumors, one that the stock would be placed on a 5 per cent dividend basis the first of the year, and another, that the Vanderbilt interests, which are working hand in hand with Horace Andrews in central New York, had acquired heavy holdings in the company. Officials of the company declined to verify either of these reports. The stock advanced from 81 to 86, but early this week it fell back to 82½. Aurora, Elgin & Chicago had another upward movement reports of phenomenal earnings. It opened the week at 29¾, and advanced to 32, a new high mark for this year. The preferred advanced to 87½. There is talk of refinancing this company, issuing second mortgage bonds to retire the preferred stock and pay off accumulated dividends and floating debt. Cleveland & Southwestern common made a fractional advance to 14¼, while the preferred sold for 60; the property is showing fine increase in earnings. Northern Ohio Traction & Light sold at 24½, and Lake Shore Electric common at 13¾, both slight advances.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Oct. 4	Oct. 11
American Railways	53	52½
Boston Elevated	153	152
Brooklyn Rapid Transit	72¼	71⅝
Chicago City	—	199
Chicago Union Traction (common)	12⅝	12⅝
Chicago Union Traction (preferred)	—	—
Cleveland Electric	78	75
Consolidated Traction of New Jersey	82½	82½
Consolidated Traction of New Jersey 5s	109	109
Detroit United	93½	93⅛
Interborough Rapid Transit	212	212½
International Traction (common)	34	39
International Traction (preferred) 4s	73	74½
Manhattan Railway	165⅝	167
Massachusetts Electric Cos. (common)	14	14
Massachusetts Electric Cos. (preferred)	57½	57
Metropolitan Elevated, Chicago (common)	25¼	25
Metropolitan Elevated, Chicago (preferred)	71	71¾
Metropolitan Street	126¼	127
Metropolitan Securities	80⅝	81⅝
New Orleans Railways (common), W. I.	36	36
New Orleans Railways (preferred), W. I.	78	79
New Orleans Railways, 4½s	90	89
North American	98	98
North Jersey Street Railway	28	28
Philadelphia Company (common)	48	48⅞
Philadelphia Rapid Transit	28	27¾
Philadelphia Traction	100⅛	100
Public Service Corporation 5 per cent notes	97	97
Public Service Corporation certificates	69½	69
South Side Elevated (Chicago)	97	97
Third Avenue	126½	127
Twin City, Minneapolis (common)	118½	117¼
Union Traction (Philadelphia)	62¼	62
West End (common)	99	98½
West End (preferred)	113¼	113

W. I., when issued.

Iron and Steel

According to the "Iron Age" the production of pig iron for the month of September was 1,898,873 gross tons, against 1,843,673 tons in August and 1,741,935 tons in July. Returns from all the steel companies make their pig iron production 1,262,033 in September, against 1,186,050 tons in August, an increase in spite of the fact that the Pittsburg district produced only 449,632 tons in September as compared with 488,119 tons in August. The capacity at work has increased in September, and stood on October 1 at 445,468 tons per week, as contrasted with 412,563 tons on September 1. There is promise, therefore, of an increased production, which the country needs so sorely. There has been a good deal of buoyancy in the pig iron market in all parts of the country, and prices have further advanced. Some further goodly orders have come to the rail mills. A good deal of business is pending in bridge material, fully 60,000 tons being under negotiation. The higher lines are active and in good shape.

CONSOLIDATED RAILWAY GETS ANOTHER CONNECTICUT PROPERTY

The Willimantic Traction Company's property has been sold to the Consolidated Railway Company, acting for the New York, New Haven & Hartford Railroad. The monetary consideration is not large, but the sale is important because it gives control to the Consolidated of the last of the series of lines extending from the heart of Connecticut to the coast at New London. The Willimantic line runs from Willimantic to Baltic. There it connects with the line of the Consolidated Company operated to Norwich, which line in turn connects with the New London Street Railway for New London and the shore. The plan of the Willimantic Company under separate ownership was to build from Willimantic in a direction opposite to Baltic to Manchester. At the latter place connection would be made with the electric line between Manchester and Hartford, and so a line could be completed between Hartford and New London. A charter to build this extension had been obtained by the Willimantic Company. Whether or not the line will now be built is a matter of speculation, as the extension by making a through line by trolley from Willimantic to Hartford would parallel the New York, New Haven & Hartford Company's lines between the two places, with uncertain results to the latter.

WIDENER-ELKINS RUMORS OFFICIALLY DISCUSSED BY W. KESLEY SCHOEPF

Presumably with a view to setting to rest erroneous statements that have been circulated regarding the plans of the Elkins-Widener syndicate, W. Kesley Schoepf, of the Cincinnati Traction Company, submitted a few days ago to a lengthy interview by the daily press. To start with, Mr. Schoepf said there is no such thing as the "Widener-Elkins" syndicate, so far as the general proposition of building through systems in Ohio and Indiana is concerned. He said Messrs. Widener and Elkins are interested in the Cincinnati Traction Company, but not in the Indiana properties. These properties, as well as the Ohio lines just purchased, are owned by Messrs. Dolan, Morgan, McGowan, Schoepf and Irwin & Company, of Philadelphia. He denied that there is any connection between these interests and the Standard Oil Company, as had been intimated in recent newspaper stories. He also denied that negotiations are on for the purchase or lease of the Cincinnati, Newport & Covington Traction Company, and said his interests have no connection with Chandler & Jones, of Philadelphia, who recently purchased interurban and city properties in central Kentucky. Relative to the proposed lease of the Toledo, Bowling Green & Southern Traction Company, Mr. Schoepf said the matter is in *status quo,* because of some detail in connection with the bonds of that company. No deal is on for the purchase of the Appleyard properties, but he is of the opinion that his interests may make a bid for these lines if they are put up for sale. No negotiations are on for the purchase of the Dayton & Troy and Western Ohio properties, as has been reported. He said that the car builders' combine, which is to include the Cincinnati Car Company, one of the properties with which he is connected, is progressing smoothly, so far as he knew.

CHICAGO EXTENSION ORDINANCE GOES TO COUNCIL—A SUMMARY OF ITS PROVISIONS

The franchise extension ordinance of the Chicago City Railway Company was formally presented to the City Council Wednesday evening, Oct. 4. The ordinance of the Union Traction Company was to have been presented on Monday. The two differ in details, only where conditions affecting the two companies vary. While the Chicago City Company was able to present its ordinance, it was unable to give with it the maps showing the rearrangement of the downtown loops, and, more important than this, the through routeing of cars from one division of the city to another. The ordinance is along the lines previously referred to in the Street Railway Journal and outlined in the issue of Oct. 7. The document contains some 30 sections, a careful digest of which follows:

Sec. 1. Twenty-year franchise, providing that city may purchase at any time after three years.

Sec. 2. Company shall reconstruct tracks and roadbed.

Sec. 3. Company shall use overhead trolleys, except on Clark and State Streets and downtown loops, north of Polk Street, where underground trolleys shall be used if found feasible after test on State Street.

Sec. 4. Specifications for poles and trolley wires.

Sec. 5. City can use company's poles to carry its wires and electric lights.

Sec. 6. Company may rent partial use of its poles to telephone, telegraph and electric lighting companies.

Sec. 7. All of company's feeder wires in central portion of city shall be laid underground and same rule shall apply to all feeders carrying over 1000 volts in all parts of city.

Sec. 8. All electrical work must be done subject to city electrician, and all other work according to orders of commissioner of public works.

Sec. 9. All new track construction in well-paved streets shall include the grooved rail.

Sec. 10. Company shall fill, grade, pave, keep in repair, sweep, sprinkle and keep clean its right of way, removing snow and ice in winter. Specifications of pavement.

Sec. 11. New cars shall be of best kind, without running footboards, well heated and equipped with two sets of brakes.

Sec. 12. Funeral cars, postal cars and cars for the carriage of parcels and packages may be operated by the company.

Sec. 13. Company may make bargain with city for sweeping and cleaning entire width of streets occupied by company and for removing sweepings and garbage by night cars.

Sec. 14. Street cars shall have the right of way, and wagons must turn out under penalties.

Sec. 15. Policemen and firemen in uniform and detectives vouched for by the chief of police shall ride free.

Sec. 16. All dead tracks, except emergency curves and switches, shall be removed.

Secs. 17 and 18. Straight 5-cent fare for adults; children between 7 and 12 years of age to pay 3 cents. Universal transfers, except in the downtown district north of Twelfth Street.

Sec. 19. Provision for through routes on Halsted Street and on Western Avenue and for jointly-operated belt line connecting all routes entering business district.

Sec. 20. Compensation fixed at following percentages of gross receipts: First three years, annually 3 per cent; next two years, annually 5 per cent; ensuing ten years, annually 7 per cent; last five years, annually 10 per cent; general average, a fraction under 7 per cent annually. Compensation is to be in lieu of all licenses and all franchise taxes, including taxes on capital stock.

Sec. 21. Company relieves city from onus of damage suits.

Sec. 22. Company before March 1 of every year shall make annual report of gross receipts, and books shall be open to city Comptroller.

Sec. 23. Forfeiture clause, in case company fails to live up to provisions of its ordinance.

Sec. 24. City may intervene in case any suit it deems collusive is brought against the company to restrain it from carrying out the provisions of this ordinance.

Sec. 25. City Council may compel company to extend its lines at the rate of not more than three miles of double tracks annually, providing at least 150 families live within one-quarter of a mile of the street along every mile of the proposed extension.

Sec. 26. City may at any time after not less than one or more than two years' notice to the company buy it out at the fair cash value for all real and personal property plus the fair cash value at that time of such of the company's present rights as may then still be unexpired, regardless of the present ordinance. The city and the company each shall appoint one appraiser of these rights, and those two appraisers shall select a third, who must not be a resident of this State. Should both fail to agree, the third appraiser must be selected by three judges, including the Chief Justice of the Supreme Court of Illinois, and two judges of the United States Circuit Court. The decision of a majority of these appraisers shall be binding on both the city and the company.

Sec. 27. At the end of twenty years the city may buy or sell to another corporation the right to buy the company's lines for the appraised value at that time of the real and personal property without paying anything for "any franchise or license." Every right and privilege of the company of every kind will then cease.

Sec. 28. If, after twenty years, the city is willing to make a further grant to the company, the appraised cash value of the company's property at that time shall be taken as the value of company's investment, regardless of any stocks or bonds that may be then outstanding.

Sec. 29. Express waiver of all claims under ninety-nine-year act and other laws in return for a full twenty-year franchise. Provision withdrawing that waiver if city takes over lines before expiration of the desired twenty-year grant.

Sec. 30. Provision for referendum, requiring majority of all voting at next spring's election to vote against ordinance in order to invalidate it.

Mayor Dunne placed his "contract plan" for municipal ownership before the City Council, Oct. 9, and it was defeated by a vote of 45 to 18. The plan provided for the organization of a corporation and the issuance of certificates under what is known as the Mueller law. Out of the sale of these certificates the first ninety miles of street railway were to be constructed, paralleling existing lines. It is expected that the Mayor will now abandon this plan and bring in in its place his alternative or "city plan." This contemplates the acquirement by purchase or condemnation of all the lines of the existing street car companies.

THE SALT LAKE & OGDEN RAILWAY

As a preliminary to building a double track interurban electric railway from Salt Lake to the mouth of Ogden Canyon, the Salt Lake & Ogden Railway Company has filed an amendment to its articles of incorporation, by which its capital stock is increased from $800,000 to $1,500,000. President Simon Bamberger, of Salt Lake City, states that arrangements have been made with New York interests to finance the project.

AMERICANS IN DUTCH PROJECT

The announcement was made in New York on Monday of a plan by Americans for building a 45-mile electric railway in Holland, to extend from the German frontier to the North Sea. Interested in the project are important financial and commercial interests, representatives of which are now on the way to Holland to further the plans already made by the original investigators, who returned to this country several weeks ago.

From a representative of those interested in the project the Street Railway Journal learned the plans so far as they are matured. The western terminus of the proposed line is Wykan Zee, on the shore of the North Sea, about three miles north of the west end of the Amsterdam Canal. The main line is to cross Holland in a southeast direction to Arnheim, about a dozen miles from the German frontier. From Wykan Zee it will run to Zaandam, and thence into Amsterdam, the principal city in Holland. Continuing in approximately the same southerly direction, the main line will cross the canal that connects the Rhine with the Zuyder Zee to Utrecht. From Utrecht the road will cross the lower Rhine Valley to Rhenen, a small town some five miles north of the Rhine, where it will turn slightly north of due east to its terminus in Arnheim.

Wykan Zee, the proposed western terminus of the line to be first constructed, is not now in direct land communication with Amsterdam, but from Zaandam to Arnheim the road will practically parallel steam lines already in operation. Both freight and passengers will be carried by the proposed road on its main line and branches.

To carry out the project the Holland-American Construction has been incorporated under the laws of New York, the board of directors of which includes George C. Smith, vice-president of the Security Investment Company, of Pittsburg; Walter D. Updegraff, of the same concern; Newcomb Carlton, fourth vice-president of the Westinghouse Electric & Manufacturing Company, and Joseph H. Lukach, of London.

John F. Alden, at one time prominently connected with the American Bridge Company; J. George Kaelber, Charles H. Palmer and John H. Beckley, who are also largely concerned in the new company, are the men who have sailed for Europe in the interest of the project. On reaching the other side, they will be joined by Mr. Lukach.

DETAILS OF CONTRACT FOR LONG WESTERN ROAD

A few weeks ago announcement was made in the Street Railway Journal of the awarding by the Spokane & Inland Railway Company to the Westinghouse Electric & Manufacturing Company of a contract for equipping its proposed road. Now the details are available of this contract. The present terminals of the road will be Spokane, Wash., and Moscow, Idaho, 146 miles apart. The roadway is completed from Spokane to Waverly, a distance of 34 miles, and operation will be begun on this as soon as possible. The road is a home enterprise, the stock being held entirely by men living in the district through which the line passes. The directors of the company are: J. P. Graves, president; F. A. Blackwell, vice-president; F. Lewis Clark, John Twohy and Alfred Coolidge.

In selecting the equipment for this road, the a. c.-d. c. and the single-phase systems were considered, but, after careful comparison the single-phase alternating-current system was adopted. Not only did the estimates show a large saving in initial investments and in annual operating expenses in favor of the single-phase system, but a form of heavy traction is made possible which would be practically unfeasible with the a. c.-d. c. equipment. Besides the passenger traffic the company is preparing to do a heavy freight business and also to carry mail and express.

Power for the operation of the road will be purchased from the Washington Water Power Company, which will supply three-phase current at 4000 volts, 7200 alternations, to frequency-changing station apparatus approximately 1½ miles from the generating station. Seven 750-kw oil-insulated water-cooled transformers will step-down the voltage from 4000 to 2000 volts, the potential for which the induction motors of the frequency changing sets are wound. There will be four of these motor-generators of 1000-kw capacity each at normal rating. Each consists of a 1000-hp, three-phase, 2000-volt, 60-cycle induction motor, a 1000-kw single-phase, 2200-volt, 25-cycle revolving field alternator, and a 750-hp, 550-volt direct-current generator, which is to float on the storage battery acting alternately as a motor or a generator. The three machines will be mounted on a single bed-plate with seven bearings. Exciting current for the alternators will be supplied by three sets, each consisting of a 75-hp, three-phase, 2000-volt induction motor and a 50-kw d. c. generator.

Nine 675-kw oil-insulated water-cooled transformers will step-up the voltage from 2200 to 45,000 volts, at which pressure it will be transmitted to the fifteen static transformer sub-stations, each containing two 375-kw, 45,000-6600-volt oil-insulated self-cooling transformers. A twenty-three panel switchboard, electrically-operated automatic oil circuit breakers, and protective apparatus complete the equipment of the frequency changing station. Low equivalent lightning arresters and choke coils are provided for both primary and secondary circuits in all sub-stations.

The transmission lines will consist of two No. 2 copper wires, and the trolley will be of the standard catenary construction, using a No. 000 wire and carrying current at 6600 volts.

Each passenger car will be equipped with four 100-hp motors, capable of maintaining a schedule speed of 35 to 40 miles an hour. In the freight service four 150-hp motors will be used on each car. For the heavy freight service double locomotives weighing approximately 70 to 80 tons will be used, each consisting of two parts and each part a complete 35 to 40-ton locomotive. Two or more of these locomotives may be coupled together and operated from the front cab as a single unit. The motor cars and locomotives will all be operated by the Westinghouse multiple unit control system. The motors will operate under three different conditions,—6600 volts alternating current in the interurban districts, 700 volts alternating current in the smaller towns, and 575 direct current in the city of Spokane.

NEW YORK CITY COMPANY'S ANNUAL REPORT

President Vreeland, of the New York City Railway Company, in his annual report to the stockholders, made public Wednesday, Oct. 11, says it is still too early to reach a definite conclusion in regard to the ultimate effect of subway travel upon the earnings of the surface lines. The decrease in the company's gross earnings, amounting to $596,881, according to the figures published some days ago, is attributed by President Vreeland to the unfavorable weather conditions of last winter. The cost of removing the snow from the company's lines, owing to the very heavy fall, was $119,824 more last year than the year before.

The loss in gross earnings for the fiscal year was accounted for almost entirely by the smaller earnings in the winter months. The decrease for December, January and February amounted to $544,845.

The statement of income for the year shows a deficit of $2,796,942 from operation. It is pointed out that this deficit will be further increased by the special franchise tax. Concerning this President Vreeland says:

"The company's appeal to the United States Supreme Court involving the constitutionality of the special franchise tax law has been decided adversely to the company, and the constitutionality of the law upheld. Proceedings are now pending to secure reductions in the special franchise assessments for every year subsequent to 1900, and it is expected that very substantial reductions in the original assessments will be secured."

In regard to the effect of the opening of the subway upon the New York City Railway's earnings, President Vreeland says:

"While the subway service, inaugurated Oct. 27, 1904, together with the unfavorable weather conditions which prevailed during the winter, materially affected the receipts from passengers for a few months, it became apparent by March of 1905 that the traffic was becoming adjusted to the new conditions, and that a considerable additional short-haul traffic was being developed which would, partially at least, make up for the long-haul business lost to the subway. During June, July and August of this year the receipts from passengers have shown a substantial increase over those of the corresponding months of last year, when there was no subway competition. It is too early to reach definite conclusions as to the ultimate effect of subway travel upon the earnings of the surface lines."

The general balance sheet of the company, as of June 30 last, gives the deficit carried in the profit and loss account as $782,585. It is explained that it is the policy of the company to charge "profit and loss" each year with the net deficits of its controlled companies and to credit the amount to the "reserve" account. The report says that for this reason it is necessary, in order to arrive at the net profit and loss of the system as a whole, to eliminate these duplicate charges.

In regard to the year's fixed charges this statement is made:

"The fixed charges include the first full year's charge of the guaranteed annual rental of 5 per cent paid to the Third Avenue Railroad Company stockholders, as compared with but two months and seventeen days of this rental accrued during the previous year. This, together with interest on notes of the Central Crosstown Railroad company, and bonds of the Third Avenue Railroad and Second Avenue Railroad Companies, issued for construction purposes, accounts for the increase in the fixed charges."

The company reports earnings as follows for the quarter ended June 30:

	1905	1904
Gross receipts	$4,417,081	$4,479,812
Operating expenses	2,420,230	2,512,543
Net earnings	$1,996,851	$1,967,269
Other income	325,738	133,525
Total income	2,322,589	2,100,794
Fixed charges	2,793,539	2,513,420
Deficit	$470,950	$412,626

The consolidated income account of New York City Railways system (including Third Avenue and all lines owned or controlled) for the year ended June 30, 1905 (as compiled from the quarterly statements), compares as follows:

	1905	1904
Gross receipts	$17,907,399	$17,757,650
Operating expenses	10,031,129	9,530,360
Net earnings	$7,876,270	$8,227,290
Other income	1,225,818	1,086,209
Total income	$9,102,088	$9,313,499
Fixed charges	11,497,415	10,368,283
Deficit	$2,395,327	$1,054,784

COURSE OPENED IN ALTERNATING-CURRENT TESTING AT BROOKLYN POLYTECHNIC

The evening course in alternating-current testing to be given at the Polytechnic Institute of Brooklyn began Thursday, Oct. 12, at 7:30 p. m. and will extend over a period of twenty successive Thursday evenings. This course will consist of twenty tests upon rotary converters, transformers, induction motors and other alternating apparatus. The course will commence with the elements and will develop gradually. Reports in engineering form will be expected of the students. This work will be under the direction of Sydney W. Ashe, who had charge of the Polytechnic's direct-current course last year.

DULUTH TO MINNEAPOLIS BY ELECTRICITY

Duluth and Minneapolis interests attach great significance to the statements made by C. C. Cokefair, of the Great Northern Power Company, at the recent meeting in Duluth of the Real Estate Board of that city. Mr. Cokefair said that in the next two years Duluth would be nearer Minneapolis by nearly two hours, and that the cost of transportation would be much less than now between the cities. This, he said, will be either by an interurban route, connecting the street railway systems of the cities, or by the electrification of one of the steam roads. Estimates are being prepared by the Westinghouse Company and the General Electric Company on these two propositions, power to be taken from the Great Northern Power Company's plant. Further than this, Mr. Cokefair refused to say anything about the project for publication.

PLANS MAKING FOR ANOTHER LINE OUT OF CHICAGO

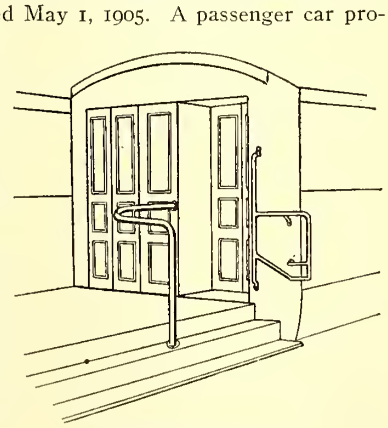
W. S. Reed, First National Bank Building, Chicago, is actively pushing his plans for building into Chicago from the south. His latest move is the incorporation at Springfield, Ill., of the Chicago, Des Plaines & Fox River Railroad to build from Chicago to McHenry, Ill. The company is capitalized at $1,000,000. The route of the projected road will follow the Des Plaines and the Fox Rivers for a considerable portion of the distance between termini, and will run through the towns of River Forest, River Grove, Franklin Park, Des Plaines, Arlington Heights, Barrington, Lake Zurish and McHenry. This right of way has been obtained by the absorption of the Illinois & Wisconsin Railway. In the Street Railway Journal of Sept. 9, mention was made of the purchase by Mr. Reed of the Chicago Electric Traction Company, which connects with the South Side Elevated at Sixty-Fourth Street and South Park Avenue, Chicago, over which entrance will be secured to Chicago. The directors of the Chicago, Des Plaines & Fox River Railroad are: Geo. N. Bryson, W. S. Reed, E. T. Ross, W. C. Gunn and William K. Kenly.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED SEPT. 26, 1905

800,172. Passenger Car; William G. Ross and Duncan McDonald, Montreal, Can. App. filed May 1, 1905. A passenger car provided with two separate doorways between the interior and the platform, and having an intervening space between the doorways, and a barrier dividing the platform and platform steps and providing a separate passage to each doorway.



PATENT NO. 800,172

800,294. Trolley Pole and Stand; William M. Hallenbeck, Burrville, Con. App. filed Jan. 12, 1905. A trolley stand having two sets of ball bearings with horizontal and vertical raceways respectively.

800,355 Fender; John C. G. Bradley, Brooklyn, N. Y. App. filed April 13, 1905. A "feeler" mounted in advance of the fender closes a circuit, when an obstruction is encountered, to actuate electro-magnets and attract an armature which draws the fender into operating position. Other details.

800,409. Fulcrum Post for Brake Beams; William E. Sharp, Chicago, Ill. App. filed July 10, 1905. Comprises a skeleton frame adapted to be secured to the brake beam, said frame having a pair of right and left passageways formed therein, in combination with a pair of removable fulcrum plates adapted to be mounted in either of the passageways and to pivotally support the brake lever between them.

800,435. Railway Switch; Herman Fenske, St. Louis, Mo. App. filed March 6, 1905. Comprises a shifting plate mounted beneath the switch, a rocking arm connecting said plate with the switch, a shifting bar adapted to contact with the shifting plate, and means for contacting the same.

800,446. Switch and Signal Track-Trip; Charles M. Hurst, Rawlins, Wyo. App. filed Oct. 15, 1904. Consists of an apron inclined toward one or both its ends, joined to a fixture of the track by parallel links, and a crank arm for attachment of the member connecting the device with the switch, rotated from the parallel links by means of a tie-rod from each.

800,520. Rail Sanding Device; William T. Watson, Vancouver, Can. App. filed Dec. 30. 1904. The depression of a pin by the motorman opens the hopper valve and actuates a rock shaft having agitator fingers which loosen the same in the hopper and permit it to flow through the valve. The spout is made of resilient sheet metal bent to form a tube, the edges thereof being loosely engaged, whereby a cleaner may be inserted.

800,656. Fare Register; Charles E. Gierding, Newark, N. J. App. filed May 19, 1904. Details.

800,566. Fare Register; Charles E. Gierding, Newark, N. J. App. filed Nov. 25, 1904. Details.

800,567. Fare Register; Charles E. Gierding, Newark, N. J. App. filed Feb. 10, 1905.

800,581. Automatic Switch; Elliott T. Humpton, Reisterstown, Md. App. filed May 31, 1905. A rod in the roadbed has a pinion on one end disposed between two rocks, and at the other end has an eccentric connection with the switch tongue. The racks are engaged by an approaching car to rotate the rod in either direction and thereby throw the switch.

800,854. Trolley Wire Coupling; Edward M. Leslie, Cincinnati, Ohio. App. filed Nov. 20, 1903. A tube having tapered ends is adapted to inclose the abutting sections of the trolley wire, which are held in place therein by circular-toother wedges.

UNITED STATES PATENTS ISSUED OCT. 3, 1905

800,671. Brake Beam Fulcrum; John V. O'Connor, Chicago, Ill. App. filed Jan. 9, 1905. Comprises two parts having locking projections which are engaged when the jaws are moved in a direction tending to separate them.

800,715. Grab Handle for Open Cars; John A. Brill, Philadelphia, Pa. App. filed Aug. 29, 1903. A reversible seat having a grab handle upon the end edge of the back.

800,716. Semi-Convertible Car; John A. Brill and Henry E. Haddock, Philadelphia, Pa. App. filed Sept. 28, 1903. Space is economized by providing means for moving the sashes in each window against each other and then into the sash pockets.

800,717. Car; Ezra S. Buckman, Philadelphia, Pa. App. filed Dec. 17, 1904. Relates to the construction of sash and guide rails therefor, and consists of a free guide rail secured adjacent the window frame, a sash and a stop fixed to the sash and provided with anti-friction rollers that engage the rail.

800,762. Trolley Pole; Andrew L. Prentise, Buffalo, N. Y. App. filed Oct. 18, 1904. A pneumatically-controlled trolley pole in which the harp is hinged to the pole so that its upward movement when the wheel leaves the wire, tends to actuate the controlling means.

800,888. Bolster for Railway Cars; Henry H. Vaughan, Montreal, Can., Feb. 76, 1905. A single-piece cast-steel bolster, which tapers vertically from its middle toward its ends and comprises top and bottom walls connected at each end by a single vertical web and between its ends by spaced vertical webs, which converge toward and merge into said end vertical webs.

800,909. Controller Regulator; Cyrus P. Ebersole, Keokuk, Iowa. App. filed July 23, 1902. A wheel upon the controller shaft having a zigzag slot or groove in its periphery and a suitably governed movably-mounted dog adapted to co-operate with said slot, whereby the speed of operation of the controller is regulated to any desired extent.

800,921. Car Truck; William F. Kiesel, Jr., Altoona, Pa. App. filed July 11, 1905. In order to drop the center plate to provide for deep center sills, the bolster is supported by stirrups hung from the wheel pieces.

801,045. Valve; Arthur I. Perry, New York, N. Y. App. filed Dec. 21, 1904. Relates to an air valve for fluid pressure brakes provided with means for applying the pressure proportionately to the movement of the valve handle, and consists of admission and exhaust ports and a movable body portion provided with opposite heads, between which is a space which may communicate with each of the ports, the heads having different areas.

801,164. Car Fender; George W. Steenrod, Wheeling, W. Va. App, filed March 11, 1905. Details of construction.

801,188. Motor Truck; Archibald H. Ehle, Philadelphia, Pa. App. filed July 22, 1905. The invention relates to the mounting of gas engines on the car trucks for driving the same, and to provide gearing by which the same can be controlled.

PERSONAL MENTION

CAPTAIN WILLIAM J. SALLES has resigned as superintendent of the St. Charles division of the New Orleans Railways Company, of New Orleans, La.

MR. EDMUND L. DES JARDINS, superintendent of the Chicago & Milwaukee Electric Railroad Company, has announced that he was married last February to Miss Harriet Cammack, of Highland Park, Chicago.

MR. H. B. UPTON has resigned as superintendent of the Shelburne Falls & Colerain Street Railway Company, of Shelburne Falls, Mass., to become connected with the Berkshire Mill Supply Company, of Pittsfield, Mass.

MR. JOHN C. OSTRUP, M. AM. SOC. C. E., who was formerly designing engineer of the Boston Elevated Railroad, and afterward consulting engineer in Boston and New York, and who was recently appointed vice-president and chief engineer of the American Engineering Company, of Indianapolis, Ind., has now arrived in that city and assumed his new duties.

MR. ROBERT D. BEATTY has been appointed general manager of the Eastern Ohio Traction Company, succeeding to the duties of Mr. George T. Bishop, receiver for the company, who is giving his personal attention to the construction of the Washington, Baltimore & Annapolis Railway. Mr. Beatty has been for the past fourteen years with the Westinghouse Company, in charge of the Walker plant at Cleveland. He will devote himself to straightening out the financial difficulties and improving the company's power facilities.

MR. R. T. GUNN, general manager of the Lexington Railway Company, of Lexington, Ky., contributed to a recent special edition of the "Lexington Herald" an interesting article descriptive of the properties of his company, which include the street railway, lighting and gas facilities of the city. Mr. Gunn has long been identified with Lexington and its interests, in fact, was educated at the State College there, and so lent to the narrative facts of historic interest that greatly enhanced the value of the description, making it a record of achievements along lines that have aided most in shaping the destiny of Lexington and the country adjacent thereto.

MR. C. O. SIMPSON has resigned as treasurer of the Birmingham Railway Light & Power Company, of Birmingham, Ala., to accept the position of general manager of the Little Rock Railway & Electric Company, succeeding Mr. J. A. Trawick, resigned. Mr. Simpson has been connected with the street railway industry for the past fifteen years, having begun his career in the office of the Metropolitan Street Railway, of Kansas City. In 1898 he became auditor of the August Railway & Electric Company, and while with this company organized an employees benefit association, which occupies handsome club rooms fitted out by the company. In September, 1901, Mr. Simpson resigned from the Augusta Railway & Electric Company to become treasurer of the Birmingham Railway Light & Power Company. He has always taken a great interest in the operating department, and this promotion to be general manager at Little Rock is a deserved recognition of his ability as an operating man. Mr. Simpson was at one time one of the vice-presidents of the Street Railway Accountants' Association.

PROF. W. WYSSLING, Ph. D., secretary and member of the Council of the Swiss Institution of Electrical Engineers at the Swiss Polytechnicum, at Zurich, and secretary of a commission recently appointed by the Swiss Government to study the question of the electrification of the railways of Switzerland, and Mr. Chas. Wirth, engineer of the Swiss Government Railways, sailed from New York for home on Saturday, Oct. 14, on the "Koenigen Louise." Messrs. Wyssling and Wirth have been in the United States since August, studying methods of operation here of electric and steam lines and looking into the development of power here. Many of the large Eastern and Western cities were visited by them, Boston, Philadelphia, Buffalo, Chicago, Cleveland and Detroit being among the cities at which they stopped. At Niagara a careful study was made of power development and its application as exemplified in the many industries dependent upon the falls. At Schenectady the General Electric Company's works were inspected, and at Pittsburg considerable time was given to an inspection of the Westinghouse Company's works and the Inter-Works Railway.

MR. B. J. JONES has recently become manager of the electrical department of the Cincinnati Gas & Electric Company. Mr. Jones is well known in Chicago electrical circles, having been since 1897 on the staff of Sargent & Lundy, consulting engineers. His first work with that company was that of the direct supervision of the electrical equipment of the South Side Elevated Railroad. He has been prominently identified with a number of the important undertakings by that firm, and has come closely in touch with the electrical work of the Cincinnati Gas & Electric Company. He is the inventor of the flat flexible bond and solid terminal, designed to go under the fish-plate, which was sold originally as the Atkinson bond, being made by that company. He is also the designer of many of the details of high-tension construction used on the Indianapolis & Cincinnati Traction Company's line between Indianapolis and Rushville, and adopted by the Westinghouse Electric & Manufacturing Company as standard construction for certain classes of single-phase trolley work. Previous to his connection with Sargent & Lundy, Mr. Jones was superintendent of the South Chicago City Railway Company, which position he accepted upon leaving a similar position at Sioux City, Ia. He was at one time with the Westinghouse Electric & Manufacturing Company.

MR. LINCOLN NISSLEY, who for a number of years has been associated with the Knox Engineering Company, of Chicago, has resigned to accept a position on the engineering staff of Sargent & Lundy, consulting engineers, of Chicago. Mr. Nissley has a wide acquaintance and experience in engineering in this country and Europe, and is one of the pioneers in the introduction of the electric railway. Some twenty-five years ago, Mr. Nissley entered railroading, in the engineering department of the Atchison, Topeka & Santa Fe Railroad. During seven years of laborious service in the field, in what was at that time the wild Southwestern frontier, he rose through the various positions of assistant engineer, resident engineer and locating engineer until he had advanced by ability alone to the position of chief engineer of important work. In 1886, Mr. Nissley took up the investigation of the electric motor as a motive power, and, in an extended trip abroad, visited Switzerland, Germany, France and Great Britain in the study of the art. Returning to America, he entered the engineering department of the Thomson-Houston Electric Company, and was engaged until 1890 in the construction of electric railway and lighting plants in the South and throughout New England. In 1890 to 1892 he was engaged in the experimental and engineering department at the Lynn factory. Upon the organization of the General Electric Company he was appointed chief engineer of that company's Pittsburg district, and was subsequently transferred, in 1893, to the Western district and the World's Fair. His reputation as a thoroughly competent engineer, and his published investigation of the hydro-electric transmission systems of Switzerland, attracted the attention of the bondholders of the consolidated interests at Los Angeles, Cal., and for four years he was engaged in the complete electrification of the Pacific cable roads, the construction of power stations and shops, and the pioneer high-voltage transmission lines into Los Angeles. Mr. Nissley is a recognized authority on the economic location, construction and operation of electric railways, and a well-known contributor to the technical press on the generation, utilization and distribution of power and on electric traction.

MR. EDWARD G. CONNETTE, who resigned as vice-president and general manager of the Syracuse Rapid Transit Company to become general manager of the Consolidated Street Railway Company, of Worcester, Mass., assumed the duties of that position on Oct. 3. The public press and citizens of Syracuse are all lamenting Mr. Connette's leaving that city, in whose affairs he has always taken deep interest and whose interests he has always carefully conserved. Procedure very unusual on the part of the Mayor of Syracuse, illustrates strikingly the feeling entertained in that city for Mr. Connette. Mayor Forbes, of Syracuse, took it upon himself to commend Mr. Connette to Mayor Blodgett, of Worcester, telling what had been accomplished by him in bringing the Syracuse Street Railway system up to its present state of high efficiency. He said in part in his letter:—It is with feelings of regret that the citizens of Syracuse part with Mr. Connette, who for five years has been vice-president and general manager of the Rapid Transit Railway Company in this city. Mr. Connette combines to an unusual degree the qualities which enable him to please the public while serving faithfully the corporation whose affairs he directs. The situation as to the street railway service in Syracuse to-day is in marked contrast with what it was when Mr. Connette came to Syracuse. He found the service poor and unsatisfactory to the citizens of Syracuse. The company, too, had troubles with its employees, and the situation was unsatisfactory, both from the standpoint of the company and that of the public. Announcing that he considered that the interests of the company and of the public as regards good service were mutual, Mr. Connette applied himself to improving conditions and the situation which he now leaves could not be better, its appreciation being attested by largely increased patronage, and the company's earnings having shown a markedly steady increase through Mr. Connette's administration. He has been instrumental in bringing about voluntary advances in the pay of the employees, who now have the best of feeling towards the company. Syracuse's loss in this case is Worcester's gain, and again I congratulate you and the citizens of Worcester upon the acquisition of so able and public spirited a street railway manager as is Mr. Connette.

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Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

Of this issue of the Street Railway Journal 8000 copies are printed. Total circulation for 1905 to date, 343,950 copies, an average of 8189 copies per week.

The New York Central-New Haven Situation

In an extended communication which appears elsewhere in this issue, Frank J. Sprague analyzes the conditions which will be brought about by an attempt to utilize a. c.-d. c. locomotives in the present d. c. zone of the New York Central & Hudson River Railroad Company. The situation as outlined by him is a most interesting one, and is discussed from both an electrical and an operating standpoint. Although Mr. Sprague is known to believe very thoroughly that the possibilities of d. c. operation are by no means reached, in his article he does not consider the relative merits of the two systems except in connection with this particular case, but in this instance he makes a most effective argument in favor of the d. c. system. Although expressly disclaiming any intention of speaking for the New York Central Electric Traction Commission, of which he is a member, Mr. Sprague's connection with that Commission has made him familiar with every step taken during the progress of the Central work and the reasons for their adoption, so that his arguments are based upon a thorough knowledge of the conditions.

These conditions do not necessarily apply to the New Haven road, except so far as the entrance of its trains into New York City is concerned. We understand that the New Haven Company has not yet placed any order for multiple-unit equipments, either a. c. or d. c., although its business from Stamford west is essentially one for multiple-unit operation. From this fact we assume that the company's decision to purchase the single-phase locomotives described by Mr. Scott and to use them on the d. c. zone between Woodlawn and New York, and upon the company's own tracks as far as Stamford, was based upon the desire to acquire further knowledge of the performance of single-phase apparatus under heavy traction conditions before proceeding further with the electrical equipment. This proposal, of course, interferes with the contemplated plans of the New York Central Railroad Company in devoting the lower tier of its Forty-Second Street station to the use of suburban trains and the upper tier to through trains, as explained by Mr. Sprague, and also to the proposed pooling of rolling stock. It is unfortunate that the New Haven road should have waited so long before deciding upon its plans for electrification, but the company now commands excellent electrical talent, and although somewhat late in entering the game, still has eleven months to complete its equipment.

The subject is one which has its popular as well as its technical side. The New York public and others who travel to and from the city by the three lines running into the Forty-Second Street station have been patiently awaiting the conversion of the motive power in the Park Avenue tunnel from steam to electricity, which the Electric Traction Commission expects will be made by September, 1906. Whatever plans for composite working are adopted they should be such as not to delay the date of change or interfere with the convenience, economy or despatch of operating trains out of the new station.

Recent Speed Contests

Some excellent persons worthy of foreign extraction have recently been casting the dust off their wheels at a rate that is enough to make the engineering profession wipe its spectacles. When automobiles on a country road, even a good one, can keep up a pace of over a mile a minute for four or five hours, with the winner averaging 70 miles an hour, and an even faster car only put out of the race by collision near its end, one stops to consider what it all means. The winning car was rated at only 90 hp, and the transmissions of an automobile are far from being in the first rank of efficiency. It would be most interesting and instructive to know what the actual driving horse-power was in this tremendous sprint. We know of no tests which give even an approximate answer to such a question, but it is very evident that the power taken for these high speeds is much less than one would guess at first thought. And what would these engines do on a straight line of rail or even upon a fine, smooth road with minimum grades and curves? Certainly something astonishing.

The practical question that at once suggests itself is the probable effect of such performances on a general demand for higher speeds of traveling. The time is here when a resident of the suburbs can get into his office more quickly in a motor car than he can on the railway trains he is likely to patronize. He will have to overrun the legal speed limit to do it, but he can get there. Will he thereafter be content to jog along behind a mere locomotive? It would not be surprising if the result were a general tendency to increase speeds all along the line. Even now we hear rumors of new fast trains, of straightening tracks, lowering grades and eliminating all the remaining grade crossings. The hundred mile an hour train has now been on the way a good many years and has not yet arrived. But if there is any sporting blood left in the railway business the hundred mile an hour automobile threat ought to stir it into activity. As for the electric roads we have no fear; when the time comes for high speeds the electric locomotive will be the one to do the work without much doubt. It can concentrate more power in a given dead weight than any other, and it is power that counts. It can also maintain that power more steadily than anything yet devised. All this has been well understood, but the incentive to high speed has been lacking. When, however, the high speed microbe begins to get in its work, slow traveling becomes irksome to the victim, and he will have none of it. Perhaps a motor-car enthusiast could be found who would take a 50-mile an hour train if a 100-mile an hour train were available, but we think his conscience would tweak him at every mile post. A little more of the strenuous education of public opinion will begin to produce an effect. We do not approve of giving the automobiles exclusive rights to speed or exclusive use of the road. If, however, it calls for more speed in its own behalf it brings an influence to bear that may give a new impulse to train records.

A Coming Test

We learn with pleasure that at least one of the huge direct-connected gas engine sets of the California Gas & Electric Company has been shipped so that the time draws near in which the facts as to the practical properties of very large gas engines will be ascertained. Discussion of the subject hitherto has been strongly favored with polemics, since American gas-engine practice has been upon a rather modest scale until within very recent years. Certainly the Californians have thrown down the gage of battle with a resounding clatter, and any steam engineer who is looking for trouble is welcome to pick it up. Our friends of the Coast have done the same sort of thing before, and those who have gone into the lists against their propositions have generally retired in bad order. This time the battle is of great significance, for upon the result of it hinges the question whether the advocates of reciprocating engines and turbines will hereafter have to be largely on the defensive. The load will be largely a railway load, and San Francisco is not a city of smoothly beautiful load curves by any means. Those gas-engine sets will get soundly tested, but if they make good, we see some lively times coming. We earnestly hope that the whole matter can be soon opened to public inspection, for the issue is of very great importance. Probably decisive results one way or the other will quickly leak out, but if the odds are nearly even, it may take a long time to settle matters. At all events, the fun is now about to begin, and we shall try to keep our readers informed of the latest news from the scene of carnage, and to take a hand in the subsequent autopsy on the remains.

Use of Steel in Car-House Construction

The use of steel in "fireproof" structures has always been necessary to a greater or less degree, but experience has shown its presence to be objectionable, owing to its susceptibility to warping or buckling under intense heat. The tendency of the past decade, during which a great deal of study and attention have been given to this line of architecture, has been to substitute, as far as possible, tile and concrete beams, wider span of arches between beams, and other means to reduce as much as possible the amount of steel work in the structure. This revolution, for it may well be so called, has accomplished the long-sought for result of entirely doing away with the vulnerable steel channels in the all-concrete structures now built and building in many of the larger cities.

It seems strange that under these circumstances, architects should specify for car houses, which in case of fire are subject to an intense heat, roofs of expensive open tile and steel detail with long steel trusses under heavy strain. A fire in a single car, should it be so confined, as is seldom the case, could quickly cause enough damage to the members of a truss as to cause heavy damage to a large area of the roof. If it should spread to two or more cars, the chances are that the entire roof will collapse and every car in the car house, or at least in that section, will be destroyed. If a wide roof does not collapse, the labor and material for repairing it are correspondingly more expensive than one of simple construction.

For the reasons outlined above, we have frequently laid stress upon the importance of dividing up the car house into sections, with slow-burning or incombustible roofs and correspondingly protected walls. A recent structure of this kind is considered by its owners a model fireproof house, as it is subdivided by several walls, and each section contains from two to four tracks. Good as was this principle, the walls were built up by using steel columns with exposed flanges and filled in with 8-in. brick walls. To the top of these columns were attached the steel roof trusses, making the building practically a steel building except for the brick filling between columns. It would be interesting to see the result of a severe fire among cars in such a structure. But from the action of steel under far less severe conditions than would be imposed by a conflagration among cars, it may be expected with all reason that the ability of these walls to hold a fire would be small, for the buckling of the trusses and of the beams themselves as exposed in the so-called "fire walls," would cause a quick collapse of the brickwork and spread of the fire to adjoining sections, with a resultant general fire. In this case, and there are many with similar wall construction, the objection was aggravated by the fact that the only means for removing cars from all sections was by a single transfer table, the operation of which would be practically impossible in case of emergency, owing to its proximity to the building and the intensity of the heat at that short distance from a fire.

It would be far more practicable to subdivide the area by substantial 12-in. brick walls corbeled for truss or roof supports with roof of simple construction, such as corrugated iron sheets on light supports with small span. These are easily replaced, if destroyed, with low original cost, and are so light that their collapse in case of fire would not add materially to the damage to contents. One company has large storage yards for cars in active service with concrete walls, unroofed, 14 ft. high, dividing yard into sections containing each from two to three tracks. Others have small storage sheds of all-concrete construction. Others have "slow-burning" or wooden timbers. Any one of these is far better, from an economical or underwriting standpoint, than expensive roofs which are but little more serviceable than the inexpensive types, and far more susceptible to heavy loss from fire.

The Street Railway Situation in New York

The street railway situation in New York City, as disclosed by the report of the New York City Railway Company in our last issue, is a very interesting one. The net results of surface operation, if considered by themselves, might give rise to a pessimism which is not warranted when the text of the report of President Vreeland and the other conditions which affect transportation in New York are considered. Nominally, the report for the year's operation shows a deficit of over two million dollars after paying dividends on the stock of the Metropolitan Street Railway, Third Avenue and other underlying companies. Actually, the condition is not so unfavorable as this report would seem to indicate.

In the year ending the 30th of last June there were a number of temporary causes which increased the expenses and decreased the net earnings. Principal among the former was the large expense caused by the severe winter, and which was not confined to the increase of $119,000 for the removal of ice and snow mentioned in the report. As we have taken occasion to remark before, an increase in this item is always followed by an increase in others. This is due not only to the additional power required to move the cars, and to the burn-outs caused by the strain on the electrical apparatus, but also to the weakened condition of the motors, caused by continuous operation on overload; this weakened condition is sometimes not reflected in the repair charges for two or three months, or until the motors become unfit for use. It is not too much to say, therefore, that a cold winter, accompanied by an unusual fall of snow such as we had last winter, will increase the total repair bills from 25 to 50 per cent. With this increase in expenses comes a natural decrease in gross receipts, due to the snow which keeps people at home and reduces transportation. As the statistics published in our issue of March 18 show, the past two winters have been phenomenal in the amount of snow which has fallen in New York City, and by the law of averages it is safe to assume that a similar condition of affairs will not occur for a great many years, if ever.

But it has not been alone on account of a severe winter that the New York surface railways have been handicapped. During the past year there has not only been a large amount of reconstruction and electrification which naturally impeded movement of cars, but during the last nine months the company has experienced the competition of the subway. We have already expressed the opinion that the ultimate effect of the construction of rapid transit lines running longitudinally in New York will be to increase the gross receipts of the surface cars, as it will relieve them of long-distance traffic and will bring to them a large amount of short-distance traffic. During the first nine months or year, however, it is only natural that the factor of competition should be felt more keenly than the causes which will increase the traffic. It should also be remembered that the main effect of the subway in distributing the population within the limits of Greater New York will be to build up the Bronx, which now, outside of the surface lines, has no transportation lines except in a north and south direction. It will be the province of the Bronx surface lines to carry the people living in this borough between the subway and elevated stations and their homes. At present about 33 per cent of the track controlled by the New York City Railway Company is north of the Harlem River, whereas the per cent of earnings north of the river is only a little over seven. This fact shows the future possibilities in the way of transportation in this section of the city.

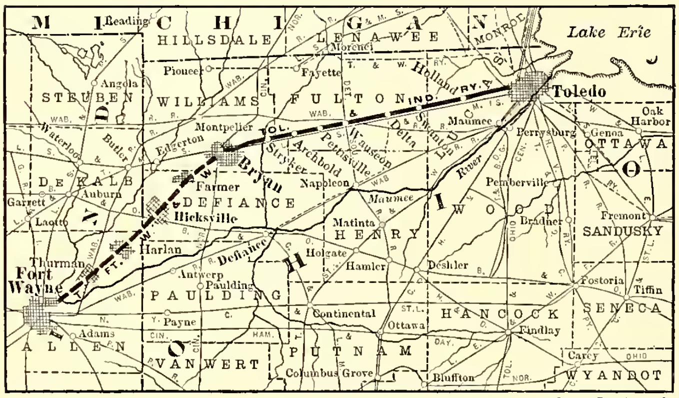
Three years ago, when the plan of forming the Metropolitan Securities Company and of leasing the Metropolitan Street Railway Company to the New York City Railway Company was broached, we published an editorial on the comparative merits of issuing "overlying" and "underlying" securities to provide the additional capital required to complete the equipment of the system, and took the occasion to say, "it seems to us that it was a very wise plan to make a lease of this kind by which those among the stockholders who are sanguine as to the future possibilities of the system can invest their money in the stock of the Securities Company with the knowledge that they will have to wait a considerable time for dividends, while those who do not feel warranted in taking a step of this kind can retain their railway stock with a guarantee of 7 per cent." At that time many, if not all, of the conditions which have since developed were foreseen by the management, and their judgment in making the lease, although criticised at the time in some quarters, has been amply justified by subsequent events. The records of the last quarter indicate that the corner has already been turned, and we shall be surprised if the earnings should not now begin that recovery which students of transportation matters in New York consider certain.

Cost of Oiling Cars

The figures given in the answers to the Question Box of the American Railway Mechanical & Electrical Association on the cost of oiling cars with four-motor equipments, brought out such a wide variation in figures as to call for considerable comment and discussion at the convention. We do not altogether agree with some that the amount of oil required to lubricate a car is independent of the amount of dust and dirt through which the car must operate. Any machine operating where there is dust and dirt must have a liberal margin of safety in its oil supply, and such margin is not necessary upon an elevated road operating on a perfectly clear right of way. Other things being equal, the cost of oiling a motor depends almost entirely on the amount of oil that is wasted. The actual amount of oil that is required for lubrication is very small. It is the oil that is wasted that makes up a large part of the expense. The main question is to reduce this waste. With motors which are designed with oil chambers with the intention of having them oil lubricated entirely, there is not the same chance for waste of oil that there is when the motor has some oil cup arrangement adopted as a substitute for the old fashioned grease lubrication. With the latter devices, the oil after it passes through the bearing is generally wasted and cannot be used a second time. The main thing with them is to get a cup which will feed no more than the necessary amount, and will, as far as possible, stop feeding when the car is standing still. Few, if any, devices will absolutely stop when a car is standing, but all the more successful ones feed much more rapidly when the car is moving than when it is at a stand-still. At any rate, it seemed to be the consensus of opinion at the convention, that even a wasteful oil lubricating scheme is more economical for a company than grease lubrication, on account of the longer life of bearings, fewer hot bearings, and consequently fewer ruined armatures.

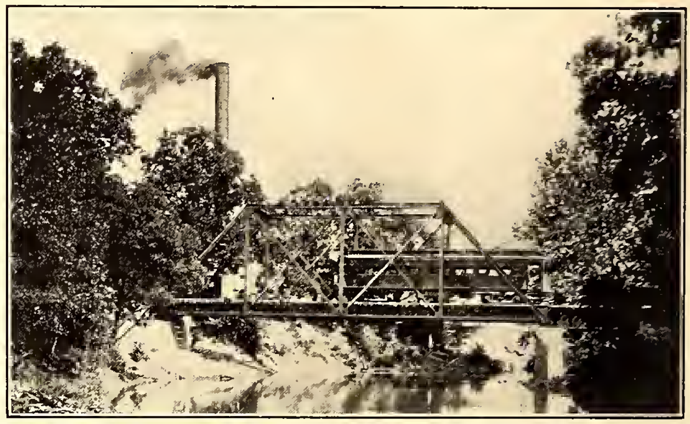
THE TOLEDO & INDIANA RAILWAY

The Toledo & Indiana Railway Company has recently opened an extension from Wauseon to Bryan, 22.4 miles, making the entire line from Toledo to Bryan 55.8 miles in length. With this enlarged field of operation, numerous improvements were necessary, and consequently the entire line was renovated, the rolling stock overhauled, and a power plant, car house and repair shops were erected on the east bank of the Tiffin River near Stryker, replacing the former temporary power station and shops at Delta, Ohio. At present a further extension of the road from Bryan to Fort Wayne, Ind., is being pushed through with all possible speed, and surveys and engineers' reports have already been completed. The route of the extension is shown in the accompanying map. This will give a through line from Toledo to Fort Wayne 101 miles long. At Fort Wayne direct connection will be made for Indianapolis. With limited service it will be possible to compete for time with the steam roads to these points, as the routes are shorter. In addition to the extension mentioned, the same interests have organized the Toledo, Defiance & Southwestern Railroad, and will build a branch line from Delta to Liberty Center, Defiance and Napoleon.



Street Ry. Journal

PROPOSED ROUTE OF THE TOLEDO, FORT WAYNE & WESTERN RAILROAD, BRYAN TO FORT WAYNE



CROSSING THE TIFFIN RIVER BRIDGE—POWER HOUSE IN THE BACKGROUND

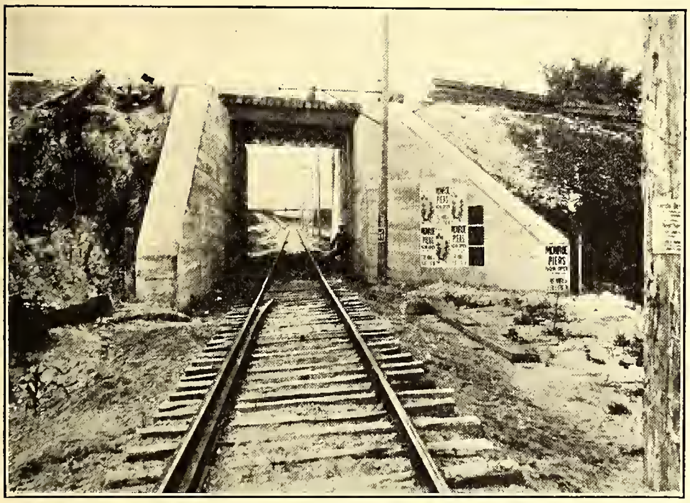
ADJOINING RIGHTS OF WAY OF THE LAKE SHORE & MICHIGAN SOUTHERN RAILROAD AND THE TOLEDO & INDIANA RAILWAY

65-FT. THROUGH GIRDER BRIDGE ACROSS BEAVER CREEK, NEAR BRYAN, OHIO, ON THE LINE OF THE TOLEDO & INDIANA RAILWAY

From the Toledo interurban station to Calvary Cemetery, a distance of 3.8 miles, the company uses the tracks of the Toledo Railway & Light Company, under a traffic arrangement. This is perhaps the best interurban entrance to the city, as the track is new and the route direct, which is of great benefit to the interurban schedules. From there the line passes over a 50-ft. private right of way through an extensive truck-farming district across country to Holland. From this point, and on through the towns of Swanton, Delta, Wauseon, Pettisville, Archbold and Stryker, the line is to the north of, and immediately adjoining, the Lake Shore & Michigan Southern Railway's Air Line division, which is perhaps the finest stretch of track in the country—a perfect tangent for 77 miles. A short distance from Bryan the electric line passes under the Lake Shore by an undergrade crossing and passes into the city south of the railroad, but aside from this, the rights of way of the two lines closely adjoin one another. Much of the way they have ditches in common and with no fence between, so that probably no electric road in the country has as many long tangents. Approaching each town the line swings over to the first parallel street. In every case the main streets of these towns lie north and south, so that the electric line crosses them at right angles. In nearly every town the road has been allowed to place a siding in the street, where it is permitted to lay up freight cars if desired, so that all these features tend to make it an ideal high-speed line and at the same time improve its possibilities for handling carload freight, a feature which is to be strongly pushed.

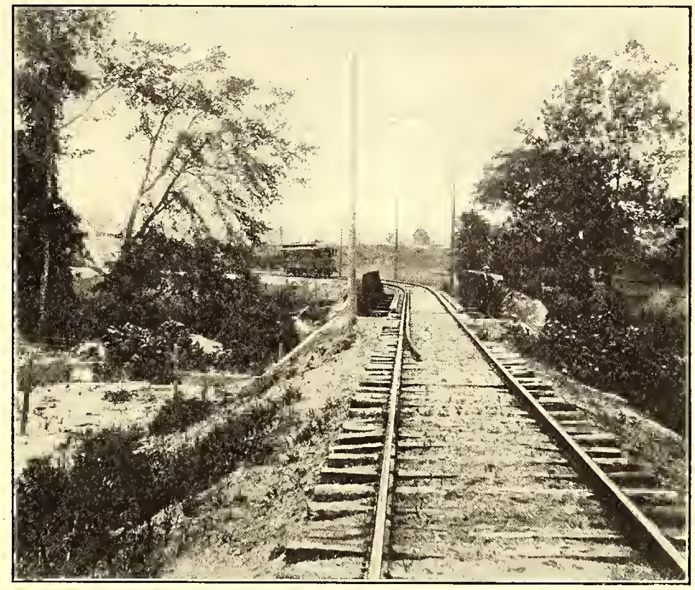
ROAD CONSTRUCTION

This district is very level, and there are no grades over 1½ per cent, and few as great as this. A number of good-sized fills and cuts were made, the heaviest fill being about 20,000 yds. The undergrade crossing near Bryan required a fill of 4 or 5 ft., and the track has natural drainage, a peculiar circumstance for a crossing of this kind. The track-bed is 14-ft. face and it is heavily ballasted with A1 grade of gravel from the famous pits at Tecumseh, Mich. Trains of forty cars or more were hauled the whole length of the road for this work, which gives an idea as to the grades and curves. The track is all 70-lb. rail, bonded with the Ohio Brass Company's soldered bonds and five cross-bonds to the mile. The trolley wire is two No. 000 grooved on the new section and two No. 000 Fig. 8 on the old. The overhead work is of the Ohio Brass Company's heaviest type, flexible suspension bracket construction, 9-ft. arms of 1½-in. tube, supported above and below. Ears are 10-in. clincher and soldered. The poles are 35 ft. with 7-in. tops, set 5 ft. in the ground and spaced 100 ft. apart. The high-tension system consists of three No. 4 copper wires insulated with 7-in. triple petticoat glass insulators. Garton 500-volt lightning arresters are placed ⅓ of a mile apart. The sidings are all on the north side of the track; they average 2½ miles apart and are 300 to 500 ft long. They have No. 10 frogs and spring switches, and under the operating rules the east end of every switch is locked open, so that every westbound car takes the siding and eastbound cars the main line. The trolley wire is arranged in the same way, so that it is not necessary to change the trolley at any time. At each siding is a circuit of six 110-volt lamps; two at each switch and two in the telephone booth, and the practice is to allow them to burn all the time. Extra lamps are carried in the telephone booth.



UNDER CROSSING OF LAKE SHORE & MICHIGAN SOUTHERN RAILROAD NEAR BRYAN, OHIO

Telephone booths are placed at all sidings and waiting rooms. Conductors take written copies of orders and read them to the motorman before leaving the switch or station. Telephone lines are No. 12 copper, and the 'phones are of the bridging type installed by the W. G. Nagel Electric Company, of Toledo. The despatcher uses the standard steam train sheet, and in addition to despatching, it is part of his duty to check the time slips with the train sheets. He figures mileage on the bottom of the train sheets, distributing it into four classes—passenger, special passenger, freight and carload freight.

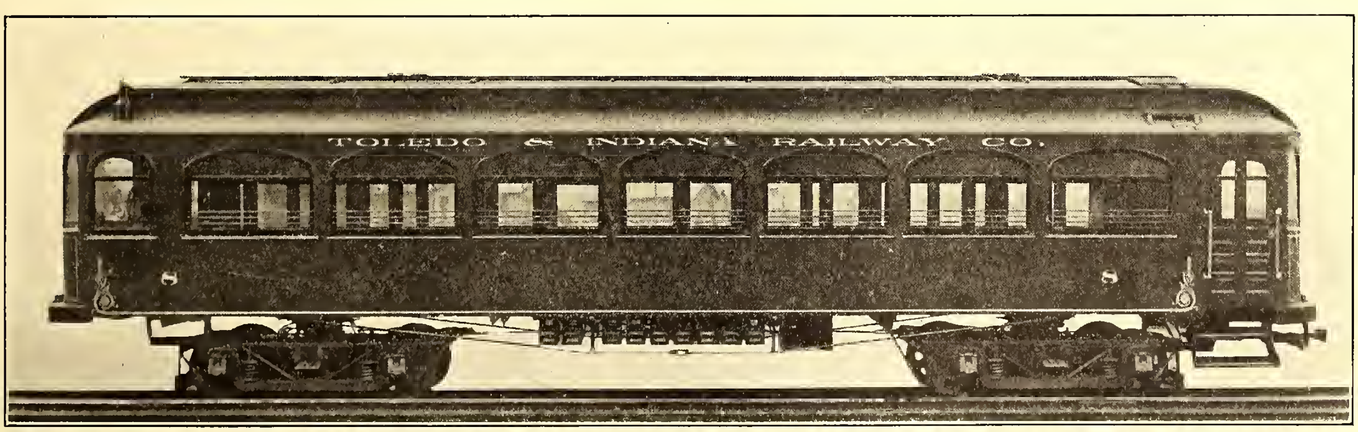


BEAVER CREEK BRIDGE AND UNDER CROSSING OF LAKE SHORE ON THE LEFT

All bridges are built of concrete and steel in accordance with steam railroad practice, steel girders or spans being used exclusively where pipe and masonry culverts were insufficient. At Stryker, where the road crosses the Tiffin River, the bridge consists of a 90-ft. high truss and two 45½-ft. deck girder spans, and over Beaver Creek near Bryan there is a 65-ft. through girder, these being the largest bridges on the line.

ROLLING STOCK

The rolling stock was increased at the time of the opening of the Bryan extension by three passenger and two express cars built by the Jewett Car Company. The passenger cars are 52 ft. over all, 40-ft. body and standard width, with vestibule at each end. The bottom framing is extra strong, reinforced with I-beams. The interior finish is mahogany with marqueterie inlay, and the ceiling is of the semi-empire type. The front end has a smoking compartment seating sixteen people, while the main compartment seats thirty-eight people. The



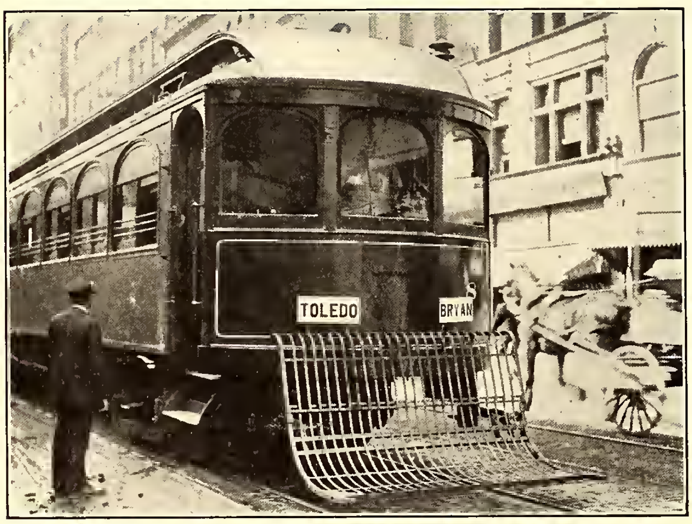
STANDARD PASSENGER CAR OF THE TOLEDO & INDIANA RAILWAY COMPANY

Near Wauseon the line crosses the Wabash and the Detroit, Toledo & Ironton steam railroads. Both of these crossings are protected by interlocking systems, which also protect the Lake Shore & Michigan Southern crossings, one towerman taking care of three lines in each case; one of these crossings is illustrated. Near Toledo, there are two other crossings protected by derailers, which are thrown by the conductor.

seats are of the walkover type upholstered in green Pantasote. Windows are of polished plate glass ornamented in gothics, and have Pantasote curtains with Keeler fixtures. Every car

STANDARD EXPRESS CAR USED ON THE TOLEDO & INDIANA RAILWAY

has continuous parcel racks, Van Dorn coupler on rear end, Smith heater and Sterling-Meaker register. The trucks are Peckham M. C. B. 36-A extra heavy type, on which are



VIEW SHOWING STYLE OF FENDER USED ON THE CARS OF THE TOLEDO & INDIANA RAILWAY

mounted four Westinghouse No. 57 motors with K-14 controllers and National Electric Company's AA1 air equipment. The passenger cars are geared for 60 miles per hour.

The express cars are 44 ft. long, equipped with four 75-hp No. 112 Westinghouse motors with L-4 controllers and Christensen air brakes. These cars are geared for slower speed than the passenger cars, and the heavier equipment will enable them to haul a number of freight cars. The company had six Stephenson passenger cars and an express car, which have been repainted a uniform orange and brought up to the standard of the new cars. In addition, the company has seven gondolas, two flat cars, three standard box cars and three center-dump ballast cars. These are equipped with air brakes and M. B. C. couplers. A 40-ton electric locomotive is being built; it is to be equipped with very heavy trucks and four Westinghouse No. 76 motors.

POWER STATION

The power station at Stryker is at exactly the center of the system, considering the proposed extension to Fort Wayne, and it is designed to take care of the entire line. The Tiffin River, on whose bank it is located, is the largest stream on the line, so that in every way it is an ideal location. The building is of substantial and pleasing design. The boiler room is 90 ft. x 44 ft., with a clear height under roof trusses of 32 ft. The engine room is the same length and 56 ft. wide; the engine room floor is 8 ft. above the boiler room floor, leaving a height to the trusses of 24 ft. On the north side at the west end there is a bay 14 ft. x 45 ft. divided into two stories for the reception of the switchboard apparatus. The basement under the engine room is on the same level as the boiler room, excepting that between the engine foundations there is a pit for the condensing machinery 14 ft. below the engine room floor. The roof trusses are of steel, and the roof is 1½-in. matched sheeting laid on nailing strips fastened

INTERIOR OF STANDARD CAR, SHOWING THE TYPES OF SEATS AND WINDOWS, LIGHTING ARRANGEMENT, ETC.

to the steel purlines, covered with a prepared roofing. There are two ventilating monitors over the engine room provided with pivoted windows actuated by mechanism controlled from

INTERLOCK AT WAUSEON, OHIO, PROTECTING TRACKS OF THREE ROADS—LAKE SHORE, DETROIT SOUTHERN AND THE TOLEDO & INDIANA RAILWAY the floor, and two over the boiler room with permanent ventilators.

The floor in the engine room is of Berger multiplex plate laid on steel I-beams and finished with concrete; it was installed by Shillinger Brothers, Toledo. The entire basement and boiler room floor is concrete, well pitched to secure good drainage. The engine foundations are solid concrete, and each has six T-rails the full length of the foundation. This work was done by Gorman Brothers, of Toledo.

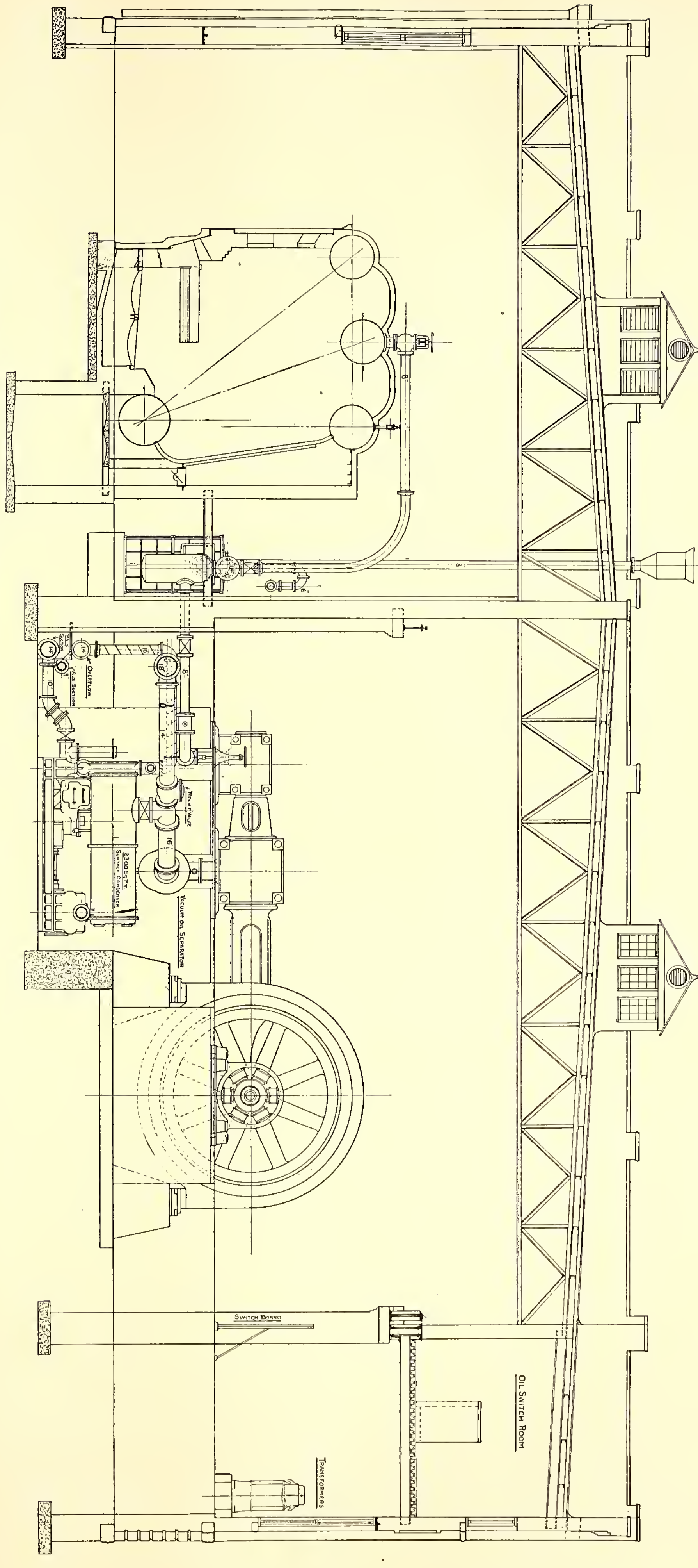
A 10-ton hand-power crane furnished by the Northern Engineering Works, of Detroit, spans the engine room, traveling the full length. The girder over the switchboard bay being in one span, leaves the entire space free beneath it. The outside walls of the building are all 17 ins. thick, faced with selected brick laid in red mortar.

STEAM PLANT

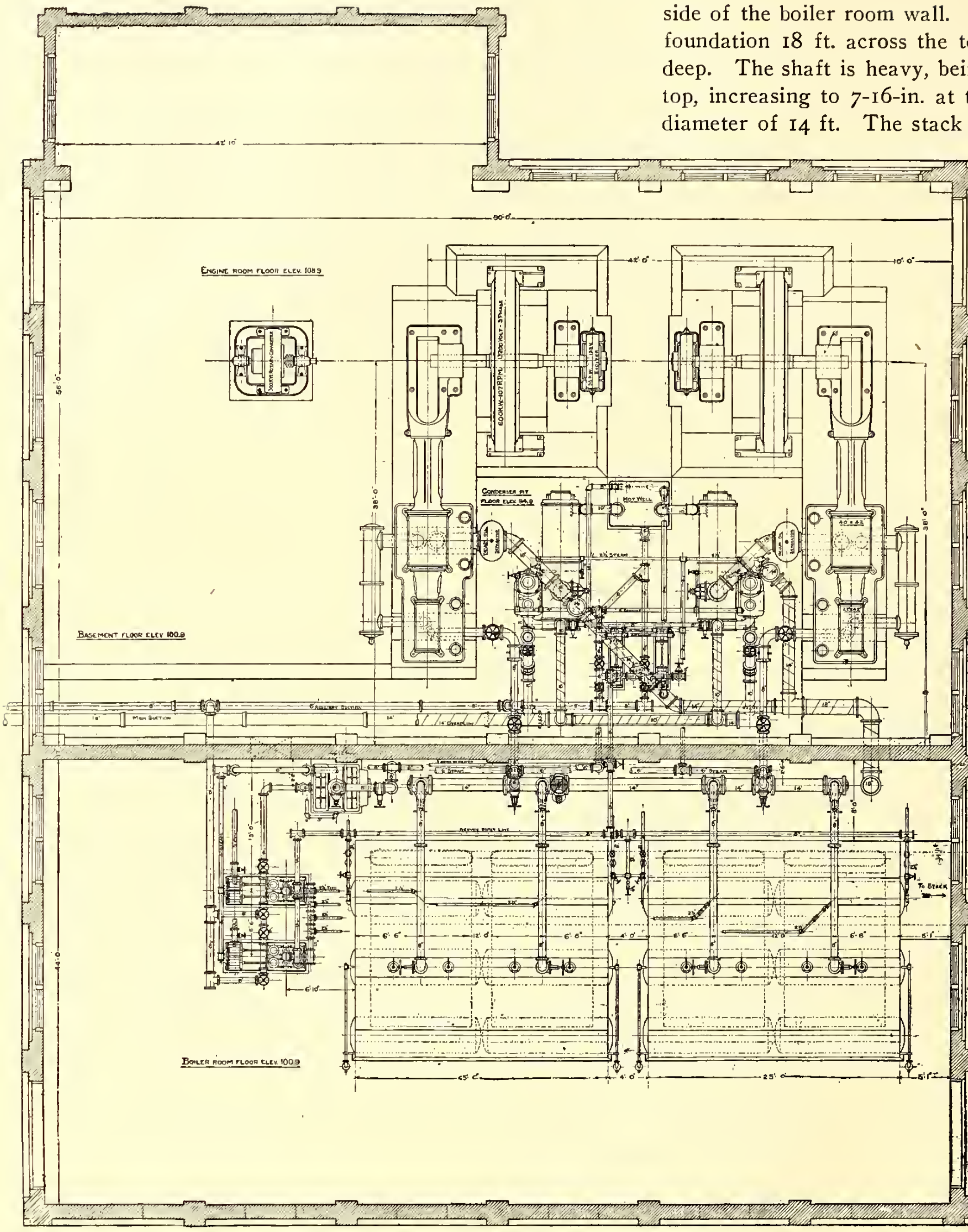
This division of the installation comprises the following: four 415-hp Stirling boilers; one 90-in. x 160-ft. self-supporting stack; two 800-hp Cooper-Corliss engines; two 2300 sq. ft. Dean Brothers condensers; one 2500-hp Cochrane heater; the piping system and the electrical equipment.

The boiler equipment, as above noted, is very liberal, as one unit can always be kept out of service, even when both engine units are working at full capacity. Each boiler has 4135 sq. ft. of heating surface and is constructed for 150 lbs. steam pressure. All the latest refinements of design adopted by the Stirling Company are embodied in these boilers, among them being a "wide and narrow" arrangement of spacing the tubes, by means of which it is possible to remove and replace any tube without disturbing any of the others. The fronts are of pressed steel. At present they have plain flat grates for hand firing, giving 72 sq. ft. of grate surface per boiler, but they are designed for stokers if desirable. The fire and ash pit doors are of the steel counterbalanced "inflop" style. An arrangement somewhat out of ordinary is made for the smoke connection, the setting being made a little deeper than standard and the dampers being located about 5 ft. above the floor, communicating with an underground flue, the walls of which form part of the boiler foundation. The absence of a bulky overhead breeching keeps the boiler room cool and gives a neat, roomy effect.

The flue from the boilers is extended through the building foundations to the foundation of the stack, which is located 21 ft. from the out-



SECTION OF POWER HOUSE, SHOWING CONSTRUCTION OF BUILDING, LOCATION OF BOILERS AND MACHINERY, ETC.

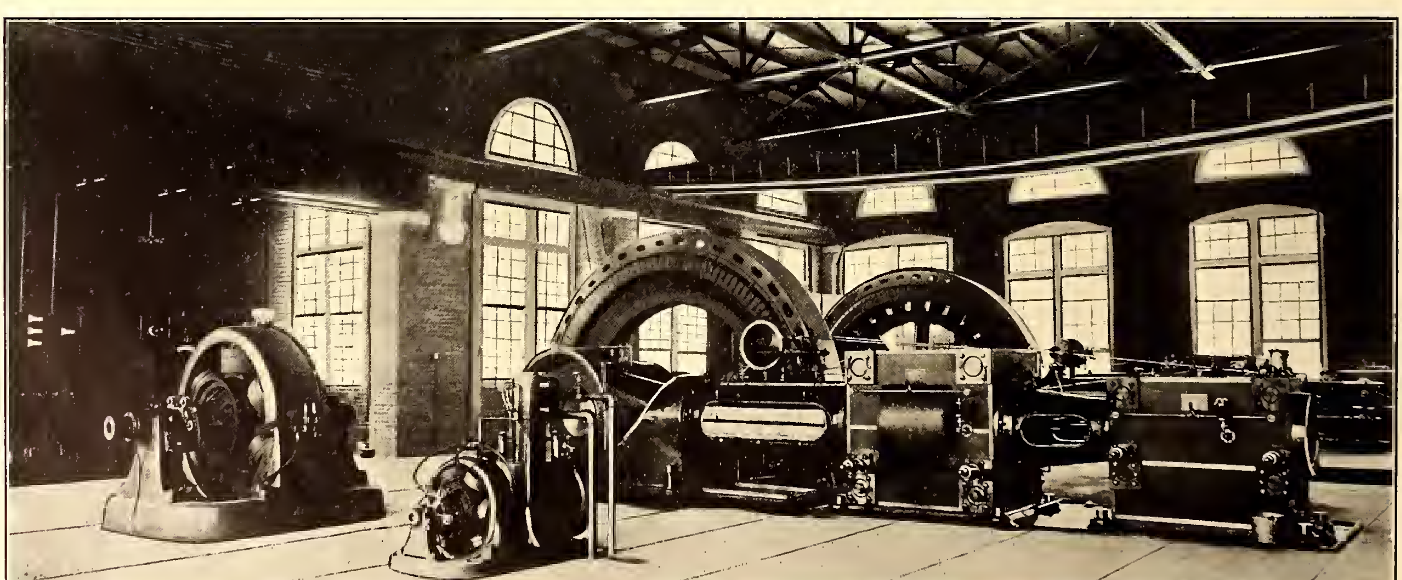


PLAN OF MAIN PIPING LAYOUT IN THE POWER STATION OF THE TOLEDO & INDIANA RAILWAY

side of the boiler room wall. The stack rests on an octagonal foundation 18 ft. across the top, 22 ft. at the base and 20 ft. deep. The shaft is heavy, being formed of ¼-in. plates at the top, increasing to 7-16-in. at the bottom, which is flared to a diameter of 14 ft. The stack is heavily bolted to the foundations and no guys are used. A lining of brick 8 ins. thick extends to a height of 50 ft. from the foundation.

ENGINES

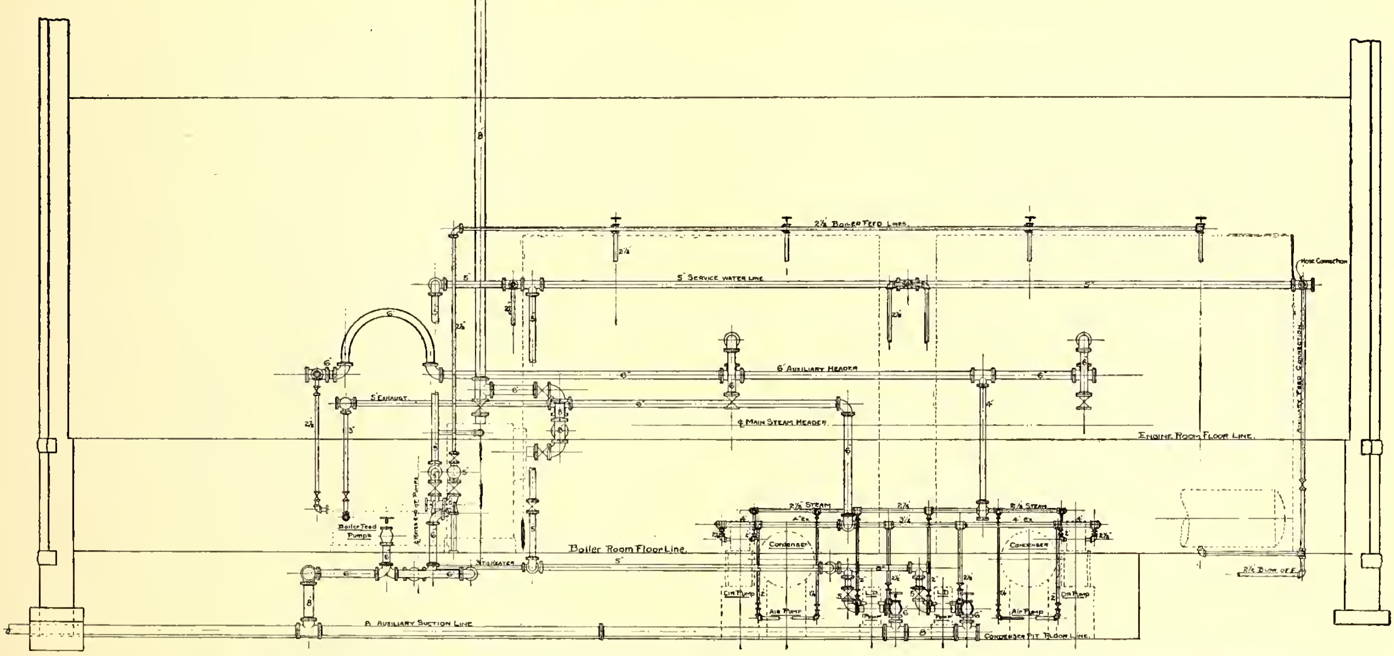
There are two tandem compound Corliss type engines, built by the C. & G. Cooper Company. The cylinders are 22-in. and 40-in. x 42-in. stroke. They operate at 107 r. p. m. and are rated at 900-hp each. Steam is taken from beneath the floor, and in addition to the throttle valve, a butterfly valve is placed in the steam line, operated by an automatic tripping device from the governor, which positively shuts off the steam where the speed increases beyond a prearranged point. Each engine is direct connected to a 600-kw General Electric generator placed between the bearings, and a 35-kw exciter is on the extended shaft overhanging the outer bearing. On account of the design of the generators, no fly-wheels are used, the revolving fields having the necessary momentum to permit parallel operation of the units. The cylinders are mounted on heavy cast-iron foundation plates and are lubricated by means of multiple force-feed oil pumps. Machine oil



VIEW OF ENGINE ROOM IN THE STRYKER POWER HOUSE OF THE TOLEDO & INDIANA RAILWAY is supplied from a gravity oiling system in connection with a Cross filter and pump in the basement. The main and outer bearings are water jacketed. Besides the main units, there is installed an 8-in. x 6-in., 400 r. p. m., vertical marine type engine for an auxiliary exciting unit.

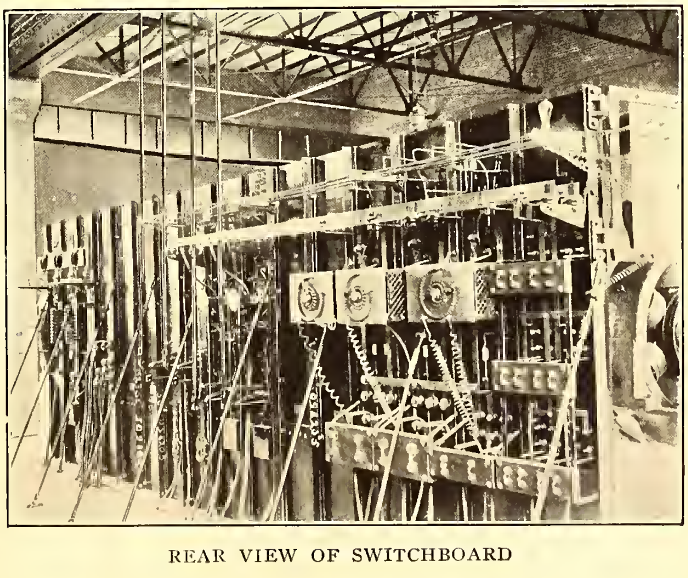
In the pit formed in the space between the engine foundations are two surface condensers, each containing 2300 sq. ft. of cooling surface. The shells are cylindrical and are made of cast iron in two sections. The tube heads are of composition metal, and the tubes are ¾-in. seamless brass, tinned inside and out. The condenser shells are mounted over 10 x 18 x 18 single air pumps, brass fitted, while the circulating water is supplied by two 12 x 22 x 15 vertical single type double-acting pumps. In the condenser pit is also located a steel hot well and two 12 x 8 x 12 single service pumps. There are two duplex outside center packed boiler-feed pumps with cylin-

THE POWER STATION OF THE TOLEDO & INDIANA RAILWAY AT STRYKER, OHIO



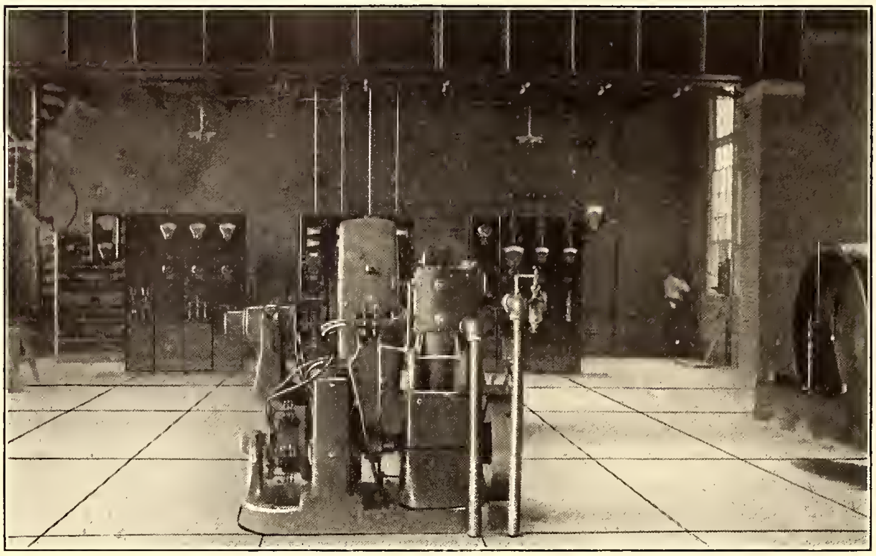
LONGITUDINAL ELEVATION OF PIPING, AS VIEWED FROM BOILER ROOM WITH PARTITION WALL REMOVED

OIL SWITCH ROOM IN GALLERY OF BAY WINDOW

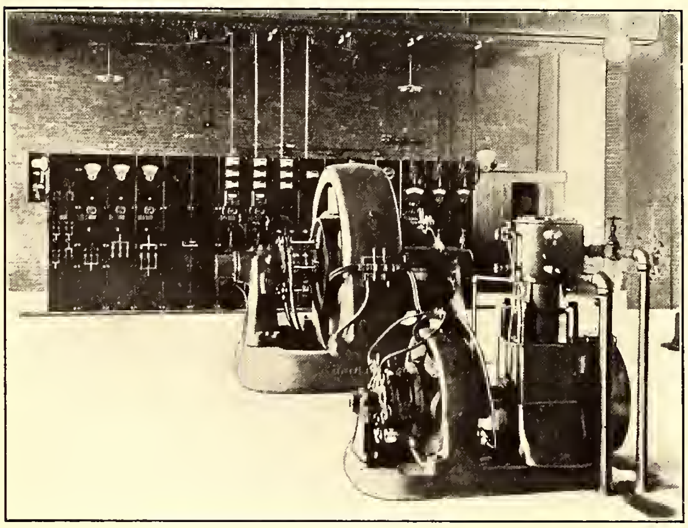


REAR VIEW OF SWITCHBOARD

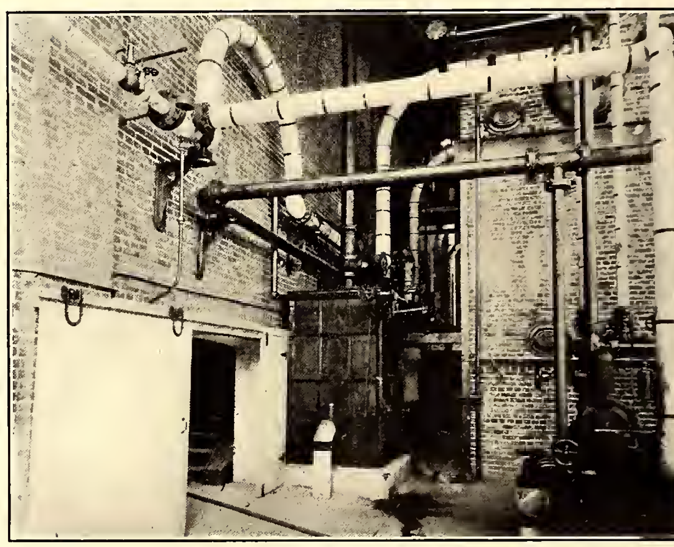
ders 12 x 7 x 10 placed in the boiler room at the side of the battery of boilers. All of the pumps have lagged steam cylinders and cast-iron bed-plates to catch drips. In addition to the above, there are two small single vacuum pumps used to drain the vacuum oil separators, and a steam-driven oil pump to elevate the engine oil from the filter and tanks to the elevated supply tanks. The entire pumping and condensing equipment is of the Dean make. Near the boiler-feed pumps in the boiler room, is a 1500-hp open feed-water heater of the standard Cochrane design.



VIEW OF SWITCHBOARD EXCITER AND ROTARY IN POWER STATION



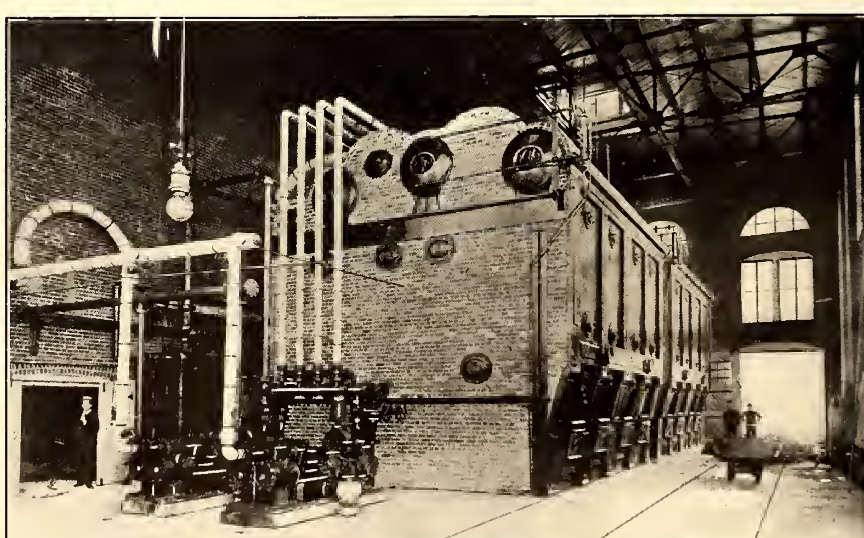
SWITCHBOARD EXCITER AND ROTARY IN POWER HOUSE AT STRYKER, OHIO



STEAM HEATERS BEHIND THE BOILERS IN THE STRYKER POWER HOUSE

The arrangement of the piping is made on the unit system, so as to permit of extension of the power plant without any rearrangement. The main steam header is supported between the boilers and division wall on steel beams and rollers, and is 14-in. pipe with extra heavy valves and fittings. On each boiler nozzle is located an automatic stop and check valve, and in addition there is a gate valve in each boiler lead at the header, and a stop valve in the line to each engine. Steam is taken for the engines at the bottom of the header, passing through large receiver separators, which act as a constant drain to the header. There is a 6-in. auxiliary steam line taking steam from the top of the main line and running along the division wall supplying boiler-feed pumps, condenser equipment and low-service pumps. The auxiliary header can take steam from either side of the valve in the main line, thus allowing either of the latter to be cut out of service. The 16-in. exhaust line from each engine contains a vacuum oil separator, made by the Austin Separator Company, Detroit. Gate valves control the passage of the steam into the condensers, and automatic relief valves are provided for atmospheric exhaust. The lines from the relief valves combine into one 18-in. atmospheric line which passes through the division walls and thence through the roof. The exhaust lines from the small exciter engines and the pumping machinery combine into one 8-in. line, connecting to the feed-water heater with a by-pass, extending above the boiler room roof into a Lyman exhaust head.

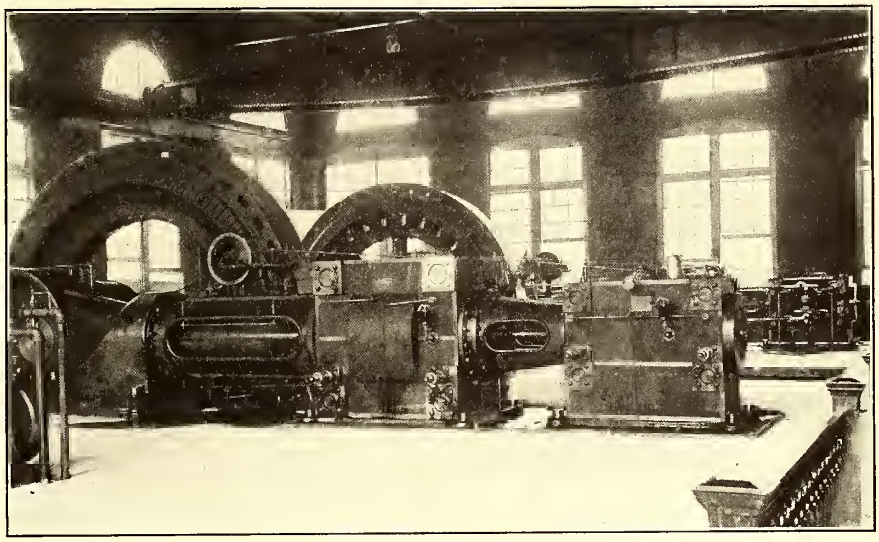
About 150 ft. west of the power house on the banks of the river is located a cold well 15 ft. in diameter, in which are located foot valves for the main and auxiliary suction lines. These lines are formed of 14-in. cast iron, bell and spigot pipe, respectively, to the point where first connections are taken inside the power house. The main suction line supplies only the circulating pumps of the condensers,



VIEW IN THE BOILER ROOM OF THE TOLEDO & INDIANA RAILWAY and each branch contains a large air chamber. The auxiliary suction line is connected to the low service pumps in the basement, also to the boiler-feed pumps. Suction connections are also made from the hot well to the service pumps, and from the feed-water heater to the boiler-feed pumps.

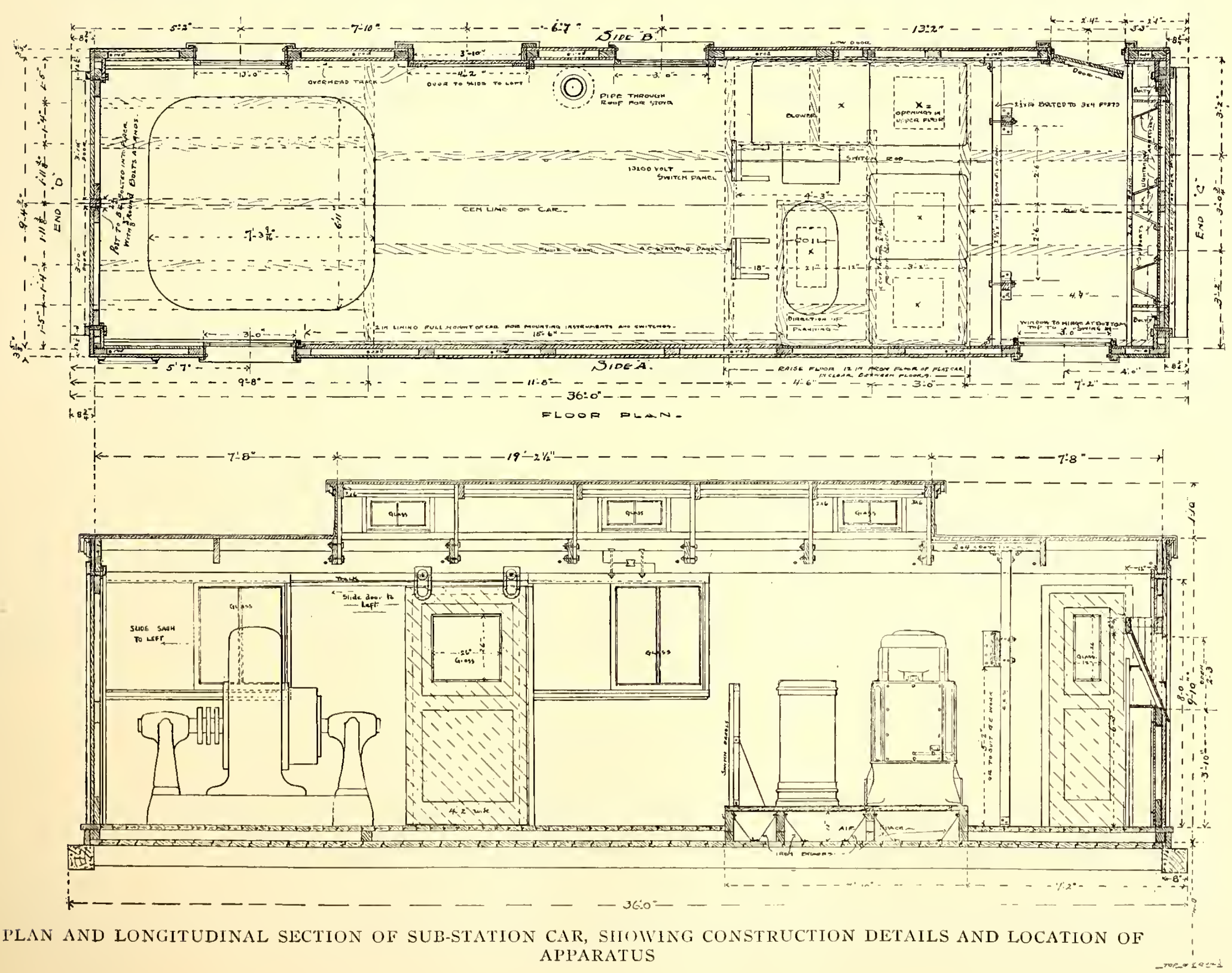
There are two 10-in. lines running from the discharge connections of the condenser, combining into one 14-in. outflow line running outside of the power house to a sink, into which also lead all drip and blow-off lines from the station. This sink is drained by a vitrified sewer-pipe line to the river below the intake of the cold well. In the overflow line from each condenser is located a T, the side outlet of which has a valved 5-in. connection, the two lines combining into a line running into the hot well. In the hot well this line terminates in an automatic float valve. This valve preserves the level of the water in the hot well, and in case the water discharged by the condenser air pump is not sufficient to supply that taken out by the service pumps, the automatic valve provides the make-up water.

A boiler-feed manifold is provided, being supported at the end of the boiler-feed pumps, having a valved branch for each boiler; either pump can supply this manifold. There is also provided a connection from each pump to the service line which is supported on the back wall of the boiler setting. The discharge lines from the low-duty pumps are connected into one line which connects to the service line and also the feed-water heater. This line is so valved that the service pumps can supply the feed-water heater while one of the pumps is supplying the service line for boiler cleaning, etc. There is also a connection from the service line to the blow-off line on each boiler, so that in case the main feed line of any boiler is



THE MAIN DIRECT-CONNECTED GENERATING SETS IN THE STRYKER STATION

disabled it can be fed temporarily from the service line or from the boiler blow-off. The high-pressure steam drips are all combined into one manifold located in the condenser pit, this manifold being drained by a Sorge registering drainer, dis-plete gravity oiling system is installed, two 60-gal. tanks being charging the condensation into the feed-water heater. A com-



PLAN AND LONGITUDINAL SECTION OF SUB-STATION CAR, SHOWING CONSTRUCTION DETAILS AND LOCATION OF APPARATUS located on an elevated platform in the boiler room from which the oil is piped to the sight feed valves on the engine bearings. The drips are collected and run through a large Cross oil filter in the engine room basement, and, after being purified, it is pumped into the storage tanks. All of the live steam and hot-water piping is covered by 85 per cent magnesia covering.

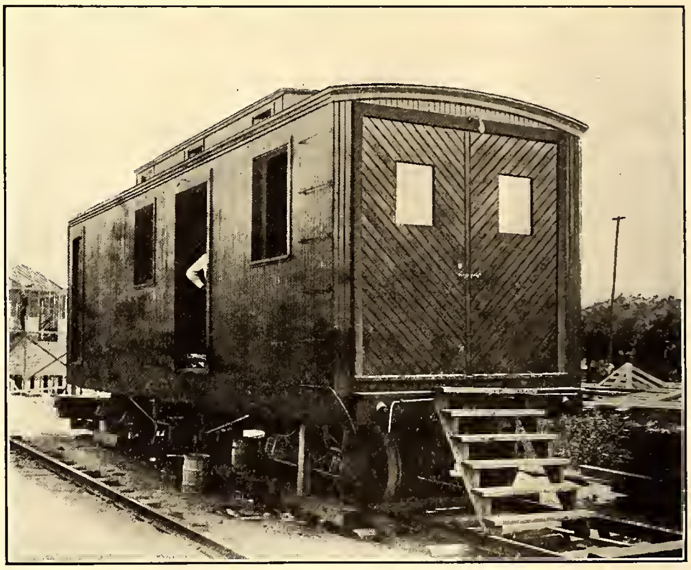
CAR HOUSE OF THE TOLEDO & INDIANA RAILWAY AT STRYKER, OHIO

ELECTRICAL EQUIPMENT

The electrical equipment consists of two ATB 28-pole, 600-kw, 107 r. p. m., 13,200-volt, three-phase revolving field, fly-wheel type generators, direct connected to the Cooper-Corliss engines. Each unit has direct connected to the end of its shaft one 35-kw, 125-volt exciter. In addition to this, there is one 15-kw, 400 r. p. m., 125-volt exciter, direct connected to a standard G.E. vertical single cylinder engine. The lighting of the station as well as that of the adjoining car house is taken from the exciter bus. This unit was installed for lighting the station and power house after the large units are shut down, and for the further purpose of an auxiliary exciter. The converter equipment in the main station consists of the following: one 6-pole, 360-kw, 500 r. p. m., 600-volt, 25-cycle, standard three-phase rotary converter, with speed limiting and end play device; three 25-cycle, 110-kw, 13,200-370-volt single-phase air blast step-down transformers; one 45-kw air blast reactive coil; one blower set, consisting of a 40-in. Buffalo fan, direct-driven by a 4-pole, 2-hp, 250 r. p. m., 350-volt induction motor. The transformers are each provided with four taps in the primary winding, giving a total variation in voltage of 10 per cent. A tap in the middle of the secondary winding is used in starting the rotary. The station switchboard consists of three exciter panels, one lighting feeder panel, two high-tension generator panels, one high-tension out-going line panel, one 360-kw, 13,200-volt rotary panel, one 600-volt d. c. rotary converter panel, and two 600-volt d. c. feeder panels. Panels are black enameled slate; instruments of dull-black finish. A novel feature of the arrangement of the electrical apparatus is that in place of arranging the switchboard, transformers, etc., in the main engine room, these are placed in the bay. On the second floor of the bay are installed the high-tension lightning arresters, instrument transformers and the high-tension oil switches, each of which is enclosed in an individual compartment. A view of this room is shown. All lighting wires in the building are run in conduits.

SUB-STATIONS

The sub-stations are located at Holland, Delta and Pettisville, an average distance of 12 miles apart. Each of the stations has installed one 360-kw rotary converter, three 110-kw transformers, one 45-kw reactance coil motor-blower set, three 15,000-volt, 200-amps., single-pole automatic oil switches, three-phase 15,000-volt G.E. lightning arresters, together with the necessary instruments and switches. Due to the greatly increased flexibility, two of these equipments are installed in portable cars, which were built and designed by the Hirsch Company. A monitor extending the full length of the car furnishes good ventilation, while one end, that near which the rotary is placed, is composed of two doors, which allow ample room for the removal of the rotary. The method of entering the car with the high-tension wires is the same as used by the General Electric Company, with the exception that the entire end can be removed in case the transformers have to be taken out. The entire electrical equipment, outside of car motors, was furnished by the General Electric Company.



PORTABLE SUB-STATION CAR USED BY THE TOLEDO & INDIANA RAILWAY

CAR HOUSE AND SHOPS OF THE TOLEDO & INDIANA RAILWAY

The car house, which is 100 ft. wide and 180 ft. long, is built of brick and steel, and contains four storage tracks, two concrete pits sufficient to accommodate four cars, offices, storerooms, armature room and machine shop. The last named is equipped with a 160-ton wheel press, one 36-in. and one 24-in.

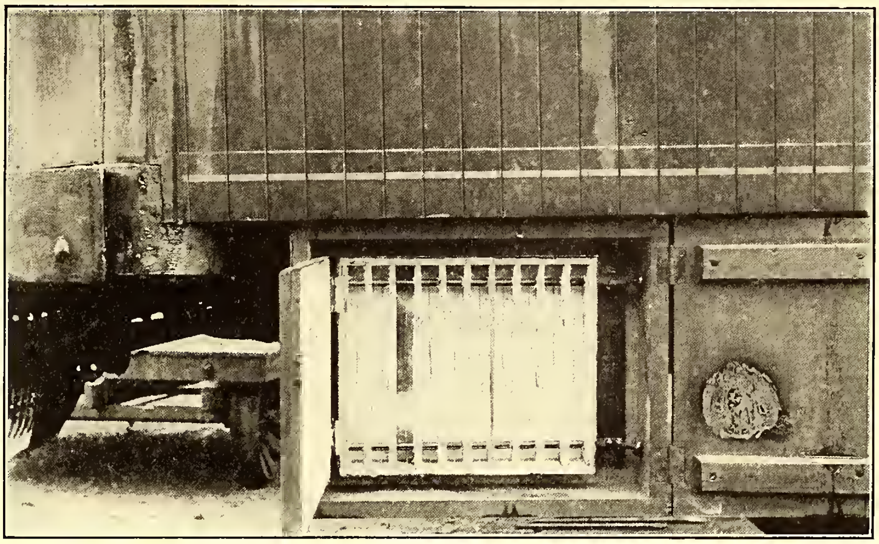
lathe, drill press, emery wheels, etc. Cranes are installed for handling motors, trucks and armatures. The company does more of its own repair work than is usual for a road of this size. It rewinds all its own armatures, makes its own coils and does the commutator work. Wood gear cases are made from 1-in. matched and grooved material, tops as well as sides, so that grease will not work through. The gear face is 5 ins. and the case is made with a clearance of but 1/8 in. on either side, so that broken bolts cannot work up and get into the teeth. The cases are made very strong with iron straps formed in the company's shop.

The company has a special trolley wheel for which remarkable mileage is claimed. Wheels are made from its own formula and cost 88 cents each in the rough at a neighboring brass foundry. Bushings cost about 12 cents each, and the work of turning and assembling is about 10 cents, making the finished wheel cost $1.10. The wheel has a 3-in. oil reservoir and a very thick shoulder. The groove is 1 1/8 ins. wide and 3/4 in. deep, the idea being to have it shallow enough so that when it becomes worn down it will not knock off hangers. The pins are of cold rolled steel and the bushings are the standard Star Brass Company's, except that two additional holes are bored in them to give free flow for lubrication. The oil reservoir is packed with a mixture of motor cup grease, cylinder oil, machine oil and Mexican graphite, and it is claimed that it is never necessary to touch either bushings or wheels until they are worn down to the spokes. It is claimed they run 10,000 to 12,000 miles, and Master Mechanic L. R. Gaw says that the "trolley wheel problem" is the least of his troubles.

Car lightning arresters are home-made, after the type used in Detroit. One of these arresters as installed on the car is shown in the illustration on this page. The fuses are made from No. 29 magnet wire, cut in two and braided in the center with a Western Union connection. One end is bare and is tied around the positive bar, and the other end, which is covered, is tied to the negative bar, the bars being made from No. 000 grooved trolley wire. The box and partitions are covered with asbestos and shellac.

TRANSPORTING A LOAD OF FREIGHT ON THE TOLEDO & INDIANA RAILWAY

Formerly the company made its own stop, crossing, and siding signs from wood, but it is now using galvanized Bessemer steel signs furnished by the Bond Steel Post Company, of Adrian, Mich., as they are cheaper and more durable than wood signs. Express and passenger cars are being equipped with a new fender, built by the Automatic Fender Company, of Wyandotte, Mich., which is illustrated on page 764. There is a cable stretched across the front of the fender, and anything striking it with a force of 8 lbs. to 10 lbs., causes the fender to trip. The cable has connected to its ends a turnbuckle, by means of which it is always kept tight. All supporting castings on the fender are malleable and wrought iron. The entire construction is strong and heavy, and the device is designed for interurban service.



INSTALLATION OF LIGHTNING ARRESTER UNDER CAR

Oil lubrication is used for journals and armatures, and the company has adopted the automatic feed oil cups and lubricants furnished by W. A. Wood, of Boston. Rochester steel wheels are used and solid gears are being adopted.

Cars are swept out by the crew at the end of each run, there being a 30-minute layover in Bryan. The men clean the cars thoroughly each morning before taking them out; cuspidors are washed out daily. Windows are washed three times a week and cars are thoroughly scrubbed out twice a week. The master mechanic has arranged a system for keeping accurate mileage on all parts such as trolley wheels, bearings, armatures, gears, etc., and reports of these are made monthly to the manager.

RATES AND SCHEDULES

Before the opening of the new power station, the schedule to Wauseon, 32 miles, was 1 hour 45 minutes, but this has now been reduced to 1 hour 28 minutes, while the schedule from Toledo to Bryan, 56 miles, is 2 hours 15 minutes, which equals the speed of limited cars on a number of interurban roads. Rates are based on 2 cents a mile in multiples of 5 cents, and where there is a fraction the company takes it. The steam road has recently announced competitive commutation rates between points on the electric line and Toledo, but as the steam road has only two accommodation trains a day which stop at all towns, and as the time to the center of Toledo is no faster than that offered by the electric, it is not believed that the business will be affected.

EMPLOYEES' CLUB

The employees have an organization known as the Lavenberg Club, named in honor of General Manager D. H. Lavenberg, and practically every employee from president to section man is a member. The company exercises no jurisdiction over the organization and it is not allied with any union. Members pay 50 cents a month, and the company furnishes a clubroom, where there are facilities for reading and amusement. In case of sickness or disability, the employee draws $6 per week. It is the intention to increase the dues somewhat and provide a fund so that it will be possible to pay almost full wages for disability.

FREIGHT BUSINESS

The freight business is developing in a manner really surprising, considering the facts that the line closely parallels a great steam road and its rates are practically the same. All of the towns touched are good manufacturing and agricultural centers, and the electric line has an advantage in that its cars traverse the streets and can unload goods in front of stores and manufacturing establishments. It has laid sidings into a number of factories, and is getting carload business in direct competition with the steam road. As has been pointed out, the absence of grades and curves makes it possible to haul a number of cars at a time. At present it has two package freight runs a day, the cars running to the Toledo terminal station, and it is claimed that its business at the station is heavier than any of the roads entering Toledo. Like the Toledo & Western Railway, whose freight business was referred to in the Street Railway Journal of Sept. 2, the company has an arrangement with the Toledo Terminal & Belt Company whereby its standard freight cars are hauled to the center of the city or delivered to other roads, the Belt making a switching charge for its service. Through the same intermediary it has received foreign cars from distant points, and it receives a switching charge for delivering them. A great deal of crushed stone has been handled in connection with the Toledo, Angola & Western, a small steam road with which it makes connection by means of the Belt. Last year it handled several millions of brick, besides other material used in rebuilding the town of Delta, whose business section had been destroyed by fire. The ability to deliver the material on the spot where it was to be used, gave it the advantage over the steam road. At present all freight cars are handled by the package express cars, but, as stated, electric locomotives are being built, and then it will institute regular freight train service. The market-gardening district near Toledo is furnishing a large bulk of business, and teaming has almost been dispensed with. In a number of instances the farmers have put up cash for laying a siding into their yard, the company paying for it in freight. The company has passenger and freight stations in each town, and in all the larger towns it employs two men, going on the principle that a station man cannot work eighteen hours a day and give efficient service.

ORGANIZATION

The Toledo & Indiana Railway Company has a capital stock authorized and issued of $2,500,000, and a bonded debt of $1,650,000. The officers of the company are: S. C. Schenck, president; T. H. Clauss, vice-president; M. G. Briggs, treasurer, and C. H. Masters, secretary. The above, with Patrick Hirsch, M. Donnelly, H. C. Stahl, Frank Yesbera, George G. Metzger, C. H. Webster, L. E. Flory and J. M. Longnecker, are directors of the company. D. H. Lavenberg is general manager; Robert Dittenhaver, general passenger and freight agent, and E. B. Kleinhaus, auditor.

The extension to Bryan was financed and the contract for the entire work was taken by the Patrick Hirsch Company, of which the officers are: Patrick Hirsch, president; H. C. Stahl, first vice-president; M. I. Wilcox, second vice-president; J. H. Clauss, secretary-treasurer; C. E. Van Bibber, chief engineer; D. A. Proctor, resident engineer, and F. H. Froehlich, electrical engineer. The grading, track and overhead construction was sublet to the Fidelity Construction Company, of Detroit, while the contract for boilers, engines and piping was given to the Arbuckle-Ryan Company, of Toledo, which installed that portion of the work. This journal is indebted to General Manager Lavenberg, of the railway company, and to Mr. Froehlich, of the Patrick Hirsch Company, for much of the information presented herewith.

AN UNPRECEDENTED RAILWAY SITUATION

BY FRANK J. SPRAGUE

"After a most thorough investigation on the part of the New York, New Haven & Hartford Railroad's electrical commission"—certainly a most astonishing preamble in more ways than one, yet so reads the trade notice which announces the placing of an order for twenty-five a. c. locomotives, under conditions not stated, for operating both the through and suburban passenger service on the New York and Stamford division.

Speaking in my individual capacity as an engineer, and also from a railroad equipment and operating standpoint, I venture to assert that under the existing circumstances, and in view of certain special limiting conditions, this decision is an error of more than ordinary magnitude—one which no engineer knowing the facts should have urged, and one which, instead of advancing the application of electricity to trunk line service, may very easily seriously interfere with it.

A discordant note this, I know, in that chorus of praise with which the technical press is resounding because of the "brilliant and progressive action" of the New Haven road, and yet I am led to this conviction after full consideration of all the factors of the problem, and without, I trust, shutting my eyes to any advantages which may accrue from all-round successful a. c. operation. Such as are my conclusions, however, it seems but proper to state them with the same candor which I have always observed in speaking of engineering problems, for, unless the wisdom of this action by the New Haven Company is promptly challenged, it is likely that erroneous conclusions affecting trunk line operation may become temporarily settled convictions.

In what I have to say I disclaim any intent to speak for the electrical commission of the New York Central & Hudson River Railroad, of which I have been and am an active member, for whatever their individual opinions, and whatever may be that body's present or future official action on the subject, it will undoubtedly be confined to problems affecting joint operation of the roads, and embody only those ideas to which all of its members can subscribe. Even less do I assume to speak for the railroad company in matters affecting its relations with another company operating over its tracks, but the public announcements made from time to time concerning developments on both the Central and New Haven roads afford ample basis for my comments.

Furthermore, my criticisms are not dictated by any spirit of antagonism, practical or theoretical, to a. c. development, concerning the possibilities of which I have well-defined notions, and the bearing of which upon railroad equipment I can, I hope, judge perhaps as clearly as most engineers. I regret, however, that so seemingly bold a step has been taken where alternating-current operation must necessarily be handicapped by various physical, engineering and operative conditions over which neither the New Haven road nor the contracting company can have any control, which the nature of things makes it impossible to change, and which will surely interfere with the full fruition of the hopes of those who have committed themselves to this proposition; and further, that it should be supported by some assertions concerning d. c. operation which will not bear inspection.

Generally speaking, I assume that a trunk line railroad's chief concern is how best it can meet conditions which are from time to time forced upon it, both from a financial and an operative standpoint, improve and lower the cost of its service and benefit its stockholders; and that it is not directly concerned in experimental development for the benefit of other companies, whether railroad or manufacturing. In fact, because of the necessity of maintaining effective and safe operation it should be slow to commit itself to any radical departures save for the gravest of reasons.

The first queries which naturally arise are: Why has the New York & New Haven Railroad decided to adopt electricity at all, and what has determined the limitation, of the particular zone selected?

Is it because the company has suddenly become convinced that the economy of electric locomotive operation is such as to warrant it in embarking at great expense in a more or less experimental venture, or is it so certain of it that it intends ultimately to adopt electricity throughout its main line, and meanwhile is willing to try it on its own as well as some one else's dog first, even at some possible great inconvenience?

I venture to assert that neither assumption is tenable, for not only is the latter most improbable, but even the first is not a strong enough motive to lead to the present action by the New Haven Company. The simple truth is that the New York Central & Hudson River Railroad was, primarily because of a grave disaster in the Harlem tunnel, quickened into a more serious consideration of plans already under advisement, and being compelled by legislative act to locally abandon steam, had for practical operative reasons to further consider whether an extension of its proposed operation by electricity was not only feasible but necessary. The electrical zone thus determined necessarily included not only the yards, tunnel and viaduct in New York City, but, so far as relates to the operation of the New Haven trains, the section of the Harlem road to Woodlawn, at which point the trains of that company deflect to its own tracks. Hence for that dozen miles it became necessary that provision should be made for the operation of all trains by electricity, no matter what the New Haven Company might otherwise have wished to do, and Woodlawn being impracticable as a point of change of motive power, the operation had to be carried to some natural terminal division of suburban traffic, either New Rochelle, Port Chester, or Stamford, where change could be conveniently made on trains intended for more remote destinations, just as the Central had decided for North White Plains and Croton.

The limited zone of present operation having been evident for over two years, what would have been the ordinary procedure? Naturally, one would say, through executive and technical representatives, to promptly enter fully into the investigation, and if possible determination of plans which would affect joint operation, and which might further be acceptable for individual operation.

The Central took up this problem in a manner which I think has commended itself to the common sense of the community, and ought to the engineering and railroad world, by bringing together in a commission outside independent technical advice and its own constructive and operative officers, and reinforcing them with all that was necessary for effective work. In spite of the criticism which those who have not this responsibility upon their shoulders are lightly given to express, I, for one, save in one particular, where the better decision had to be subordinated to external conditions, am satisfied with the results, whether measured by first costs of installation, determination of engineering facts and possibilities, or practical railroad operation. And, if I mistake not, the example thus made by the Central will not only help raise the standard of electrical engineering, but establish a precedent for the safe and economical determination of problems of vital concern reaching every operative department of a railroad.

No sooner had this commission undertaken its responsibilities than it generalized a harmonious plan, making use of every advance which had been made or seemed reasonably sure of fruition in electrical equipment and operation, and planned for a reliable and economical service to satisfy alike the public and the railroad company. The broad question of whether alternating or direct current should be used on motor equipments had at the time to be settled in favor of direct current, not only because of the unpreparedness of the manufacturing companies to reliably undertake the solution of problems of paramount importance by a. c. methods, but also because of special engineering and other limitations. In my own mind there has not been a shadow of doubt of the wisdom of this decision, and that the results will be fully equal to those anticipated, in spite of any claims based upon what is hoped to be accomplished by other means, now some three years later. And now, what of this problem of the New Haven road, and how is it going to affect plans already formulated and being actively carried out?

Let us briefly consider the character of its service, and to what extent it meets with that favored condition advanced quite forcefully, although sometimes on mistaken premises, as specially adapted for demonstrating the advantages of a. c. operation, namely, a long line with relatively infrequent units.

Operating in one direction there are in the twenty-four hours of a week day a total of sixty-seven trains run on passenger schedule, of which the runs of five end at New Rochelle, eight at Port Chester and nine at Stamford, leaving forty-five for points beyond this division. Thirteen of the latter are scheduled not to stop at Stamford, and thirty-two of the sixty-seven are essentially local trains making frequent stops.

On the Mount Vernon-Stamford section the schedule of these locals varies from 23 to 27 miles an hour, and the station distances average 1.65 miles apart, while intervals between train stops vary from 4 to 6 minutes, quite comparable to the conditions on the express service of the Interborough system.

Woodlawn, the point of departure of the New Haven from the Harlem tracks, is a flag stop for four trains only, and Mount Vernon, 1.6 miles farther on—or 13.63 miles from the Grand Central Station—is practically the first suburban station on the New Haven road.

As further illustrating the character of this service, it may be noted that in addition to the starts at Forty-Second Street Station, these sixty-seven trains make only 23 starts below Mount Vernon, but 289 in the 19.85 miles beyond, excluding, on the one hand, possible stops at the drawbridge over the Harlem, and on the other, movement of trains in the yards at New Rochelle and Port Chester.

The train movement is variable, intervals at stations in one direction varying from seven minutes to nearly three hours. But considering traffic in both directions, while at times there are no trains in motion on the Mount Vernon-Stamford division, and for a period of about three and one-half hours when there is but one train at any moment, for the remaining time there is an average of a train every ten minutes, and sometimes as many as eight trains in the section. Any freight movement is, of course, an addition. The road, therefore, can hardly be classed as a long rural road with infrequent service.

Four months ago the New Haven road's expressed determination was to limit its electrical movement of trains over the equipped tracks of the Central; three weeks ago, after a period of three years of vacillation, during which time there was but a single attendance of any representative of the road at the meetings of the Central's electrical commission, a second attendance is accompanied by the announcement of the adoption of alternating-current locomotives, the intention to extend operation from Woodlawn to Stamford, the abandonment of multiple-unit suburban train operation, the handling of all trains by electric locomotives, and a possible call for electric power not alone on the direct-current third-rail section, but for a single-phase a. c. supply to an overhead trolley on the balance of the division.

In eleven months the Central hopes to begin electric operation. It has taken that company two years to have developed by two great manufacturing companies an electric locomotive which can perform such part of its service as must be so operated, and months must elapse before any number are ready for use, despite the fact that they are built for a single purpose, and are to be operated on a single plan. The development of this locomotive has been accompanied by a running test of nearly 25,000 miles under every conceivable load and operative condition, on a track specially set apart day and night for this purpose.

Now, by some wizard performance, the development of a new locomotive on other plans, designed to be operated both by alternating and direct currents, to have a double system of contacts, and control both for single and multiple-unit locomotive operation, is promised in time to meet the already established conditions. Just here, and to have at first hand an authoritative expression as to proposed methods, I will quote from a paper presented at the recent meeting of the Philadelphia convention of the American Street Railway Association by Charles F. Scott, as follows:

"While single-phase cars can be arranged to operate from a direct-current trolley wire, it handicaps in some measure the single-phase equipment. The addition of resistance to the car equipment, and the extra switches and the like for enabling the change to be made in the current supply are obviously objectionable. It is best, therefore, to keep single-phase equipments free from operation on direct current if it be practicable to do so. When it is found necessary for them to operate from an existing direct-current trolley wire, the motors are connected two in series for 500 volts, and if there be four motors, the two pairs may be connected first in series and then in parallel as in ordinary series-parallel control. The transformer is cut out, and the control apparatus and motors operate substantially the same way as those on an ordinary car."

"Current may be taken from one phase of a two-phase or a three-phase generator. Current from the several phases of a polyphase generator may be used for operating different divisions of the railway."

"A polyphase motor taking power equally from each phase of the high-frequency circuit may drive an alternator, either single-phase or polyphase, for furnishing current to the single-phase railway."

"Trolley voltage [on d. c. operation], however, has been limited to approximately 500 volts on account of the limitation of the direct-current motor."

The pertinence of these remarks will be apparent later.

Assuming, for the sake of argument, that an a. c. locomotive of sufficient capacity to handle the New Haven trains can in the time required be developed, how will the introduction of a. c. operation affect the elaborated plans of the Central?

That road is actively engaged in carrying out plans involving an expenditure of nearly sixty millions of dollars, much of it made possible by the advances in electrical development, and over ten millions are being invested in electrical equipment alone. Increase of capacity, however defined and elaborated, has been the keynote of its plans, and anything which threatens to impair or in any way interfere with the full measure of its accomplishment must be subjected to rigid scrutiny, and if the threat becomes a fact should meet with prompt and emphatic rejection.

In what particular, then, does the proposed introduction of a. c. locomotive operation into this territory promise to better or even equal that already provided?

The plans of the Grand Central Station show a terminal designed to obtain the maximum despatch and economy in handling train service and passengers, and the minimum dead movement of all equipment. To accomplish this, a double-track level is being provided, the upper for trains drawn by locomotives originating from points outside of the electric zone, and the lower to accommodate the movement and storage of suburban trains operated on the multiple-unit plan, this lower level being provided with a loop, storage tracks and the necessary cross-overs, and also for a possible, though improbable, connection with the Interborough system.

This loop is of 135 ft. radius, even less than that at the City Hall station of the Interborough, and on which it is manifestly impracticable to effectively operate any locomotive handling a ten or twelve-car train. This method of operation, designed for the New York Central trains, should without argument govern the operation of all trains which come into this terminal, and yet the proposal to use alternating-current locomotives means the abandonment of multiple-unit train operation, at least on this section, by the New Haven road.

Assume that on second thought it recognizes the necessity of altering its conclusions so as to meet the imperative demands of terminal station movement and the traffic requirements of the public, what are the technical facts?

Simply that not only every locomotive, but every motor car—and in a suburban train of any length there must be several if not all motor cars where high schedule is attempted—must according to present plans be equipped with bow collectors for overhead trolley contact 22 ft. above the traffic rails, and third-rail as well as overhead collectors for operation on the d. c. zone, must pass through a tunnel of only 15 ft. in height and over special switch work in terminal yards, and must be provided with means for throwing one or other of these sets of collectors into operation and two distinctive systems of control, one for a. c. and the other for d. c. operation.

When considering the difficulties which must be inevitably experienced in the change over from one system to another, and especially if the attempt is made to operate the suburban trains on the multiple-unit system, one wonders why, instead of adding to them by an overhead trolley from Woodlawn to Stamford, a properly constructed and protected third rail operated at a moderate potential was not adopted for at least this experimental equipment.

To say nothing of the increased weights, and the liability of trouble and delay because of the extra apparatus and complications, and even assuming that these can, despite Mr. Scott's inference, be ignored, what will be the result in the matter of economy when operating in the d. c. zone, and what bearing will it have upon the capacity of conductors and supply at the Central's sub-station nearest Forty-Second Street?

The a. c. motors proposed are designed to work at a maximum of about 250 volts when at full speed, and when in the d. c. zone they must be coupled in series in pairs because of the higher potential. Locomotives, although equipped with four motors, can then be operated only with the two groups in series and parallel relation, and motor cars if equipped with only two machines must be operated with fixed relation of motors. The result will be that for locomotive operation there will not be the advantage of the d. c. four-motor series control provided on the Central's locomotives, and no corresponding two-series control for motor cars. Locomotives will therefore require an increase of over 100 per cent in current up to about 12 miles an hour, which constitutes a considerable part of the yard movement, and there will be a similar increase of d. c. current requirements for two-motor suburban motor cars up to speeds of 20 or 25 miles an hour. In fact, the conditions will be worse than indicated, because if the motors are designed for 250 volts individual operation, two in series will not be sufficient for the d. c. zone, where the regular potential will range from 600 to 650 volts.

No wonder, then, that in spite of local requirements, and the fact that the multiple unit has become an accepted tenet of such character as to preclude the possibility of successful criticism, the New Haven road commits itself to the abandonment of that method of train operation, one of the strongest reasons and most legitimate excuses for the use of electricity.

Even its locomotives, be they ever so successful, would introduce an additional cause for trouble and complaint on account of the extra number and yard space required, and because of the inability to pool the equipment.

Furthermore, should there be delay in providing them, it will mean a like inevitable delay in commencing electrical operation by the Central, because of the inadvisability of joint electrical and steam operation in the tunnels, a condition to which a long-suffering public will register an emphatic and justifiable protest.

In the matter of current supply, what shall it be, especially in view of the limited time remaining before electric operation should begin at Forty-Second Street? Either there must be a single supply from the power houses of the Central for both a. c. and d. c. operation, or d. c. supply for 12.05 miles by the Central's power house, and single-phase a. c. supply for 19.85 miles from an independent station. In the latter case it is manifestly impossible to get the highest economy because of the great variation of load, and because only one part of the work, and that the more severe, will be performed by the independent station. Joint supply of the d. c. division is simply out of the question, because in order to meet the necessary conditions it would have to be through independent sub-stations, practically similarly equipped, and supplied by independent high-tension lines from the New Haven plant, which duplication, because of physical conditions, is impracticable.

The proper determination of the relative amounts of energy used by the equipments of the two companies under the complicated conditions of train operation, with supply from three main power stations and the necessary duplicate sub-stations feeding a common working conductor, would be most difficult. Nor could there be under such conditions of supply from independent corporations that effective control of current supply vital in times of emergency.

It must be remembered that the New York Central, while providing space for future increases of equipment, has established two power houses considerably removed from each other, one at Port Morris and the other at Glenwood, near Yonkers; that these two stations generate polyphase currents which are transmitted to eight sub-stations, where they are converted into continuous current at 650 volts pressure which is delivered to the working rail; that at these sub-stations storage batteries of great capacity are to be installed; and in order to insure reliable operation of the rotaries under the extreme variations of load due to the heavy train demands, extraordinary care has been taken to maintain a practical minimum of voltage variation and freedom from sharply fluctuating loads at the main stations.

Furthermore, these two main stations are tied together, and the sub-stations are supplied by a system of high-tension conductors of minimum number, so that either joint or independent operation of stations can be effected with the least delay and the greatest freedom from confusion and trouble.

While normally, at least during times of heavier traffic, both stations will be maintained in operation, the reduction of fluctuations and the reserve capacity afforded by the batteries is such that in an emergency one station could just about take care of the Central's service, and in case of a total temporary breakdown of the high-tension lines the batteries will have reserve capacity enough to carry the entire load for a short period. It will be seen, therefore, that a fundamental idea of the Central's equipment is that of insurance because of the great volume of traffic and the vital necessity of maintaining continuity of operation. If called upon to supply three times as much power as originally contemplated outside of its own necessities, there would, unless the capacity of both stations is increased, and also the number or capacity of certain of the high-tension feeders, be imposed upon it a demand which it will not be prepared to meet. The fact that two-thirds of this special demand would be of a sharply varying character, without any relief whatever from storage battery equalization, would certainly tend to interfere with the attainment of results which have been considered fundamental.

But assuming that a. c. supply is made from the Central's main station, how can it be done? There are several theoretical possibilities:

Single-phase, all from one section of the machines to step-down transformers which in turn supply the trolley wire or single-phase from all windings to independent transformers, from each of which a section of the road will be supplied. Neither of these plans is permissible, because in view of the size of the train units there would be serious unbalancing of the phases, with consequent irregularities and unreliability in operation of the rotaries, especially when accompanied with material drops of potential, to say nothing of the possible overloading and burning out of some part of the windings, or the necessity of operating an excess amount of machinery.

An alternate plan, supply by all phases to transformers connected upon the three-phase two-phase plan, the two phases supplying different sections of the road, is likewise objectionable for the same reasons.

An independent supply from machines specifically set apart for the New Haven's service cannot without great cost be made effective because of the existing system of distribution and switchboard arrangements. Only a limited supply of this sort could in any case be possible from the station equipments now being provided.

A remaining possibility is by all phases to polyphase motors, which in turn drive single-phase generators to supply the trolley wire, so as at all times to make equal use of all phases. This seems to be the only practical method when rotaries are also to be operated from the same source, and when train units of the size under consideration are to be operated. This, of course, means the introduction into the sub-stations of that moving machinery so much deprecated by critics of d. c. operation.

Every specific condition surrounding this proposed equipment seems, therefore, to militate against that directness and simplicity of equipment essential to the claim of a. c. operation, and which under more favorable auspices would have a fair chance of being demonstrated.

What, then, is to be gained, and by whom? The New Haven Company must make a serious expenditure, lessened possibly by utilizing current from another company in the d. c. zone, but this necessarily rendering less efficient the supply from its own station, if it has one for the a. c. division, and it turns over its tracks and equipment, as well as operation, to an experiment in the hope of demonstrating such economy in electric locomotive operation alone as will warrant the enormous expenditure necessary for any serious extension of electric service on its main line.

The passengers seem to have been lost sight of, for there is no promise of a single additional train, or higher schedule, or any improvement in the service, save abolition of smoke, which nuisance seems to have assumed gigantic proportions.

The Central, when it fully comprehends the meaning of the proposed equipment, may find sufficient warrant to view with equanimity the entire disarrangement of its plans, and the prostitution of its service to what may be fairly termed a craze for experimental development applied without regard to consequences, but I doubt it.

On the general subject of a. c. and d. c. operation, I beg to add a word. Affecting, as it vitally does, conductor capacity and sub-station distances, it is unfortunate that Mr. Scott should make a statement to the effect that 500 volts has become the standard, and by inference must necessarily be the limit for d. c. operation, for the Central's rail supply will be at 650 volts, its d. c. motors are guaranteed for 750, the Berlin Elevated and the Zweisimmen-Montreux roads are built for 800 to 850, reliable companies in Europe are supplying d. c. motors wound for 1000 volts, and it may be safely assumed that in spite of apparent difficulties turbine operation of comparatively high d. c. current dynamos is not an impossibilty.

By all means let us have the utmost which can be gotten by either system, let every improvement and advance possible be attained. Every engineer stands ready to welcome accomplished facts, and help in the progress of the art, but for the best interest of that progress it is vital to avoid not only unwarranted claims but adverse statements which will not bear critical analysis.

THE INTERNATIONAL STREET RAILWAY CONVENTION OF 1906

At a meeting of the officers and the executive committee of the International Tramways & Light Railways Association (Union Internationale de Tramways et de Chemins de fer d'Intérêt local) held at Liége, Belgium, recently, it was decided to hold the next biennial convention of the association at Milan, Italy. The date for the convention has been set for September, 1906. One reason for the choice of Milan was that, during the summer of 1906, an international exposition will be held in that city for the purpose of celebrating the opening of the new Simplon Tunnel through the Alps, and that an important feature of the exposition will be the exhibition of transportation apparatus. Some particulars of this exposition were published on page 125 of the issue of July 15, 1905. The programme for the convention has not yet been decided upon, but will be issued shortly from the office of the general secretary, at Brussels, together with an announcement of the exact date of the meeting.

EFFECTIVE METHOD FOR ATTRACTING PARK TRAFFIC

A unique idea was carried out with success by the Boston & Northern and the Old Colony Street Railways on Saturday afternoons, Sept. 23 and 30, which were given up wholly to pleasure for the children in the form of "hunts" held in the various parks maintained by the companies. The hunt of Sept. 23 was an exciting chase in which the children secured real live animals and took them home for pets. The fortunate child to secure the first prize received a goat and a goat-cart. Others who were successful received as prizes live guinea pigs, doves, canaries, rabbits, etc. On Sept. 30 the presents were dolls, watches, games, balls, Indian clubs and many other toys. In each case, tags bearing the names of the various articles were hidden away, and on being unearthed the holder was presented with the article named on the tag. Both hunts were open only to primary and grammar school scholars. While considerable money was spent in carrying out the plans, the company was well repaid, as more than 40,000 children and their parents were carried to and from the parks at which the hunts were held.

Edward D. Adams, the well-known financier of New York and representative of the Deutsche Bank, has been presented by the Siemens & Halske Company, of Germany, with a superb model of their high-speed car with which such brilliant demonstrations were made on the Zossen military road some time ago, using three-phase current. The model is exact in every detail of outward construction, and a great many of the working parts are also reproduced with closest exactitude. The scale is 1:20. The model was made by the apprentice force, which was sent into the field to make its measurements from the actual car itself as it stood on the track, without the working drawings. It is particularly interesting, in this model, to study the bow contacts for the three overhead wires, these having proved very successful in the final operative tests.

MEETING OF INDIANA ELECTRIC RAILWAY ASSOCIATION

The first regular monthly meeting of the Indiana Electric Railway Association after the summer vacation was held in the palm room of the Claypool Hotel, Indianapolis, Oct. 12. The occasion brought out a good attendance of traction men from all over the State. The meeting was called to order by C. L. Henry, president of the association, who very felicitously congratulated the members of the association over their healthy and vigorous appearance following their summer vacation, and also congratulated the association on the auspicious opening of the first monthly meeting. Mr. Henry said he had selected C. L. Morgan to act as secretary in the absence of Mr. White, the regular secretary, if there were no objection. The unanimous vote by which the selection was ratified indicated that no better choice could have been made.

President Henry called the members' attention to the death of John W. Chipman, vice-president of the association, and spoke very feelingly of his worth as a friend and helpful counselor. A committee composed of C. C. Reynolds, of Lebanon; C. G. Pohlman, of South Bend, and C. E. Morgan, of Indianapolis, was appointed to draft suitable resolutions, and the following resolutions presented by Mr. Reynolds were adopted by a rising vote:

Resolved, That in the death of John W. Chipman, which occurred at Boston, Mass., on the 12th ult., this association has lost a valuable member, an energetic worker and a wise counselor, and a friend whose exemplary habits in his public and private life are worthy of emulation by all.

Resolved, further, That we, as an association, extend to the family of our deceased friend and associate our heartfelt sympathy in their great loss.

A copy of these resolutions was ordered spread upon the minutes of the association and the secretary directed to furnish a copy thereof to the family of the deceased member.

President Henry announced that it had been suggested that a question box be established. This suggestion brought out a hearty discussion relative to the purpose and management, and when explained, the question box was unanimously indorsed. The question box will be in charge of a committee, of which B. L. Kelsey, of the Indiana Union Traction Company, of Anderson, is chairman. Members are requested to forward questions for the box and the committee will assign the questions to certain members of the association to answer; however, questions will be received up to the hour of opening the box, and the members present will be given an opportunity to discuss them. The question box is expected to prove a popular and interesting feature of future meetings.

The supply men present asked for the privilege of making an exhibit before the association once a year, and this was heartily agreed to. The May, 1906, meeting was selected as the time, and the supply men the wide-world over are invited to make exhibits.

The only topic on the programme for discussion was "Claims and Their Adjustment." The discussion was opened by the presentation of a very interesting and instructive paper by E. C. Carpenter, claim adjuster of the Indiana Union Traction Company. Mr. Carpenter said:

Claim departments were created and exist by reason of the misfortune of others; but so long as motormen will run their cars into each other in broad daylight and women persist in getting off cars backwards, the necessity for the departments will remain and they must be maintained, although I feel certain that even claim adjusters would welcome the day if the causes could be removed so that the claim departments could be disbanded. What we shall say in this paper will be said in the light of what our experience and observation has taught us, yet realizing that we have not attained perfection.

Every claim department should be furnished with certain blank forms for reporting accidents, the forms being prepared to cover local conditions. It is not possible to have a blank form of report that will cover all accidents and not be confusing, but a blank form of report should cover such important features that experience has shown are most likely to occur in the more frequent accidents.

We are now using a form of accident statement (our form No. 401) that we prepared about a year ago. It has proved very satisfactory, and answers our purpose where accidents are occurring on city as well as interurban lines. This blank is placed in the hands of our agents and reports are to be made out by the agent, the information being given to him by the train crew reporting the accident. We find we get clearer information in reports where one person at each terminal has been instructed regarding taking reports, and he gets the details from the train crew and fills out the report, but reports are always signed by the train crew.

We are also using a form of report for employees (form No. 416) which is intended to cover accidents to employees in the departments of roadmaster, electrical, shops, power house and construction. This blank is especially prepared with a view of ascertaining the familiarity of the injured party with the duties which are being performed, the condition of tools, staging, etc., at the time of the accident. The report of accidents of this character are to be made out by the foreman in direct charge of the work at the time of the accident.

In case of serious or fatal accident, immediate notice should be given the claim department, either direct or through the train despatcher. For this purpose we are using a telephone accident report (form 417) which is intended to cover only important facts that can be gathered quickly. This report is given to the despatcher by the train crew out along the line, and is sent in immediately by the despatcher to the claim department. We are also using a short form of report (form C. D. 403) that conductors must carry with them to report all trouble occurring on the cars, such as ejectments, controversy over tickets, etc. Conductors are also required to carry small printed tabs so they can quickly have passengers write down their names and addresses when collecting this information in case of accident.

Our agents are provided with blank reports for delayed baggage. The first part of report is made out when the complaint is made; the second part, or receipt, is taken when the baggage is delivered. The agent fills out the "Agent's Report" as soon as baggage is delivered and forwards his report with baggage check attached to the claim department. We also have for the use of section men a form of report for stock killed or injured.

The above covers all the blank forms that are essential in securing reports of accidents, but we have in addition to the above our release blanks for use in making settlement with injured parties, and a special form for releases by employees. It is, I believe, a correct policy to require all employees injured in any manner to execute a release to the company before being permitted to return to work. It is then left to the judgment of the claim department as to whether or not any consideration should be paid in settlement other than re-employment. Inasmuch as a large percentage of accidents to employees occur by reason of their own negligence, and are settled upon the basis of re-employment, we use in connection with this form a blank addressed to the head of the department where the employee was injured, showing that the injured employee has executed a release. Upon this blank the foreman must endorse the date upon which the man returned to work, and must send this information to the claim department for permanent filing. This makes a complete record of each case and shows the fulfillment of the contract by each party.

When a report of an accident is received by the claim department, we immediately note the date and the hour of its receipt, and index in a book for that purpose, under the name, if given, showing date, location and kind of accident; a space is left for entry of settlement when made. The report should then be placed before the head of the claim department and he can order inquiries mailed to witnesses or assign the case for personal investigation, after which reports are filed alphabetically according to date in special files for the purpose.

For effective work thorough organization is essential, and every department of the service should co-operate with the claim department.

The prompt report of accidents means much, for if the information regarding accidents is slow in reaching the claim department, many times important information may be missed and much time and expense is required in looking it up, when, if a prompt report had been made, the matter could have been determined and proper action taken. Information in full regarding accidents cannot reach the claim department too soon. It is necessary in many instances, in cases of serious accidents, to have the employees report to the claim department in person as soon after an accident occurs as possible. In case of fatal accident this rule should always be observed, not only so that full details may be reported to the company, but that the main facts may be prepared in the form of an affidavit ready for the signatures of the train crew so that the affidavits may be taken to the coroner and sworn to before him. By following this plan important details can be kept from the coroner's records and the public that an over-inquisitive officer might bring out and be troublesome in court.

One of the most important features relating to accidents, and which is so often looked upon lightly by the transportation department, is the prompt securing of full names and addresses of witnesses to accidents or persons near the scene of an accident. It is difficult to make men in charge of cars realize the importance of doing this and securing this information, and how to get them to do it is worthy of our best thought. When a serious accident occurs, such as a collision where possibly 100 to 200 persons may be more or less injured, I know of no more important service a train crew can render the company, even if the entire system should be stopped for half an hour, than to secure the name and address of every individual on the car. In every accident of this kind you will find some designing person who will gladly welcome an opportunity to filch money from the company upon some real or imaginary injury, and we have known cases where claims have been made by persons who were not on the cars at the time of the accident, but who claimed they were, thinking it would not be possible to detect them.

There are two ways of keeping this matter before the men. One is by general rules governing this question and printed in the train schedules. The other is by explaining to the men in meetings arranged for the purpose, the importance of this as well as other matters pertaining to the claim department. These meetings should be held at least twice a year, so as to include all new employees and keep them informed regarding these matters. No man, however, should be placed on a car in the capacity of motorman or conductor unless in his preliminary examination he is able to answer intelligently a few pertinent questions as to what should be done in case of an accident.

When the car men understand these matters and place the main facts, with the witnesses, promptly before the claim department, the matter of ascertaining from disinterested persons their version of the accidents should be promptly done by expert investigators. We find that young married men are best for this work. They should be of good address, pleasant and courteous, with judgment as to when to get down to business and touch vital matters.

Written statements signed by parties are best, and a shrewd investigator can weave into a general conversation about an accident the vital points and get what he wants. He should always want facts and bring them out as clearly as he can get them, and never mislead a witness into an intentionally wrong statement. If a written statement is prepared along the line of the conversation, using as nearly as possible the language or peculiar expressions of the witness, it is seldom that he will refuse to sign and afterwards, if necessary, testify in court as to the occurrence in a way corresponding with his statement after he has been permitted to see the signed statement and refresh his memory.

In an investigation of accidents, the question as to the negligence of either or both parties to an accident should be borne in mind, and the circumstances surrounding accidents should be reported as accurately as possible. To cite an illustration: suppose a car collided with a wagon at a crossing, which is of frequent occurrence. The essential facts which should be fully and carefully given are: the distance the wagon was from the car track as well as from the car when the motorman first saw the wagon, the speed of car, condition of car an track, and whether or not the party driving looked, how he was driving, speed, kind of wagon, etc., etc.

It takes a person of more than ordinary ability to obtain in the best way, written statements from witnesses and at the same time to couch the statements in such language as to make a plausible account of an occurrence and omit conflicting or derogatory statements, so that, if necessary to use the statements in court, they will have a good effect with a jury. With this in view, the statements should always be read over to witnesses and asked if correct before signing.

It is necessary for a successful investigator to be somewhat familiar with every department of the service in order to make intelligent inquiry as to the running of cars, condition of shops or machinery, power plant, or whatever may be involved in an accident. A cheap man is an abomination, for he will make more blunders than two good ones can correct.

Good, active, intelligent men, capable of understanding the requirements, only should be used in this work. They should be assigned and required to do a liberal amount of work and to do it thoroughly and should be well compensated for it.

If the work of the investigator is well done, and reliable information is placed before the adjuster, it can soon be rightly determined whether or not a claim should be settled or contested.

In dealing with the question of the adjustment of claims, claim adjusters must, of course, be governed by the policy of their company. Some companies adopt the policy of fighting everything. This is wrong. It not only makes enemies of the claimants, but an atmosphere of antagonism is created that pervades every community through which a line passes and affects travel, as the public would travel with you only when really necessary.

Then there is the very liberal policy of settling practically everything out of court and abhoring a lawsuit and paying liberally to escape having a suit filed against your company. This, too, is wrong. The public in general, and lawyers in particular, soon learn of this, and take undue advantage of you, and you have many claims filed and unreasonable demands made. There is, to my mind, but one right policy, and that is this: permit every case to stand upon its own merits. If the company is liable for an injury done, pay what is reasonable. If not liable, or unjust demands are made, stand upon the rights the law affords. The only exception to this should be in the case of fatal accident, where parties appreciate there is no liability. Then settlement should be made upon the basis of a reasonable allowance for funeral expenses where the surviving parties are too poor to stand the expense. You may rest assured that this is not money thrown away, but really brings better returns (although indirectly) than settlements made in most any other form. For instance: a man is killed; his family is in meagre circumstances; the company is not liable; you pay $50 or $100 and take a release. That family has its friends who know of this allowance; you are afterwards engaged in a lawsuit; a friend of this family sits as a juror when the case is determined; don't you believe the friendly feeling of this juror will mean dollars saved to the company? I do most assuredly.

The question of making adjustment of claims is one for which there can be no fixed rule, and a company must depend largely upon the ability of its adjuster to negotiate settlements upon the most advantageous terms, considering the question as to the liability or non-liability of the company, the nature and extent of injuries, the temperament, position and station in life of the claimant, as well as the surroundings in which he finds his claimant. All these, as well as many other minor matters, a well-informed adjuster will be quick to note and use in the proper way.

The matter of dealing with persons injured is something one cannot well describe. No two persons are alike, and you must judge your individual when you see him. A successful adjuster must almost be a "jack of all trades, and master of them, too," for it is often necessary to discuss with the lawyer the legal phases of a proposition upon which a claim is based. He must be able to talk intelligently with the physician about the physical condition of his patient so as to obtain as favorable a report as possible on a claimant. He should be a farmer, if farming interests his man; a merchant, if this is what gets his attention; a mechanic, or what not; in fact, anything that will interest the person with whom he is dealing, even to the extent of flattering the ladies where the necessity exists.

Mr. Carpenter's paper was well received, and in the general discussion that followed his plan and suggestions were endorsed. Mr. Spillman, of the Indianapolis & Northwestern, said he knew of a company that at first contested every claim, but subsequently adopted the plan of paying where there was a possible liability. The company soon had friends along the line. A new attorney was appointed, and he started in by paying a small amount and getting a release. This plan failed to stand the test in the Supreme Court, the latter deciding that a release based on an inadequate consideration was no bar to recovery. He thought it a good policy to pay damages actually sustained, even when there is no liability. He related numerous instances where there is no liability, but a gift from the company or settlement made friends for the road. He thought it a good plan to keep in friendly touch with the public by being liberal with those unfortunate enough to get injured or damaged. The road may ask for concessions, right of way, or a jury in a meritorious case, and these friends can then be relied upon.

President Henry asked for the plan adopted by companies in case of injured employees. Mr. Reynolds, general manager of the Indianapolis & Northwestern Traction Company, said his company had assisted in the organization of a mutual aid association among the employees and encouraged entertainments given, whereby a sufficient sum is kept in the treasury to pay weekly benefits to the injured and the sick employees. This plan, he believed, had almost wholly destroyed the disposition upon the part of employees to bring suit.

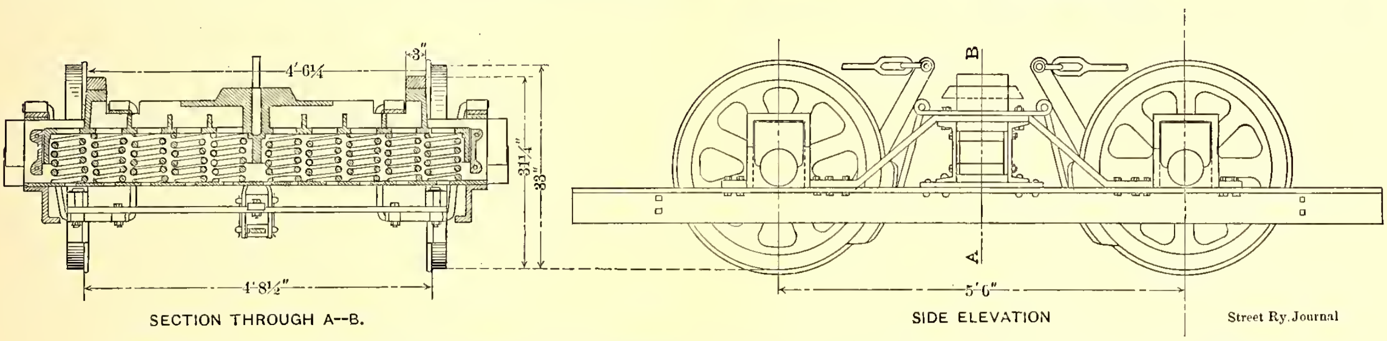
Mr. Nichol, of the Indiana Union Traction Company, was asked to divulge the plan in vogue with his company. Mr. Nichol very graciously referred the inquiry to Mr. Carpenter, who said his company invariably allowed a faithful employee his wages in case of injury or sickness. Continued employment or re-employment after injury had much to do toward lessening the number of damage suits, he thought.

Mr. Henry said the claim department is one we always have with us. The real difficulty is to determine whether it is more advisable to settle or stand suit. He thought a lawsuit a good thing at times, as they give the public to understand that electric railroads stand on their legal rights. Mr. Henry advocated the appointment of a medical staff; that good physicians should be employed along the line to give immediate medical services to the injured. This plan, he said, was proving advisable on his line, and was far less expensive than to pay for the medical services rendered by other physicians.

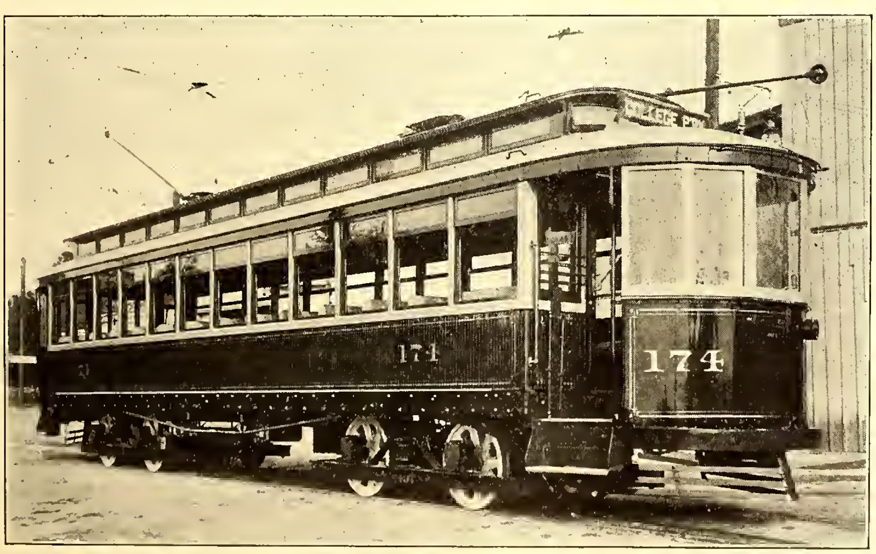
The November meeting of the association will be held at Rushville, as the guests of President Henry, where the members will be given an opportunity to examine the power plant and sub-stations of the famous single-phase line of the Indianapolis & Cincinnati Traction Company.

DOUBLE-TRUCK CAR BUILT BY THE GEORGIA RAILWAY AND ELECTRIC COMPANY

The Georgia Railway & Electric Company, of Atlanta, Ga., has recently placed in service a number of fine interurban cars designed by A. M. Moore, the company's master mechanic. This car is of the double-truck, double-vestibuled type, and, as shown in the illustration, is furnished with large windows, which are arranged to slide upward. It measures 35 ft. 7 ins. over corner posts, 46 ft. 7 ins. over all, and is 8 ft. 2 ins. wide over all. The bottom framing consists of 5-in. x 8-in. side sills, with a ¾-in. x 8-in. steel plate running the full length of the car body. The center sills are 4¾ ins. x 7 ins., and the end sills, 5 ins. x 8 ins. All of the cross timbers are 4 ins. x 6 ins.; the side posts are 2⅓ ins. x 3 ins., and the corner posts, 5 ins. x 5 ins. The car has straight sides and is sealed with ¾-in. x 6-in. ash longitudinal; gained in all posts, ¼ in.; ⅝-in. V-ceiling, glued and nailed to the longitudinal ceiling. The platforms are made of one continuous piece, ½-in. x 4-in. x 6-in. angle, and with two center knees. The vestibules consist of five sash; center sash arranged so as to be raised and fasten to hood.



ASSEMBLING OF STANDARD Z-BAR TRUCK USED BY THE GEORGIA RAILWAY AND ELECTRIC COMPANY



DOUBLE-TRUCK INTERURBAN CAR BUILT BY THE GEORGIA RAILWAY & ELECTRIC COMPANY

Cherry, with bird's-eye maple ceiling, constitutes the interior finish of the car. The seats are of the Wheeler No. 52 rattan type with grab handles, and are transversely placed, with the exception of the four longitudinal seats at the corners of the car. There are thirteen seats to the side.

INTERIOR VIEW OF ATLANTA CAR, SHOWING THE SEATING ARRANGEMENT

The electrical equipment consists of four GE 67 40-hp motors, mounted on trucks also built and designed by the company. Owing to the length of the car, two trolley poles are used. Every car is furnished with the National Electric Company's air brakes, AA-1 type air compressor. The cars are also equipped with Consolidated Car Heating Company's heaters and the J. G. Brill Company's gravity platform gates.

The trucks are made of 4-in. x 4-in. Z-bar; bolster construction, ½-in. x 10-in. channels, with ¾-in. plate riveted to same. The journals are of cast iron, babbitted for 3¾-in. x 9¼-in. journals. These trucks have a 4-in. axle, 5-ft. wheel base and 33-in. wheels, with outside hung motors. The approximate weight of the car body and equipments is 42,000 lbs.

The company has also built quite a number of this type of car with 20-ft. 8-in. bodies for the city lines. The neat appearance of this type is well shown in the half-tone illustration of the exterior of the double-truck, double-vestibule car.

SOLICITING TRAFFIC BY LETTERS

The Public Service Corporation of New Jersey has given a great deal of attention to the development of business in its railway, electric lighting and gas departments. Some of the methods are quite novel, while others, like the issue of a bulletin on electric lighting and power, and a bird's-eye map, have been followed successfully by other companies. This work is in charge of C. W. Lee, of the advertising department, and of J. N. Akarman, traffic superintendent. Among the novel methods followed is the transmission at occasional intervals of manifolded letters, addressed to persons within the territory served by the company, and suggesting special reasons for patronizing the cars of the company. Thus, last spring the following two letters were sent out to stimulate the special car business of the company. The first was sent to a large number of school teachers; the second to the secretaries of various fraternal and other organizations:

PUBLIC SERVICE CORPORATION OF NEW JERSEY
Office of Traffic Superintendent
NEWARK, N. J., June 1, 1905.

Miss Jennie Smith, 234 Main Avenue, Orange, N. J.

DEAR MADAM.—Have you ever considered the two excellent natural educational advantages which New Jersey possesses? I refer to its resources for the study of botany and American history.

North of an imaginary line running from Perth Amboy, at the Raritan River, to Belvidere on the Delaware, the flora of the State consists of northern species. About one-third of this wild vegetation is also native of Europe, while a large share of the remainder is found in the northern part of this country.

Armed with a penknife, dissecting needles and a good lens, a day in the woods would give to your pupils and yourself a fresh inspiration for the closing weeks of this trying part of the school year.

There is no better method of impressing either our national or natural history upon youthful minds than by visiting famous places or studying direct from Nature.

Even a jolly picnic party becomes more interesting when the lunch is spread on historic ground. New Jersey as one of the principal battle fields of the Revolution, teems with such associations.

The enclosed folder may be of service to you in planning such an excursion. We make a special arrangement for large parties and should be pleased to give you any information on this subject.

Yours truly,
JNO. N. AKARMAN,
Traffic Superintendent.

PUBLIC SERVICE CORPORATION OF NEW JERSEY
Office of Traffic Superintendent
NEWARK, N. J., June 7, 1905.

Mr. John Jones, Secretary, 85 Clinton Street, Newark, N. J.

DEAR SIR.—Intersected as New Jersey is by trolley lines, it offers exceptional facilities for trolley parties.

These may be given either as all-day picnics, afternoon rides or evening jollifications. The variety of fun they offer recommends them particularly for club organization outings.

New Jersey also teems with historical points of interests, of which many are accessible by trolley. They make interesting places for pleasure seekers.

A society as a body needs an outing in the summer just as much as its individual members. There can be no pleasanter or more expeditious way of taking it than by trolley.

Our special car facilities are excellent and we will be pleased to give you any information on the subject.

Yours truly,
JNO. N. AKARMAN,
Traffic Superintendent.

These letters were the means of increasing the company's special car business at least 50 per cent over that of last year. They were followed this fall by another letter which was addressed to the school teachers in New York City and New Jersey, and which read as follows:

PUBLIC SERVICE CORPORATION OF NEW JERSEY
Office of Traffic Superintendent
NEWARK, N. J., Oct. 2, 1905.

Miss Fannie M. Williams, Tallmans, N. J.

DEAR MADAM.—After the first hurried weeks of school are over, and yet before the weather grows cold, is a delightful time to take your pupils for a day's or a half day's outing.

This season of the year, when Mother Nature is gaily garbed in her most brilliant garments, was made particularly for the children. The woods are full of secrets, and the nut trees are dropping their treasure on the ground. It is a time rife for sipping at the cup of botanical knowledge.

Such an outing, which is easily possible on the cars of Public Service, will quicken one's powers of observation. To this end it could be aptly used in language or rhetoric classes.

It might also be utilized to gather large quantities of the most perfect autumn leaves, which could be pressed and made to beautify and brighten the school rooms, during the long winter months.

New Jersey teems with wild and beautiful spots, good objective points for such a trip. The enclosed folder may offer you some suggestions, and if I can be of any assistance to you, kindly advise me.

Yours very truly,
JNO. N. AKARMAN,
Traffic Superintendent.

The letters are neatly printed in imitation typewriter type and mailed in a sealed envelope so that they bear every appearance of a personal communication on the part of the traffic superintendent, and hence receive attention.

OPENING OF JAPAN'S FIRST ELECTRIC INTERURBAN RAILWAY

The Hanshin Electric Railway, between Kobé and Osaka, the first line constructed in that country to connect two large cities, has been placed in operation. It is operated by the electric overhead trolley system, and covers a little more than 19 miles. There are in use at present eighteen cars, which were made by the Nippon Sharyo Seizo Kaisha, of Nagoya, Japan, from a sample car imported from the United States. The rails were imported from Pittsburg, and the electric motors were imported from Schenectady. The line is divided into four sections, the fare on each section being 2½ cents, these being subdivided into 1½-cent journeys. All told there are thirty authorized stopping places between the termini, stops being made only when passengers wish to get on or off cars. On the opening day several cars passed eight or nine stations without stopping, and the trip of nearly 20 miles was made in 1 hour and 20 minutes. The average time, however, is about an hour and a half—half as long again as the time occupied by the steam cars. There has been much speculation as to whether the new competing service will not greatly affect the traffic between Kobé and Osaka, on the Imperial Government Railway. Besides the difference of fare, which is 10 cents on the tram and 17 cents third-class and 50 cents first-class on the steam cars, the electric cars run every twelve minutes against every hour on the steam railway, and have thirty stopping places as against 3. On the whole, however, it is more than probable that the new line of cars will cause a very considerable diminution in the receipts of the government railway between these two cities.

ELECTRICITY FOR PARA, BRAZIL

J. G. White & Company, Ltd., of London, England, are to equip with electricity the existing mule and steam lines operated by the Companhia de Estrado de Ferro Paraense, in Para, Brazil. The present transportation systems have about 40 miles of track. Later on the various lines will be extended to the different suburbs of Para. The track will be relaid with heavy rails. At first a 3000-hp plant will be built. The rolling stock will consist of about 100 double-truck motor cars. The value of the contract is about $2,000,000. It is the intention of White & Company to handle this enterprise much in the same way as was done with the Manila Electric Railway & Light Company, that is, the old tram lines will be consolidated, rehabilitated and operated as a modern, up-to-date system.

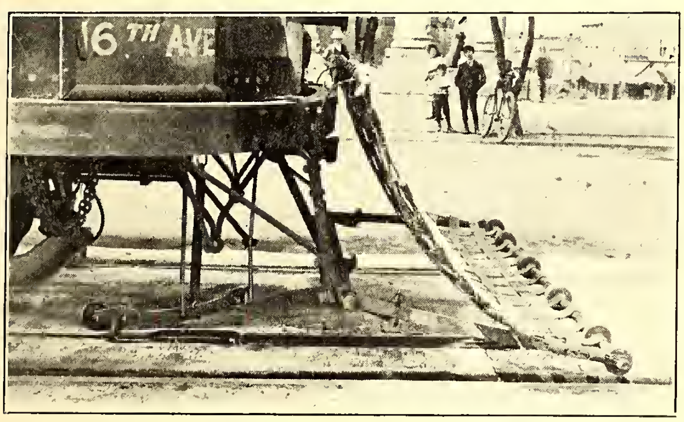
AUTOMOTONEERS IN NEW YORK

The rapid strides in popularity that the automotoneer is making, both on city and interurban electric railways, is shown by the fact that the New York City Railway Company has ordered all of the cars on the Eighth Avenue line to be equipped with this current controller, which is made by the Garton-Daniels Company, of Keokuk, Ia. The company's standard automotoneer is so adjusted that full power cannot reach the motors until the expiration of twelve to fourteen seconds. In this instance, however, the controllers are arranged to permit the full travel to be made in five and one-half to six seconds. This change is due to the fact that the congested thoroughfares covered by the Eighth Avenue line make relatively fast feeding a necessity in order that the cars may keep within their schedule.

SWITCHING DEVICE USED ON THE BRITISH COLUMBIA ELECTRIC RAILWAY

The British Columbia Electric Railway Company has been using successfully for the last two years a new automatic switch throwing device on its lines in Vancouver, Victoria, New Westminster and various interurban divisions.

This switch thrower obviates all necessity of turning switch points by hand and is operated while cars are in motion. It is of simple construction, inexpensive and unfailing if operated with but ordinary care. The company has operated and thoroughly tested this device under all conditions of service and weather on streets where there is heavy traffic, since June, 1903, and it has met every requirement.

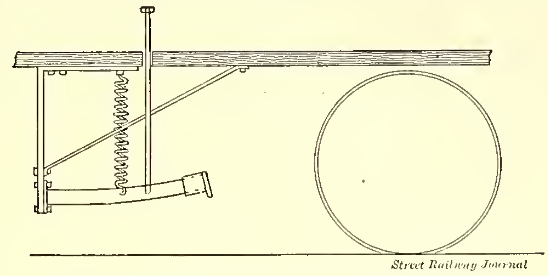


SWITCH BEING THROWN BY MOTORMAN ON CAR

The company gives the following as some of this switch thrower's points of value: Saving of time; switch is operated from any distance without stopping car; motorman or conductor do not leave their positions on car to operate it; conductor is free to attend to passengers, and motorman to his duties on the car, therefore there is less liability of accident; motorman can see switch point move over before car enters switch; less danger of collisions at switch points or crossings; services of switchmen not required; inexpensiveness and simplicity of device; and cost of maintenance and repairs so low as to be a consideration of no importance. The company has spent 90 cents on the first switch installed, the same having been in continual use since installation.

The switching device consists of two parts, the switch throwing lever attached to the car body and the device installed on the street railway track between the rails.

To install, the tongue switch first is drilled about 22 ins. back

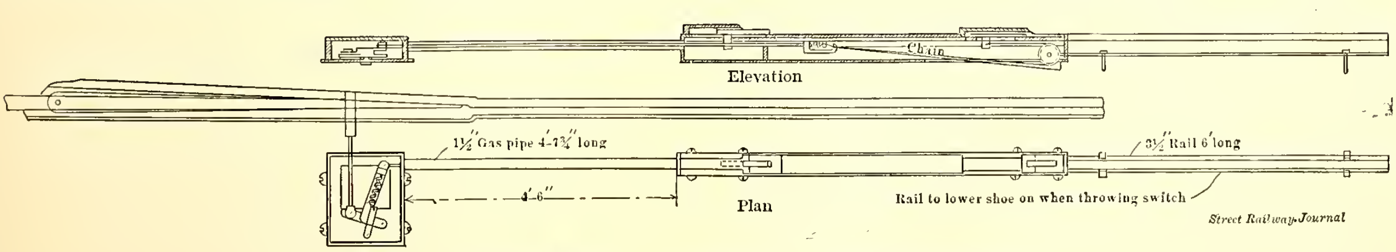


CAR EQUIPMENT FOR SWITCHING DEVICE

from the tongue, making a rectangular hole 1½ ins. x 1⅛ ins., as per separate detail; the dog is fitted to the tongue and connected to the lever in cast-iron box by the connecting rod provided. Then the 1½-in. wrought-iron pipe that serves as a

CAR APPROACHING A SWITCH

cover for the long connecting rod is placed in position, fitting one end in the square box and the other end in the long casting, driving the pipe into place to the mark on the pipe. The levers and the chain are then connected up to the two triggers, making sure that all parts are in line and work easily before spiking down. A short length of rail, about 6 ft. long, is spiked down for the shoe on the switch thrower to run on.



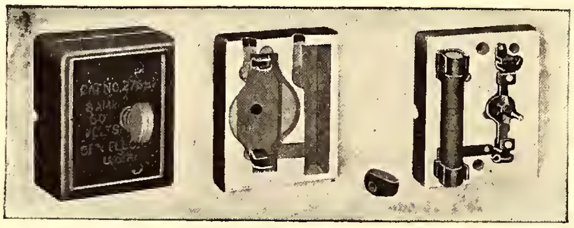
TRACK ARRANGEMENT REQUIRED FOR AUTOMATIC SWITCH

In equipping a car with the switch thrower, care must be taken to see that the latter is the same distance from the gage line of the rail as the triggers on the track, and to see that the shoe and lever has not too much side play. The operating rod in the floor of the vestibule can be offset to bring it into the best location for the motorman's use. This position will naturally vary with the different types of vestibules.

To throw the switch for the main line, it is required to press the pin just as the first trigger in the long casting rod disappears under the fender, holding the shoe steadily until the switch is thrown. To throw for a branch line, the pin is pressed at the second trigger just as the one nearest the switch disappears under the fender. When operating switch thrower, the car must be slowed down to 2 m.p.h., and the foot released from the pin as soon as the switch is thrown.

COMBINED SWITCH AND ENCLOSED FUSE CUT-OUT FOR CAR LIGHTING

Large cars are constantly coming into more general use in both city and suburban railway service, and heavier duty is being imposed upon the lighting switches and cut-outs, owing to the use of several lighting circuits in multiple. The switch



COMBINED SWITCH AND ENCLOSED FUSE CUT-OUT

and cut-out illustrated herewith has been designed by the General Electric Company with a view to these conditions, and also to convenience in installation and operation. The switch movement is positive and rapid, and will invariably break at its rated load. The fuse is of the enclosed type and will open a dead short circuit on any line with a voltage up to 650. It is held in position by spring clips, no binding screws being used, and can thus be quickly snapped into place. The cover is also held by substantial clips and does not carry any part of the circuit. The contacts and binding screws for wiring, mounted on the surface of the flat base, are all easily accessible, and the back of the base is recessed so that the device may be used in connection with either cleat or concealed wiring.

A LARGE CONCRETE STEEL CHIMNEY FOR THE PORTLAND GENERAL ELECTRIC COMPANY

The Portland General Electric Company has recently replaced its induced draft plant with a concrete steel chimney,

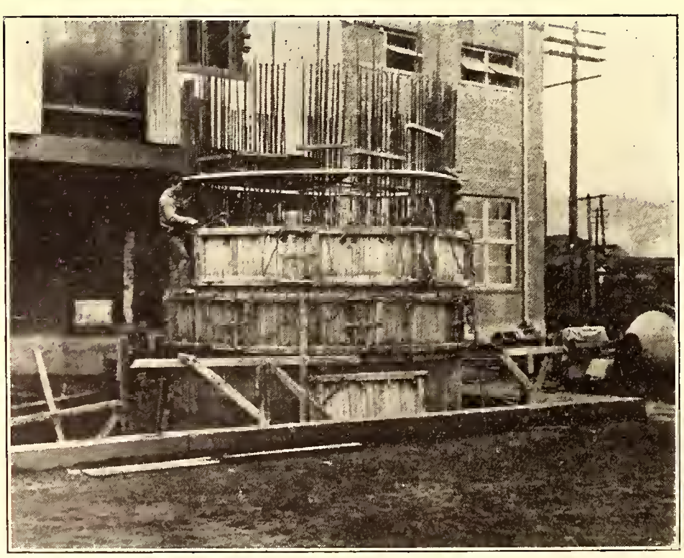


FIG. 1.—VIEW OF CONCRETE CHIMNEY IN COURSE OF CONSTRUCTION

erected by the Weber Steel Concrete Chimney Company, of Chicago. Fig. 1 shows the chimney during construction, and

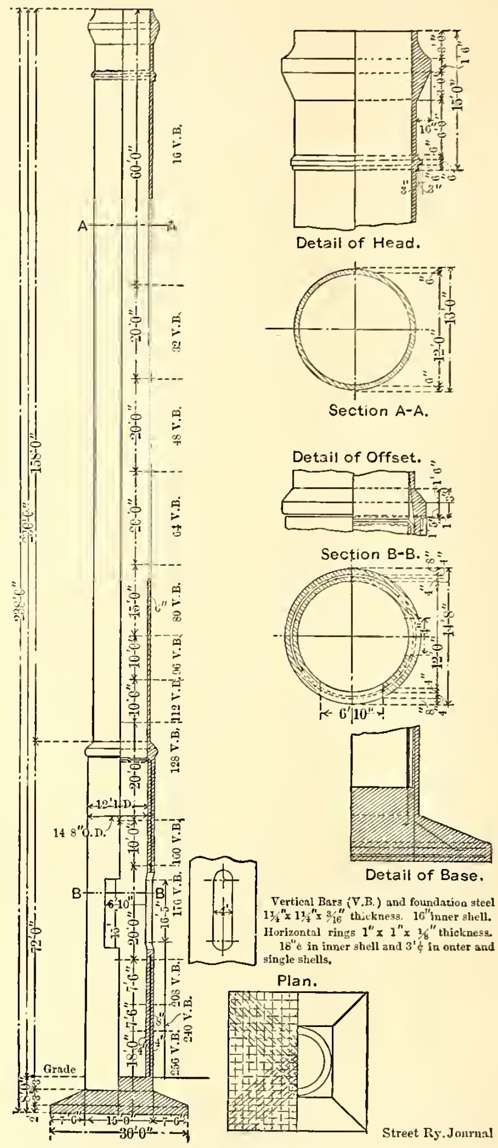


FIG. 3.—SHOWING PLAN, ELEVATION, SECTIONS AND OTHER DETAILS OF CONCRETE CHIMNEY

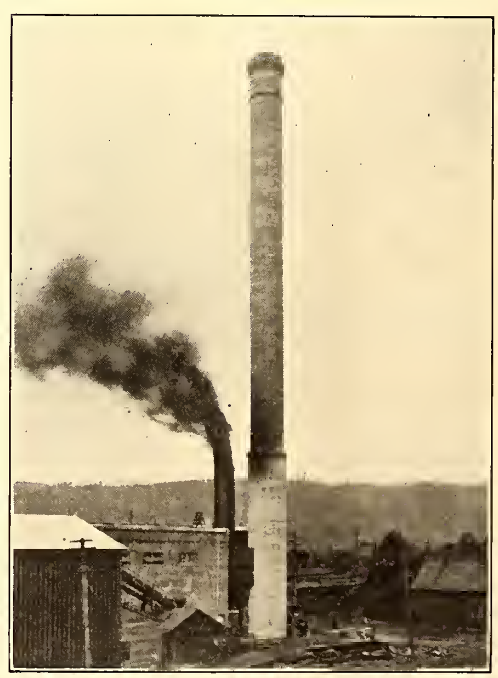


FIG. 2.—COMPLETED CONCRETE CHIMNEY

Fig. 2 shows the completed work. Fig. 3 is a drawing giving the dimensions and showing some of the details of construction. The chimney is 230 ft. high with a 12-ft. flue. Work was commenced March 18, 1905, and completed March 12, 1905, or in fifty-eight working days. Steel T-bars are used for reinforcing the concrete. These are of 1¼-in. x 1¼-in. x 3-16-in. section, with a sectional area of .45 sq. ins., weighing 1.7 lbs. per lineal foot. The steel is the best low carbon Bessemer. The cement used in this chimney is German Portland, Alsen brand, made in Hamburg. The sand used was bank sand of excellent quality, mixed in a proportion of one cement to three of sand. No gravel or crushed stone was used except in the square part of the foundation below the ground. All the mixing and hoisting of material was done in a special combination mixing and hoisting machine built specially for the purpose. The material was used medium dry and tamped into the forms placed around the steel bars. Fig. 1 gives a good idea of these forms, which consist of two inner and two outer rings, each 3 ft. high. These rings are divided into several sections, held together by latches. As soon as the upper form is filled, the latches of the lower form are released and its sections set upon the upper form one at a time. Two sections, or 6 ft., were made each day, except for a few days, in the lower part, where the chimney consisted of a double shell, as shown in Fig. 3. All work and hoisting was done inside the chimney, so that no outside scaffolding was needed. The platform supporting the workingmen was fastened direct to the inner molds, and only a light stage was used inside to support the ladder, which reaches to the working platform. In Fig. 1 a wooden ring is seen above the forms. This ring is for the purpose of holding the steel bars in place before tamping in the concrete. It is kept always about 6 ft. above the upper forms. The bars are used in mill lengths of 20 ft. to 30 ft. Where bars join lengthwise, they are overlapped about 3 ft. The overlappings are so distributed that they are at irregular intervals, and never more than four bars overlap at the same height. No special finish is applied to the outside of the chimney, the outer surface being left the way the forms mold it, but very smooth forms are used and extra care taken in setting them. The company has now erected about sixty steel concrete chimneys in the United States and Canada, the highest being one of 350 ft. in Butte, Mont.

A NEW INDUCTION MOTOR

The National Electric Company, builder of direct and alternating-current machinery and the Christensen air brake, so

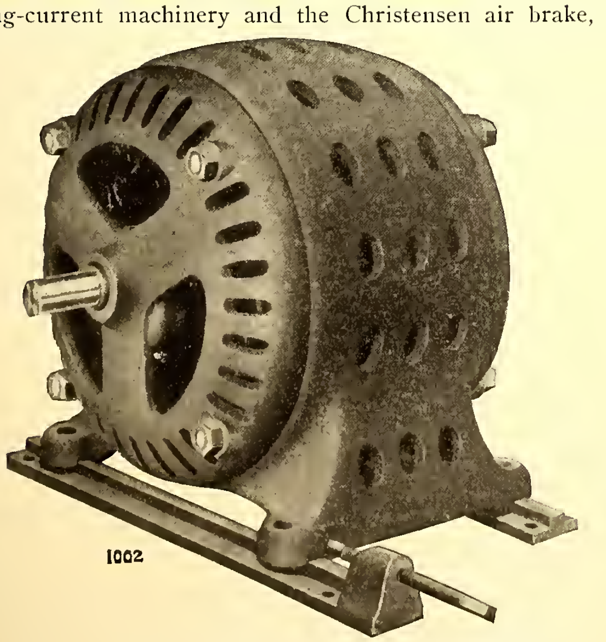


FIG. 1.—INDUCTION MOTOR READY FOR SERVICE

well known in the street railway field, has just brought out a new line of induction motors. These machines are of extremely heavy and substantial construction, and they may be operated from floor, side wall or ceiling by changing brackets which carry the bearings. Owing to the high speeds at which these machines operate and the small space between stator and

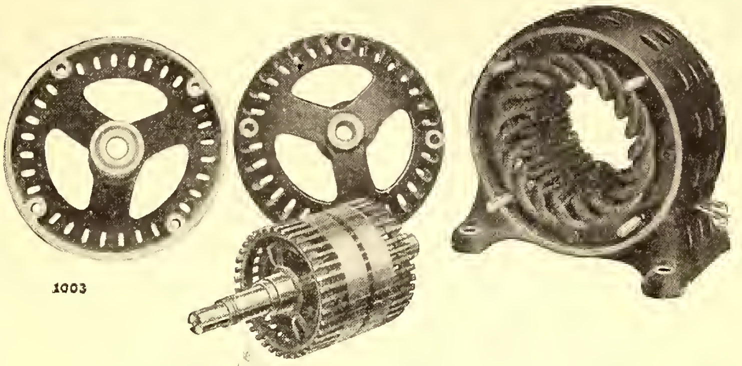


FIG. 2.—PARTS OF MOTOR READY FOR ASSEMBLING

rotor, an extremely heavy shaft is used, while the bearings are of large area, eliminating as much as possible any variation in the air gap.

The frame is made of cast iron, into which is assembled the laminations. The windings are all form wound by automatic machinery, and between each coil air space is provided to take care of the heating. The ventilation has also been given careful consideration, there being numerous openings provided in the frame, and also ventilating spaces between the laminations.

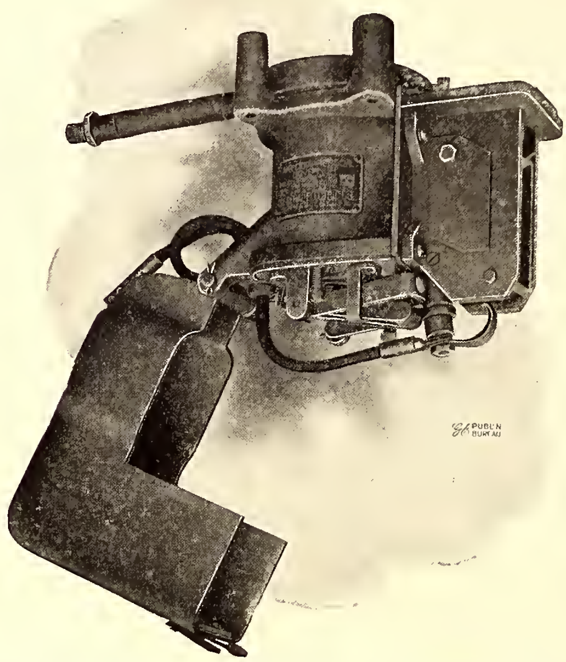
The rotor is of the squirrel-cage type, with copper rods inserted in the slots. This is built up of laminations of mild steel assembled on a spider and held firmly in position by end plates. Bearings are self-oiling and have wearing surfaces of ample proportions. An auto-starter is furnished with the squirrel-cage type, consisting of transformers connected across the line with voltage taps suitable for starting the motor under different conditions of load. A switch of suitable construction is provided for throwing the motor from one voltage to another. All of this apparatus is immersed in a tank of oil, which makes it sufficiently reliable to operate at high voltages, and which takes care of any heating due to starting under heavy torque.

A NEW GOVERNOR FOR ELECTRICALLY-DRIVEN AIR COMPRESSORS

The modern electric car equipment, including as it does the independent motor-driven air compressor for the braking system, requires for successful operation an automatic regulator or governor to control the air pressure. The function of the governor is to stop the compressor motor when the desired pressure has been reached, and to start it whenever the pressure falls below the predetermined minimum. The reliability of the governor is the most important factor in insuring continuity of service and a ready and positive operation of the air-brake system at all times. The General Electric Company, of Schenectady, N. Y., has developed the type MC governor with these conditions clearly in view. The governor is light, compact and simple in operation, and embodies details of construction which are the result of long experience with apparatus of this class.

The limiting pressures at which the governor acts are usually such that a fall of 10 lbs. in the operating pressure will start the compressor motor, which will run until a rise of 10 lbs. pressure is obtained. The varying pressure of the air against a diaphragm actuates a set of operating levers, one of which carries the contact finger by means of which the motor compressor circuit is made and broken. The form of contact, arc chute, and magnetic blow-out is similar to that employed in the standard railway contactor, this construction having been found to be superior to any other form of current-interrupting device.

Friction and leakage, usually experienced from pistons and packing rings, are entirely eliminated by the substitution of a



AIR COMPRESSOR GOVERNOR WITH COVER SWUNG DOWN

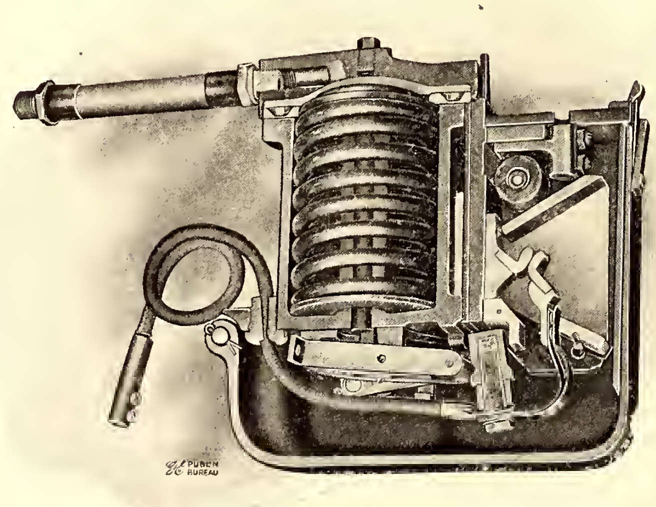
thick diaphragm of pure rubber in their stead. This forms an hermetic seal and prevents any leakage or flow of air through the governor, thus obviating all difficulties due to condensation and freezing of moisture which accompany the flow of air through a governing mechanism. This construction, together with the absence of valves of any sort, insures the utmost reliability of operation.

The compact arrangement of the governor permits its installation in small space directly on the bottom of the car. It is 5¾ ins. wide, 9⅞ ins. long and 10 3-16 ins. deep. If installed for stationary use, it may be placed in any desired position. A tightly fitting cover protects the operating parts, contacts and adjustments from dust, dirt and mechanical injury. This cover also serves to exclude snow, brake-shoe dust and wheel wash, permitting the use of the governor without any enclosing box. Adjusting screws are provided for accurate adjustment for various maximum pressures within the range of the governor. These maximum pressures may be selected over a wider range than is obtainable for the opening and closing limits, and vary from 40 lbs. to 60 lbs., or from 100 lbs. to 140 lbs., according to the particular range desired.

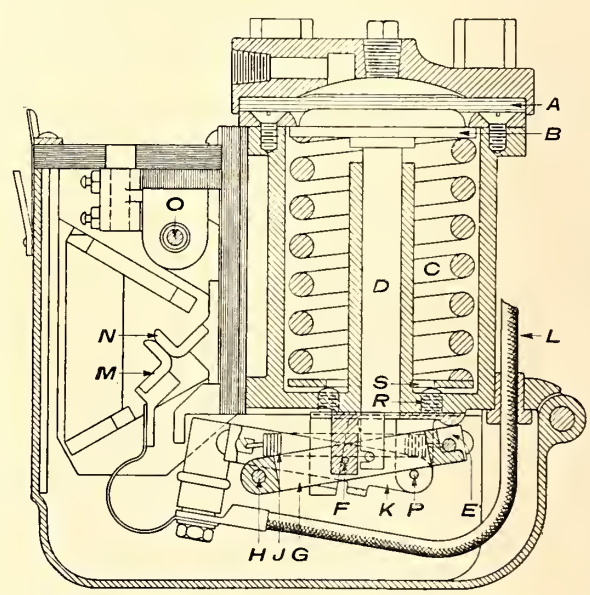
These ranges are predetermined in each governor by the strength of its operating spring, any desired pressure being provided for by the use of the proper spring. The difference of 10 lbs. between the opening and closing pressures for which all standard governors are set, is not readily varied without a change in the operating mechanism. Governors of this type can, however, be furnished to meet any special requirements.

From the lettered sectional view shown herewith, it will be seen that the cylinder head is provided with a tapered hole for the insulated pipe, which affords connection between the governor and the compressor reservoir. This cylinder head is so constructed that this connection may be placed at the back or either side of the governor, as desired. It is bolted to the frame Z and holds the rubber diaphragm A against the retaining ring Y. This ring serves as an abutment for the piston B, against the upper surface of which the diaphragm A is pressed. The lower side of the piston is acted upon by the operating spring C, the pressure of which is adjusted by means of the screws RR bearing against the washer S. Attached rigidly to the piston B is the rod D, the lower end of which is connected to one of the operating levers. The largest of these levers is provided with a recess, into which a mica-insulated stud is forced by hydraulic pressure. Attached to the stud is the cable terminal and the spring carrying the contact finger. The finger tip through which the circuit is completed and broken is so made as to be readily renewable when worn.

This finger completes the circuit through the stationary contact, the tip of which is also renewable. Enclosing these contact members is the arc chute W, composed of a special molded insulating compound, and is provided with renewable



SECTION OF AIR-COMPRESSOR GOVERNOR



DETAILS OF COMPRESSOR GOVERNOR

plates of a highly refractory material. This material has the property of resisting the action of the electric arc to a greater degree than any other similar compound. In series with this circuit is the blow-out coil O, which produces the magnetic field which extinguishes the arc when the circuit is broken. This coil is made of enameled copper ribbon, wound edgewise. Connected with this coil is the terminal Q, which is provided with two set-screws for clamping the wire. The protecting cover is hinged at the back of the frame and is held in the closed position by the spring catch. On the inside of this cover, adjacent to the arc chute, is a plate of insulating material which prevents the possibility of the arc striking the metal.

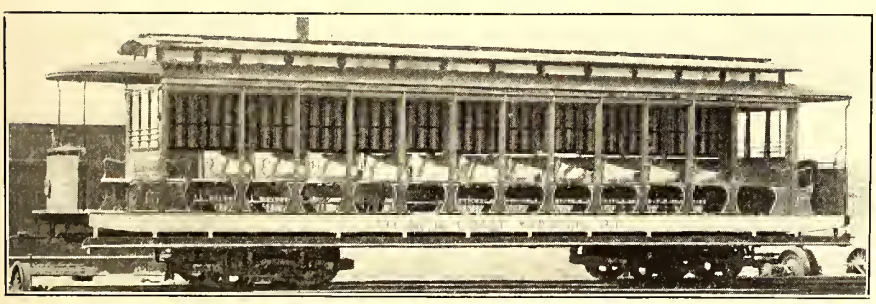
The action of this governor in opening and closing the motor circuit of the compressor is as follows: As the compressor continues to operate and the pressure of air in the reservoir is thereby increased, the pressure in the chamber above the diaphragm A rises; the piston rod D is thereby forced downward against the action of the operating spring C, turning the lever E around its fulcrum. This brings the pivot H above the center line of the tension springs J, which connect the intermediate lever G with contact-carrying lever K. The action of these springs then pulls the back end of the intermediate lever downward; this movement quickly carries the center line of the springs past the pivot P, thus reversing the action of these springs on the contact-carrying lever K, which causes the free end of this lever to be drawn downward, separating the contacts M and N with a quick snap.

The object of this double system of levers is to maintain a constant pressure between the contacts until the tripping point is reached, thus preventing the liability of burning at the contacts, which would otherwise occur.

As the pressure in the reservoir is reduced, the piston rod D raises the back end of the lever E, a projection on which engages the intermediate lever G. This carries the center line of the tension springs J above the pivot of the contact-carrying lever K, and thereby pulls the contact finger upward, quickly closing the circuit.

LARGE OPEN CARS FOR ASBURY PARK, N. J.

A number of fifteen-bench open cars has lately been delivered to the Atlantic Coast Railroad Company, of Asbury Park, N. J., by the John Stephenson Company. These cars are duplicates of a lot built for the railway company in 1903. The lines of the company connect Long Branch, Elberon, Deal, Allenhurst, Asbury Park, Bradley Beach, Neptune City, Avon, Belmar and Spring Lake, and about eighty cars are operated.



ONE OF THE LATEST FIFTEEN-BENCH OPEN CARS DELIVERED TO THE ATLANTIC COAST ELECTRIC RAILROAD

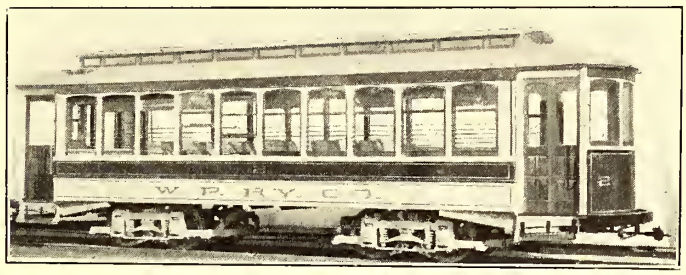
The attractive amusement resort, Pleasure Bay Park, is also owned by the railway company.

The new cars measure 33 ft. 4 ins. over the end panels and are seated for seventy-five passengers. The seats are reversible and are composed of ash slats. Ash, with ceilings of bird's-eye maple, constitutes the interior finish of the cars. The sashes in the bulkheads are arranged to drop into pockets between the seats. The curtains may be pulled down to the floor, the Brill round-corner seat-end panels which are used being so arranged in connection with the grooves in the posts as to permit the curtains to come down over the post outside of the panels, a continuation of the grooves of the posts being formed in the exterior surface of the panel.

The width over the sills is 6 ft. 6⅝ ins., and over the posts, 7 ft. 3 ins. The distance between the centers of the posts is 2 ft. 7 ins. The side sills are 4¾ ins. x 7¾ ins., and the end sills are 2¼ ins. x 6⅝ ins. The sill plates are 10 ins. x ⅝ in.

SEMI-CONVERTIBLE CARS FOR WILLIAMSPORT, PA.

The J. G. Brill Company has delivered to the Williamsport (Pa.) Passenger Railway Company four of its semi-convertible cars. These are mounted on the Brill No. 27-G short-base double trucks, and will be used in the city and suburbs of Williamsport, where the company operates about thirty cars. Forty passengers may be comfortably seated in the new cars, the seats being of spring cane. All the seats are transversely placed except four longitudinal seats at the corners. The seats are 36 ins. long and the aisles are 22 ins. wide. The illustration shows the windows raised at different heights, and gives an idea of the appearance of the car when open for summer service. The low window sills, the height being 24⅝ ins. from floor to top of sill, are considered to be a decided advantage in a car of this type. Since the sills are too low to be



DOUBLE-TRUCK VESTIBULED CAR FOR THE WILLIAMSPORT PASSENGER RAILWAY COMPANY

reached comfortably by an adult person, neat armrests are attached. The lower sash measures 26½ ins. over the frame and the upper 17¼ ins., and both together weigh 17 lbs. As there are ten windows to a side, there is a 170-lb. weight of sashes when raised in each side roof, three-quarters of which bears vertically on the tops of the posts. This excess of weight, though small, is amply compensated by the extra-strong construction, including a heavier letter board than usual. The interior of the cars are finished in cherry, with ceilings of birch.

The general dimensions of the cars are: Length over the end panels, 28 ft., and over the crown pieces and the vestibules, 37 ft. 5 ins.; panel over the crown piece and vestibule, 4 ft. 8½ ins.; width over the sills, 7 ft. 10½ ins., and over the posts at the belt, 8 ft. 2 ins.; the sweep of the posts is 1¾ ins. The distance between the centers of the posts is 2 ft. 8 ins. The side sills are 4 ins. x 7¾ ins., and the end sills are 5¼ ins. x 6⅞ ins. The sill plates are 12 ins. x ⅜ in. The thickness of the corner posts, 5⅝ ins., and of the side posts, 3¼ ins. The Brill No. 27-G trucks have a wheel base of 4 ft. and 33-in. wheels.

A system of close scrutiny of clothes, such as is in vogue in the police departments in cities, will hereafter be a feature of the management of the Chicago & Oak Park Elevated, of Chicago, and prizes will be awarded based upon personal appearance. Well-pressed clothes, shiny shoes, immaculate collars and neatly combed hair will all count. Hereafter trainmen's uniforms must be pressed once a month. Half the expense of this will be borne by the company, the employees contributing the other 25 cents. The office of the company in Austin Avenue has been equipped with whisk brooms, combs, brushes and shoe-shining outfits, so that those employees who report without having complied with the new orders may have a chance to remedy the fault before taking out their trains.

FINANCIAL INTELLIGENCE

Wall Street, Oct. 18, 1905.

The Money Market

The money market developed a rather easier tendency this week, but rates for all maturities ruled practically unchanged from those recently quoted. The opening was firm, with lenders generally demanding full asking rates, but subsequently there was some shading of quotations on the stronger position of the local institutions, as revealed by the statement of the associated banks, published on last Saturday. Other factors operating in favor of an easier market were the extremely light demand for funds, as a result of a restricted stock speculation, and a less urgent demand for money for crop-movement purposes at interior points. For the week ending Oct. 12 the local banks gained substantially from the interior, this being the first gain in the currency movement reported since the beginning of August. The gain, however, was more than lost by the banks in their operations with the sub-treasury. On Monday of the present week, the final instalment on the Japanese loan was paid, amounting to about $17,000,000, but the money was at once made available for market purposes, and the reoffering of a considerable part of it was largely responsible for the easier conditions noted. A noteworthy feature of the market has been the decided strength in sterling exchange, rates for prime demand bills advancing nearly a cent on the pound sterling, despite the prevailing rates for money in the local market. The advance in sterling was due largely to the advancing discounts abroad, and to the heavy buying to cover maturing bills and to purchases by the short interests. The supply of commercial bills continued extremely light for this season of the year, owing largely to the action taken by cotton growers to hold the staple for higher prices. There were no further engagements of gold for import, the movement being arrested, at least for the present, by the high rates of exchange. The arrivals of gold to date amount to $8,780,000, leaving a comparatively small amount yet to arrive. The foreign markets have ruled firm, discount at all the principal European centers, and especially at London, showing an advancing tendency, and at this time there is some talk of a possible advance in the Bank of England rate in the near future to 5 per cent. The bank statement, published at the close of last week, was extremely favorable. Loans decreased $29,456,600, due partly to liquidation in the stock market and partly to shifting of loans from the banks to the trust companies. The decrease in cash amounted to $2,350,800, and was considerably larger than expected. Deposits were smaller by $33,104,100, due in part to the withdrawals of balances by out-of-town institutions, to be loaned in the local market. The reserve required was $8,276,025 smaller than in the previous week, resulting in an increase in the surplus reserve of $5,925,235. The surplus is now $10,121,400, as against $15,957,875 in the corresponding week of last year, $17,433,250 in 1903, $5,608,250 in 1902, $15,465,775 in 1901, and $2,947,700 in 1900. At the close the opinion prevails in banking circles that the market will hold at near the present level for some weeks to come. Money on call loaned at 6 and 3 per cent, the average rate for the week being about 5 per cent. On time 5¼ per cent was asked for sixty-day funds, 5 per cent for three to five months, and 4¾ bid offered at 5 per cent for six months maturities. Specialists in commercial paper reported an extremely light supply of prime material, and all offerings are readily absorbed at 5 per cent, the minimum rate. For other good names the rates range from 5¼ to 6 per cent.

The Stock Market

The depression in the stock market, primarily caused by the "note of warning" sounded by one of the vice-presidents of a leading bank of this city, in an address at Washington, proved to be of only temporary duration, and while there has been no evidence of any pronounced upward tendency in the general run of stocks, the range of value at the close is somewhat higher than it was following the spasm of weakness resulting from the speech alluded to. Withal, however, a conservative feeing permeates the general share speculation, a fact due to existing monetary conditions more than to anything else. Throughout the week, money on call at the stock exchange has ruled firm, though the average rate was somewhat lower than that of the previous week. This, together with the expectation that money rates during the balance of the year will rule at least fairly firm, served as a deterrent to bullish operation in the stock market, and by some was used as an excuse for selling in a moderate way. These counter currents caused a rather irregular movement to prices, but, as before noted, the tendency for the most part was upward, the unexpectedly favorable showing of the bank statement on Saturday last having had considerable to do with this condition of affairs. A sharp upward turn in the shares of the anthracite coal properties, notably in Delaware & Lackawanna, which sold near 500, the unexampled prosperity in the iron and steel industry, the continued bright outlook for the crops, and the generally satisfactory reports of railroad earnings to hand, all tended to inspire confidence in the future of security values, but, as previously stated, present and prospective monetary conditions held speculation for the bull account in check, and in consequence of this dealings, as a rule, were in somewhat restricted volume. Aside from the anthracite coalers there were comparatively few noteworthy features to the speculative, although Amalgamated Copper attracted considerable attention and was strong, partly on account of the continued strength of the copper metal market and partly in anticipation of the stock being placed upon a 6 per cent dividend basis this week.

The local traction stocks have followed the same general course as practically all other stocks, and there have been no particular developments having a bearing upon any of their properties. The selling wave that appeared in Metropolitan Street Railway shares on the publication of the company's annual report abated, and in its place has come a quiet purchasing movement, based upon the knowledge that the causes which operated to make that showing so unfavorable were only temporary and do not now exist.

Philadelphia

Extreme dullness characterized the market for local traction issues during the past week. Comparatively few issues figured in the transactions, and the individual totals were considerably below those of the preceding week. Prices, however, remained steady. Philadelphia Company common was the interesting feature, upwards of 12,000 shares changing hands at prices ranging from 49 to 48⅝. The preferred stock sold to the extent of about 200 shares at 49 to 48½, and 300 rights brought 28. Philadelphia Traction ruled firm, 300 shares selling at 100 to 100⅛. Philadelphia Rapid Transit was dealt in at 28 to 27¾, for about 600 shares. Union Traction moved up a small fraction, 300 shares selling at from 62⅞ to 63¼. American Railways brought 52½ for several hundred shares, and 200 Railways General brought 4. Other sales included Fairmount Park Transportation at 17½ to 17, United Companies of New Jersey at 269½ to 269, United Traction of Pittsburg at 50, and United Railway & Investment at 92.

Baltimore

Little interest was manifest in the traction issues at Baltimore. United Railway issues, which have furnished the principal feature of the trading for several weeks past, ruled extremely quiet, and prices showed very little change from those prevailing at the close of a week ago. The income bonds were dealt in to the extent of only $72,000, at from 65⅛ to 65⅞, while $18,000 of the 4s brought 93⅛ and 93. The stock and the deposited incomes were practically neglected. The investment issues ruled generally quiet but firm. A somewhat better demand existed for the Virginia Railway & Development 5s, $11,000 of them selling at 100. City & Suburban 5s sold at 114¾ for $5,000, and $3,000 Lexington Street Railway 5s brought 106. Other transactions were: $1,000 Augusta Street Railway 5s at 104½, $2,000 Macon Railway & Light 5s at 99¾, $1,000 Baltimore Traction 5s at 118⅜, $2,000 United Railway incomes certificates at 65¼, 100 United Railway stock certificate of deposit at 16, 20 Norfolk Railway & Light stock at 13, and $10,000 of the 5s at 97.

Other Traction Securities

Trading in the Boston market was dull and absolutely featureless. Boston Elevated rose from 153 to 154 on the purchase of about 300 shares. Massachusetts Electric sold at 14¼ for 100 shares, and 130 shares of the preferred brought 57. West End common sold at 99¼, and the preferred brought 113¾ and 114. Boston & Worcester common sold at 27½ and 27 for odd lots. The feature of the Chicago market was the strength in Northwestern Elevated common and preferred. The first named sold at 24 early in the week and later rose to 25½, while the preferred jumped from 65 to 68. Chicago & Oak Park common sold at 5¼, and the preferred, after selling at 20¼, dropped to 18¾. Metropolitan Elevated common sold at 26½ and the preferred at 72 and 70⅛. West Chicago Street Railway brought 62 and 61, and 300 Chicago Union Traction changed hands at 12. North Chicago held firm, 100 shares selling at 85. In the New York curb market Interborough Rapid Transit ruled fairly active and firm. From 212¼, the low price of the week, there was an advance to 215½, but later the price ran off to 214¾. Upwards of 4500 shares were dealt in. Other sales included 600 New Orleans Railway common at 36½ and 36, 900 preferred at 79 and 79⅝; $54,000 New Orleans Railway 4½s at 88½ and 90, $4,000 Washington Railway 4s at 91, $3,000 International Traction, of Buffalo, 4s at 83 and interest, $10,000 Jersey City, Hoboken & Paterson 4s at 74¾ and interest, and $10,000 Public Service Corporation certificates at 65½.

Another very active week in Cleveland with advancing prices for nearly all traction issues. Western Ohio, which has been inactive for a long time, opened the week at 15 and made gains until the early part of this week it sold at 19½, about 2000 shares changing hands. This was due largely to the reports of probable lease to the so-called Widener-Elkins syndicate. The bonds advanced in sympathy from 84 to 86½. Northern Ohio Traction was very active and made a slight advance from 24½ to 25½. The 4 per cent bonds advanced to 73⅜, and the 5s to 87. Aurora, Elgin & Chicago shared in the bull movement to the extent of over 2000 shares and made another advance, from 31½ to 33½. The preferred moved up from 88 to 91½ on sales of a few hundred shares, while the bonds advanced to 98½. Cleveland & Southwestern had another strenuous week and it moved up from 14 to 17¼. The preferred sold at 60. Lake Shore Electric advanced in sympathy from 13¾ to 17⅜. The old preferred sold at 60¼ and the bonds at 85½. Muncie, Hartford & Ft. Wayne sold at 43¾. Cleveland Electric was active with an advance from 82½ to 85.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Oct. 11	Oct. 18
American Railways	52½	52
Boston Elevated	152	153
Brooklyn Rapid Transit	71⅝	72¼
Chicago City	199	199
Chicago Union Traction (common)	12⅝	11¾
Chicago Union Traction (preferred)	—	—
Cleveland Electric	75	75
Consolidated Traction of New Jersey	82½	82
Consolidated Traction of New Jersey 5s	109	108½
Detroit United	93⅛	92
Interborough Rapid Transit	212½	214
International Traction (common)	39	39
International Traction (preferred) 4s	74½	73
Manhattan Railway	167	166
Massachusetts Electric Cos. (common)	14	13¾
Massachusetts Electric Cos. (preferred)	57	56
Metropolitan Elevated, Chicago (common)	25	25½
Metropolitan Elevated, Chicago (preferred)	71¾	70½
Metropolitan Street	127	125⅝
Metropolitan Securities	81⅝	80⅜
New Orleans Railways (common), W. I	36	36
New Orleans Railways (preferred), W. I	79	79¾
New Orleans Railways, 4½s	89	89½
North American	98	97
North Jersey Street Railway	28	28
Philadelphia Company (common)	48⅞	48⅝
Philadelphia Rapid Transit	27¾	28⅛
Philadelphia Traction	100	100
Public Service Corporation 5 per cent notes	97	96
Public Service Corporation certificates	69	64½
South Side Elevated (Chicago)	97	96
Third Avenue	127	124½
Twin City, Minneapolis (common)	117¼	116
Union Traction (Philadelphia)	62	62½
West End (common)	98½	99
West End (preferred)	113	114

W. I., when issued.

Iron and Steel

The "Iron Age" says that leading interests in the steel industry are more and more emphatically taking a position adverse to any violent upward prime movement. They are endeavoring to keep not alone values of raw material in bounds, but are holding down prices for finished iron and steel. The market for pig iron has stiffened. This week it is the East and the Central West which have marked up quotations. Some of the large Southern interests have withdrawn from the market entirely, but there is still some, though little, iron available on the basis of $12.50 for No. 2 at Birmingham. The news of greatest interest in the Central West is that the Steel Corporation has purchased 20,000 tons of iron for October delivery at $15.50, and 20,000 tons for November delivery at $18, thus establishing an advance. In the Eastern market, No. 2 foundry has advanced to $16.75 at furnace. A number of moderate-sized lots of steel billets have been contracted for during the last week. The pressure upon car builders and locomotive shops is enormous. Reports from the lighter lines are very encouraging.

RAILROAD OFFICIALS AND ENGINEERS INSPECT LONG ISLAND COMPANY'S ELECTRIC LINES

A party of railroad men and engineers inspected the Atlantic Avenue and Rockaway divisions of the Long Island Railroad, now equipped with electricity, on Saturday Oct. 14. The party first ran out to Belmont Park, about 15 miles, and then returning to Woodhaven, they ran across Jamaica Bay to Rockaway Beach, inspecting the protected third-rail system, the sub-stations, car shops and other features of the system. The following persons were members of the party:

W. K. Vanderbilt, Jr., E. W. Winter and J. F. Calderwood, of the Brooklyn Rapid Transit Railway; Oren Root, of the New York City Company; Frank Hedley, of the Interborough; F. D. Underwood, J. M. Graham and J. C. Stuart, of the Erie; W. J. Wilgus and A. T. Hardin, of the New York Central; F. L. Shepard and M. Trump, of the Pennsylvania; President Ralph Peters, Superintendent C. L. Addison, George Gibbs, head of electrical department, and J. R. Savage, chief engineer, all of the Long Island Railroad; George and H. H. Westinghouse.

TUCKER-ANTHONY PROPERTIES

The recent sale by Tucker, Anthony & Company, of Boston, of several street railway properties in Ohio, also the sale by them of the Peoria & Pekin Traction & Terminal to the Chicago & Alton Railway, all of which has been mentioned in the Street Railway Journal, call forcibly to attention the operations of the company in the building and management of this class of properties. The firm have successfully organized, or financed, built and managed twenty-eight different street railway, electric light and power companies in the past ten to twelve years. Of these twenty-eight properties, they have sold all but twelve, and it is a remarkable record that in every case the properties have been sold at a profit to the underwriters and the stockholders.

The following is a list of the various properties organized by this firm and later sold:

Properties	To Whom Sold
Macon Consolidated St. Ry.	Southern capitalists.
Worcester & Marlboro	
Fram., Southboro & Marlb.	Worcester Rys. & Inv. Co.
Marlboro Street Ry. Co.	
Brock., Bridgewat. & Taun.	
Prov. & Taunton St. Ry.	
Hingham Street Railway	Massachusetts Electric Cos.
Newport & Fall River	
New London St. Ry. Co.	
Montville Street Ry. Co.	New Haven Railroad.
Norwich Street Ry. Co.	
Indianapolis & Northwestern Street Railway	
Indiap. & Western St. Ry.	United Gas Imp. interests.
Col., Buckeye Lake & Newark	
Col., Newark & Zanesville	
Peoria & Pekin Term. Co.	Chicago & Alton interests.

The following are the properties and capitalization of the companies still managed by Tucker, Anthony & Company:

Properties	Bonds	Stock
Manchester St. Ry. Co.		
Manchester Electric Co.		
Garvins Falls Elec. Power Co.	$2,000,000	$2,050,000
Un. Elec. Co., all consol. into		
Manchester Tr., Lt. & P. Co.		
Hartford & Springfield		
Somers & Endfield Co.		
Broad Brook Company, all consolidated into the Hartford &	925,000	700,000
Springfield St. Ry. Co.		
Canton-Akron St. Ry. Co.	2,000,000	2,000,000
Canton-New Philadelphia Co.	600,000	1,500,000
Tuscarawas Traction Co., Ohio.	200,000	200,000
Binghampton Lt., H. & Pow. Co.	400,000	650,000
Gt. Nor. Power Co. and Northwestern Pow. Co., Duluth, Wis.	4,000,000	10,000,000

THE CHICAGO UNION COMPANY'S OFFER

The franchise ordinance of the Chicago Union Traction Company has reached the City Council. As previously stated in the STREET RAILWAY JOURNAL, it is substantially the same as that presented by the Chicago City Company, of which an abstract was published in the last issue of this paper. The first difference between the Chicago City and the North and West Chicago ordinances appears in the first section, where the grants to the three companies for the joint use of tracks in any street are made to expire concurrently, regardless of the actual date of their passage and acceptance. Section 3 provides that the North and West Side companies shall install the underground trolley system in that portion of the south division of the city lying north of Van Buren Street in the event that the underground trolley installed by the Chicago City Company proves to be practicable and satisfactory after two years of operation and other tests. Through routes are provided for on Halsted Street and on Western Avenue. Provision is also made for two through routes from each division of the city to each of the other two divisions through the business district east of Halstead Street, south of Chicago Avenue and north of Twelfth Street. Transfers within this district are to be discontinued. Passengers on the through cars are to be entitled to the same facilities as to transfers at the ends of the routes as if they paid cash fares. W. W. Gurley, general counsel of the company, says, if the companies operate through cars within the district described they should not be required to give transfers within the district. He says the present complaint his companies had to make is the tremendous abuse of transfers in the downtown district. In section 26, the provision for the city's purchase of the lines binds all the companies to grant the city the right at such time as it may elect after the completion of the reconstruction period required under the terms of the ordinance to purchase all the property, real and personal, then comprising the going street railway systems of the companies. The conditions of the purchase are:

The price to be paid therefor to be the then fair cash value of said real and personal property (exclusive of earning power and any franchise value) for continuous use in the city for street railway purposes, plus the then fair cash value of all of the then unexpired rights of said companies, and each of them, in the streets of the city of Chicago, existing at and prior to the date of the passage of this ordinance.

Section 30 provides for the construction of tunnels at Van Buren, Washington and La Salle Streets. The tunnels are made parts of the street railway systems, and provision is made for their appraisement with the other properties when the city elects to purchase. Until the tunnels are lowered or rebuilt the companies are to be allowed to use the river bridges.

The Supreme Court has advanced the hearing of the Chicago Traction cases to Jan. 2. The cases come to the Supreme Court from the Circuit Court of the United States for the northern district of Illinois.

CONTRACT LET FOR LINE FROM DETROIT TO BAY CITY

The Detroit-Bay City Traction Company has filed a trust mortgage for $3,000,000 to cover a bond issue of that amount and has let a contract for the construction of the road, which will extend from Detroit to Bay City, to Ross Construction Company, of Chicago. A subsidiary company known as the Wayne Construction Company, of Detroit, has been organized to carry on the work in Michigan. The contract calls for the completion of the road by Oct. 1, 1906. Construction work will begin at Bay City, run east to Akron and thence south to Cairo. The entire length of the road will be 112 miles. The power house will probably be located at Lapeer, and sub-stations at Pontiac and Cairo.

Several years ago the project was known as the Detroit, Pontiac, Lapeer & Northern Railway, and the best known of its promoters was O. J. Price. Also interested in the project at that time were John H. Christian and L. H. Rothwell, of Detroit, and E. H. Whitcomb, of Davenport, Ia. Then the company became involved in financial troubles through the machinations of one of those interested. About a year ago Messrs. Whitcomb, Rothwell and Christian decided to go ahead with the project on an entirely new basis. They abandoned the old survey and surveyed a new right of way. They also secured control of about $800,000 of the old bond issue, and settled with O. J. Price all claims which he had in the project. Bankers in Chicago, Davenport and New York will underwrite the bonds of the new company, and the Union Trust Company, of Detroit, will be trustee of the mortgage. The officers of the company are: E. H. Whitcomb, of Davenport, Ia., president; L. A. Rockwell, of Detroit, secretary; C. H. Christian, of Detroit, treasurer.

THE RIGHT OF CITY COUNCIL TO COMPEL THE ADOPTION OF CERTAIN FENDER

An important decision has just been rendered by the Supreme Court of Indiana as to the right of a municipality arbitrarily to dictate the style of the fender that shall be adopted for use on cars operated within the corporate limits. It seems that the City Council of Elkhart passed an ordinance providing that it shall be unlawful to run any street car within the city limits without attaching thereto a certain form of automatic fender made by a certain company, or some fender equally as good, to be approved by the Council. The court holds that the ordinance is void because it vests in certain public officers an arbitrary discretion in determining what fender shall be used.

MISSOURI COMPANY ABOUT TO LET CONTRACTS

The St. Louis, Hillsboro & Southern Railroad Company, Mechanics' Bank Building, St. Louis, is about to take bids for the equipment, etc., as well as the construction of the line, which will run through the foot hills of the Ozark Mountains from South St. Louis to Hillsboro, the county seat of Jefferson County, Mo., about 40 miles. The company is incorporated for $1,200,000. The bond issue is $1,600,000. Henry Bowen, formerly with H. M. Byllesby & Company, of Chicago, is the general manager of the company. The financing of the road is all arranged. It is the intention to extend this line 168 miles further south than the present terminus, through rich lead, zinc, coal and timber country.

OTHER TROLLEY DEVELOPMENTS IN NEW JERSEY IN CONNECTION WITH TUNNELS TO NEW YORK

Another project for the development of electric railway lines in New Jersey to operate in conjunction with tunnels building to New York and with the underground roads already in operation in that city is under way. On Monday there were filed with the county clerk of Hudson County, New Jersey, articles of incorporation of the Hudson Street Railroad Company, capitalized at $3,000,000 "for the purpose of increasing and improving the local transportation facilities throughout the principal cities and towns of Hudson County, with a view to operating these lines in connection with the tunnels now being built under the Hudson River." The new lines are so planned as to tap the tunnels at points back from the water front, so that fast time can be made through the congested business districts in Jersey City and Hoboken, and this, coupled with the fact that the new lines will have superior track construction and most modern equipments, will results in reducing the time between the residential and business districts of New York and New Jersey to practically one-half of that now required to get across the river.

The incorporators of the company are Pliny Fisk, Rye, N. Y.; Walter G. Oakman, Roslyn, N. Y.; W. C. Fisk, New York City; Andrew Freedman, New York City; David C. Young, Newark, N. J., and William G. McAdoo, Yonkers, N. Y. The incorporators constitute the board of directors, with the exception of W. C. Fisk, whose firm of Harvey, Fisk & Sons, bankers, will be doubly represented on the board by William M. Barnum and Pliny Fisk. Walter G. Oakman is president of the Hudson Companies in New York, W. G. McAdoo is president of the Hudson & Manhattan Railroad Company, Andrew Freedman is a director of the Interborough Rapid Transit Company, and David Young was, until their absorption by the Public Service Corporation, the vice-president and general manager of the North Jersey Street Railway Company and president of the Jersey City, Hoboken & Paterson Street Railway Company. The officers chosen are William G. McAdoo, president; Andrew Freedman, vice-president; K. B. Conger, secretary, and William C. Kinney, treasurer.

To be specific, the new company plans to connect with the tunnels being constructed by the Pennsylvania Railroad Company at the foot of Exchange Place, Jersey City, and with the branch tunnel at Hoboken of the McAdoo Company. The rival corporation contemplates running lines through Jersey City, Hoboken, Bayonne and the other municipalities in Hudson County, and extend out through the State.

The Pennsylvania Railroad has formally signified its intention of equipping with electricity one of its lines from Philadelphia to Atlantic City. Passenger service over this line is acknowledged to be the best in the world. It is the line over which many records for speed are made.

VESTIBULING BROOKLYN CARS

The first shipment of the new vestibules with which the Brooklyn Rapid Transit Company will equip one-third of its surface cars for the coming winter are due to arrive in Brooklyn soon, and the month of November will be devoted to placing the vestibules on the cars. As there are several different types of surface cars in use on the Brooklyn Rapid Transit system the adjustment of the vestibules to fit the various measurements, will be no small task. Two sample vestibules are now being fitted to cars at the Fifty-Second Street shops. The mere adjusting of the vestibules will be but a portion of the work, as the old fenders which protrude over the dash rail will be of no use on the cars fitted with the new vestibule, as they could not be properly operated. The old fenders will, therefore, be added to the cars remaining without vestibules, thereby giving those cars a double allotment of fenders, which will be of advantage to the general equipment, making two fenders to each of these cars.

Several of the new semi-convertible cars have already been equipped with vestibules and are in regular operation, but the regular rolling stock will not be equipped ready for operation before Dec. 1. On account of it being impracticable to utilize the old fenders on cars to be vestibuled, 1200 new fenders for this purpose have been ordered. According to the Thonet law, one-third of the cars are to be vestibuled for the coming winter, an additional third next winter, and the balance the third winter.

A CALIFORNIA PROPERTY SOLD

The Santa Clara Interurban Railway Company—with all of its franchises, rights of way and other interests—has passed into the possession of Lewis E. Hanchett, who has been elected president of the company. All of the stock of the Interurban Company has been placed in Mr. Hanchett's name, and the deal is said to have been accompanied by a simultaneous transfer of $500,000 to the retiring owners, represented by A. T. de Forest, Pacific Coast manager of the American Steel & Wire Company, and Attorney J. C. Campbell. Mr. Hanchett will not say who his associates and backers in the railroad enterprise are, but the impression has gone forth that the interests behind the deal are the Western Pacific or Gould interests.

The Santa Clara Interurban Railway Company was brought into existence some time ago for the purpose of building an electric railway from San Jose to San Mateo, and from the personnel of its board of directors and for other reasons it has been pretty generally understood that the American Steel & Wire Company, or the United States Steel Corporation, of which the former is an important asset, was behind the enterprise. The interurban company obtained franchises for its proposed road through all of the intermediate towns between San Mateo and San Jose, and purchased a private right of way connecting up its various franchises, so that the operation of its trains would not be restricted as to speed. In San Jose it obtained a franchise that permits it to enter the city over a street parallel to the Alameda, and to run over certain city streets to connect with suburban lines to Berryessa, Alum Rock and Alviso.

Subsequently the company obtained an option on the properties of the San Jose & Santa Clara Street Railway Company and paid $50,000 on account of the purchase price. The latter company owns and operates electric lines that run through the town of Santa Clara, along the Alameda to San Jose, through San Jose and out to Alum Rock, with extensive feeders reaching in various directions. The closing of this deal was involved in the negotiations for the acquirement of the interurban company. Several meetings were held recently, as a result of which, it is said, the properties of San Jose & Santa Clara Railway Company, which were owned by the Centers, of San Jose, as well as those of the Santa Clara Interurban Company, have passed into the possession of the new owners.

Thus far the Interurban company has constructed very little track. It has built a mile and a half of line in Palo Alto. Construction work was temporarily abandoned some little time ago, but was resumed quite recently, and the Palo Alto line, it is announced, will be ready for operation very shortly. The track at Palo Alto is of standard gage and is laid with heavy steel similar to that on the main line of the Southern Pacific, so that the road could be used as a steam road without the necessity of any reconstruction. The entire line up the peninsula, its understood, will be of similar construction.

GREAT FALLS & OLD DOMINION NEARING COMPLETION

The Georgetown-Great Falls line of the Great Falls & Old Dominion Railway Company is nearing completion. The track has been laid and the poles for the wires which will furnish the current are in place for a distance of 10 miles, and work on the power house and the car house is being pushed with vigor. The Georgetown end of the line is at Thirty-Sixth and M Streets northwest, at the Washington end of the Aqueduct Bridge. The track across the bridge is complete, and all the track is nearly ready for the cars, within 4 miles of Great Falls. The grading for the line was made for a double track, but at present only a single track has been laid.

The power house, which is being built of concrete reinforced by steel, is located just across the Aqueduct Bridge, in Rosslyn, about 200 yds. from the bridge on the banks of the Potomac. It is nearly square in shape, its dimensions being 84 ft. x 90 ft. Its height will be 42 ft. The smokestack will be 125 ft. high, and will be 8 ft. in diameter. The Westinghouse Company is equipping the plant. A feature of the installation will be the use of 500-kw Westinghouse-Parsons turbines. A sub-station will be built about 10 miles up the road.

The car house, which will be completed in about two weeks, is situated about 200 yds. to the right of the Virginia end of the Aqueduct Bridge. It is 150 ft. long and about 45 ft. wide. The height at either end will be 16 ft. and at the peak 25 ft. The car house will be of wood frame, covered with galvanized iron. Three car tracks will be laid in the shed.

There are some six or seven bridges on the road, crossing wagon roads and creeks, etc., and the one over Difficult Run, Fairfax County, is about 600 ft. long and 100 ft. high.

When the road is completed, it will open up to Washingtonians one of the prettiest parts of Virginia, the scenery along the line of the road being very attractive. An elevation of 465 ft., the highest point around Washington, will be reached within a few minutes' ride.

It is expected that the road will be opened to traffic this fall, but the exact date is as yet uncertain.

ACCIDENT FAKIRS RUN DOWN IN NEW YORK

The New York City Railway Company caused the arrest on Sunday, Oct. 15, of Albert Woods and Mrs. Mae Woods, a middle-aged couple, on the change of having attempted to defraud the company out of $2,000 on an accident claim. The technical charge against them is perjury. The alleged accident upon which the charge is based dates back to June 27, 1904. On that date a Mrs. Herbert was alleged to have fallen from a surface car at Fifty-Third Street and Columbus Avenue. Woods was the conductor of that car. He had worked on that line nine days when the accident occurred, although, it is said, he had worked on another division of the road under another name prior to that time.

Woods is accused of having written a report to the company's headquarters describing the accident to Mrs. Herbert. According to the company's officials, Woods practically claimed liability on the part of the company because he admitted in his report that he was fixing the fare register when the accident occurred, and had given a signal to the motorman to go ahead, not noticing that a woman was standing on the running board of the car. Woods then further stated, according to the counsel of the company, that he heard the woman scream and that he saw Mrs. Herbert fall. Woods at that time gave his name as Walter Gardner and said that he lived at 211 West Forty-Sixth Street.

The trial of Mrs. Herbert's suit to recover $2,000 from the company came up in White Plains before Judge Platt and a jury on Nov. 2, 1904. At that trial two physicians certified that Mrs. Herbert had received a fracture of the lower part of the spinal column. Her counsel at that time is said to have been Alpheus Frank and Harry Hardenbrook. The suit was decided in favor of the company. It came out then, the detectives say, that Mrs. Herbert really was Mrs. Woods.

The company decided to take up the matter again about two months ago and put detectives on the case. They traced Woods to the New England States, but he jumped so quickly from one State to another that they failed to catch him. Recently, however, they learned that he was living at 213 West Thirty-eighth Street. As soon as this was discovered by the company's detectives warrants were issued in White Plains for the arrest of the couple, and they were taken into custody. It is declared that a swindle similar to that charged against the Woodses was recently attempted in Baltimore, and the police are investigating the case there.

CLEVELANDERS TO FINANCE KANSAS CITY-ST. JOSEPH LINE

Announcement has been made of the plans for financing the Missouri Valley Electric Railway, which is being promoted by Cleveland capital. A committee has been appointed to manage the affairs of the company during the construction. It consists of L. W. Prior, of Denison, Prior & Company, and Warren Bicknell, president of the Lake Shore Electric Railway, representing financiers associated with the Citizens' Savings & Trust Company. The line will run from Kansas City to St. Joseph, Mo., with connections into Leavenworth and Atchison, 66 miles. The tract from Kansas City to Leavenworth will be double-tracked, giving total track of 95 miles. The line will be built on the Missouri side of the Missouri River, crossing the river at Kansas City, bringing the line virtually into the heart of the business district. Connection will be made into Leavenworth and Atchison by spur lines. The interests in this project are the strongest and best known in Cleveland, and there is little doubt that the line will be pushed to completition. The company will be capitalized at $7,500,000, of which $5,000,000 will be issued, and will authorize $7,500,000 5 per cent bonds, of which $5,000,000 will be issued.

A NEW WIRE AND FIBRE COMPANY

The Ryder Wire & Fibre Manufacturing Company, of New York, was recently incorporated with a capital stock of $200,000 to manufacture all kinds of wire and fibrous fabrics, iron, steel and copper-wire rope and insulated wire. The president and treasurer of the company is G. F. Valentine, who was formerly president and treasurer of the Magnet Wire Company. The fabrics will be manufactured under the patents covering products and machines of H. Ryder, who is vice-president of the company and who was formerly manager of the Ryder Belt & Cordage Company, Buffalo, N. Y. The wire rope the company purposes to produce will be made by a new process by which the torsion is entirely eliminated, and it is claimed that by this method the strength and lasting qualities of the rope are increased about 10 per cent. The rope the company will manufacture will be made of fine wire, about which fibre is spun. When these fine strands are woven into either a rope or a covering for any material which undergoes high pressure or hard usage, the strength and durability qualities are greatly increased. Among the specialties of this material will be air-brake coupling hose, fire hose, automobile tires, etc. For automobile tires the material is especially valuable, as it makes the tire puncture proof; will stand a very high air pressure, and, on account of its rough surface, will overcome skidding.

LONGEST THROUGH TROLLEY LINE IN NEW ENGLAND

The longest through trolley line in New England, from Boston to Fall River, a distance of 35 miles, was inaugurated by the Old Colony Street Railway Company on Monday, Oct. 9. This line has been considered for some time, in order to connect with the New York boats in Fall River, and its installation is being favorably received. The initial trip was made in 3 hours and 20 minutes.

This trip to New York by trolley and boat reduces the rate 45 cents each way over the steam roads, and if one take the "New Line" of boats between Fall River and New York, the entire cost from Boston is only $1.75.

Although the schedule has been in force only for a few days, it fully demonstrates that it will become very popular, especially in the fall and during the spring and summer months. The route lies through Mattapan and the famous Blue Hill Reservation, one of the finest parks in the country, then through Randolph with its beautiful trees, and continues on to Brockton, noted the world over for its shoe industry. From Brockton to Taunton the route follows the Old Turnpike and goes through a portion of Easton and Raynham. Taunton Green, where the first flag bearing the device "Union and Liberty" was unfurled, is passed. Then for some distance the trip lies along the banks of the beautiful Taunton River, through Dighton, at one time the center of the shipping industry. Somerset, with its long avenue of giant elms and fine old houses built in the seventeenth century, is another town visited before reaching Fall River. At the latter place the car takes one within a minute's walk of the boat landing.

NEW STEEL ELEVATED AND NEW SURFACE CARS FOR BROOKLYN

The first shipment of the new steel elevated cars for the Brooklyn Rapid Transit system arrived in Brooklyn Monday, Oct. 16, and as soon as they have passed through the company's shops they will be placed in service. This is the new type of elevated car, of which 100 were ordered last summer. In the new cars the old style seats, running along the sides, have been done away with. Practice has shown that the majority of persons on entering an elevated car immediately select to occupy the cross seats, in the center of the car, as these seats permit less crowding, and more prefer to ride facing forward than facing sideways. In addition to that, the cross seats are more comfortable. The new cars have a steel body and steel underframing and are of the convertible type. They seat sixty-two persons, as against fifty-two for the old type.

The Brooklyn company has also just placed orders for 150 additional surface cars. The John Stephenson Company received an order for 100, and the Laconia Car Company will build the remaining 50. The cars to be built are similar in design to the semi-convertible type described at some length in the STREET RAILWAY JOURNAL for March 11, 1905. During the past season 200 of these have been in service on the company's lines in Brooklyn and the vicinity. The new cars will be provided with closed vestibules.

PRETENTIOUS PUGET SOUND PROJECT

F. R. Brown, of Philadelphia, representative of the capitalists who control the Portland Consolidated Railway Company, of Portland, Ore., has been making investigations preparatory to beginning active work of construction on an electric railway projected to connect Portland and Puget Sound cities. Under the direction of Mr. Brown investigations have been carried forward, and compilations made upon which are based calculations as to the possible tonnage that such a road could expect to originate. Engineers have also gone into the physical features of the route, and have reported that low gradients and easy curvatures can be had for the entire route to a connection with suburban lines from Portland along the Columbia, or by a route through Clark County, Wash., connecting with the ferry at Vancouver, which, before the end of the present year, will land at a new terminal on the Oregon side, located on Shaw's Island. It is stated that negotiations have been entered into with business men of Seattle, Tacoma, Olympia, Portland and of the principal points that it is intended to serve between Puget Sound and Portland, to determine what traffic now handled by the steam roads may be diverted to the electric railway, and that within a short time several corps of locating engineers will be placed in the field to complete the engineering work for the road.

OHIO MERGER IN WHICH BUFFALONIANS ARE INTERESTED IS EFFECTED

The East Liverpool Light & Traction Company, which is the result of the merger of the East Liverpool Railway Company, the United Power Company and the East Liverpool & Rock Springs Railway, has elected the following officers: Van Horn Ely, of Buffalo, president; C. A. Smith, of East Liverpool, secretary, and Edward McDonnell, treasurer. These, with M. K. McGraw, G. H. A. Hunt, N. B. Billingsly and U. C. DeFord are directors. The Ohio Valley Finance Company of which W. Caryl Ely, of Buffalo, is president, is financing the proposition. Edward McDonnell, formerly superintendent of the International Company, at Buffalo, has been appointed general manager of the property. The company will immediately rebuild and double track the line between East Liverpool and Wellsville. Louis A. Watres, former lieutenant governor of Pennsylvania; Wm. F. Hallstead, former general manager of the Delaware, Lackawanna & Western Railroad, both of Scranton, and Chas. A. Smith, of Pittsburg, former owners of the constituent properties, it is understood, retain large interests in the new company, of which Col. Watres and Mr. Smith are directors.

The East Liverpool & Youngstown Railway Company has been incorporated by U. C. DeFord, M. E. Johnson, N. B. Billingsley, C. B. Kenty and others interested in the East Liverpool Light & Traction Company. The company proposes to build from East Liverpool to Lisbon, and possibly to Youngstown. The company owns franchises which were secured some time ago. Both the Youngstown & Ohio River Railway Company, promoted by Cleveland people, and the Youngstown & Southern, which is partially in operation, propose to build over this route.

WINTER WORK OF THE BROOKLYN RAPID TRANSIT EMPLOYEES ASSOCIATION

The plans are all laid by the Brooklyn Rapid Transit Employees Benefit Association for the winter's work. As heretofore, there will be special educational and amusement features in addition to that freedom of the main clubhouse at East New York and the several branches at the depots which is enjoyed by members of the association all time.

The educational committee of the association has arranged with Harry Netzer, instructor of last season's physical culture class, to conduct a similar class during the winter at the East New York clubhouse on Tuesday evenings. The class is open to all employees desiring to join, instruction being free to all. It is, however, required that each pupil wear, during class sessions, the regulation class uniform consisting of shirt, trunks and slippers, the price of which is $2.

The bowling tournament for the season of 1905-06 will commence on Monday, Nov. 13, and will be effective on Mondays, Wednesdays and Fridays thereafter on the association's alleys at Crosstown, Ridgewood and East New York. Similar to previous years the tournament will be open to teams of employees from all departments. Each team is to consist of five men and not more than five substitutes; the captain to be selected by the team. Heads of departments, division superintendents, shop foremen, etc., have been requested to supervise the selection of teams from their several departments and approve the applications before sending them to the secretary's office. The prizes this season will be similar in number and value to those of last season. The team prize will be a silver loving cup. Four individual prizes will be awarded, a gold watch, gold chain, gold filled watch, diamond scarf pin. For the highest number of strikes a gold watch will be given, while for the highest number of spares, diamond cuff buttons will be awarded. The three high single-score prizes will be a gold ring, gun metal watch, pearl scarf pin.

The band of the association gained a splendid triumph at its first public appearance in the recent Mardi Gras parades at Coney Island. This organization is composed entirely of employees of the Brooklyn Rapid Transit Company and is the outgrowth of one of the departments of free instruction given to the members of the association. The band now numbers sixty pieces, and its members are composed of every branch of the railroad life, including electricians, despatchers, foremen of shops, locomotive engineers, motormen, conductors, guards and track and line department employees. It is little more than a year old. Last September it was decided to engage the services of W. S. Mygrant, band master of the Thirteenth Regiment, as instructor, and under his guidance the organization has made remarkable progress. The association has expended for instruments, uniforms, instructor, etc., a sum of nearly $3000. Rehearsals are held every Monday and Thursday evening in the clubhouse on Jamaica Avenue. Monday evening is for the students, and Thursday for the playing members. Prof. Mygrant is in charge of both classes. As the instruments are owned by the association the men share equally in the benefits of the instruction.

The report of the association for the month ended Sept. 30, shows as follows:

Receipts for September	
Balance Sept. 1, 1905	$9,775
Dues for September collected in August	2,372
Initiations	282
Cash left in cars	391
Total receipts for September	$12,820
Less September expense	1,998
Balance Oct. 1, 1905	$10,822
Expenses for September	
Sick benefits	$1,018
Death benefits	150
Medical service	305
Salaries	194
Printing and stationery	76
Miscellaneous	135
Postage and petty cash	30
September expense (total)	$1,998
Cash on Hand Oct. 1, 1905	
Balance B. R. T. E. B. A. Fund, Oct. 1, 1905	$10,822
Dues and initiations for October collected in September	2,485
Total cash Oct. 1, 1905	$13,307
Cash on hand, secretary's office (emergency)	250
Total cash available Oct. 1, 1905	13,557

THE CASULTY RECORD OF THE NEW YORK ELEVATED

Since the opening of the elevated railroads in New York more than a quarter of a century ago these lines have established an unparalleled record for the safety with which they have handled their tremendous volume of traffic. Until recently no passenger had ever been killed while on the company's cars, so that even in the light of the recent disaster on the Interborough system the record for safety still probably stands unmatched. To show how infinitesimal is the death record of elevated passengers to the total number carried, the "Wall Street Journal" recently printed the following figures of passengers handled since 1890:

Year	Passengers
1891	201,202,518
1892	213,692,745
1893	221,407,197
1894	202,751,532
1895	187,614,985
1896	184,703,636
1897	182,964,851
1898	183,360,846
1899	174,389,917
1900	184,234,000
1901	190,045,741
1902	215,259,345
1903	246,587,022
1904	280,207,620
1905	283,753,680
Total	3,152,174,835
Average per annum	210,144,989

In fifteen years, therefore, there have been carried more than 3,000,000,000 passengers, an average of more than 210,144,989 per year, and of this total less than twenty persons have been killed while on the cars. Going back to the commencement of operations will increase the total of passengers very largely without adding to the number killed.

A NEW COMPANY TO BUILD FROM ROCHESTER TO BUFFALO

Directors of the recently dissolved Buffalo & Rochester Railway Company are organizing a new company to operate between Buffalo and Rochester, to be known as the Buffalo & Rochester Traction Company. The company is capitalized at $3,500,000, and the same Philadelphia and Buffalo capitalists interested in the dissolved company are interested in the new one. There are no Rochester names in the list. The old company was incorporated Nov. 23, 1904, but in June of this year was denied the right to build because the road ran along public highways. Last month a court writ was obtained permitting the company to dissolve on Dec. 18. The new company will build on a private right of way. The western terminus will be at Depew, and the company's cars will enter Rochester over the Genesee Street tracks. The intermediate points to be touched at are Looneyville, Crittenden, Grimesville, Wende, Pembroke, Alden, Corfu, Batavia, Stafford, Le Roy, Caledonia, Mumford, Wheatland and Chili. The directors of the company are: Henry H. Kingston, J. Andrew Harris, Jr., John J. Collier, Horatio A. Foster, T. Henry Dixon and Samuel Welch, all of Philadelphia, and William B. Cutter, George A. Ricker and Herbert P. Bissel, all of Buffalo.

ROCK ISLAND DISCONTINUES IOWA INTERURBAN SERVICE

Orders have been received by the local officials of the Rock Island Railroad, in Des Moines, Ia., to discontinue the interurban service established between Indianola and Des Moines and Colfax and Des Moines. The order came as a surprise, as the Iowa officials are said to have been well pleased with the result of the experiment, the passenger traffic having increased between the places mentioned to a point where it was paying, even with the added expense of three extra trains each way daily. Reasons for the discontinuance have not been announced, but it is presumed that it was done on the advice of the legal department and was due to the laws of the State, which practically provide that the same proportionate rate shall be charged over all the line as is maintained between any two points. The company had been selling commutation tickets at reduced rates, and this is probably what caused the trouble. It is also stated that the interurban service on the line of the company between Cedar Rapids and Iowa City, which was established to compete with the interurban line connecting those two cities, will be discontinued in the near future.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED OCT. 10, 1905

801,203. Brake Beam; Carl E. Bauer, Hammond, Ind. App. filed Sept. 23, 1903. A brake beam composed of two channel bars placed with flat sides together in substantially the same plane.

801,335. Trolley; Engene J. Parker, Providence, R. I. App. filed Dec. 23, 1904. A bracket for supporting the trolley harp is mounted upon the trolley pole in such a way that the end of the pole will deflect guy wires and obstructions and prevent their engagement with the wheel and harp.

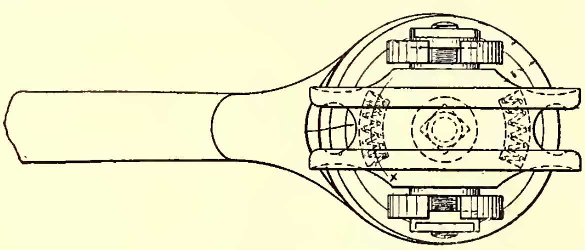
801,433. Brake Beam for Railway Cars; John McE. Ames, New Brighton, N. Y. App. filed April 12, 1905. Comprises two corresponding securing members adapted to fit upon and embrace the flange of the beam, and a jaw having a head loosely confined within a chamber formed within the members, whereby the jaw is rendered axially adjustable and adaptable for either a right of a left-hand fulcrum.

801,441. Electric Switch-Throwing Device; Louis H. Coxe, Philadelphia, Pa. App. filed Nov. 12, 1904. Relates to that class of switch operated by electric current derived from the motive power, in which the switch is actuated by cutting the current off or on when moving over insulated sections in the track.

801,516. Railway Crossing; Edward B. Entwise, Johnstown, Pa. App. filed March 10, 1904. The intersection plate, against which the ends of the running rails abut, have arms extending between the running rails and guard rails and secured thereto.

801,508. Car; Ezra S. Bucknam, Philadelphia, Pa. App. filed Jan. 19, 1905. Relates to means for stowing sashes, panels, etc., in a semi-convertible car.

801,532. Device for Increasing the Adhesion Between Wheels and Rails; Robert C. Lowry, Seattle, Wash. App. filed Dec. 5, 1904. A bar mounted between the car wheels is electromagnetically wound and provided with a shoe adjacent the rail, which exerts a magnetic pull when the coils are energized.



PATENT NO. 801,335

801,541. Car Construction; Richard J. McHale and Peter Haberle, Philadelphia, Pa. App. filed Oct. 26, 1904. In an open car a hollow metal stanchion provided with a longitudinal slot and a seat panel, secured to the stanchion and straddled thereby.

801,554. Side Bearing for Railway Cars; Warren M. Smith, Moore, Pa. App. filed Jan. 28, 1904. Comprises a rub-plate having blocks thereon and adjusting blocks mounted on said first blocks and means for adjustably connecting the rub-plate and blocks together.

801,675. Car Brake Rigging; Dennis McCarty, Chicago, Ill. App. filed June 6, 1904. A chain runs through sheaves mounted at the ends of rods leading from the two brake leavers and a spring is interposed in the chain and acts to draw the brake levers together when tension is put upon the chain.

801,718. Trolley Harp; Charles L. Hooper, Rochester, N. Y. App. filed Dec. 27, 1904. Spring blades between the harp and wheel to improve the contact.

PERSONAL MENTION

MR. H. M. BRINCKERHOFF has resigned as general manager of the Metropolitan West Side Elevated Railroad Company, of Chicago. He will leave for Europe soon upon an extended trip.

MR. M. J. MANDELBAUM, a prominent Cleveland banker, active in the Pomeroy-Mandelbaum syndicate, was married on Tuesday, Oct. 10, to Mrs. Florence Levy. Mr. and Mrs. Mandelbaum left immediately on a bridal trip to Europe.

MR. JOHN J. MURPHY has resigned as division superintendent of the Boston & Northern Street Railway. Mr. Murphy became superintendent of the Lynn division, March 14, 1903, after having served the Lynn & Boston and the Boston & Northern twenty-two years.

MR. ALBERT RICHEY, who recently resigned as chief engineer of the Indiana Union Traction Company to become head of the course in electric railway engineering in Worcester Polytechnic Institute, Worcester, Mass., has been presented with a handsome watch by his former associates in the Indiana Company.

MR. GEORGE C. TOWLE, who has been acting as general manager of the Syracuse & South Bay Railway Company, of Syracuse, N. Y., has been permanently appointed to that position. Mr. Towle formerly was connected with Stone & Webster, of Boston, Mass., for whom he acted in an engineering capacity in the installation of several systems.

MR. T. K. WELLS has been appointed superintendent of transportation for the Manila Electric Railway & Lighting Company, Manila, P. I., which is controlled and operated by J. G. White & Company, of New York. Mr. Wells was with the Wabash Railroad and the St. Louis, Iron Mountain & Southern Railroad for fourteen years, following which he spent eight years with the Syracuse Rapid Transit Company.

MR. C. F. BAKER, superintendent of motive power and machinery of Boston Elevated Railway Company, will become connected with the Brooklyn Rapid Transit Company Nov. 1. as engineer in charge of all power stations. Mr. R. C. Taylor, mechanical engineer of the company, who at present has charge of the power stations, will, upon the arrival of Mr. Baker, devote all of his time to the car equipment. Mr. Baker has been connected with the Boston Elevated Railway Company for more than ten years. He has always been prominently identified with the American Railway Mechanical & Electrical Association and was the president of that association last year.

MR. WILLIAM MARSH has been appointed chief engineer and general manager of the Brighton Corporation Tramways, of Brighton, England. He was appointed assistant engineer and manager in the autumn of 1904; acting engineer and manager in February, 1905, and attained his present promotion in July, 1905. Mr. Marsh went to Brighton in 1900 as assistant engineer and helped in the design and laying-out of the whole of the original system, together with two separate extensions since. Before coming to Brighton, Mr. Marsh served with several engineering firms in Scotland, and also for nearly two years with the Glasgow Corporation Tramways, as assistant electrical engineer, during the reconstruction of nearly the whole system for electric traction.

MR. R. F. HAYWARD, who has recently accepted the position of general manager of the Mexican Light & Power Company, City of Mexico, has occupied a leading position in hydro-electric power transmission engineering in the West for a number of years. Graduating in 1885 from University College, London, England. Mr. Hayward entered the works of the Crompton Company, Ltd., at Chelmsford, England, where he served an apprenticeship of three years. Afterward he was apointed works superintendent, holding that position until 1894, when he became general manager of the Salt Lake & Ogden Gas & Electric Light Company, of Salt Lake City, Utah. In November, 1897, he was appointed electrical engineer for the Union Light & Power Company, and in January, 1900, accepted a similar position with the Utah Light & Power Company, its successor. Four years later this company was consolidated with the Consolidated Railway & Power Company, of Salt Lake City as the Utah Light & Railway Company. Mr. Hayward accepted the appointment of electrical engineer and retained this position until September last, when he resigned to take the management of the Mexican Light & Power Company. During Mr. Hayward's connection with the power companies in Salt Lake City, several hydro-electric and steam power stations were brought into the same general transmission system, and the circuits harmonized so as to give efficient and economical service. For a time Mr. Hayward maintained a separate office as consulting engineer in Salt Lake City, and during this period, his firm, Hayward & Grey, designed and erected the Bear River power plant for the Utah Sugar Company. He was also consulting electrical engineer for the Pioneer Electric Power Company, of Ogden, and was frequently consulted in connection with many of the large hydro-electric power projects in the Rock Mountain States. In his new position as general manager of the Mexican Light & Power Company, Mr. Hayward will have direct supervision of nine power stations, the trans-ission lines nd large distributing system. About 100.000 hp is at sent utilized or being developed from water-power and steam nts, including the large Necaxa station. The power is used for ghting and general power purposes, for the operation of the street railways in the City of Mexico, for pumping the city water, and for mining, while an increasing quantity is being used for heating and cooking service.

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Of this issue of the Street Railway Journal 8000 copies are printed. Total circulation for 1905 to date, 351,950 copies, an average of 8180 copies per week.

A Setback for Mayor Dunne

Mayor Dunne, of Chicago, who was elected last spring on the platform calling for immediate municipal ownership of street railway lines, has received two severe setbacks at the hands of the Chicago City Council. Ever since he was elected on this radical platform, it has become daily more evident in Chicago that the Mayor's programme for immediate municipal ownership is one that was virtually impossible for him to carry out, and further, that the City Council, and especially his local transportation committee, as well as the majority of their daily papers and more intelligent citizens, are convinced that no scheme for immediate municipal ownership is practicable under existing legal conditions, or even desirable. The Mayor has now been defeated in two attempts to get the City Council to follow his programme. The first was to get the Council to take out of the hands of the local transportation committee his scheme for municipal ownership, known in Chicago as the contract plan. This plan called for the formation of a company to be controlled by the city. Mayor Dunne's plan was not taken very seriously in Chicago until he attempted to force it upon the Council, when the attempt was defeated by an overwhelming majority. The local transportation committee is now negotiating with the companies and attempting to frame an ordinance providing for an extension of franchise, with provision for the purchase of the lines by the city at any time. The Mayor, in a recent Council meeting, attempted to get the Council to pass a resolution ordering the local transportation committee to cease these negotiations on the grounds that they were contrary to the expressed will of the majority of voters at the election of last spring. While it is true that the vote taken last spring was overwhelmingly in favor of municipal ownership, it is very significant that the City Council upheld the action of the local transportation committee in conducting these negotiations and voted down Mayor Dunne's attempt to have them cease. From this, two things are evident: First, that the Council and local transportation committee are convinced that no scheme for immediate municipal ownership is feasible or desirable, and second, that the members of the Council do not take the vote of last spring as evidence that the people will not at next spring's election approve an ordinance providing for extensions of franchises, with the option of the purchase of the lines by the city at any time. The Council is evidently convinced that the people of Chicago will vote in favor of a tangible solution of the traction problem when once such a definite solution is placed before them rather than to cling to the impracticable theories of Mayor Dunne as to immediate municipal ownership.

Lights in the Pits

If many shop superintendents could be made aware of the amount of trouble and time taken by their motor and truck inspectors to get proper light on the under side of the cars, they would undoubtedly place more lamps in the pits of their shops. In not a few shops no pit lights at all are provided. To get light to work by, the workman must climb in the car, unscrew a lamp and place an extension or drop cord in the socket. Considering the cost of power to them it would naturally be expected that electric railway companies would have light placed at every convenient point about their shops. Probably one reason why poor lighting of pits exists so frequently is that the presence of oil and grease increases the fire risk when the wires are installed openly. But it is not necessary that the wiring should be so installed. While there is considerable cost in placing wires in pipe conduit, we believe the expense in most instances would be justified by the convenience afforded. The lights might be installed on either side of the pit at distances of about 10 ft. apart. To prevent the sockets from being torn down and to guard against the entrance of oil, sockets should be protected by iron covers or shields. The circuits may be arranged in sections of about one car length, each section to be controlled by a switch conveniently located.

The light from stationary lamps is not sufficient to note the clearance of armatures, and properly to inspect many parts. Lamps with extension cords are essential. When these are made with unprotected lamp cord they give no end of trouble. "Repairing drop lights" is a rather familiar item on the workman's time card. Much of the expense of such repairs and a great deal of delay and inconvenience may be avoided by using flexible conduit instead of uncovered wires in the construction of the extension lights. To be sure, those made with flexible conduit are heavier and stiffer than those with naked cord, but when workmen once become accustomed to the conduits, they will not notice the difference.

Fluctuations in Car Lighting

The time of the year has arrived when a number of hours of most profitable operation each day occur after darkness has set in. This brings up again the question of providing sufficient light so that passengers who make long journeys on interurban roads can read with as much comfort as on competing steam roads. Well managed city systems have sufficient money invested in feed wire and power distributing systems, so that drops in the voltage are not serious. On interurban roads it is comparatively rare that there are not wide variations in the voltage, and consequently in the light at points between sub-stations, when cars are approaching each other and one or both start up about the same time. The result is that, while the car may be flooded with light when near sub-stations, when it is at points between sub-stations the voltage is so low that, no matter how many lamps may be in use on a car, the lighting is not satisfactory to passengers who are reading. We are not prepared to go into the economics of the matter in this editorial, but we can hear some one say that where such conditions exist, more feed wire should be put in so as to maintain a more constant voltage. It must be admitted that this is usually the proper solution of the problem and the one that is most feasible. Nevertheless it would be desirable if some steadier source of voltage than the trolley wire of an interurban line were available for car lighting on such lines. The unfortunate thing about it is that, at the very times when the car is delayed by low voltage from one cause or another, it is most important to keep up the passenger's spirits and keep him in a good humor by furnishing him good light wherewith to read. Nothing is more dismal than a dimly lighted car dragging along behind time on an interurban road with the lights so low that reading is impossible. Passengers do not think nearly as much about a belated car if the illumination is only up to par.

It must be admitted that there is no satisfcatory solution of this little problem at present, but it is worth thinking about. An electric railway man hardly wants to add Pintsch gas to the formidable array of apparatus he has to put on a car now. He has a feeling that he might better be investing the money in additional feed copper, yet the fact remains that voltage fluctuations are very great in many cases in spite of our theories as to what they should be. Storage batteries and automatic voltage regulators have also been suggested. The storage battery is a thing to be avoided in a car equipment whenever possible, but steam and electric railway men are being forced to adopt it in a number of cases; the steam railroad man for passenger car lighting, and the electric railway man for multiple-unit control. A simple voltage regulator would solve the problem, but its simplicity must be extreme if it is to be a satisfactory thing to put on a car.

The Rules of the Road

From the records of the past summer, we observe an increasing tendency on the part of our space-devouring contemporary, the chauffeur, to try conclusions of momentum with electric cars. The casualty list has already become unpleasantly long and is growing rapidly. Now of course we understand that sort of sport, and that the guild of chauffeurs holds that anything less weighty than a steam roller is fair game, but we regard as unsportsmanlike the increasing tendency to ram the car amidships instead of meeting it in a dignified front-end collision. We have no doubt that if the guild of chauffeurs would agree to proper rules for such contests, street railway managers would be willing to put armored bulkheads in place of the dashers, and meet the issue squarely. But it is asking too much to expect them to put a complete armor belt around the car. It would be inconveniently heavy, and besides there is no convention yet to forbid the use of spar torpedos. And moreover the passengers object that it does not give them a fair show to be butted in the back.

The fact is that our present rules of the road have outlived their usefulness. They were not devised for vehicles running 30 or 40 miles per hour and built with a ram bow at that. An electric car is confined to its own track, and is not at liberty to turn out, however much it may wish to do so. At sea a ship sailing close hauled has the right of way against one with the wind free, or against a steamer, and by the same logic a vehicle confined to a track which is predetermined and visible to all, ought to have an unquestioned right of way against vehicles capable of greater speed and having the whole road in which to cruise about. It is bad enough when a car is stopping for passengers to have a big touring car swoop down upon the crowd with a blast fit to crumble the walls of Jericho and scatter it to the uttermost parts of the sidewalk. But it is even more objectionable when it tries to climb upon the platform and through the end of the car. It would seem to be a reasonable requirement to give passengers boarding a car the right of way, particularly since it is alleged that a proper automobile can be stopped in about one length. If it be so easy to stop, what hardship would be worked by stopping? Foot-pasengers may have small rights in the street, but they certainly have some upon the crossings, and right of access to a street car should be one of them. It is no proper excuse to complain of not seeing passengers in time, for the location of crossings is known to all men, even chauffeurs. In the latest case of ramming a street car, two automobiles were scorching, and the one ahead raised such a dust that the following one was lost in it until too late to dodge the car—at least such was the statement of the survivors. Now assuming this to be true, were not the machines running at speed entirely unjustifiable in view of the conditions?

We willingly recognize the fact that the automobile is a useful machine and that it has become a permanent part of the world's vehicular outfit. We have no quarrel with it as such. Nevertheless, we think it is time for such a revision of the rules of the road as shall give it equal and not exclusive or exaggerated privileges. Granting that speed is a characteristic and valuable property of automobiles, it should not be so used as to endanger other traffic. We have, to be sure, speed-limit laws which are daily violated by nearly every machine that is not temporarily crippled. Many of the speed-limit laws are essentially foolish in that they cannot be properly enforced, and also oppressive in that they specify limits that are essentially unreasonable. The abuses of automobile speeding cannot be corrected by any definite number of sleuths with stop watches. But rules of the road can be established that with malice toward none will fix the responsibility of speeding, with penalties that will make even a drunken driver think twice before he takes chances. The street railways of the country carry and will continue to carry the vast majority of all who travel by means other than those furnished by nature. Quite apart from the rights of pedestrians, those who are passengers in street cars have the right to enter and to use these cars in safety. The street railways in carrying passengers have to assume a responsibility for their safety almost equivalent to insurance, and the railways therefore may properly demand such regulation of traffic as shall enable them with reasonable precautions to carry out their trust. The rules of the road are an inheritance from days when electric cars and automobiles were undreamed of. The times have changed and the rules should change with them. The street railways do not ask for unreasonable favors, but considering their enormous passenger traffic, they may properly ask such regulations of other traffic as shall remove what has now become a serious additional peril to street traffic.

The Location of Toilet Rooms and Heaters on Interurban Cars

One point not yet definitely decided upon in the design of interurban cars is the location of the toilet rooms and heaters when hot-water heaters are employed. On a car intended to be operated in one direction only, the heater is usually placed either in the motorman's cab, adjoining the partition between the forward and the rear passenger compartments when two exist, or near the rear entrance of the car. The toilet room is likewise found in different positions, sometimes being located in the forward end and sometimes at the rear of the large section of the car. A study of the floor plans of the various interurban cars described in these columns from week to week will show that very little preference is given to any of these locations, and that one is about as popular as another. Each position has so many advantages and disadvantages that it seems impossible for car designers to adopt one location as standard, notwithstanding the fact that the governing conditions are very nearly similar on all interurban lines.

The location of the heater in the motorman's vestibule is open to several objections. One is the appearance presented by it as viewed from the passenger compartments. Passengers almost without exception enjoy the view ahead, and they object seriously to having it obstructed by the heater and accompanying pipes. Again, when the heater is placed in the cab, the motorman will naturally give more or less attention or, at least, thought to it. A motorman's time should be devoted as much as possible to running the car, and any disturbing feature should be kept away from him. A third difficulty is that it keeps the vestibule uncomfortably warm for the motorman and tends to produce moisture on the inside of the sash. The car designer has still another objection to placing the heater in the extreme end of the car. The heater, its pipes and the expansion drum have considerable weight. This gives an increased load to be taken care of at a most difficult point. The liability of drooping platforms is considerably increased unless more material is put into the bottom framing.

To weigh against these several objections there is one advantage gained when the heater is placed in the motorman's cab. The passengers are not disturbed by flying dirt and dust when the heater is shaken up or a new supply of fuel added. Then, too, it is not necessary to carry the fuel and ashes through the interior of the car, which is thus kept clean the more easily.

The practice of locating the heater between the forward and the rear compartments is also open to adverse criticism. With the mahogany or cherry finish of the car for a background, a heater as usually kept does not make a very pleasing appearance. When so located, it is for the object probably of enclosing it in a room. This, however, induces an additional expense in the construction of the car. A more serious drawback to this location is that the coal must be carried to the heater and the refuse carried from it through half the length of the car. As this is usually done by more or less careless employees, a trail of dirt is frequently left on the floor. The position between the forward and rear compartments is, however, more desirable than at the ends, when the disposition of the weight of the heater is considered. Lying as it does between the trucks, this weight is easily taken care of. There is usually but one drawback to placing the heater at the extreme rear of the car body. The passageway through the rear door is restricted.

The same objection is urged against locating the toilet room at this point. With the heater on one side and the toilet room on the other, a narrow passage is formed at a place that should by all means be kept open. The natural tendency of passengers in a crowded car to congregate about the door blockades this passage to an extent that much time is lost in waiting for passengers to get through it when leaving the car.

Not considering this feature, the rear of the car is undoubtedly the more desirable location for the heater and toilet room. When the latter is placed in the forward portion of the car some passengers are subject to more or less embarrassment on being compelled to enter it. For this reason it may be urged that the heater and toilet room be placed on different sides of the car and opposite each other. The appearance of greater isolation of the toilet room gained is greatly appreciated by many. A consideration favoring the location of the toilet room between the two compartments is that of the disposition of the waste matter. When placed in the rear portion of the car, the closet is immediately over the truck. Sometimes this makes the appearance of the trucks very objectionable, and especially is this true when the car passes through city streets.

If in the design of the car the attempt is being made to give passengers in both forward and rear compartments a clear view ahead, the heater and the toilet room cannot be placed between the two compartments. Sometimes, however, because of the usually objectionable appearance of the smoking compartment, as much separation as is possible of the two compartments is desired. In such a case this is well obtained by locating the toilet room and the heater at this partition, one being placed on each side of the car.

After considering the several points in favor of and the drawbacks against each position, it is readily understood why a definite opinion regarding the locations of these two features of interurban cars has not already been formed. So long as each designer weighs with a greater or less degree of importance the advantages and the disadvantages, differences of opinion will continue to exist.

THE BERLIN-ZOSSEN TESTS OF 1902

In the STREET RAILWAY JOURNAL for Sept. 9, an abstract was published of the high-speed tests conducted during the fall of 1901 on the Berlin-Zossen Military Railway by the Studien Gesellschaft. It is proposed to continue this subject by the publication in this issue and one soon to follow of abstracts of the results of the 1902 tests. These three articles, with the 1903 tests which have been published in book form, will give those interested in the subject of train resistance and braking at high speed practically all of the data secured during these memorable experiments. The accompanying portion of the 1902 tests discusses the air resistance and its relation to the shape of the car, and the other resistances to train movement. In a later issue the report of the 1902 tests will be concluded by an abstract of the portions relating to losses in the transmission system, measurement of energy consumption and braking tests.

As stated at the end of the report of the tests made in the fall of 1901, the results obtained were not sufficiently complete to determine unqualifiedly the best methods, from a technical and economic standpoint, of constructing an electric high-speed equipment for trunk lines. For this reason the tests at high speeds which were begun in 1901 were continued during 1902. Unfortunately, the negotiations which the company had entered into with the State authorities by which the latter would furnish the necessary heavier track for the experimental section were still uncompleted, and from all appearances would not be closed until after the approval of the recommendations for the year 1903 made by the State Railway Commission at its annual meeting.

To make good use of the intervening period, a further series of tests were conducted during 1902 over the existing tracks of the military railroad. Throughout these tests a speed of more than 125 km per hour was not permitted on account of the structural weakness of the track, but it was possible, even within this limit, to obtain further valuable information and thereby to increase the knowledge already secured as well as to lay out a comprehensive programme for future tests.

Through the valuable aid of the Royal Commission in charge of the military railroad it was possible to conduct the tests in September of 1902 according to the following programme:

1. Measuring the resistance of the motor cars at different speeds.
2. Measuring the energy consumption of the cars at different loads and speeds.
3. Determining the losses in the transmission lines.
4. Making a series of brake tests to determine the best braking conditions.
5. Determining the most judicious alterations to be made in the cars to insure their smooth running.
6. Observing the behavior of the track during the tests.

The following report is submitted on the manner of conducting the tests and the results from them:

MEASURING THE TRAIN RESISTANCE

The total resistance to be overcome by the movement of the train is made up of the following separate components, viz.: the friction at the truck king bolt and bearings; the track resistance, which, on account of the rolling and sliding friction of the wheels, causes uneven conditions of the track and bending of the rails; and finally, the air resistance.

For determining the separate resistances of the car and the track, each motor car was drawn over the track by a locomotive, and the draw-bar pull was measured, and, to eliminate the air resistance as much as possible, only low speeds were used. On account of the great weight of the motor car, which produced a decided variation in the draw-bar pull at each revolution of the driving wheels of the locomotive and was especially marked at low speeds, it was not possible by this method to obtain a smooth curve of the draw-bar pull. This was also the case when the motor car was attached to a slowly moving freight train. Somewhat better results were obtained by drawing the car with an alternating-current locomotive, although the curve obtained even by this method is not absolutely reliable.

On this account, the direct measurement of the train resistance had to be discontinued, and instead the coasting tests which had been begun in 1901, but which were stopped on account of insufficient time, were resumed.

These tests were conducted both by starting a car from a standstill position on a down grade and at a given speed from a definite point on the track. During that part of the tests in which the speeds were low, the slight inequalities of the roadbed and track made themselves evident when the speed curve was plotted, and to correct them the profile of the track had to be accurately determined with leveling instruments.

The results of measuring the profile of the section between Marienfelde and Mahlow, upon which the coasting tests were made, are given in Fig. 1. In the upper curve, the uneven line shows the average grades determined at intervals of 50 meters each and, for comparison, the lower curve shows the original profile in dotted lines with the later profile in full.

As may be seen from the curve plan of the road, there are no curves in the coasting section of less radius than 2000 meters. At these points the train resistance showed only a slight increase, less, in fact, than that resulting from the difference in roadbed and unevennesses of the track, so that this increase in resistance did not need to be considered in making the final corrections.

For securing a continuous record of the speed during the tests, a special writing instrument was installed in the motor cars. It was similar in construction to the Morse apparatus, and recorded the speed on a paper ribbon by means of an electrically operated contact point. Each apparatus contained three electromagnets and three writing levers. The first magnet, which was connected with a contact disc fastened to one of the car axles, was used to record the revolutions of the car wheel. The second was connected with a contact clock which made contact every 10 seconds and recorded this interval. The third contact was operated through a hand-key placed in the motorman's cab, and was used to record on the paper ribbon the times at which the car started, when the current was cut in and out, the beginning of the braking period, and the number on the kilometer stones.

To insure the greatest possible accuracy, indicator paper was used and the records were made with a metal point in notched lines. With the aid of this apparatus it was possible to determine the relation between time and distance, and also that between the variations in speed and the profile of the road, with extraordinary accuracy. Besides this, a Hausshalter & Grossmann registering speed indicator was installed in each car to control the results obtained for the individual trips.

The resistance of the car was determined from the coasting tests.* From the speed curve plotted in increments of 10 seconds each, the

retarding force $=$ mass $\times$ retardation

was determined and plotted in curve form. Also from the fixed profile of the road, the force resulting from the grades, which equals the car weight $\times$ grade in per cent, is plotted negatively in dotted lines. The perpendicular distance between these two curves then directly represents the train resistance.

After smoothing out the irregular line of forces due to grades, and taking into consideration the calculated curve of the retarding force in connection with the variation of speed,

* The curves referred to here are not reproduced. Fig. 2, referred to later, gives "final results" only of these curves.

the smooth curve of train resistance shown in Fig. 2 is obtained. The irregular and smooth curves of grade forces correspond 10 seconds each was so great that it is not necessary to consider the small variations in the grade of the track, and each

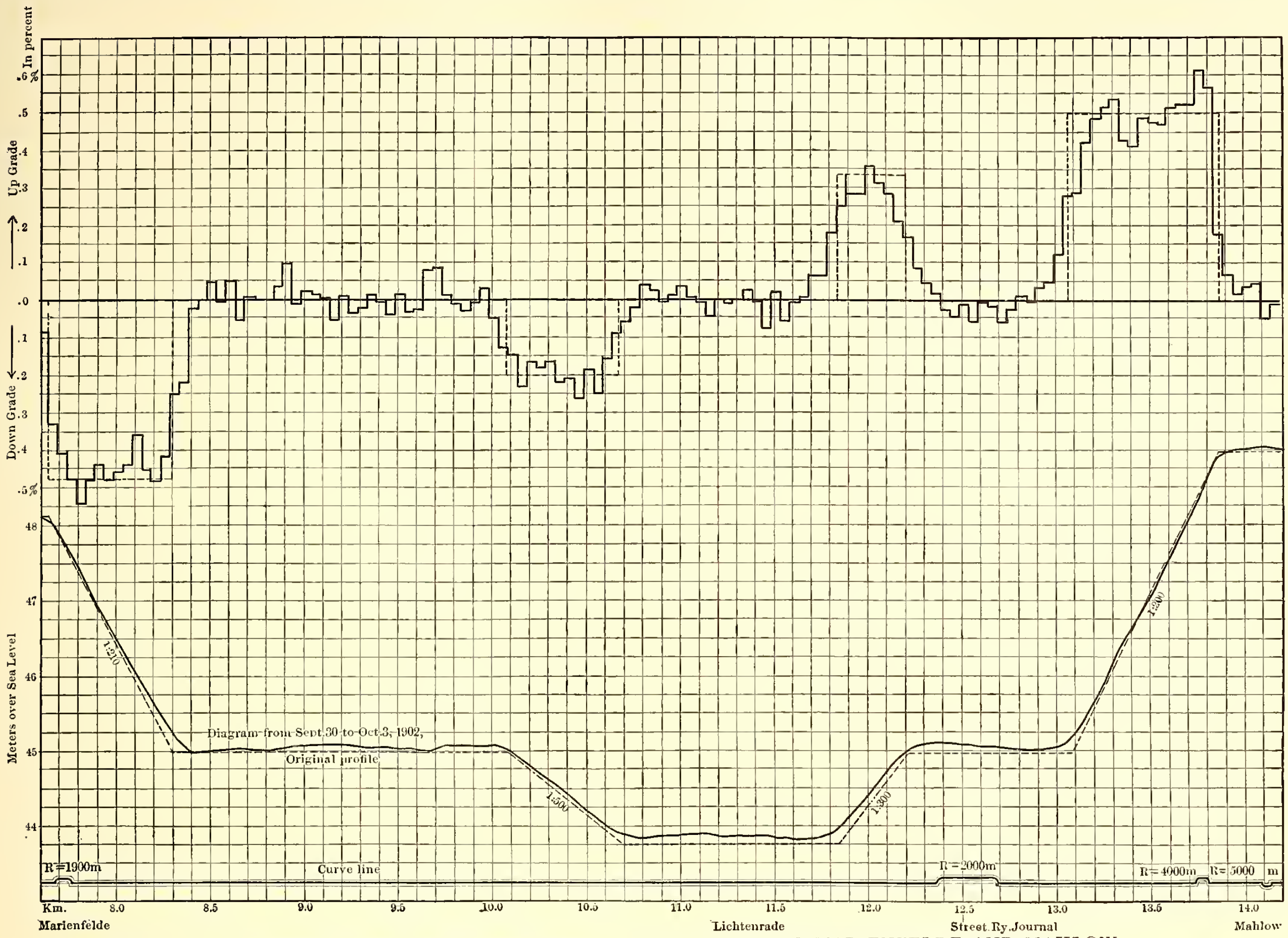


FIG. 1.—PROFILE OF THE EXPERIMENTAL TRACK BETWEEN MARIENFELDE AND MAHLOW

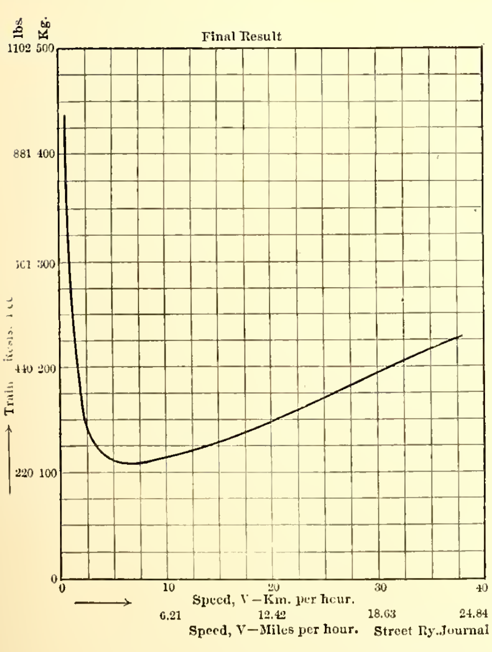


FIG. 2.—FINAL TRAIN RESISTANCE CURVE OBTAINED

very closely, showing that the methods used in their determination were trustworthy. No advantage would have been gained in fixing the profile of the road through measurements taken at shorter distances, or by reducing the time interval for determining the retarding force, as the fact must not be overlooked that the accuracy of taking the measurements has a certain limit which is fixed by disturbing factors resulting from inequalities in the track, through momentary gusts of wind occurring during the run, and by similar causes.

For determining the air resistance, coasting tests at high initial speeds were made, and Fig. 3 indicates the method used in these determinations for fixing the total train resistance. In this case, the distance covered in the recorded intervals of

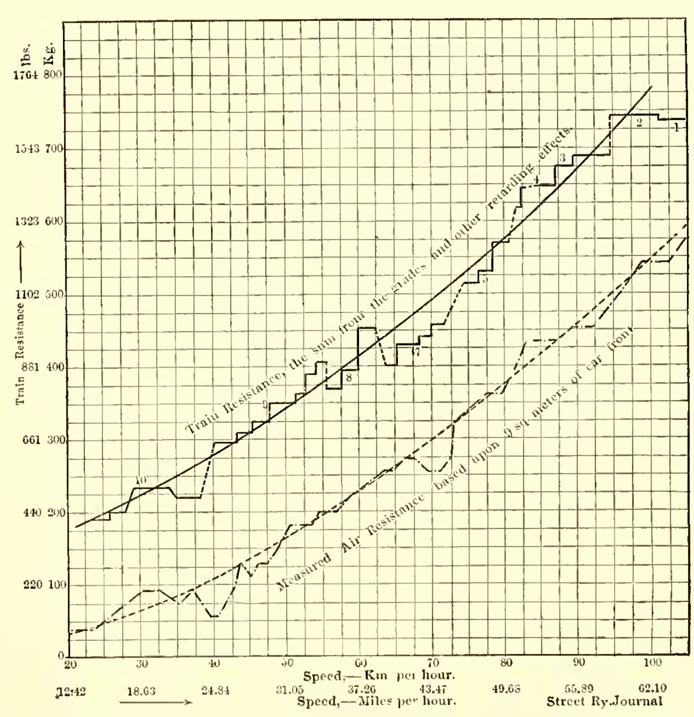


FIG. 3.—DETERMINATION OF RESISTANCE OF CAR A, FROM SECOND RUN ON OCT. 15, 1902

division can be considered as having a constant grade. These grades are noted on the speed curve which represents the average for the entire division.

The total retarding effect resulting from the sum of the retarding forces and those due to the difference in grades is plotted in functions of the speed. The air pressure recorded during this run is corrected and plotted for a car front of 9 sq. meters. A car having a smooth front surface of 9 sq. meters at right angles to the direction of motion and running at the same speed as this car, would encounter the same air pressure as in this case.

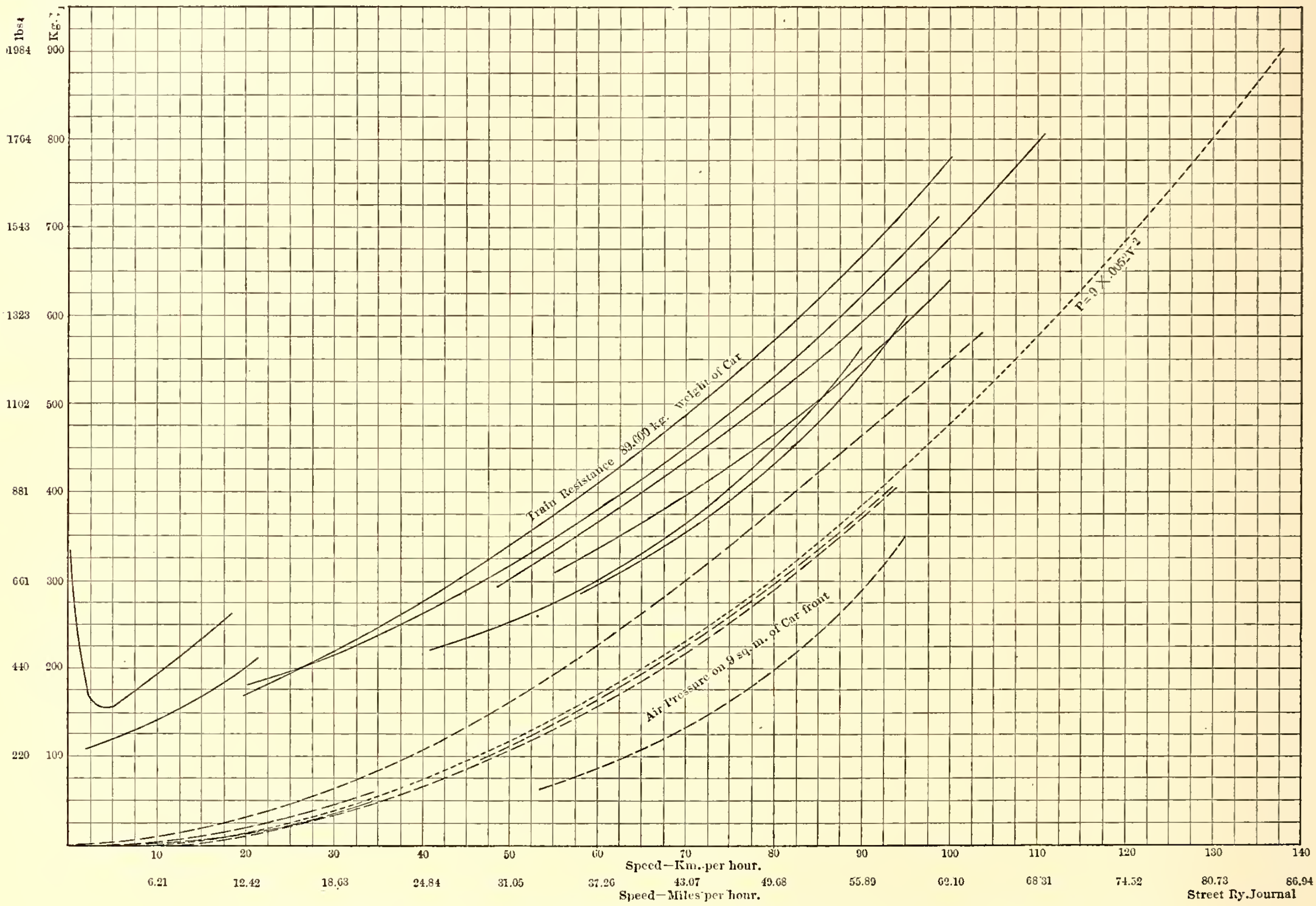


FIG. 4.—RESISTANCE OF CAR A, DETERMINED BY THE COASTING RUNS IN THE FALL OF 1902

Chief Engineer von Loessel, in his works on "Laws of Air Resistance," calls this surface the "Equivalent Surface." The accurate determination of this equivalent surface is surrounded with considerable difficulty and could not be absolutely fixed for the two high-speed cars. It is taken at 9 sq. meters for each car, and this figure will be found not very far from the correct value.

The results of many coasting tests were treated in the same manner as those just described, and the corrected average values are plotted in the curves of train resistance and air pressures given in Fig. 4 for car A and Fig. 5 for car S. The individual curves vary somewhat from each other, but, in general, they lie close enough together to show the power required for operating high-speed trains.

The curves of train resistance for car A show a decided variation at the lower speeds when compared with those obtained for car S, which lie closer together. This is due to the fact that car A had stood half a year from the time that the first coasting tests were commenced, and during this time the truck bearings and king bolt had not been cleaned. This fact demonstrates clearly the important effect exercised upon the power required by the condition of the bearings and the lubrication. During the later runs at higher speeds no great differences could be detected between the resistances of cars A and S.

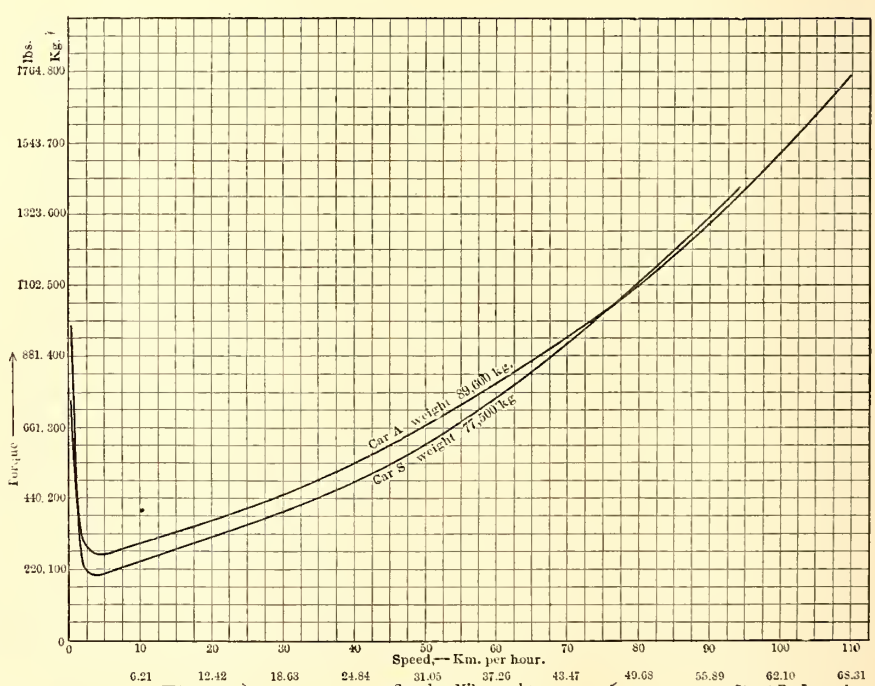


FIG. 6.—AVERAGE TRAIN RESISTANCE OF CARS A AND S, DETERMINED FROM THE COASTING RUNS IN THE FALL OF 1902

The average of all of the curves in Figs. 4 and 5 are placed alongside of each other in Fig. 6, and show comparatively small divergence. The final results of the coasting tests are given in Fig. 7, in which the total resistance of the cars, the air resistance corrected for a 9 sq. meter surface, the deduced rolling resistance, and finally, the energy consumption in metric horse-power necessary to overcome the total resistance are all plotted. The dotted extensions of the curves are approximated for the higher speeds and were more accurately determined by the tests of 1903.

The frictional resistance of the motor car is especially large at starting, but falls immediately after starting, and is only 130-140 kg, or approximately 1.5 kg per 1000 kg of car weight, at a speed of about 5 km per hour. As the speed increases, the train resistance increases slowly and gives substantially different results if the measurements are made right at the beginning of the tests or after the car has been run for a considerable length of time. In the latter case, a lower value is obtained than in the former, which may be attributed to the heating of the truck king bolts and bearings as the run continues, and the consequent lowering of the coefficient of friction.

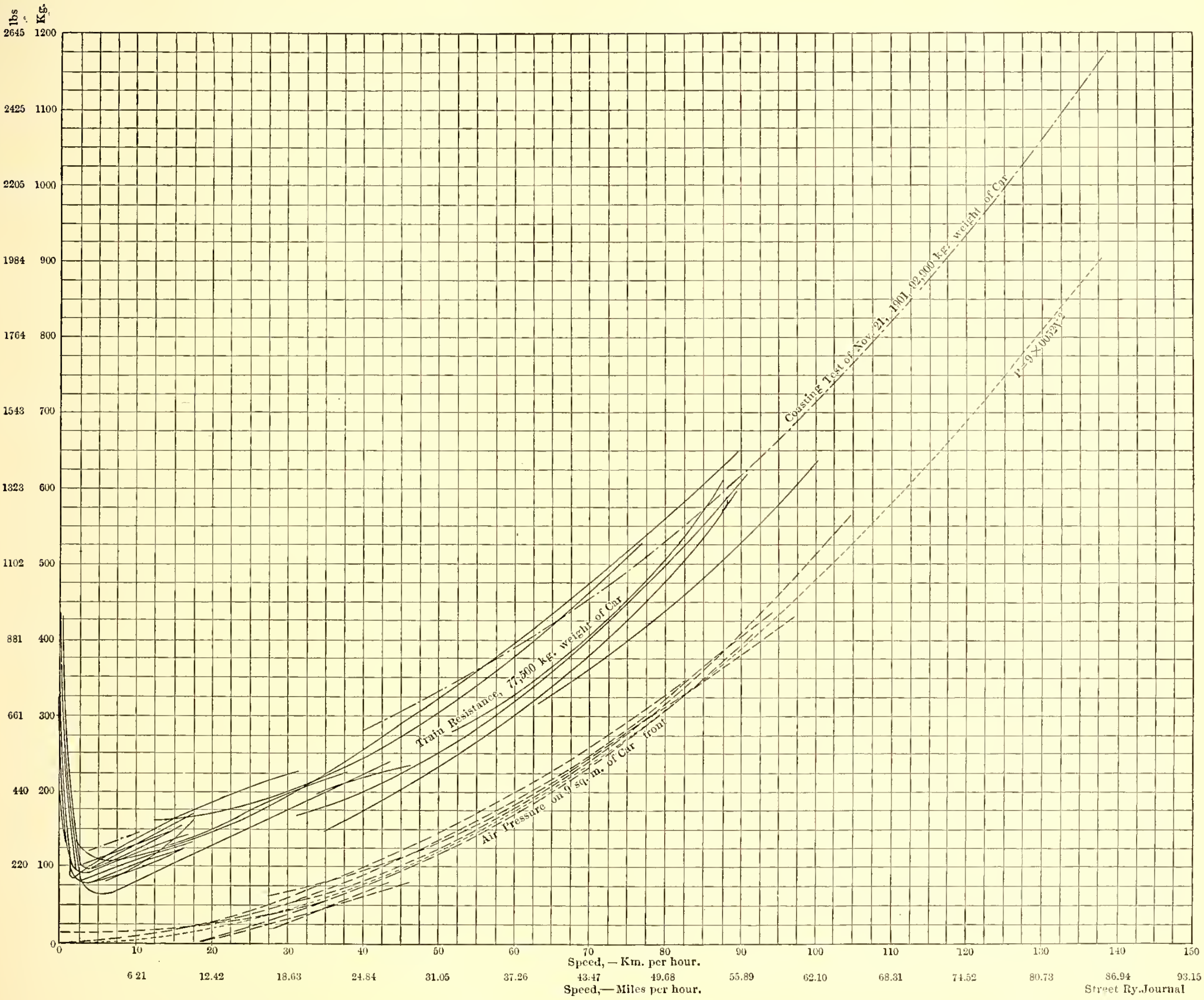


FIG. 5.—TRAIN RESISTANCE OF CAR S, DETERMINED FROM THE RUN CURVES OF THE FALL OF 1902

According to the elaborate tests on bearing friction made by Chief Engineer Lasche (Zeitschrift des Vereins deutscher Ingenieure, 1902, Nos. 50-52), the coefficient of friction for the bearings and king bolt decreases with increasing temperatures, other conditions remaining the same, and within certain limits varies inversely with their temperature. When, for instance, the bearing is heated from 20 to 40 degs. C., the coefficient of friction decreases approximately to the half of its original value. The rolling and sliding friction of the wheels against the rails increases with the speed and seems slowly to approach a maximum value. This factor, however, is not of much consequence compared with the other resistances at the higher speeds.

For measuring the air pressures on the surrounding sides of the car, the U-formed glass tubes fastened in the interior of the car, and described in the previous report, were used. Besides these tubes a special air-pressure measuring apparatus designed by the Allgemeine Elektricitäts-Gesellschaft was fastened at each end of the car A. This apparatus, which is shown in Fig. 13, consists of a thin disc (*a*) fastened to a ball-bearing shaft (*b*) and held in the direction of motion by a spiral spring. The air pressure against the disc compresses the spiral spring, and through lever arms operating over a scale this pressure may be read directly from the scale. A ball and socket joint was placed between the disc and shaft, and was so arranged that the disc could be turned not only at right angles to the direction of motion, but also at any other desired inclination. It was intended to fasten different shaped hollow forms on the shaft to determine the effect of the air pressure on different shaped bodies, but on account of lack of time, the tests could be made only on the cylindrical form.

In order to make proper corrections for the side winds prevailing during the tests, which was not done in the earlier tests, the direction and velocity of the wind was noted on each day at the beginning and close of the tests. For this purpose, a sensitive windvane and an anemometer was located at a convenient distance from the car house at Marienfelde.

The air pressure records in the car were taken at the same instant that the other observations were made, that is, at intervals of 10 seconds each, which were announced by an electric bell set in operation by a well-regulated clock. The direct measurements of the air pressures on the front end of the car, according to the method described in the first report, gave the same results as in the previous tests, and are shown by the curves of air pressure plotted in the speed diagrams of Figs. 10, 11 and 12. In these results, however, the influence of the prevailing direction and strength of the wind are not entirely neglected. For instance, at a speed of 100 km per hour, with a wind velocity of only 5 meters per second, or approximately 18 km per hour, blowing in an opposite direction to that of the motion of the cars, the air pressure on the car would be the same as that experienced when running 118 km per hour in still air, and according to the following formula the air pressure was approximately 72 kg per sq. meter, while, if there had been no wind, this pressure would have been only 52 kg per sq. meter. This fact may be recognized from the diagrams in Figs. 8 and 9. The upper parts of the diagrams give the direct readings without taking into consideration the wind pressure. The small dots refer to the results obtained when running in the direction from Marienfelde to Zossen and the small crosses for those obtained when running in the opposite direction. The effect of the wind is particularly evident in Fig. 9, which gives results obtained on October 15, taken during a prevailing wind having a speed of 5.8 meters per second. The curves given, determined by the formula

$$p = .0052\,V^2$$

in which p represents the air pressure on 1 sq. meter of smooth surface perpendicular to the direction of motion and V the speed in km per hour, is the mean of the several air pressure points for the going and return trips.

The test section was divided into three practically straight parts, and the components of speed lying in the direction of motion were ± 10 km per hour for the first part of the stretch, ± 8 km per hour for the second part and ± 4 km per hour for the third part. In the lower parts of the diagrams the points are corrected according to these figures. The direct readings for October 13, given in Fig. 8, show less divergence from the air pressure curve, because the wind speed on this day was only 2.8 meters per second.

In the calculations of these air pressures the formula for the air resistance

$$p = .0054\,V^2$$

determined from the previous tests, had to be changed slightly. The absolute value for p is .0052 V^2. The measurements of the air pressure exerted against the disc perpendicular to the direction of motion obtained by the apparatus illustrated in Fig. 13, agrees in general with the readings obtained from the water tubes, although these latter devices are more reliable, and on this account were used in all of the test runs.

When a particular disc used for measuring the pressure was placed at an angle to the direction of motion, as illustrated in Fig. 14, the resulting pressure was lowered approximately in proportion to the projection of the surface of the disc perpendicular to the direction of motion. If instead of the disc, a cylinder of the diameter d and the length l, was used, the measurements recorded had the same value as a smooth upright surface of 0.7dl placed perpendicular to the direction of motion. These values correspond with the results given by Moormann in the "Centralblatt der Bauverwaltung" for Nov. 22, 1902, No. 931, where, according to his observations, the wind pressure against a round chimney is stated as being exerted only against that part (ab, Fig. 15) of the cylindrical surface enclosed by an angle of 86 degs. This portion, ab, is approximately 7-10 of the diameter, and agrees throughout with the observations of the effects of the air on the rounded corners of the car A.

As illustrated in Fig. 16, the pipe II was fastened in the front end of the car. The water glass connected with it recorded the same height of pressure as that in pipe I as long as the mouth of the former lay in the plane of the front end; but

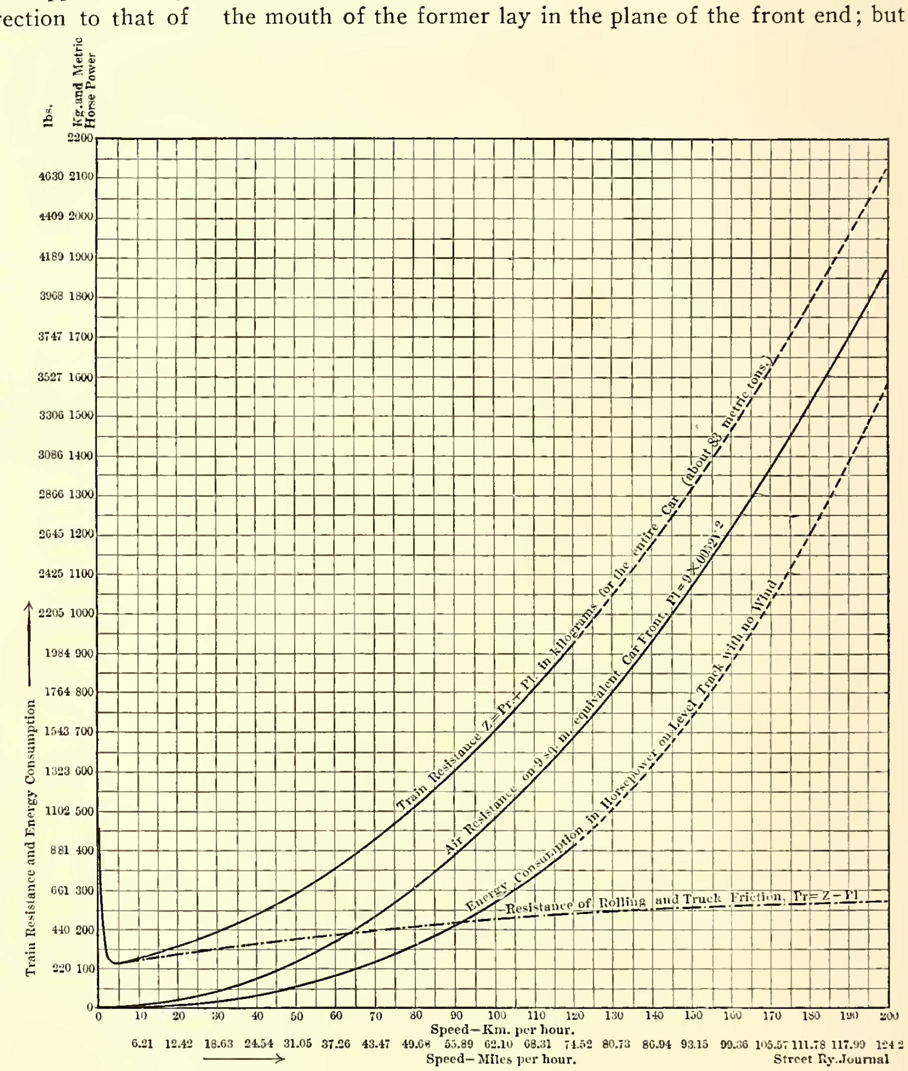


FIG. 7.—RESISTANCE AND POWER CONSUMPTION OF CARS

just as soon as it was turned out of this plane the air pressure was notably decreased until finally, by further turning of the pipe, an actual suction was observed.

In this connection, an instructive incident occurred which was accidentally noticed. A window pane was lacking in the curved side of car A between the front and side of the car, and the resulting opening ab (see Fig. 16) was closed by a sheet of pressboard. When running in the direction of the arrow the pressboard fell outward and not inward, as might naturally have been expected, and the observer who stood by the water stand glasses at the rear end of the car noticed a sudden falling of the water level, which was finally attributed to the attenuation of the air in the car. The air did not flow into the car through the opening in the window, but along the rounded edge, as illustrated by the dotted lines, producing a suction effect. The observer standing behind the opening in the window, consequently, did not notice any difference in air currents during the run. Similar observations were also made earlier

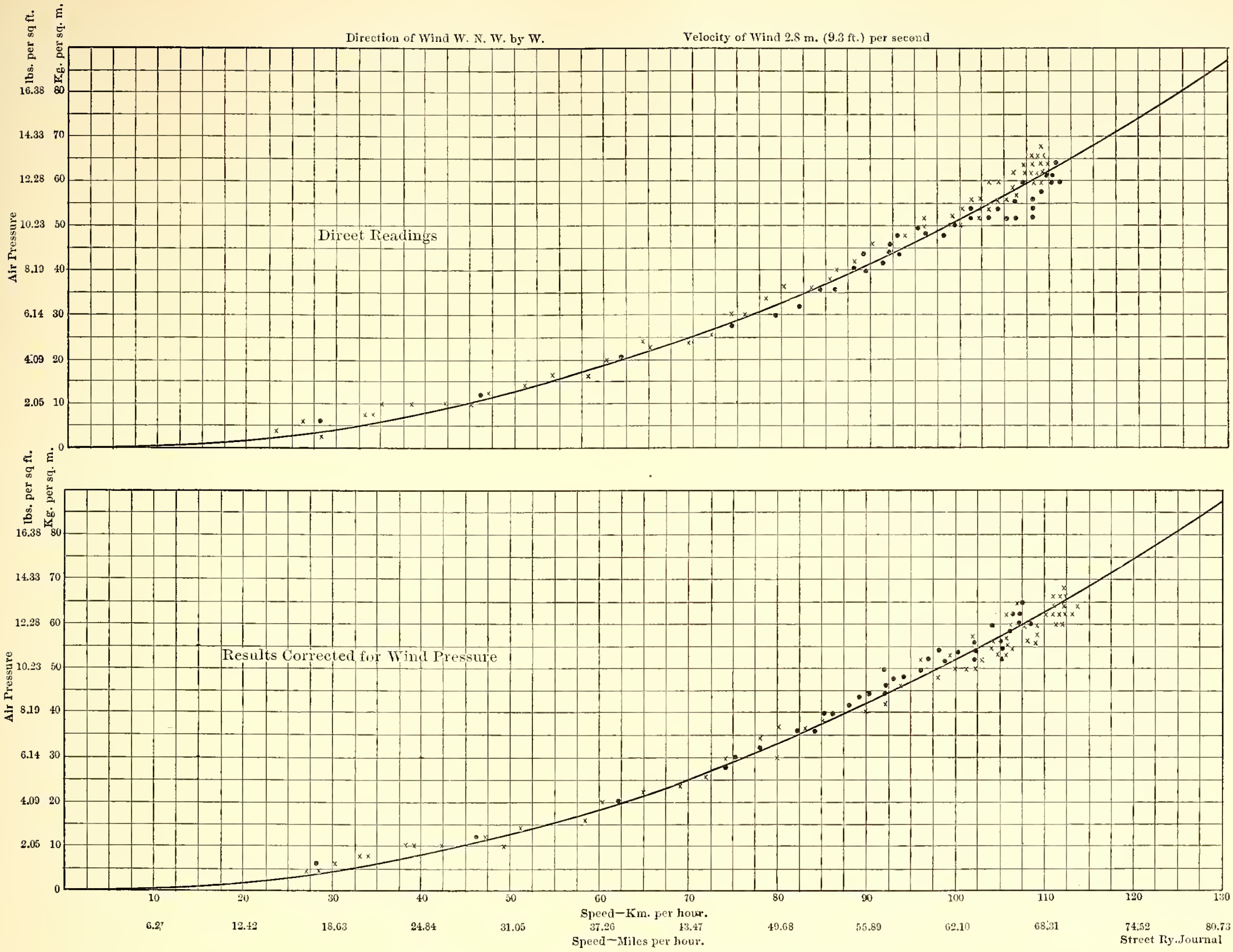


FIG. 8.—MEASUREMENT OF AIR PRESSURES

Trip on Oct. 11, 1902, from Zossen to Marienfelde; frequency = 20.8 cycles per second; four motors, two transformers.

Trip on Oct. 17, 1902, from Marienfelde to Zossen; frequency = 24 cycles per second; two motors, one transformer.

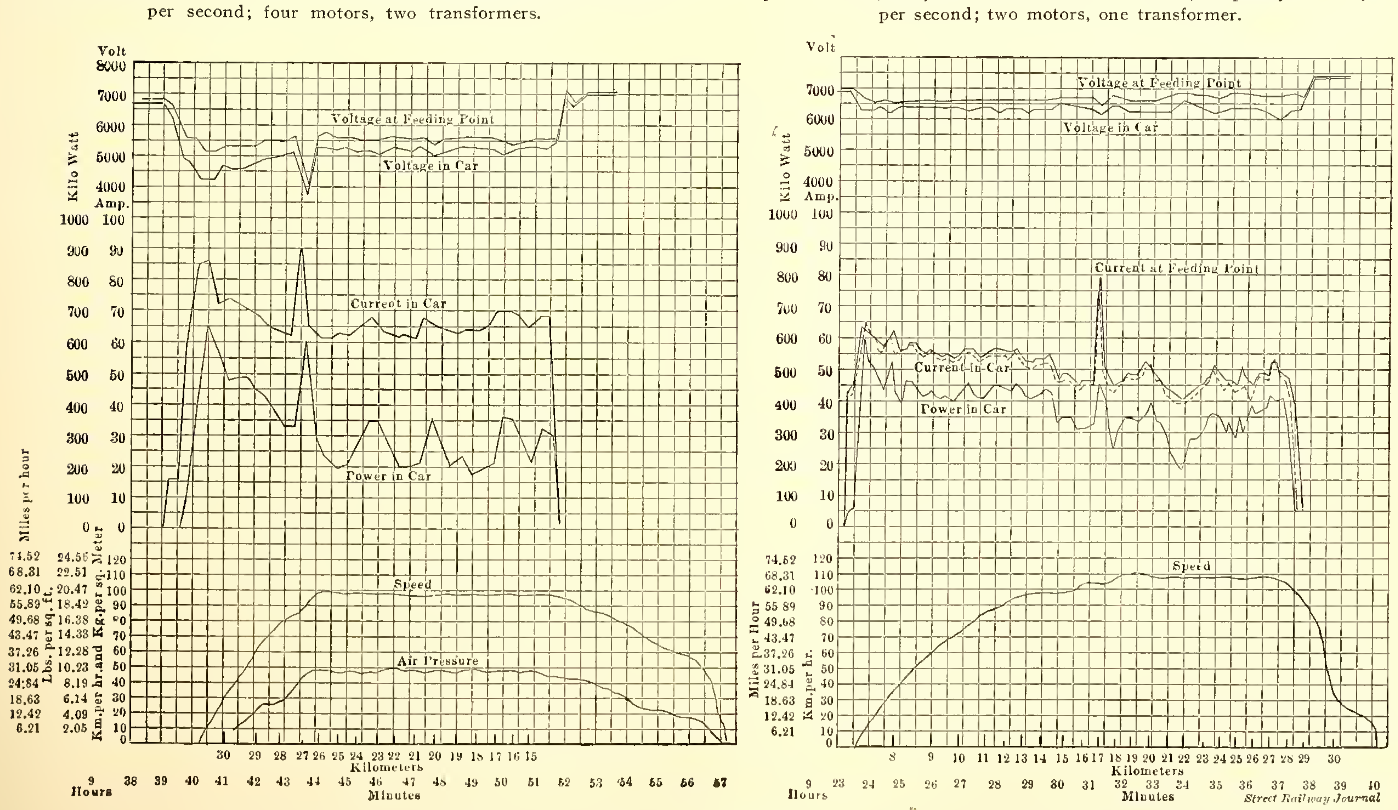


FIG. 10.—CURVES OBTAINED FOR SPEED, AIR PRESSURE, CURRENT, VOLTAGE AND POWER, WITH TWO TRIPS ON CAR A (WEIGHT, 89,500 KG.)

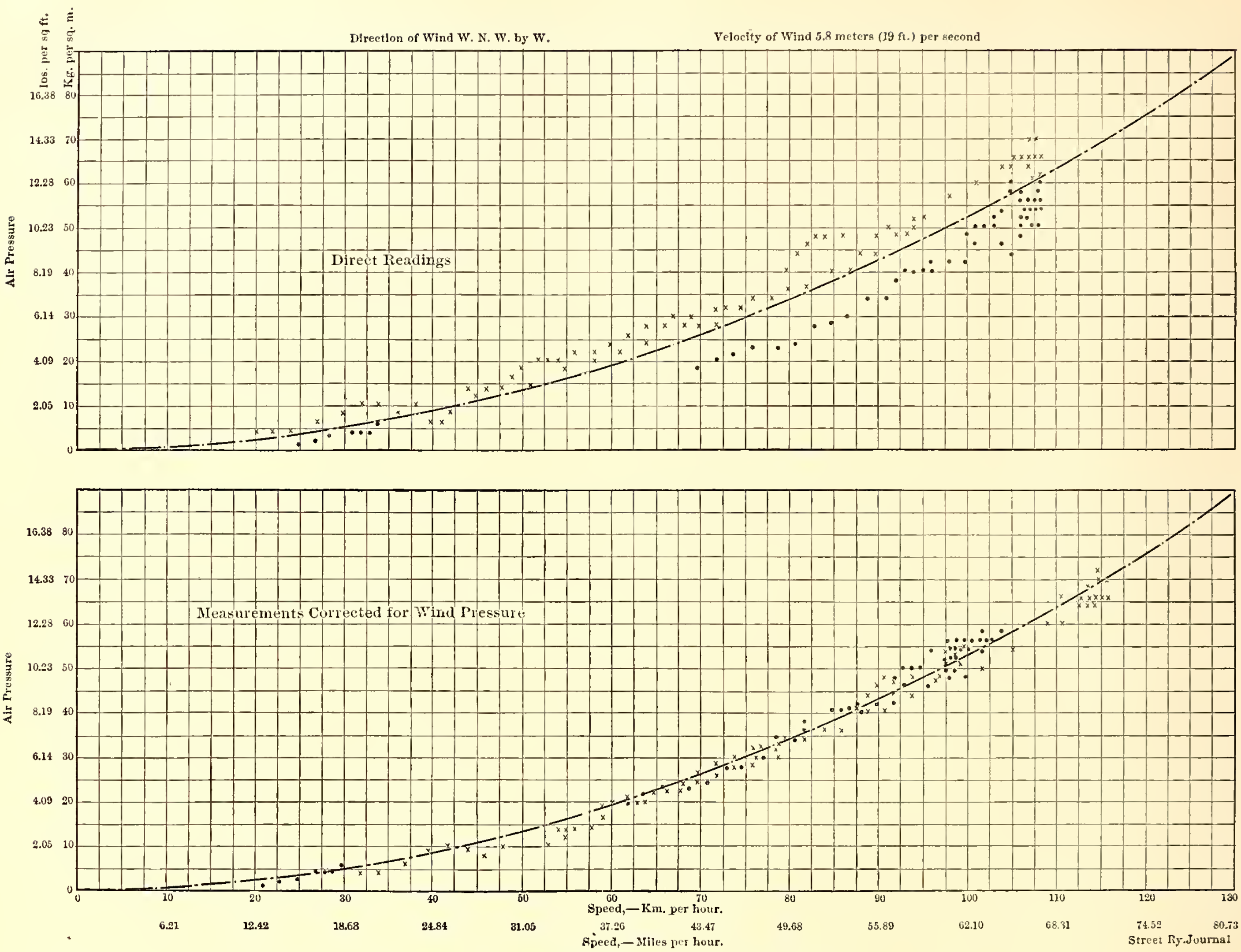


FIG. 9.—MEASUREMENT OF AIR PRESSURES

Trip on Oct. 9, 1902, from Zossen to Marienfelde; frequency = 20.8 cycles per second; two motors, one transformer.

Trip on Oct. 13, 1902, from Zossen to Marienfelde; frequency = 24 cycles per second; two motors, one transformer.

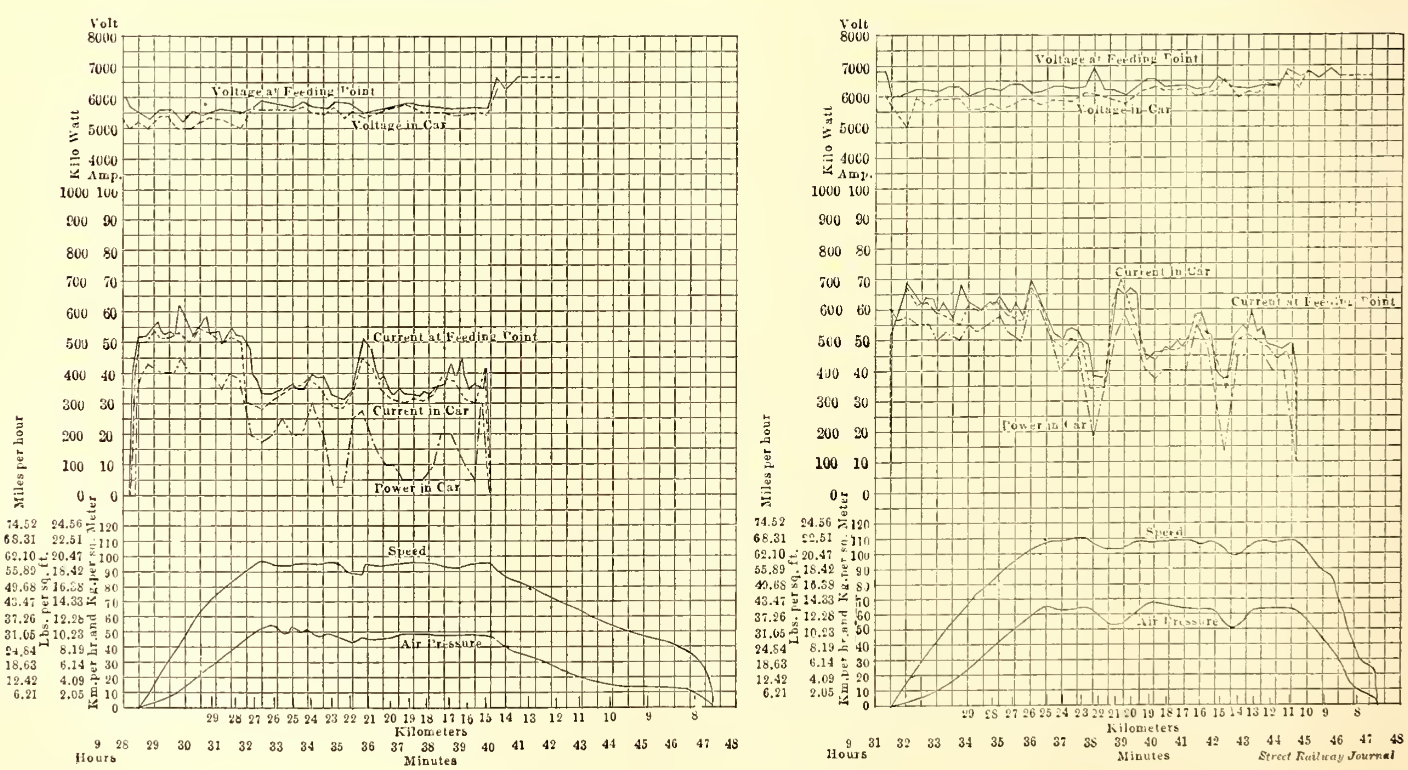


FIG. 11.—CURVES OBTAINED FOR SPEED, AIR PRESSURE, CURRENT, VOLTAGE AND POWER, WITH CAR S (WEIGHT, 77,900 KG)

in the tests at the tubes fastened in the rounded ends of the car.

Tubes were arranged in the forward corner of the car S, as shown in Fig. 17, having their mouths placed right at the corner and lying near each other. Pipe II showed a strong suction, while pipe III registered the same pressure as the opening I in the middle of the front wall. A strong flow of air toward the rear of the car prevailed at this corner and continued along the side, the full air pressure being felt only at the front end of the car, the surface of which was perpendicular to the direction of motion. Moreover, a tube having its mouth turned toward the front and placed a short distance from the forward corner, approximately in the position represented by IV, did not show the full pressure as recorded at the middle of the front end of the car, which might have been deduced from the dotted lines representing the flow of air in the illustration.

Trip of Car A on Oct. 25, 1902, with three-axle trailer (total weight = 188,400 kg), from Marienfelde to Zossen; frequency = 25 cycles per second; four motors, two transformers.

Trip of Car S on Oct. 25, 1902, with three-axle trailer (total weight = 193,400 kg), from Zossen to Marienfelde; frequency = 25 cycles per second; four motors, two transformers.

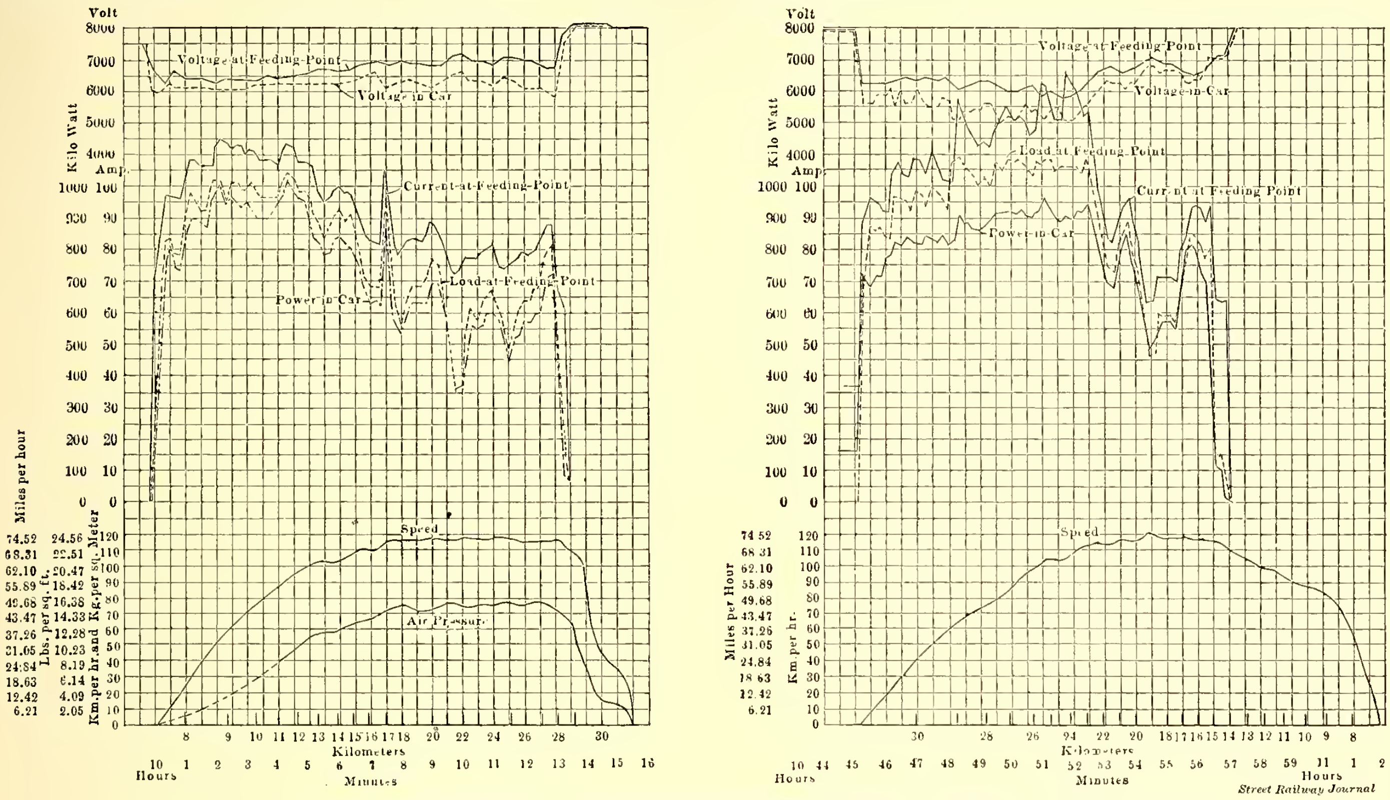


FIG. 12.—CURVES OBTAINED FROM TRIPS WITH TRAILERS ATTACHED TO CARS A AND S

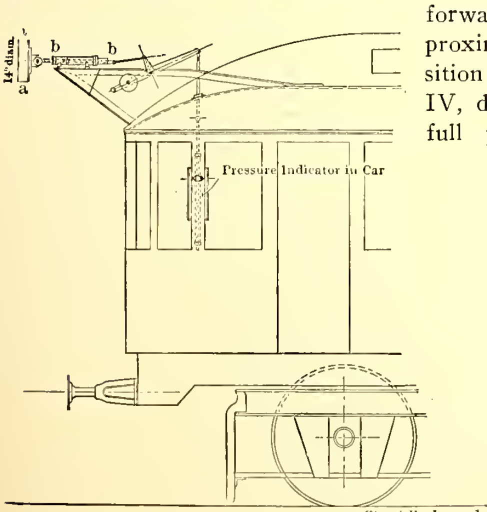


FIG. 13.—SPECIAL AIR-PRESSURE MEASURING APPARATUS

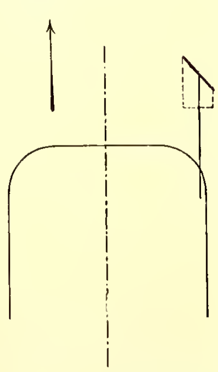


FIG. 14.—PRESSURE-MEASURING DISC

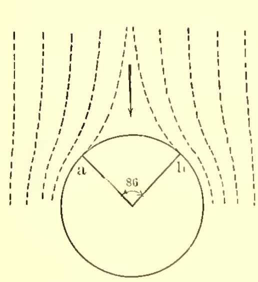


FIG. 15.—PRESSURE-MEASURING CYLINDER

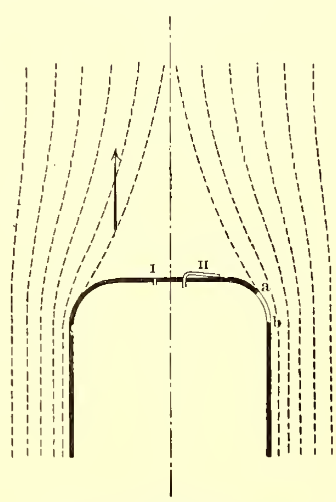


FIG. 16.—SHOWING PRESSBOARD COVERING AT *A B*

Especial importance is laid upon the tests made this year on account of the valuable results obtained by observing the air pressure conditions at given distances from the front and rear end of the car, similar observations being noted and described in the first report made by the extended tube, which was sealed air tight to the shank of the water-stand glass. At the mouth of this tube, extending from 3 to 5 meters before the front end of the car, the air pressure was the same as that recorded near the front end of the car, and, as was also noticed in the present experiments, a cone of compressed air was formed before the mouth of each tube. Equal air pressures were obtained when the mouths of the tubes were placed out of the center line of the car. To determine how far the compressed air cone extended in front of the moving car, the ends of the tubes were bent backwards, and were also extended up to a point 4.75 meters in front of the surface of the front end of the car, and 1.85 meters on either side of the center line of the car. In running in the opposite direction, these tubes were used to ascertain the state of the air drawn along at the rear end of the car.

In Fig. 18, the outlines of the cars are given and the location of the mouths of the tubes are shown by small crosses and dots; the former referring to car A and the latter to car S. The figures represent the air pressure and the air attenuation. These figures are corrected for a speed of 110 km. per hour by multiplying the height of pressure noted at the speed V by $\frac{110^2}{V^2}$. The figures are also corrected by taking into consideration the direction and speed of the wind according to the method already described.

Finally, the tubes were carried upward through the roof of the car and then still further to a height of 6.3 meters above the heads of the rails. Fig. 19 shows the different positions of the tube. As was expected, tube I showed a suction when its opening was toward the rear. Up to the height of 6.3 meters above the heads of the rail the air pressure was the same as

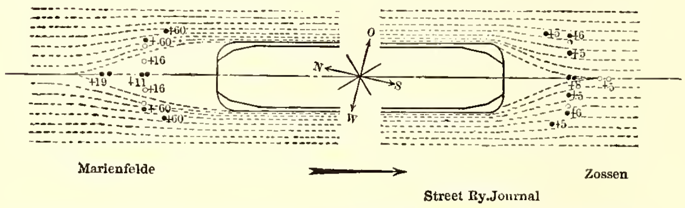


FIG. 18.—DISTRIBUTION OF AIR PRESSURES AROUND CAR

that directly against the front of the car as long as the mouth of the tube was pointed in the direction of motion. When the mouth was turned toward the rear, however, a suction effect up to 20 mm water column was produced. Tubes carried up to about 4.8 meters height above the rails showed similar suc-

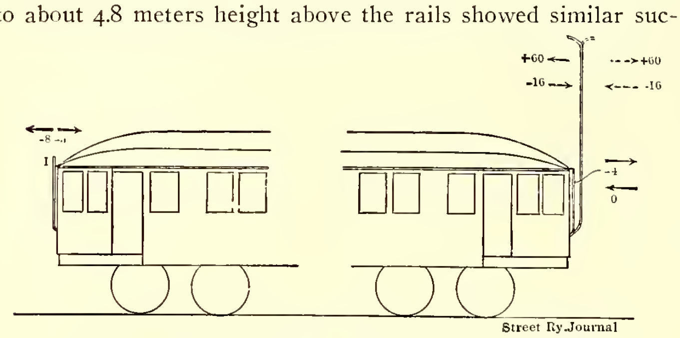
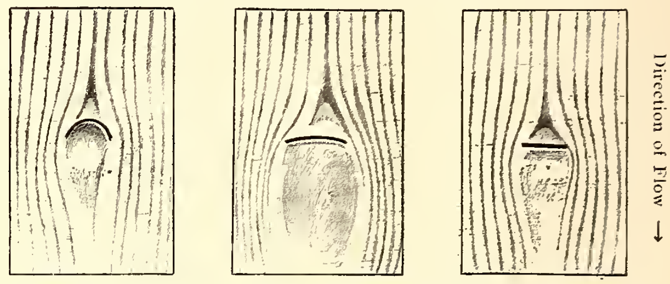


FIG. 19.—SHOWING DIFFERENT POSITIONS OF TUBE

tion and pressure effects, but decidedly lower values were noted.

Mention should be made of the fact that a parabolic shaped end of sheet iron was fastened to the front of the car A, illustrated in Fig. 20, to ascertain what effect it would produce in

density is formed. At the rear end of the car, no, or only a very slight, suction is experienced, and the separate points in Fig. 18 indicate that quite a large space exists back of the car in which neither compression nor attenuation of the air is felt, and where only a very slight air movement is recorded. These



FIGS. 21, 22 AND 23.—ILLUSTRATING FORMATION OF COMPRESSED-AIR CONES

observations are substantiated by the fact that in dry weather the last car in a rapidly moving railway train is followed by a cloud of dust arising at some distance from its end and not directly behind it.

The probable air currents, illustrated by the dotted lines in Fig. 18, agree throughout with the results of the very elaborate tests on the flow of air against interfering surfaces made by Georg Wellner, professor of the Technical High School of Brünn, in his treatise, "Der dynamische Flug," published in the jubilee number of the K. K. Technical High School of Brünn, and issued at the celebration of its fiftieth anniversary in 1899.

Figs. 21, 22 and 23 illustrate several of the effects ascertained by him when the currents of air strike against interfering surfaces. In these experiments, a cone of compressed air was formed in front of the surfaces and behind them was a space filled with this still air.

In conclusion, mention should be made of the observations noted of the resulting air pressure by the passing of the car near a temporary constructed board wall 20 meters long and 5 meters high, located at a distance of 2.2 meters from the

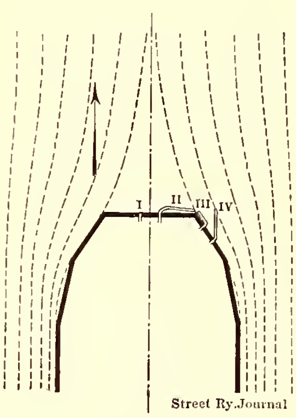


FIG. 17.—TUBE ARRANGEMENT IN FRONT END OF CAR S

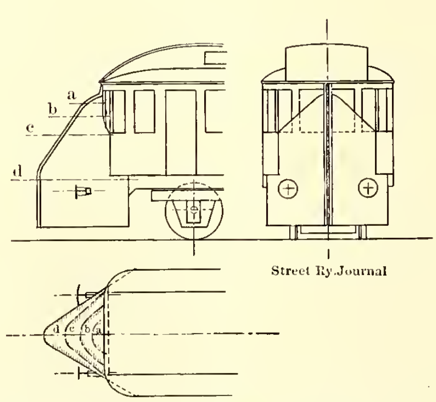


FIG. 20.—PARABOLIC SHIELD TRIED ON CAR A

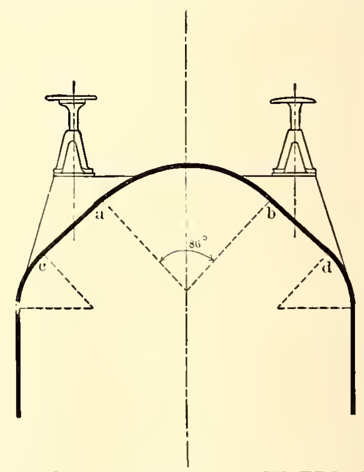


FIG. 24.—SUGGESTED FORM OF FRONT END OF CAR

decreasing the air resistance. By its use a lower energy consumption was noted; but as the shield covered only a part of the front end of the car and the speed at which it was tried was not much above 100 km per hour, the effect produced was not of great magnitude.

From the results of these tests it is approximately possible to decide what movement of the air takes place in relation to the car.

At a distance of about 4½ meters before the front of the car the zone of compressed air seems to cease, while directly at the front wall and extending to the rounded or sharpened corners of the sides, a cone of compressed air of uniform

middle of the track. The wall was perforated with holes at several points, and into these holes were placed water-stand glasses similar to those fastened on the sides and front of the car for measuring the air pressure. A pressure of 12 to 14 kg on 1 sq. meter of the wall was recorded when the car had a speed of 120 km per hour.

As the air resistance forms the greater part of the total resistance of rapidly moving trains, it is essential to design the outer form of the car so that the air resistance should be reduced as much as possible. According to the results of the tests described above, the best conditions would prevail if the front end of the car had the form of a very sharp parabolic wedge. This is practically impossible on account of the arrangement of the motorman's cab and the placing of the couplings and buffers. The view of the track would also be impaired. It seems, therefore, to be more practicable to give the forward part of the front end of the car a cylindrical form in order to make it possible to arrange for windows. The wall of the cylinder would merge into the smooth surface *ac* and *bd* at the points *a* and *b*, Fig. 24.

According to Fig. 15, the cylindrical surface would be limited by an angle of about 86 degs. The extensions of the sides of the car at the points *c* and *d* must be rounded off. The closing of the top would be made in a similar manner to the present cars. A change in the sides would not be necessary, as a noticeable pressure against them would only be produced by a strong side wind, which would not increase the total resistance of the train very much. If trailer cars are carried, they must be connected to the motor car through the medium of stiff telescoping canvas.

CORRESPONDENCE

THE NEW YORK CENTRAL-NEW HAVEN SITUATION

THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO.

New Haven, Conn., Oct. 23, 1905.

Editors Street Railway Journal:

I have read the article in your issue of October 21 by Frank J. Sprague, entitled "An Unprecedented Railway Situation." It is not my feeling that the arguments for and against the respective plans of the New York Central & Hudson River Railroad Company and the New York, New Haven & Hartford Railroad Company for the electrical handling of their traffic into Forty-Second Street can be discussed with profit in the columns of the press, between the engineers of the two companies; neither is it my purpose to reply to Mr. Sprague's comprehensive arraignment of the policy and manners of the New Haven road. However, as the inference may be drawn that the public is to be incommoded, and the prosecution of a great engineering improvement hindered by the action of the New Haven road in declining to absolutely follow the engineering lead of Mr. Sprague and his associates, I cannot let the article pass unnoticed.

On that score it is proper to point out that the locomotives which have been purchased by the New Haven road will handle that company's trains between Forty-Second Street and Woodlawn, receiving continuous current from the third rail in exactly the same manner as it is proposed that the locomotives purchased by the Central Company will handle the trains of that company, and inasmuch as the stub end track facilities of the enlarged Forty-Second Street station will be largely increased over similar facilities afforded by the present station, and inasmuch as these increased facilities will be relieved of a considerable number of the present trains of the Central Company, by transfer to the suburban loop, it is difficult to find reason for alarm at prospective delays or lack of accommodations to the traveling public, or on behalf of the Central Company for inharmonious operation.

That the progress of the art of locomotive design since the purchase of the locomotives adopted by the Central some two years ago has enabled the New Haven road to procure a type which, in addition to operating on the Central's continuous system, is also capable of operating on a single-phase alternating current, thus widening the possible application of electric traction for future extensions on the New Haven's electrical system, should be a source of gratification, rather than of censure or alarm.

Mr. Sprague's unfamiliarity with the up-to-date development of electric locomotives has, perhaps, led him into his dire prognostications of disaster, and while, under the circumstances, an extended argument can be of little avail, I have no doubt that the management of the New Haven road will be quite content to await the practical results which will very soon furnish substantial evidence of the correctness or error of their judgment.

Calvert Townley.

Boston, Oct. 24, 1905.

Editors Street Railway Journal:

It is with great hesitation that the writer undertakes comment on Mr. Sprague's arraignment of the New York, New Haven & Hartford Railroad plans for alternating-current traction. He has played so great a part in the growth of electric railroading, and has so unusual a store of keen common sense in dealing with electrical problems, that the whole engineering profession must hold his views in high respect. Yet, in reading his discussion of the situation, I am impressed by the possibility that he has not entirely taken into account the larger and more remote features of the matter. Personally, I have long believed that, however successful the third-rail direct-current system may be in dealing with purely suburban and terminal work, it has limitations in the matter of the electrical distributions that are forbidding when one comes to consider the larger railway field.

As a practical matter, I consider high voltage on the working conductor a virtual necessity in dealing with the electric railway of the future, and this of itself implies laying aside the third-rail system for conductors placed where they can be adequately insulated. At the time when the decision was made upon the New York Central equipment it was wisely made on the then existing conditions. But we seem just now to be in a transition period in traction, and it would be nothing surprising if that equipment, like many another that has gone before, should prove within a very few years to be obsolescent.

Of the value of multiple-unit control in heavy suburban work there is no doubt, but if anything is to be learned from the great experiments on high-speed electric traction it is that the electric locomotive has there a great and legitimate field. It looks as though the New York, New Haven & Hartford Railroad in this latest move, sensational though it be, is building, not for the terminal service which will soon be inaugurated, but for the far larger work to which the carefully worked out third-rail direct-current system is not even a prelude. Of course, the big alternating-current locomotive is in a measure experimental, involving some very nice questions of engineering, but one can safely assume that the railroad is not buying a pig in a poke. It is up to the contracting company to make good its guarantees and to make a success of those locomotives if possible. No wise railway man is going to assume the responsibility for that part of the work, nor is he likely to be asked to do so. The locomotives can be tried out with the utmost thoroughness, even if a locomotive of the steam persuasion has to trundle along ahead to give its electric brother a tow until such assistance is shown to be needless. And if those electric locomotives are accepted it will be because they have shown themselves able to do the work required of them. If they are successful, then a problem of engineering infinitely greater than even the New York terminal system will have been solved, and the way will be open for very great changes.

In short, I do not think it a sound conclusion to assume that the New York, New Haven & Hartford Railroad has recklessly butted into a huge experiment at the peril of its passenger service merely for the sake of its trains to Stamford. It is after larger game, and game that cannot be brought to bay by any weapon yet discovered in the direct-current armory. If the experimental stage is safely passed with the a. c. locomotives, then the question will be, not how conveniently they can be accommodated by the existing d. c. terminal system, but how long that system can keep up under the new conditions without accommodating its equipment to modern improvements. If the a. c. locomotive system should fail, it would be tough luck for the contractors, but not in any way disastrous for the railroad, which would be at least as well off as it was before. It is pretty evident that the contractors believe that they can make good, and I am glad that some one has had the courage to undertake the very important work of developing, to its legitimate conclusion, single-phase traction upon a large scale.

On the other hand, I believe that it would have been a grave mistake for the railroad to have committed itself to a heavy expense for direct-current apparatus, in view of the present state of the art of electrical traction, for it must be granted, even from the standpoint of conservatism, that if the a. c. locomotive makes a success in heavy traction it will have a wider field of usefulness in big work than can be hoped for by 500-volt or 600-volt or 800-volt d. c. motors, tied up as they are to the third-rail scheme of feeding. As it is, the railroad wins much if the experiment succeeds and loses little if it fails. It can go in for d. c. equipment any time it seems desirable, and with the advantage of the experience that the New York Central terminal system will have paid for. The announcement of the a. c. locomotive contract was a bit startling, of course, but until a certified copy of it is published I shall be disposed to believe that the railroad has not taken the step without adequate assurance that it shall not suffer very severely in case of failure.

LOUIS BELL, Ph. D.

New York, Oct. 23, 1905.

EDITORS STREET RAILWAY JOURNAL:

I have read with interest Mr. Sprague's article in your last issue on the New York Central-New Haven situation and his plea for multiple-unit trains. That this plan, for which Mr. Sprague has worked diligently and faithfully for nearly ten years, has been a marked success and has advanced our knowledge of traction conditions is beyond dispute.

It is well known, however, that there are many engineers experienced in steam locomotive as well as electric operation who believe that multiple-unit trains have their place. But under conditions where comparatively high speed is required without high acceleration—and there are such conditions to be found—and where cost of motive power and maintenance of rolling stock are as carefully watched as is the custom on steam roads, multiple-unit trains stand a chance of coming in second in the race against the electric locomotive hauling a train of coaches. The statement that "it is a fact that the multiple unit has become an accepted tenet of such character as to preclude the possibility of successful criticism," cannot by any reasonable argument be made to apply to the main line service of a steam road, or even to the suburban service of every steam road.

If the New Haven road intends to run its a. c.-d. c. locomotives over the d. c. zone of the New York Central, have not the engineers of the New Haven road sufficient intelligence to design their locomotive to fit a 15-ft. tunnel, even with a trolley bow pulled down flat on the roof of the locomotive? Are not the New Haven people, pioneers as they were in heavy electric railroading, justified now in waiting to see the result of the, to them, enormous experiment of the New York Central? Can they not be permitted, in the meantime, to do a little more experimenting on their own hook, this time with a. c.-d. c. locomotives on their Harlem River branch and the New Rochelle-Stamford section of their main line?

Few persons, if any, outside of the inner councils of the New Haven road know what are its future plans for the development of its suburban service between Stamford and New York. The regular commuter service of this road extends to New Haven, 73 miles from the Grand Central Station. That those in authority realize that this entire section must be equipped with electric traction in a comparatively short time is not to be doubted. Is not that another reason why a. c. locomotives ought to be tested?

Why is the company expending $6,000,000 on the electrical equipment of two additional tracks on the Harlem River branch from New Rochelle to 135th Street? That branch will then consist of six tracks of 100-lb. steel, laid on a splendid, rock ballasted, level right of way. It would serve practically all their suburban district except Mount Vernon, which is also served by the New York Central. Does anyone suppose that the New Haven road is anxious to continue the payment of upward of $35,000 per month rental for the privilege of entering the Grand Central Station when it has another terminal of its own within the city? It is true that the position of this terminal is not so convenient to the center or downtown districts of the city as the other, but the coming subways and other facilities for rapid transit may in a short while make the running time to the business district as short, if not shorter, than the other.

How about the connection to be made in the near future between the Harlem River terminal and the Pennsylvania tunnel in Brooklyn by the bridge over the entrance to the sound near Hell Gate? Would the operation of a. c.-d. c. locomotives over this section be so disastrous to the capacity of the company's power plants? It might be interesting to look back upon this question when in the future the New York terminal of the New Haven road, for both suburban and through service, is found at the great Pennsylvania station at Thirty-First and Thirty-Second Streets, between Seventh and Ninth Avenues.

The officers of the New Haven road, and especially those responsible for the electrical operation, must understand that its suburban business out of New York is menaced by the construction of the four-track third-rail line to be built as far as Port Chester, whatever its name may be. Therefore, its plans are probably formed with a view to compete successfully with this rival, and the establishment of an up-to-date equipment, according to Mr. Sprague's ideas, for handling the suburban business, which dumps out the passengers at Forty-Second Street, would hardly give the company any advantage.

The ability of Mr. Sprague as an engineer is well known, and no one questions it, but to assume that the multiple-unit system is the only one, and that the electric locomotive, which has never been tried in this country under steam railroad conditions, has not a single argument in its favor, is perhaps premature.

The New Haven road has stated that the operation of its suburban service is conducted at a loss with the present steam power. Mr. Sprague criticises the number and movement of the present trains, apparently forgetting that an increase in the number of trains under present conditions would constitute a greater loss. He even appears to assume that the present schedule would remain unchanged under electric operation. It should be remembered that the New Haven road has had a much greater experience in electric traction than any other steam road in the country. While its officers and engineers have been changed, the records of the years of pioneer work are there, and the new men should be given a fair chance to prove themselves equal to the task.

EDWARD C. BOYNTON.

TESTS OF AXLES

New York, Oct. 7, 1905.

EDITORS STREET RAILWAY JOURNAL:

In answer to F. W. Bacon's inquiry in your issue of Sept. 9, regarding tests on axles, I have had to go into this question for several clients of mine. In one case the fracture of the axle between the driving gear and hub was frequent, as the torsion stress is of such short radius that the axle eventually becomes crystallized. The cure for this cause is to extend the hub of the gear to the hub of the wheel and bolt these two together. Narrow-gaging of track also seems to be a prevalent cause for broken axles, with the straight axle necessary for the back support of the motor. We cannot taper the axle as in steam road practice, and so give it the flexibility which would allow the wheels to spring the axle from its true center of rotation and accommodate a narrow gage on curves or warped track surfacing. The important point is to test the axles when new and when they are rewheeled. A crystalline condition or fracture is often not discernible by visual examination, especially as an old axle usually has to be cleaned to show up the surface, and this operation tends to fill up any fissures. I have found that a steel axle increases in electrical resistance when it commences to crystallize, but the specific resistance of the metal used in axles varies so much that this is not a sure test and is not practical to apply in the repair shop, as it requires several thousand amperes and careful measurements and records to give positive results.

The drop test for a 4-in. axle consists of dropping a weight of 1640 lbs. from a height of 20 ft. on the middle of the axle, which has supports 3 ft. apart. Five blows are given, and the axle should be turned at each blow and must not show fracture after this test. One axle in a hundred is submitted to this test, and as the strain is beyond the elastic limit

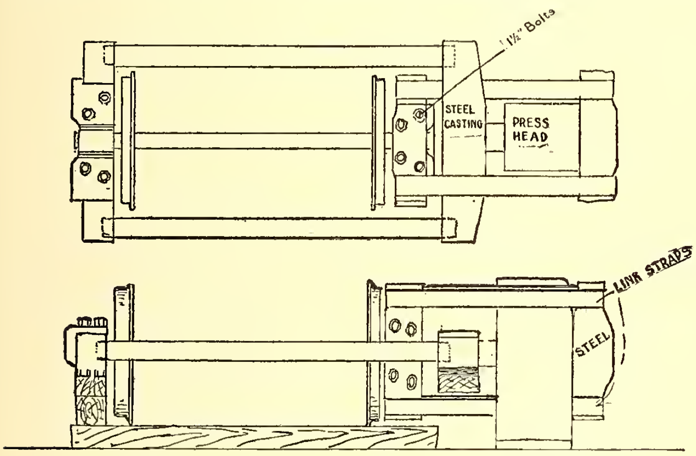


FIG. 1.—ARRANGEMENT OF WHEEL COMPRESSOR FOR TESTING AXLES

of the axle, and the fibrous structure of the axle is broken, it is rendered useless. The test, therefore, is conducted only to determine if the lot of axles will probably stand up in practice.

I believe the following test, which can be readily conducted with the wheel compressor as shown in Fig. 1, will prove out an axle with wheels on or off without affecting the further usefulness of the axle. Advantage is taken of the fact that while the compression value of a crystallized axle is not much changed, the tensile strength is greatly reduced. The tensile strength of good steel for axles should be 80,000 lbs. per sq. in. with an elongation of 20 per cent. This practically gives a factor of safety of 10 under interurban cars, so that if the axle can stand a tensile strain of 8000 lbs. per sq. in. under test it should not show a permanent fracture or a permanent elongation. This requires a test strain of 100,200 lbs., or 50 tons, for a 4-in. axle, which is within the limit of most all wheel compressors. The method of applying this strain on the axle from the compressor is shown in Fig. 1. The bearing is fitted with a clamp conforming to the dimensions of the bearing and made in two halves which can be tightly bolted around the bearing, and arms long enough to span the wheel. These arms are provided with pillars which reach to a yoke against which the piston of the compressor acts. The bearing next the compressor is clamped in the same way with straps around the end of the compressor head having twice the area of the axle to be tested. By this arrangement the compressor can gradually increase the tensile strain on the axle until the test strain has been reached and the physical condition of the axle proven.

Albert B. Herrick.

THE COST OF CARRYING A PASSENGER*

BY C. L. S. TINGLEY,
Second Vice-President the American Railways Company, Philadelphia, Pa.

This is a broad subject and is worthy of the most careful study. Conditions vary so widely that the conclusions of one man may not be of much value to another. Adequately treated, it would require months of study and work. Owing to the limitations of time imposed by our worthy secretary, and the demands of the writer's own business, he was unable to give it the careful study of which the subject was worthy, and must plead this in extenuation of any shortcomings which may be discovered in his handling of the question.

At first sight this would seem to be a very simple question, and one which would be readily answerable by anyone in the railway business. Any manufacturer who can do business in these days of combinations and fierce competition can give you at once the cost not only of every item of his product, but of every stage of manufacture, and one who is familiar with the standard classification of accounts adopted by this association, and with the recommended form of report would say that it would be an easy matter to compute the cost of carrying a passenger. Apparently, however, this is not true, for no less an authority than Edward Dana Durand, of the National Bureau of Corporations, who, in collaboration with T. Commerford Martin, prepared the text of the United States Census Report of 1902 on "Street and Electric Railways," writing in the "Review of Reviews" for February, makes the statement that for the census year the average cost of carrying a passenger had fallen to 3 cents, but this is coupled with the statement in the latter part of his article that "as a matter of fact American street railway companies have almost never made systematic appropriations for depreciation out of their earnings."

This question is further most ably handled by Howard S. Knowlton in the "Review of Reviews" for July, and from both of these articles it is apparent that the question of an adequate depreciation account is the crux of the whole question.

It is contended by Mr. Durand—and in this he is supported by many practical street railway men—that if the physical property is well kept up from time to time as it is worn out or becomes obsolete, and all such replacements charged to operating expenses, that there is little or no need for depreciation charges. But, as a matter of actual practice, it is well known that this is not done, nor is it sound accounting, as in that case each year fails to bear its proportion of the dissipation of capital caused by the wearing out of the property. Take, for instance, the case of track. Ten years ago the road which laid down an 80-lb. girder rail was well abreast of the times, and the track was subjected to the operation of 20-ft., or in some cases a trifle larger, cars, with two 20-hp motors. Now, suppose that this track had been kept in good repair, ties renewed from time to time, joints kept up and everything done for it that was needed; it is to-day subjected to the wear of from 40-ft. to 50-ft. cars, with four 40-hp motors, and is inadequate and must be replaced with 100-lb. to 120-lb. girder rail laid in concrete, the cost of which must be borne either by a depreciation fund or by new capital. The same thing is true of cars, motors and power plant.

Mr. Knowlton quotes from "Electric Railways and Tram-

* Paper presented at the convention of the Street Railway Accountants' Association of America, Sept. 29, 1905.

ways," published by Philip Dawson, an eminent English engineer, in which he gives as the results of an extended study of street railway conditions in this country the following table of allowances for depreciation:

	Per cent
Buildings	1-2
Turbines	7-9
Boilers	8-10
Engines (slow speed)	4-6
Generating units (direct coupled)	4-8
Transformers	5-6
Batteries	9-11
Rotary converters	8-10
Bonding	6-10
Overhead system	3-8
Cars	4-6
Shop equipment	12-15
Motors	5-8
Track work	7-13

And deduces therefrom a fair average allowance for depreciation of from 8 per cent to 10 per cent as a minimum. The latter figure coincides with the writer's own judgment in the case.

The special report of the United States Census Bureau on "Street and Electric Railways" for the year 1902, on page 11, gives the following figures in table 6:

DISTRIBUTION OF THE GROSS INCOME OF OPERATING COMPANIES TO LEADING ITEMS OF EXPENDITURE

	Amount	Percentage
Gross income from all sources	$250,504,627	100.0
Operating expenses	142,312,597	56.8
Fixed charges, total	77,595,053	31.0
Taxes and licenses	13,078,899	5.2
Rentals	25,518,225	10.2
Interest	38,085,911	15.2
Miscellaneous	912,018	0.4
Dividends	15,882,110	6.3
Surplus	14,714,867	5.9

And on page 39 of the same report the average fare is stated at 4.94 cents per revenue passenger. We now have data for all items which enter into our computation except the much-discussed one of depreciation.

From the foregoing we get the following table of cost as shown by United States Census Report, being the average of all the roads in the United States:

	Cents	Cents
Gross earnings per passenger		4.94
Operating expenses per passenger	2.81	
Taxes, licenses, rentals and interest per passenger	1.53	
Total cost per passenger without any allowance for depreciation		4.34
Surplus over cost of passenger		.60

For the purpose of illustrating this discussion, the writer has selected three companies with which he is connected as typical of varying conditions:

First—One which had been originally well constructed, had been well maintained, but had been in operation for over ten years prior to passing to its present ownership and the resultant rehabilitation.

Second—One which had not been so well constructed originally, and which had been in operation less than ten years before passing to its present ownership.

Third—One which had been thoroughly well built and maintained, and had been in operation less than ten years since its reconstruction before passing to its present ownership, but upon which much of the equipment had become obsolete, owing to the advancement of the art and changed conditions of service.

As the Census Bureau has reduced all its figures to the basis of percentage of gross earnings, the writer has taken the amounts expended in the reconstruction of the above properties and reduced them to the percentage of the gross earnings for the year following the completion of such reconstruction, so that in each case the property might have the advantage of any increased revenue due to better service, etc. The average of the three properties has also been taken. The items considered in arriving at the above conclusions are only those relating to the destructible plant. In the first instance the percentage is 21.5 per cent; in the second, 11.7 per cent; in the third, 4.1 per cent; and the average is 12.1 per cent.

If Mr. Knowlton is correct (and the writer believes that he is), that the average life of the destructible plant is ten years, we would have an average yearly charge on the gross earnings of the above properties which should have been taken care of by a depreciation fund of 1.21 per cent of the gross earnings.

From the foregoing we can deduce the following table as an illustration of how a minimum charge for depreciation affects the cost of carrying a passenger:

	Cents	Cents
Gross earnings per passenger		4.94
Operating expenses per passenger	2.81	
Taxes, licenses, rentals and interest per passenger	1.53	
Depreciation per passenger	0.06	
Total cost per passenger		4.40
Surplus over charges per passenger		0.54

In the above figures no consideration has been given to the question of amortization of capital in the case of limited franchises. Many of us are connected with companies which are working under such franchises and know that this is a question which must be met.

The profitable part of a street railway is that which lies in the heart of the city and is of limited extent; it is that upon which you get the short ride. Every progressive street railway—and what street railway is not progressive—must keep extending its lines into the outlying portions of the city where riders are few, the hauls are long and the dead runs are numerous; where for one or two trips, night and morning, the cars are full, but the balance of the day are empty, or nearly so. As the city grows, the street railway—that pioneer of civilization—must push further and further out into the wilderness of vacant lots, and the hauls grow longer and longer, but the nickel gets no larger; wages get higher, and the cost of almost everything which we use advances, so that all of the increased travel goes to keep up that portion of the road which must be run at a loss. The central portions of the system—and this is especially true in the larger cities—have, as a rule, become so congested that no more cars can be operated with safety, so that the profitable short ride has about reached the maximum, precluding the possibility of relief from that source.

In conclusion, I would repeat that an adequate depreciation fund seems to the writer to be the crux of the whole matter. This is a much mooted question, and one which it is not the province of this paper to discuss, but to those who are interested I would commend a careful study of Mr. Durand's article in the February "Review of Reviews," and also of Mr. Knowlton's in the July number, together with the report of the United States Census Bureau for 1902.

After considering the matter for several years, the Northern Ohio Traction & Light Company has instituted limited service between Cleveland and Akron. Fast cars leave Cleveland at 7:50 a. m. and 6:50 p. m., making the run in 1 hour and 40 minutes, as compared with 2 hours and 10 minutes for the regular local cars. About 40 minutes of this time is spent on city tracks in Cleveland and Akron, and the 31 miles between city limits will be made in an hour. A slight excess fare will be charged on these cars.

SOME INTERESTING TRACK CONSTRUCTION WITH TEE AND GIRDER RAILS IN BATTLE CREEK AND KALAMAZOO

DOUBLE TRACKING IN BATTLE CREEK

A description of the new double-tracking done by the Michigan Traction Company in Battle Creek, Mich., should be especially interesting to street railway companies in cities where any trouble is experienced with grooved girder rail. Battle Creek is one of the towns where the city engineer and other municipal officials believe that T-rail construction laid as this is, is better than grooved girder-rail construction. As this track is laid in concrete, the company has had no trouble from low joints, and track laid in this same way two years ago does not show any perceptible wear.

About two years ago this season, when the Jackson & Battle Creek Traction Company entered Battle Creek, the Michigan Traction Company laid double tracks from Postumville to Monument Square of 7-in. 70-lb. T-rail to facilitate the handling of the extra traffic along this route. During the same season it also double-tracked Lake Avenue to Goguac Lake, a very pretty lake resort 2 miles from the heart of Battle Creek. In May, this year, the same company began double-tracking all of its lines in the central part of Battle Creek, and is at the present time about completing the work, so that by the time this article appears it will have about 4 miles of double track.

The track is built entirely of the T-rail mentioned, and the special work was furnished by the Lorain Steel Company and the Paige Iron Works. That furnished by the Lorain Steel Company was of the hard center type and was used for the heaviest traffic. The rails were laid on 6-in. x 8-in. x 8-ft. white oak ties, placed 2-ft. centers, well ballasted with gravel and filled to within 11 ins. of the surface of the finished work, all joints being suspended. Under the two joint ties it was

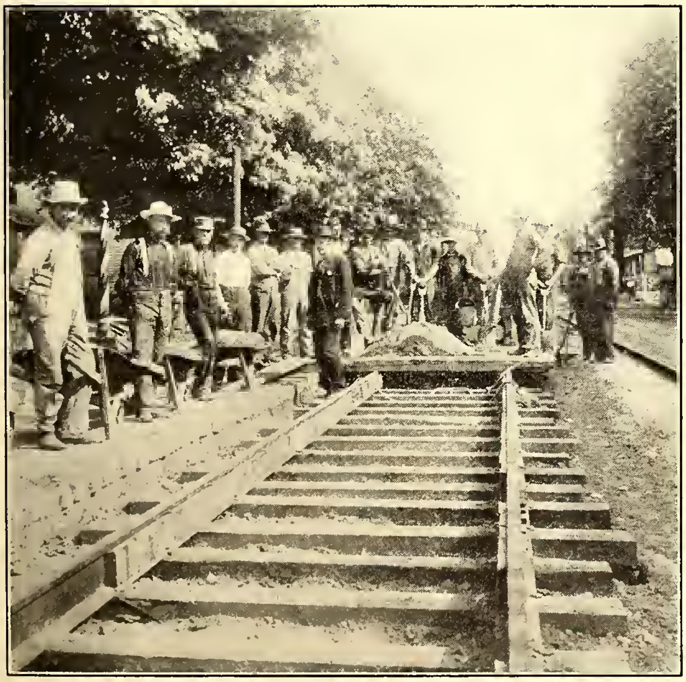


FIG. 2.—VIEW ON MAIN STREET, BATTLE CREEK, SHOWING TRACK WITH FILLER BLOCK IN PLACE PREPARED FOR CONCRETE

excavated to a depth of at least 8 ins. and filled with concrete, as shown in the accompanying illustration, Fig. 1. It was also excavated 8 ins. under the ties at all special work, the space being filled with concrete.

The repaving was accomplished by using 6 ins. concrete, 1 in. cushion sand and Nelsonville paving block as a wearing surface. The groove or flangeway was formed by using the Nelsonville filler block and the Nelsonville stretcher block, which can be seen by referring to Fig. 1 as well as Fig. 3. On the whole, from the street railway standpoint as well as the team traffic standpoint, this style of groove or flangeway is looked upon by all those who have seen this work as superior to the grooved girder rail. By the teamsters it is approved because such vehicles as get into the groove have an easy slope to get out, and thereby a great saving results in

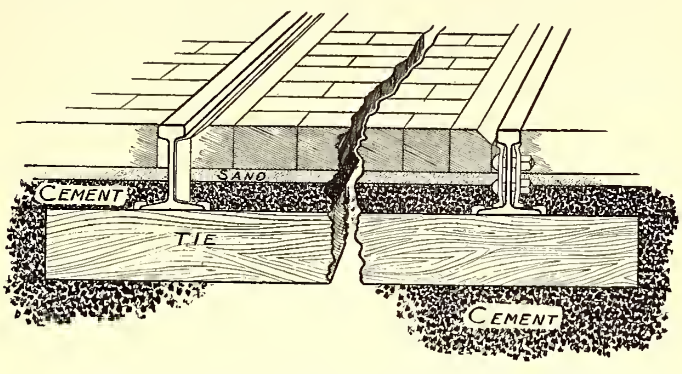


FIG. 1.—CROSS-SECTION OF T-RAIL PAVED STREET CONSTRUCTION IN BATTLE CREEK, MICH.

wheel wear. From the street railway standpoint it is preferred because it gives the bearing of the wheel squarely over the center of the base, and forms a groove which to all purposes is self-cleaning and does not wear the wheel flanges like grooved girder rail. The work done in Battle Creek during the present season was thoroughly inspected by the Aldermen and city officials of Kalamazoo, who were so well pleased with it that the same rail was adopted for their city, as explained later in this article. It might be said in this connection that Kalamazoo has always stood for the grooved girder rail, and this has been especially the case for the last five or six years.

When the traction company commenced repaving it used

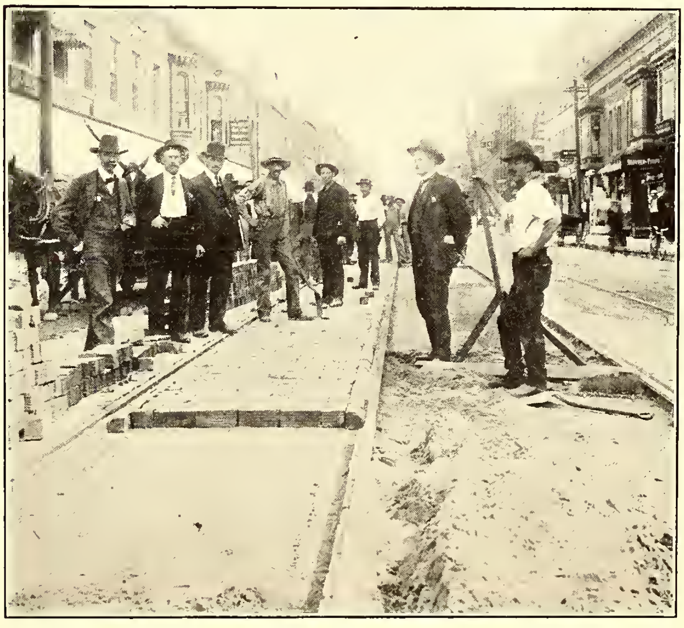


FIG. 3.—VIEW SHOWING COMPLETED RIGHT-HAND TRACK AND LEFT-HAND TRACK WITH THE PAVING IN PLACE READY TO BE ROLLED AND SLUSHED

for the concrete mixture a local bank gravel, free from all loam, and Portland cement in the proportions of eight gravel to one cement, which met the approval of the city engineer of Battle Creek.

The track bonding was done by using two Chase-Shawmut solder bonds of 0000 capacity under the plates at each joint. Fig. 2 was taken on Main Street, just in front of the mixing board, and shows the track with the filler block in place prepared for the concrete with the finished track at the right. Fig. 3 shows the right-hand track finished and the left-hand track with the paving in place ready to be rolled and slushed.

TRACK LAID IN PAVED STREETS, KALAMAZOO

A couple of years ago, when Kalamazoo decided to do many miles of paving, the commissioners of public improvements took up the question of the rail construction where the track had to be relaid upon paved streets. The paving decided upon was monolithic and brick on the shoulders, and the same paving between the rails and tracks as was on the shoulders. In many instances, this paving replaced the old wooden block paving that had formerly been laid on some of these streets. The above style of construction was adopted only after a great deal of controversy between the railway officials and the commissioners of public improvements, mainly on account of the grooved girder rail, as the railway officials wanted to use the high T-rail and the commissioners the grooved girder rail. The above construction was finally adopted and about 3 miles of it were laid. The grooved girder rail is shown in Fig. 4, and is of Pennsylvania steel section No. 240, weight 87 lbs. per yd. The rail was laid upon concrete stringer 18 ins. wide, 8 ins. under the base of the rail. The base of the rail and also the tie rods across the rail were imbedded in the concrete 3½ ins.; then the cement mortar was laid in against the sides of the rail, with paving pitch put in alongside of the cement mortar

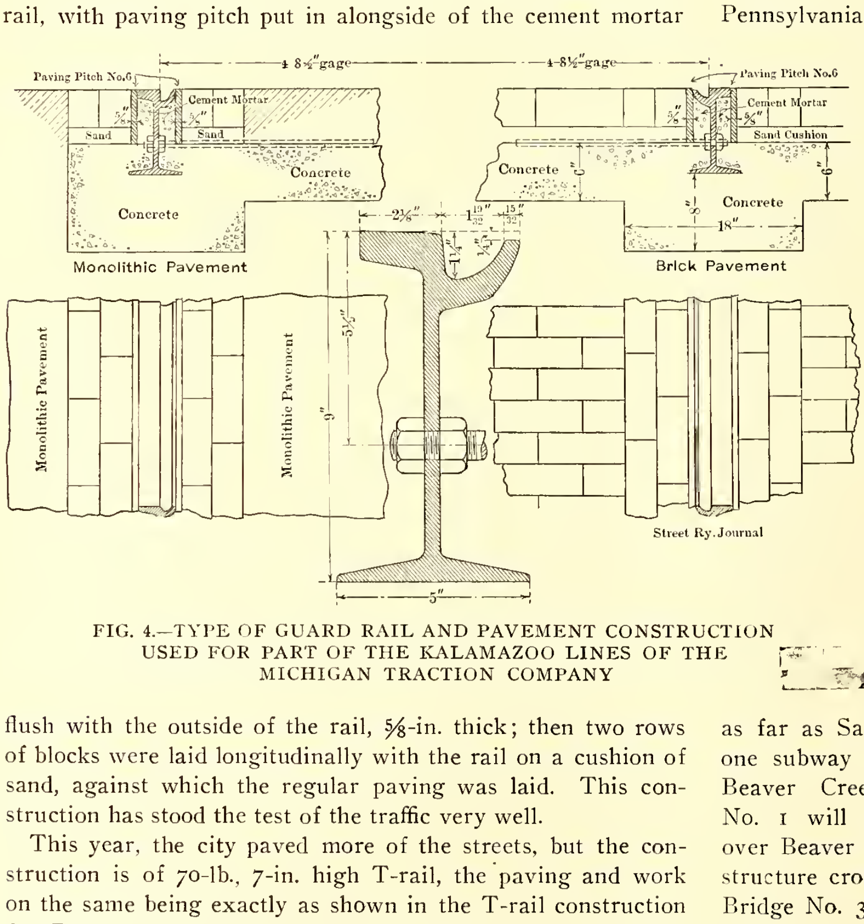


FIG. 4.—TYPE OF GUARD RAIL AND PAVEMENT CONSTRUCTION USED FOR PART OF THE KALAMAZOO LINES OF THE MICHIGAN TRACTION COMPANY

flush with the outside of the rail, ⅝-in. thick; then two rows of blocks were laid longitudinally with the rail on a cushion of sand, against which the regular paving was laid. This construction has stood the test of the traffic very well.

This year, the city paved more of the streets, but the construction is of 70-lb., 7-in. high T-rail, the paving and work on the same being exactly as shown in the T-rail construction for Battle Creek, the officials of Kalamazoo having adopted that style of work and allowed the company to put the same in after an examination was made of the work in Battle Creek. This kind of construction makes just as fine a street from a paving standpoint, and is much better for the wagons to pass over than the grooved girder rail.

This reconstruction, as well as that in Battle Creek, was looked after and carried out under the supervision of D. A. Hegarty, general superintendent of the Railways Company General, which company owns and operates the Michigan Traction Company; R. W. Harris, superintendent of the Michigan Traction Company, and A. L. Marhoff, engineer of the Michigan Traction Company.

ELECTRIC RAILWAY DEVELOPMENT IN THE VICINITY OF HARRISBURG, PA.

Development of the electric railway systems converging in Harrisburg, Pa., is keeping pace with the rapid growth of the commonwealth's capital. Already more than 100 miles of lines

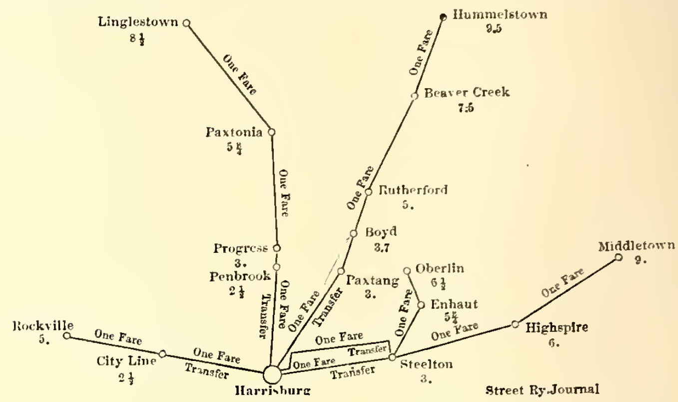


DIAGRAM OF LINES AROUND HARRISBURG, SHOWING APPROXIMATE DISTANCES AND FARE FROM POINT TO POINT

reach out in all directions from the heart of the city. This vast system is under the control of two corporations, the Central Pennsylvania Traction Company, which operates 60 miles of trackage throughout the city and to the towns and hamlets on the eastern side of the Susquehanna River, and the Valley Traction Company, which has 41 miles of line, reaching points on the western side of the river via the Peoule's Bridge, which the company controls.

Both companies have important improvements either under way or in prospect. A pretentious project of the Central Pennsylvania Traction Company was the large car houses and shops, which were fully described in the issue of the Street Railway Journal of Sept. 2, 1905. This company is building an extension of about 7 miles from Paxtang, 2¼ miles from the city, to Hummelstown, where it will connect with the Hummelstown & Campbellstown Street Railway, which in turn connects with the Lebanon system. This extension is expected to be ready for service by Nov. 15. The line is now in operation to Rutherford Station, and track laying has been completed to a rock cut about 2 miles west of Hummelstown. The Hummelstown end of the line is finished as far as Saratoga Creek. There will be three bridges and one subway on this line. Two of the bridges will span Beaver Creek and the third Swantoan Creek. Bridge No. 1 will be 101 ft. long. The span of No. 2 bridge over Beaver Creek will be 60 ft., but there will be 360 ft. of structure crossing the meadows and resting on concrete piers. Bridge No. 3 over Swatona Creek will have sixteen spans of 41½ ft. each, resting on concrete piers. The span over the creek will be 140 ft. long. These structures are well along toward completion. The subway under the Philadelphia & Reading Railway tracks at Fox's Crossing will be 33 ft. wide and 22 ft. clearance. There are two rock cuts near Beaver Creek Station, each about 300 ft. long, with a maximum depth of 22 ft. As far as possible all sharp curves will be eliminated, there being not one less than 150-ft. radius. The maximum grade along this line will be 4½ per cent, the average being about 2 per cent. Seventy-pound T-rails are being laid.

The company purposes to erect at once a $250,000 power plant on the site of the present plant on South Cameron Street, and, as previously stated in the Street Railway Journal, has selected Mason D. Pratt, of Harrisburg, to make the plans and superintend its construction. Mr. Pratt designed and built the North Cameron Street car houses and shops. The new plant will have 2400-kw capacity, as compared with the 800-kw capacity of the present main plant and 700 kw in the plant at Steelton. To defray the cost of this plant and to meet other obligations, the directors of the company have called for the payment of a second assessment of 10 per cent on the $2,100,000 capital stock, 5 per cent payable Nov. 1 and 5 per cent Jan. 1. Other improvements to be undertaken by the company are the paving of Front Street in Steelton for a distance of 1½ miles and relaying of the tracks with 60-ft. rails weighing 94 lbs. to the yard. Reily Street, from Reily to Maclay, in Harrisburg, is also to be double-tracked shortly. The rails for this work are on the ground. A subway, 33 ft. wide and 14½ ft. clearance, costing $20,000, is to be built under the Philadelphia & Reading tracks at the entrance to Paxtang Park, which will be enlarged next year by the addition of about 20 acres of adjoining land. E. L. Reeds, of Philadelphia, has the contract for the subway. In order better to meet the demands of traffic, the company plans to increase its rolling stock about 20 per cent. This increase will consist of five semi-convertible cars. At present fifty-seven cars are in use.

The Valley Traction Company, which was organized about a year ago, taking over the properties of the Harrisburg & Mechanicsburg Electric Railway Company, the West Fairview & Marysville Electric Railway Company and the Cumberland Valley Traction Company, is controlled by interests identified with the Cumberland Valley Railroad Company. Under the efficient direction of Superintendent G. H. Bartle, the property has been greatly improved. Still more important work is in contemplation, chief among which is the conversion of the Dillsburg & Mechanicsburg Railroad, a 9-mile branch of the Cumberland Valley Railroad (steam), into a combined steam and electric line. The Riverton power plant is being equipped with step-up transformers to increase the voltage from 550 volts to 2200 volts, at which pressure current will be transmitted to the sub-stations at Mechanicsburg and Carlisle, each of which will be equipped with rotaries. Work on these sub-stations will be started early this fall. They will be one-story brick buildings, each equipped with a 300-kw machine.

The bonding of the Dillsburg & Mechanicsburg steam line, referred to above, has been completed and work on the pole line is under way. In order to overcome the difficulty of operating a steam line with the overhead wire system, Superintendent Bartle has evolved a plan whereby the wire for the car trolley poles will be strung to one side of the track instead of the middle, clearing the cars by about 1 ft. The trolley pole stand on each car will be extended, so as to make the new scheme practical. Electric cars on the Dillsburg & Mechanicsburg line will connect at Trindle Spring with the Mechanicsburg-Carlisle line of the Valley Traction Company, and at Mechanicsburg with the Cumberland Valley Railroad.

The car houses at Lemoyne are to be doubled in size by the erection of an addition about 50 ft. x 120 ft. The company opened a small park at Boiling Springs this year, and is now negotiating for Island Park, a natural beauty spot of 20 acres, adjoining the present park of 5 acres.

Five new cars of the Brill semi-convertible type, the largest in this section, were recently placed in service by the company. They are each 46 ft. long, with a 6-ft. platform, 5 ft. longer than the other cars, and equipped with the most modern improvements, such as arm and foot rests, electric headlight, whistle, heaters and push buttons, and Westinghouse air brakes. Each has four motors of 40 hp. These cars will be used in the regular service between Harrisburg and Carlisle, a distance of 22 miles.

HANDLING OHIO FAIR TRAFFIC

A few years ago there was a marked falling off in attendance at county fairs in Ohio. This year, however, without exception, the reports indicate that the number of people patronizing these fairs was heavier than ever before. This is undoubtedly due in a large measure to the assistance of the electric railways in helping to promote the events and then handling the people in a satisfactory manner. This year the scheme was adopted of advertising the fairs extensively by means of posters, the electric railway companies offering special excursion rates and insuring adequate accommodations by placing in operation special fair cars.

At the Ohio State Fair at Columbus last month, the interurbans simply swamped the city with people, the attendance being far beyond previous records. The seven roads into the city each handled 5000 and 6000 passengers a day. People were carried in all kinds of rolling stock—borrowed cars from distant points, express cars fitted with seats, and in many cases even the roofs of cars were filled. In the city this business was turned over to the Columbus Railway & Light Company, which was forced to extreme measures to handle the people. On the company's High Street line cars were operated on half-minute headway, while other cars were sent to the grounds by circuitous routes.

The Darke County Fair at Greenville was another record-breaker. The Dayton & Northern and Dayton & Muncie lines handled not far from 100,000 people. Ralph DeWeese, general manager of the Dayton & Northern, gave a temporary city service with three-minute headway in Greenville, besides quadrupling his interurban service. He hired about twenty-five cars and crews from various roads, and camped and fed the employees in tents erected opposite the fair grounds. Mr. DeWesse never left the place during the week, and the crowds were handled without delay or accident. Additional power was secured from the Dayton & Muncie station at Winchester, Ind., and a floating battery station was located near the fair grounds.

At the Troy fair, the Dayton & Troy adopted the novel scheme of running special cars to and from each of the important towns along its line, and only people for these towns were carried. At the fair grounds it erected turnstiles with alleys leading to the various cars, and tickets were collected before the passenger got into the car, and then they were run through on limited schedules. The regular limited cars were run through double-headers, but only the second sections carried fair enthusiasts, so that the regular traveling public was not troubled by excessive crowds.

The Western Ohio and Dayton & Troy lines united in making the Auglaize County Fair at Wapakoneta the greatest ever held in Western Ohio. The roads carried advertisements in nearly fifty daily and weekly papers throughout the districts traversed by these lines, besides posting and scattering attractive printed matter in all towns. The plan of running limited cars was carried out in this case also.

The Toledo, Bowling Green & Southern Traction Company gave fifteen-minute headway between Toledo and Bowling Green for the Wood County Fair, and besides filling borrowed cars, it handled hundreds of people on flat cars fitted with seats.

The attendance at the Sandusky County Fair at Fremont was over 100,000, and the Lake Shore Electric handled a very large proportion of these.

The Stark Electric and the Canton-Akron lines combined to make the Canton fair a record-breaker, while the Summit County Fair at Akron proved a small gold mine for the Northern Ohio Traction & Light Company's city and interurban lines.

The majority of the lines not only profited by the tremendous passenger business, but they handled live stock and fair exhibits and transferred the traveling shows and other attractions from one fair to another. And the pleasing part of it is that, so far as can be learned, there were no accidents of any kind at any of these events.

IMPROVEMENTS ON THE DAYTON & WESTERN

The Dayton & Western Traction Company, operating from Dayton, Ohio, to Richmond, Ind., and forming a part of the through line from Dayton to Indianapolis, has been making a large number of improvements, made necessary by great increase of business, which has been due largely to the institution of through service between Dayton and Indianapolis and the great amount of interline business which is developing throughout this entire district.

In its power station at West Alexandria it has installed a 300-kw General Electric d. c. generator, driven by a Hamilton-Corliss cross-compound engine and two water-tube boilers, giving the house a total capacity of 1100 kw. A 140-ft. brick chimney was erected and a track scale for weighing fuel installed. Twenty-two miles of overhead have been rebuilt with flexible hangers, and about 15 miles of track is being ballasted and raised 5 ins. to 6 ins., so that the track will soon be in fine condition. An interesting point is the fact that it has done entirely away with through sidings, and uses nothing but stub switches. The company's schedules are as fast as any in this district, but it is believed that the slight time lost through stub switches is more than compensated for by the decreased liability to accidents and the saving in maintenance. The distribution on this line is direct current, the line being divided into four sections, and the current boosted at approximately 800 volts to the two end sections. To improve the power on these sections and to take care of load variations, storage batteries have been installed. They were furnished by the Gould Storage Battery Company, and consist of 266 cells of 240-amp.-hour capacity, and they are used in connection with shunt-wound boosters in series with the line.

It will be remembered that some months ago this company instituted parlor buffet car service between Dayton and Indianapolis, the trains being known as the Interstate Limited. At that time conservative managers predicted that the chair-car buffet service scheme would prove a losing venture, but Mr. Valentine Winters, president of the company, claims that he is now greatly pleased with the results. The limited cars are averaging forty through passengers a day between Dayton and Indianapolis, and on this road they are earning about 24 cents per car mile, as compared with 26 cents per car mile for all passenger cars. They are making rapid gains, and he believes they will soon be earning more than regular cars. A third car has been fitted up in a manner similar to the others, and it is very probable that some special cars of larger size will be built for the service, because very often at present they are unable to accommodate all the passengers that want to take the fast cars; it will be remembered that these parlor cars have seating accommodations for only twenty-six passengers. The new cars will have accommodations for carrying baggage, as it is found that a great many traveling men will not take these cars unless they can take their trunks with them. While the buffet service in itself is not a paying proposition, it is an excellent advertisement, and the management would not think of discontinuing it. It is now possible to travel on limited cars with chair seats from Logansport, Ind., to Zanesville, Ohio, about 325 miles, with very close connections and only three changes, and as a result the earnings of all of these roads is increasing surprisingly. The Dayton & Western shows a gain of 35 per cent gross in the past year, due largely to the through service. Through freight business is being worked up, and the Dayton & Western is planning to use several trail cars that can be hauled through from Dayton to Indianapolis .

This road was one of the first to install steel-tired wheels, and it is showing some interesting results. It has used the Standard, and those first installed were 2 ins. thick, and they gave from 140,000 to 150,000 miles. They are now using a considerably thicker wheel and expect to get 200,000 miles or more.

It has been reported repeatedly of late that this property had been acquired by the so-called Widener-Elkins syndicate, which is building up an immense through system in this district. While it is admitted that such a consolidation is logical for the future, it is denied that anything definite has taken place. There is no bonded indebtedness on this property, and the small group of stockholders who control it absolutely would prefer to operate the property indefinitely.

SPECIFICATIONS FOR COKE AND CROSS-TIES IN PHILADELPHIA

In the Philadelphia Souvenir issue of the STREET RAILWAY JOURNAL, dated September 23, 1905, reference was made to the value of the testing laboratory of the Philadelphia Rapid Transit Company used in conjunction with the purchasing department in the preparation of specifications covering the various materials and supplies purchased by the company. Two examples of standard specifications adopted by the company are appended in this connection. These cover the requirements for coke and for cross-ties:

SPECIFICATIONS FOR COKE, P. R. T. COMPANY

The coke must consist of large pieces, and be clean, strong, and of uniform structure. It should be of seventy-two hour coking, and conform to the following analysis:

Fixed carbon, not less than	89.00	per cent
Ash, not over	8.00	"
Sulphur, not over	.750	"
Volatile matter, not over	2.50	"

METHOD OF SAMPLING COKE

While the car is being unloaded, pieces of coke should be taken at sufficient intervals as they come from the car at different stages of unloading, so that after the car is emptied there will be in the sample about one-half of a bushel. The pieces taken should not be broken off, but must be the pieces as they come along—whether they happen to be large or small. This coke should be crushed to about 1-inch pieces (the size of hickory nuts). The crushed coke should then be sampled by the method of quartering as follows: After thoroughly mixing the coke, it is spread out in a level pile and divided by two cross-lines into four parts, of which the two diagonally opposite quarters are taken and mixed up again and again spread out and quartered as before; and this quartering is continued until the two last quarters will weigh about 2 lbs. The latter should immediately be sent to the testing laboratory with the date, name of consignor, order number and number of car marked figure on the tag.

SPECIFICATIONS FOR CROSS-TIES, P. R. T. COMPANY

Quality and Manufacture

1. The timber shall be long leaf yellow pine, grown in the interior of Georgia, Florida, Alabama, Mississippi or Texas. The timber shall be cut in the fall and winter, say from Sept. 1 to March 1. Ties ordered for immediate delivery must be made of timber cut at least three months previous to date of shipment. All ties must be cut from good living timber, well manufactured to size and length, straight, free from large, loose or decayed knots, splits, shakes or any other defects that may impair the strength and durability of the timber. They must be sawed square, and not more than 1½ in. of sap, measured on face, will be allowed on one corner; the sap must not show on the opposite face. They must be sawed off square at the ends.

Size

2. The ties shall be 5 ins. thick x 9 ins. face x 8 ft. long. The thickness shall not be more than ¼ in. under or over 5 ins.; the width shall not be more than ¼ in. under nor ½ in. over 9 ins.; the length shall not be more than 2 ins. under or over 8 ft. All ties that are longer than 8 ft. 2 ins. will be taken at a reduction of 5 cents each, to pay for cutting them to standard length.

Inspection

3. This company shall have the right to inspect the ties at point of shipment or at destination.

Stacked

4. Ties when ordered "delivered and stacked" must be stacked up in alternate layers, crossing each other, with sufficient space between ties to allow a free passage of air, or as may be directed by the company's representative.

AMERICAN CAPITAL FOR CHIHUAHUA, MEXICO

It is announced that J. W. Conger, brother of Hon. E. H. Conger, former Ambassador to Mexico, who recently obtained an option on the street railway system and electric light and power plant in Chihuahua, is meeting with success in organizing a company of Americans to take over these properties. It is stated that the transaction will be finally consummated soon and that the work of equipping the street railway lines for electric transit will be started and carried out as rapidly as possible. The street railway system will also be extended by its new owners.

AUTOMOBILES AS RAILWAY FEEDERS

The rapid improvement in the efficiency and reliability of the automobile has brought it into such prominence as a means for transportation that some have hastily concluded that the electric railway has met therein a serious competitor. It is plain, however, that the automobile can do comparatively little to reduce railway traffic on congested city streets, for anyone who has seen a long line of cars make its way through a maze of trucks and pedestrians can imagine how much worse matters would be if a like number of automobiles were free to dash in any direction. Hence, so far as city operation is concerned, the public automobile finds its main value either as a conveyance for sightseers or for transportation on avenues where trucks are not permitted. For use in the country, however, a substantially built automobile should prove a profitable adjunct to electric railways for picking up traffic along routes whose sparse population does not allow the installation of a full-fledged railway.

Whether an automobile would pay for work of this character

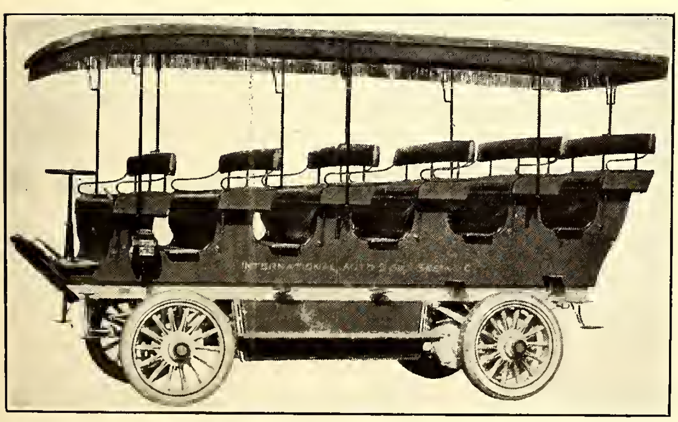


FIG. 1.—ELECTRIC GEAR-DRIVEN AUTOMOBILE FOR TWENTY-FOUR PASSENGERS

should not be difficult to determine, since five factors only need be considered, as follows: First cost of the vehicle; maintenance; wages; cost of power, and the probable traffic income.

At the present time three types of automobiles are in successful use in this country. These are the storage battery, straight gasoline and the gasoline-electric coaches.

The storage-battery vehicle operates under the most favorable conditions when the grades are not severe and it is used for runs covering in all about 25 miles. If an electric railway company employs such a motor car as a feeder, the batteries can be easily charged from the regular railway current supply with little loss. Since all of the apparatus is electrical, an ordinary motorman can run the coach and any repairs required can be made by the same men who look after the regular rolling stock, thus avoiding the necessity of employing an extra machinist skilled in gasoline motor work.

For distances over 20 to 25 miles, the gasoline or gasoline-electric vehicle has sprung into great favor, as it is unnecessary to carry so much dead weight as would be the case if a storage battery were used. Whether the drive be a straight gasoline or

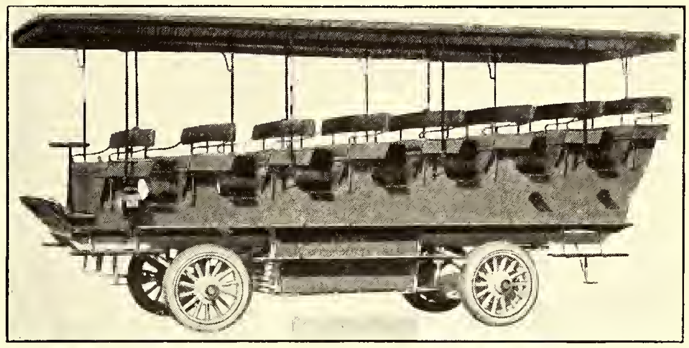


FIG. 2.—ELECTRIC GEAR-DRIVEN AUTOMOBILE FOR FORTY PASSENGERS

gasoline-electric, the cost of labor must be higher than for the simpler storage-battery equipment, as the use of a complex gasoline engine requires a higher grade of labor. A gasoline-electric equipment may simplify the work of control, but it introduces greater losses in transmission and additional dead weight. The double equipment is also more expensive in first cost and maintenance.

Some representative types are shown in the accompanying cuts, which illustrate a number of auto-coaches built by the Vehicle Equipment Company, of Long Island City. Figs. 1 and 2 show electric gear-driven automobiles, such as have proved very popular for sightseeing purposes. The smaller coach seats twenty-four passengers and the larger seats forty passengers. An excellent example of a storage battery outfit is that shown in Fig. 3, which is a view of one of six cars in regular service at Lima, Peru, for over eight months. It will be noted that the body, which was built by the J. G. Brill Company, conforms to

FIG. 3.—ELECTRIC AUTO-CAR USED IN LIMA, PERU

that builder's type of convertible car. It has a center aisle, entered from the rear, and has cross seats for accommodating thirty-two passengers. The operating equipment comprises two GE 1008 motors, General Electric controller, foot brakes, etc. On one charge this vehicle can run for 25 miles at 8 m.p.h., and can climb an 8 per cent grade at 4 m.p.h. The total weight of the entire equipment without load is 10,000 lbs. It is significant that the company purchasing these cars had enough confidence in this type of vehicle to warrant installing one so far away from first-class repair facilities.

The vehicle shown in Figs. 4, 5 and 6 is one of a number being built to replace the horse stages on Fifth Avenue, New York, on which no track laying is permitted. It is of the gasoline-electric type with chain drive. The power equipment consists of two GE 1012 motors and a 40-hp Speedway gasoline engine direct connected to a General Electric generator. The coach runs 15 m.p.h. on the level and about 8 m.p.h. on an 8 per cent grade. Lighting current is obtained from two ten-cell Exide batteries. The engine can be conveniently started by furnishing battery current to the generator for a short time, but the batteries are not used for helping the generator out on heavy loads. One daily charge is all that is required. The body of this coach was built by the J. G. Brill Company, and includes that builder's grooveless-post semi-convertible window system. The car body is similar to that used on a single truck in regular trolley service, and has a transverse seating arrangement, accommodating twenty-nine passengers. As the car is operated in one direction only, the seats have stationary backs and the platform has an entrance at one side only. The transverse seats will be very welcome to the patrons of the line, as they, of course, secure greater comfort than with the old arrangement of longitudinal seats, and the seating capacity is largely increased. The ability to transform the car from closed to open at any time, or to raise the windows to any desired height, is another feature that will prove attractive. It is not intended to allow passengers to stand upon the platform, and therefore the platform is but 3 ft. from the end of the car body to the end of the body over the dasher. The platform is enclosed at one side, and thus provides a convenient place for the conductor to stand and watch the movement of passengers in and out without obstructing the way. The body is carried on a large chassis, which is mounted on wheels with solid rubber tires. Located at the forward end of the chassis is the motor, enclosed in a substantial case, the top of which serves for the motorman's platform. The arrangement is an excellent one for economizing space and securing convenience. The general dimensions of the car are as follows: Length over the body, 16 ft. 9½ ins.; width over the body sills, 6 ft. 5 ins.; width over the posts at the belt, 7 ft. 5 ins.; distance between the centers of the posts, 2 ft. 5 ins. The complete weight of the car is about 7 tons.

FIG. 4.—VIEW OF THE GASOLINE-ELECTRIC CAR NOW RUNNING ON FIFTH AVENUE, NEW YORK

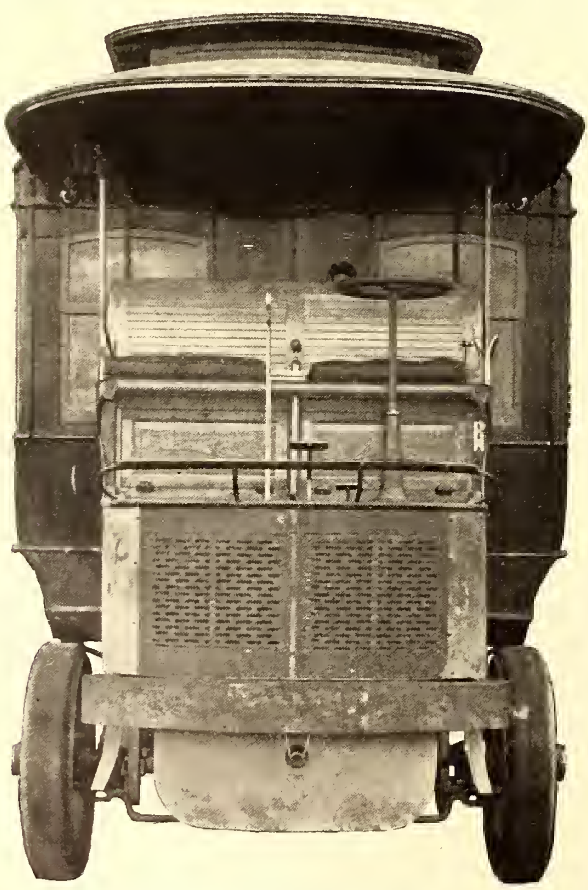


FIG. 5.—VIEW OF THE FRONT END OF THE NEW FIFTH AVENUE GASOLINE-ELECTRIC CAR

CHANGES IN THE CONSOLIDATED CAR FENDER COMPANY

The Consolidated Car Fender Company has issued a statement saying that owing to the death of A. C. Woodworth, who was the general manager of this company since its organization in 1895, it has been deemed wise to move the main office to and hereafter conduct all correspondence and sales from the works at Providence, R. I. The company believes that this move will be conducive to better, prompter and more efficient service for all with whom it does business. It should be noted, however, that a branch office for the demonstration of fenders and the

FIG. 6.—SIDE VIEW, SHOWING LOCATION OF GASOLINE MACHINERY UNDER DRIVER'S SEAT

convenience of patrons will be continued at 39 Cortlandt Street, New York, until further notice.

A. J. Thornley, who assumes the management of the company, has been identified with the manufacturing end of the business since its organization, and all the company's patrons may feel assured of prompt and courteous treatment at his hands.

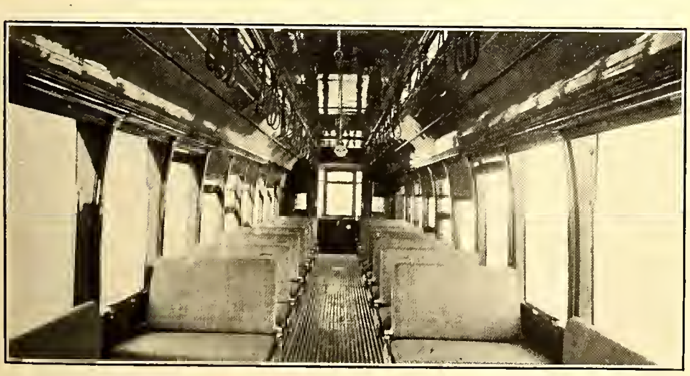
It is unnecessary here to call attention to the merits of the Providence fender. Its long and successful service on hundreds of street railways throughout this country, as well as abroad, has demonstrated beyond question that it is one of the best forms of insurance a railway company can carry. The company now has fenders in use on over 265 electric railways, which use in all more than 18,000. In addition to its large business in this country, the company is sending fenders abroad, a shipment to Japan being among the recent foreign orders.

GROOVELESS-POST SEMI-CONVERTIBLE CARS FOR BALTIMORE UNITED RAILWAYS

The car illustrated herewith is one of an order for 200 which are being delivered to the Baltimore United Railways by the J. G. Brill Company and the John Stephenson Company.

SEMI-CONVERTIBLE CAR FOR BALTIMORE

Reference to this order was made in the July 1 issue of the Street Railway Journal. The Brill Company is building 160 of the cars, which are mounted on No. 27 G-1 truck, a short base double truck with solid forged side frames; the remaining forty cars are being built by the John Stephenson Company, and are mounted on Brill Company's No. 27 E-1 truck, the high-speed type, which also has solid forged side frames. The 160 cars mounted on short-base trucks are intended for city service, and are provided with portable vestibules; those mounted on the high-speed trucks are for service on a division



INTERIOR OF BALTIMORE CAR

extending for some distance out of the city. In other respects the cars are identical, and are of the "grooveless-post semi-convertible" type. The bottom framing of these cars is made extra strong by the use of 3¾-in. x 7¾-in sills, with 15-in. x ⅜-in. plates on the inside, which extend in a single piece the full length of the sills.

An interesting and novel device of the Baltimore United Railways which has been included in these cars is a means of oiling the truck center plates by a pipe leading from the floor of the car through the upper plates. This obviates the common difficulty of getting the oil into the central portion between the plates. The opening of the pipe in the car floor has a cap neatly contrived to fit into the floor, and yet can be readily opened by inserting a finger into a slot.

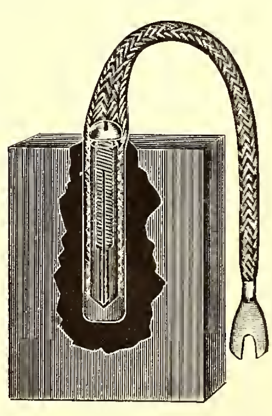
The outside platform timbers are reinforced with deep angle irons, and the outside bolt of the stirrups, which support these timbers, is secured to the side plates. This is an unusual method, but is considered an excellent one, because it takes part of the strain from the timbers. The angle irons which reinforce the knees at the center of the platforms are brought 4 ft. 8 ins. back of the center of the body bolsters, a cantilever arrangement peculiar to the builder, which brings a large portion of the platform load directly to the trucks without strain to the bottom framing. The extra wide inside sill plates take the place of upper and under trusses and add stiffness to the posts, to which they are secured with bolts and screws. The trap doors are amply long to give free access to the oil wells at the ends of the motors.

The flooring of the platforms is composed of ¾-in. x 2¼-in. boards, with a space of ¾ in. between each. These boards are placed transversely, and the flooring underneath is raised slightly at the center, so that water runs off either side through the spaces. This feature is also one of the railway company, and has the advantage of keeping the platforms free of water in wet weather. The platforms measure 5 ft. from the end panels over the crown piece. The step heights of the cars mounted on short-base trucks are as follows: From the rail to the platform step, 15¾ ins.; from the step to the platform, 14 ins.; from the platform to the car floor, 9 ins. The height from the rail to the platform step of the cars mounted on the high-speed trucks is a trifle greater.

The seating consists of seven transverse seats on each side, and longitudinal corner seats, each accommodating four passengers. The total seating capacity is forty-four. The interiors are finished in cherry, with ceilings of decorated three-ply birch veneer. The length over the end panels is 30 ft. 8 ins.; the width over the sills, including the panels, 8 ft. 2 ins.; extreme width over the water tables, 8 ft. 5 ins.

EXPANSION CONNECTION BRUSHES

A recent improvement in carbon brushes, called the expansion connection brush, which is being introduced by the National Carbon Company, of Cleveland, Ohio, consists of a carbon brush, of any size, having a hole drilled into it, penetrating about one-half of the length of the brush. A piece of plaited flexible wire, terminating in a cable shoe, is unraveled at the end opposite to the cable shoe, and this miniature wire net is formed cylindrically around a little brass sleeve. This sleeve is of the same length as the hole in the carbon brush, and is slotted over two-thirds of its length. The slot is tapped so that the closing screw fitting into the slot is forced into a tapering hole. The resistance with which the screw meets on account of this tapering is overcome by the sleeve expanding, so that the whole appliance acts as a wedge when the screw is inserted, making a very close and rigid contact between the flexible wire and the interior of the brush, which is even increased through expansion of the metallic parts should the brush become slightly heated while in use. This flexible connection is very easily detached, and can be connected to a new

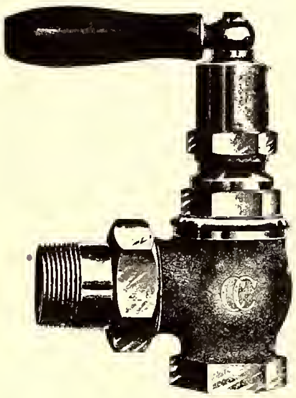


EXPANSION CONNECTION BRUSH

brush simply by the use of a screw-driver, obviating the necessity of attaching by means of the soldering process. This connection is so arranged that the distance between the commutator surface and the terminal connection is reduced to a minimum, thereby reducing the carbon resistance between these points, resulting in obtaining a higher efficiency and a lower loss between the commutator surface and the end of the connection.

A NEW QUICK-OPENING, SELF-PACKING STEAM RADIATOR VALVE

The users of radiator valves will be interested to learn that the Crane Co. has just brought out the valuable self-packing, quick-opening steam radiator valve shown in the accompanying illustration. The self-packing feature precludes any possibility of valves of this type leaking at the stuffing boxes. By a special device placed in the stuffing boxes, the packing is automatically kept tight and will last for years without renewal. The device is very simple, consisting only of a vulcanized washer located at the top of stuffing box and kept in position by spring compression, which fully compensates for the wear on washer. These valves open and close by turning the lever handle one-half turn. To open, turn to the left; to close, turn to the right.



SELF-PACKING STEAM RADIATOR VALVE

The quick-opening and closing feature will no doubt be appreciated by users who have operated old-style radiator valves. The lever handle can be operated by the foot as well as by the hand.

The construction of these valves is such that when closed the discs bear on the seats very tightly, and the valve is locked in place until released. The bonnets of these valves are interchangeable with the bonnets of Crane regular radiator valves. This is of great advantage to the user, as he may, at any time, equip his old valves with these new and important improvements. These valves are artistically designed and add much to the appearance of a nicely furnished office. The lever handles are made from cherry wood, painted a deep rich black color, which contrasts very nicely with the nickel-plated trimmings of the valves.

"UNIT TYPE" OIL FILTER

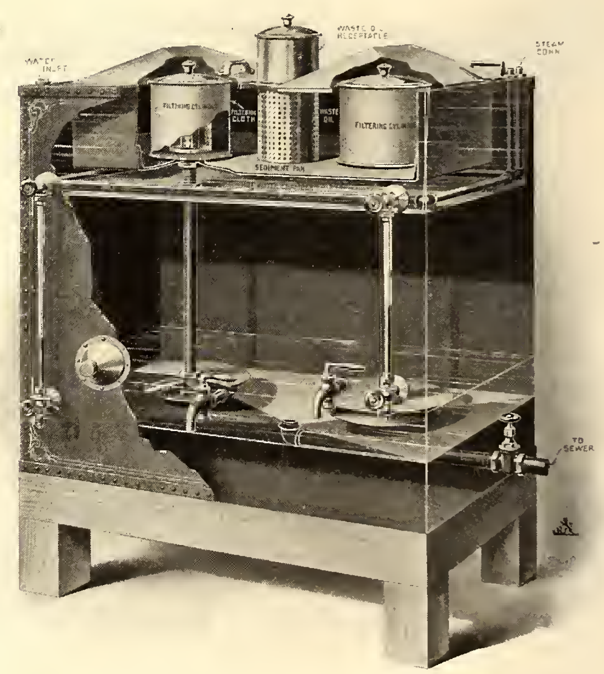
The Burt Manufacturing Company, of Akron, Ohio, has recently brought out a system of filtering oil in which a number of separate units may be connected to filter the oil used in a large plant. Each unit is independent in itself, and new units may be added as the plant grows, thus keeping the capacity of the oil filter system up to the size of the plant.

A sectional view of a single unit is shown in the accompanying illustration. The dirty oil enters the waste oil receptacle and passes through the small perforations, flowing thence horizontally to the two filtering cylinders, and in passing into these cylinders, the heavy impurities fall by gravity into the sediment pan. They are thus disposed of and do not clog the filtering cloths or filtering material. The filtering cylinders are wrapped with cloths through which the oil passes before entering the cylinders. The cylinders are filled with a quantity of animal bone-black, through which the oil must flow before entering the two tubes which lead from the cylinders to the bottom of the filter. Two plates are attached to the bottom of the tubes and the oil is spread out in a very thin film by means of these plates. It is thus thoroughly washed by the water in the filter, and any remaining impurities in the oil drop to the bottom of the filter and can be flushed out at any time desired by simply opening the gate valve, which connects with the sewer.

A hot-water chamber surrounds the upper part of the filter, which contains the filtering mechanism. The water in this chamber is heated by a small steam coil which is fed with live or exhaust steam from any convenient source. The oil is thus heated before filtering and flows more freely, thereby increasing the speed of filtration and the filter capacity. When the dirty oil is heated it spreads out, and most of the dirt and grit then falls into the sediment pan. The bulk of the sediment in this type of filter is at the top, where it can be readily removed without interfering in any way with the supply of pure oil for the oiling system. The maker guarantees that the filter will handle successfully the heaviest grades of oil, such as lard, gas engine and cylinder oil.

In the construction of the unit type of filter heavier iron is used than in the regular type of filter, and the body is riveted to a heavy wrought-iron frame. All seams are lap riveted and soldered. The upper and lower parts of the filter cylinders are made of cast iron, nickel-plated on the top. The tubes leading from the filtering cylinders to the bottom of the filter are of wrought iron. The filter is painted dark blue, decorated with gold, and is an ornament to any first-class power plant.

The filters are so constructed that they may be used with or without an oiling system. They can, if desired, be installed and operated at first without being connected with an oiling



BROKEN SECTION OF UNIT OIL FILTER

system, and later on, if an oiling system is added to the plant, pipe connections can readily be made to the filter at slight expense. It is not necessary to shut down a system and disconnect pipe connections to clean the filter. If more than one unit is used, it is only necessary to shut off the flow of oil to the filter to be cleaned, the other units being able to handle easily the extra amount. When only one filter is installed, the cloth around one cylinder can be removed instantly, and if the filtering material also needs to be removed, one cylinder is unscrewed and a plug which is furnished for the purpose is screwed into the tube, so as to keep the dirty waste oil from flowing into the filter. The other cylinder continues in operation while the first is being cleaned.

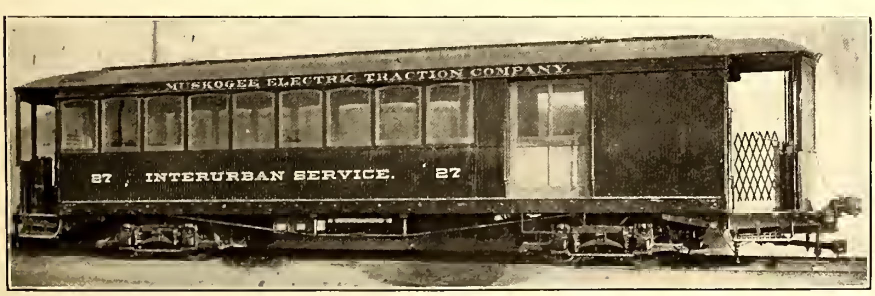
Any type of filtering material can be used in the cylinder, such as white waste, sponges, excelsior, raw wool, etc. The manufacturer recommends the use of animal bone-black, which is in use in all oil refineries for purifying oil. This material can be washed with hot water or gasoline and used many times. Filtering cloths may also be used to purify the oil. As any number of cloths may be wrapped around the filtering cylinders, and in changing them nothing but the cloths need be removed, the cloths can be removed while the filter is in operation without changing or touching any pipe connections.

This type of filter is recommended by the maker for use with gas engines of large capacity, as the hot water from the engine cylinders can be used for the purpose of heating the oil. It is also recommended for use in gas or steam turbines, for the reason that an exceptionally large quantity of oil is used on these machines, and the oil being very thin will flow rapidly through this type of filter, owing to the effect of the hot-water chamber at the top. This filter has been installed by a large number of prominent manufacturers in the United States. It has been largely adopted for use in the United States Navy, and also the Japanese and other navies.

A USEFUL TYPE OF CAR FOR MUSKOGEE, I. T.

An interesting car from the standpoint of economical construction is the one shown in the illustration, recently furnished to the Muskogee Electric Traction Company, of Muskogee, I. T., by the American Car Company. Although the car is a passenger and baggage combination type, the use of folding seats in the passenger compartment enables it to be used entirely as a baggage car. The arched roof with carline finish is not particularly attractive to look at, but is stronger than the usual monitor deck, and for the purposes for which the car is intended is very suitable. The bottom framing is powerful to permit heavy loads to be carried, and includes inside and under trusses, 8-in. x ⅝-in. sill plates and 4½-in. x 7¾-in. side sills. The sashes are composed of single lights, and are arranged to drop into pockets in the side walls. The incandescents are placed singly at intervals along the top plates of both compartments.

INTERIOR OF MUSKOGEE COMBINATION CAR, SHOWING PART OF SEATS FOLDED UP



COMBINATION CAR FOR THE MUSKOGEE ELECTRIC TRACTION COMPANY

It is unusual to mount so long a car as this on short-base trucks, as the speed required is not over 30 m.p.h., and the load to be carried will not exceed 20 tons. The builders' type of No. 27-G truck is well adapted to this service. Four 50-hp motors are used, which enable the car to be employed as a locomotive, and for this purpose it is equipped with steam car couplers, so that freight cars from sidings of the Missouri, Kansas & Texas Railway, with which the company's lines are connected, may be hauled to the various manufacturing plants in the vicinity. The car measures 37 ft. over the body and 45 ft. over the crown pieces; width over the side sheathing, 8 ft.; distance from center to center of the side posts, 2 ft. 9 ins. The truck wheel base is 4 ft., and the wheels are 33 ins. in diameter.

Muskogee is one of the most important trading centers in the eastern part of Indian Territory. It is situated in the fertile valley of the Arkansas River, and is on the line of the Missouri, Kansas & Texas Railway. The Muskogee Electric Traction Company operates fifteen cars, with 10 miles of trackage, and own Benson League and Hyde Park, popular amusement resorts in the neighborhood of Muskogee, reached by the company's cars.

THE MISSOURI VALLEY ELECTRIC RAILWAY

One of the most important electric railway projects arranged for some time is the Missouri Valley Electric Railway, concerning which brief mention was made in the Street Railway Journal of Oct. 21. The road will extend from Kansas City, Mo., to St. Joseph, and will be financed by Denison, Prior & Company, of Cleveland, and Thomas Nevins & Sons, of New York. To manage the property during construction a committee of five will be chosen, of which the members already selected are Warren Bicknell, president of the Lake Shore Electric Railway Company; L. W. Prior, of Denison, Prior & Company, and George B. Blanchard, of Thomas Nevins & Sons. According to information not available when the previous article was published, the line will be 58 miles long between terminals. In addition to this there will be 8 miles of spurs and 29 miles of double track.

Following the line out of Kansas City, it will bend to the northwest with the river and pass through Waldron and Farley, a little north of which place a spur will be built west to Leavenworth. Cars will be operated out of Kansas City in trains, which will split at the spur mentioned and operate in sections to St. Joseph and Leavenworth.

The main line, after passing the junction, will run through Beverly Station, Weston, Iatan, Bean Lake, Sugar Lake, Armour Station and Rushville. At this last-named point a spur will run southwest through Winthrop, across the Missouri River to Atchison. From Rushville the main line will follow the general bend of the river through Eveline and Kenmoor to St. Joseph, passing the famous summer resort of Lake Contrary on the way.

The road will be located on private right of way for the entire distance with overhead crossings of all railways, and will have an easy grade with few curves, permitting a schedule speed of 45 m.p.h. outside of city limits.

To secure entrance to Kansas City, a bridge will be built across the Missouri River, which will terminate at some place, yet to be decided, in the business district. At Leavenworth options are held on the Leavenworth Bridge & Terminal Company's property, which gives an entrance under favorable conditions to that city. At Atchison the present railroad bridge will be used, and at St. Joseph it is likely the company will operate over the city lines, as an offer has been made by the local company of 3 cents per passenger for all persons carried within the city limits, the Missouri Valley to man the cars and the local company to supply power.

Construction will follow closely the standard set by the latest interurban practice. Seventy-pound rails will be used and the track will be ballasted with crushed rock. From Kansas City to Leavenworth, where a 30-minute service will be necessary, a double track will be laid. The power house and the car houses will be located at Beverly, midway of the line, where a site has already been secured, and where are located several coal mines. The power house will be built of stone and brick with slate roof, and will be equipped for the generation of 3000 kw. The rolling stock will be in keeping with the high character of the construction. The motor cars will be equipped with the multiple-unit system for operation in trains, as previously stated. Freight equipment has been planned to care for the large coal traffic already offered. The general freight business in garden truck, milk and merchandise also promises to be large.

As to the cost of construction, the total is estimated as $4,446,393. It is estimated that the bridges, terminals, etc., will cost about $1,350,000. The 95 miles of single track, including power house, car stations, telephone line, block signal system and car shops, at an estimate of $29,962 per mile, will aggregate $2,846,393. The interest during construction is placed at $250,000, making the total to approach $4,500,000.

The total capital liabilities will be $15,000,000, consisting of $7,500,000 common stock and $7,500,000 5 per cent 30-year bonds. Of this total, $5,000,000 of bonds and $5,000,000 of stock will be issued at once.

AN IMPROVED CAR JOURNAL BEARING

That cool running and durability should be the essential

FIG. 1.—BRONZE SHELL FOR JOURNAL BEARING

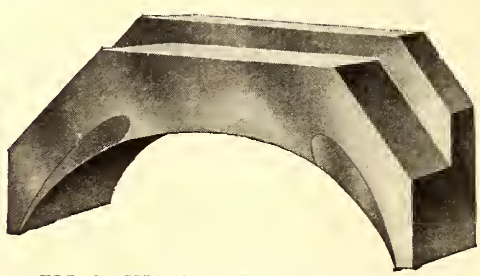


FIG. 2.—SHOWING BABBITT WORN TO LINE OF BRONZE

qualities of a bearing goes without dispute, but the fact that so many different compositions have been and still are being tried, proves that these two conditions have not yet been ful-

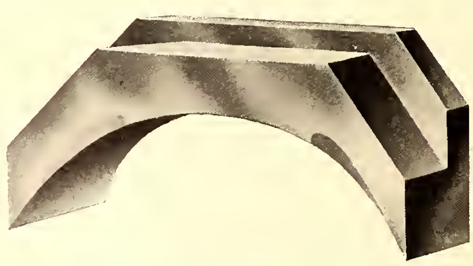


FIG. 3.—SECTIONAL VIEW OF CAR JOURNAL BEARING AFTER RUNNING 72,000 MILES

filled to the satisfaction of the railway companies. One of the latest inventors in this line is A. C. Stiles, whose fourteen years' experience, first as a locomotive engineer and then as a foreman of railroad foundries, has given him a most valuable practical knowledge of bearing troubles and their correction. Mr. Stiles has invented a locomotive driving journal bearing and a car journal bearing, both of which are now manufactured by the A. C. Stiles Anti-Friction Metal Company, of New Haven, Conn. As the car journal bearing is of special

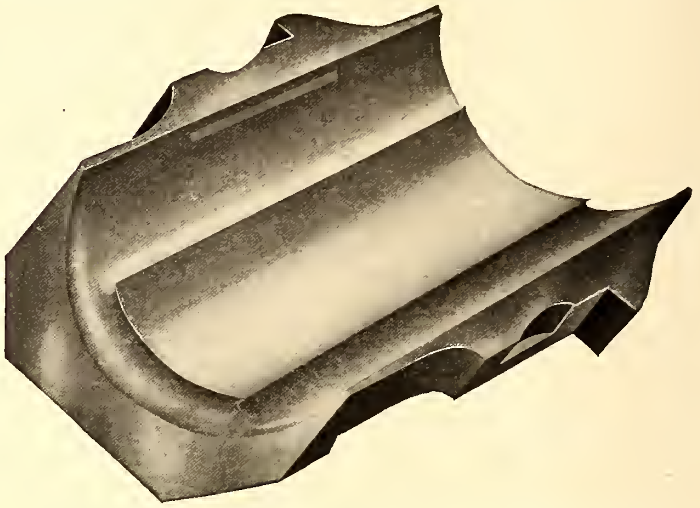


FIG. 4.—INSIDE VIEW OF CAR JOURNAL BEARING BEFORE BABBITTING, SHOWING THE CROWN OF BRONZE FITTED TO THE EXACT SIZE OF THE JOURNAL

interest to electric railways, it is described and illustrated herewith.

The accompanying Fig. 1 illustrates the bronze shell, made according to a formula insuring exceptional durability. The bearing point is of the same curvature as the journal, so that should the babbitt be melted out from any cause, the journal would find a perfectly fitted body in which it could run safely.

The method of babbitting is certainly new and interesting. Where most roads use a plain lead lining of about 3-16 of an inch tinned to a shell bored to the circumference of the journal, Mr. Stiles plans for a much thicker coating of babbitt which is interlocked to the shell by the ingenious method shown in Fig. 4. As the journal wears the babbitt lining, it rests in a bed fitted to it at all times. Fig. 2 shows how the babbittt has worn to the line of the bronze. As it continues to wear down, even after the bronze shell has begun to wear, the journal is at all times fully protected. Even when worn down to a point, the journal is so protected at the sides by the babbitt that it cannot wedge. The journal cannot at any time touch the bronze, except at the

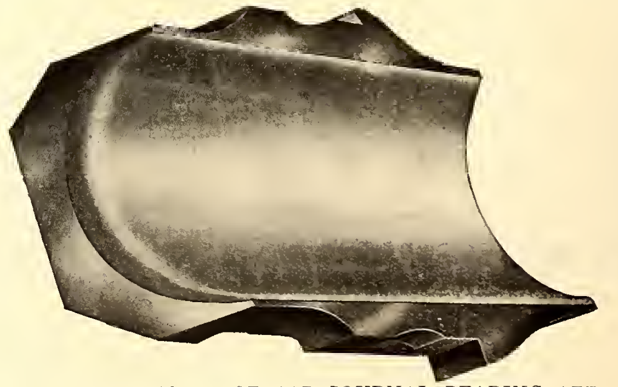


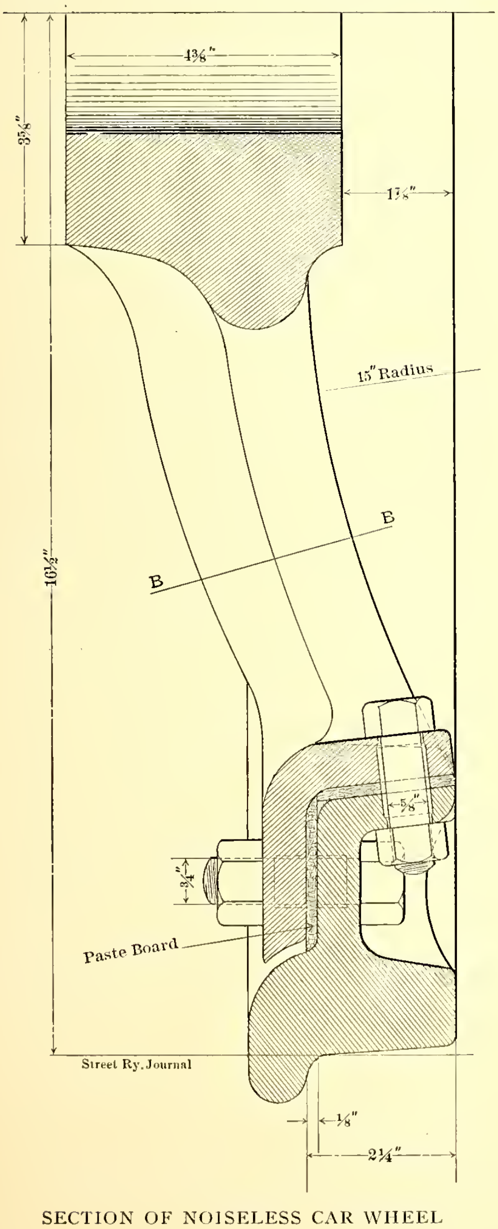
FIG. 5.—INSIDE VIEW OF CAR JOURNAL BEARING AFTER BEING BABBITTED AND READY FOR USE

point prepared for its reception. Fig. 3 is a reproduction of a bearing which ran 72,000 miles.

The babbitt prepared by the company naturally plays an important part in the satisfactory work of this bearing. It has been the manufacturer's aim to produce a bearing hard enough to carry the necessary weight and to be durable, yet sofe enough to readily conform to the wear caused by the revolution of the journal. The value of such an anti-friction metal is inestimable. The longer a bearing will run, the cheaper it becomes, of course, as the frequent hauling off of a car is expensive. Fig. 4 shows the inside of the car journal bearing before babbitting, and Fig. 5 is a view of the same journal bearing after babbitting and ready for use. This bearing is extensively used on the Consolidated Railway Company, of New Haven, Conn.

A NOISELESS CAR WHEEL

To avoid the necessity of taking a car wheel off the axle after the flange and tread have worn out, C. W. Haight, of Dayton, Ohio, has brought out the Hoagland noiseless car



SECTION OF NOISELESS CAR WHEEL

wheel, which is made in two pieces. One piece of this wheel forms the center, which is provided with an exterior flange, and bearing surface. In this flange are cored bolt holes for 14¾-in. bolts. The bearing surface is made on an incline of ⅛ in. in 2 ins., which makes it possible to form a joint and get the necessary pressure required from the bolts. The outer ring or tire is provided with an inverted flange which has cored bolt holes to match the holes in the center part; it also has a bearing surface to meet the one on the inner part of the wheel. The flange on the center part is on the inside, projecting outward. The tire flange is on the outside, projecting inward. Between these two flanges is a space of about 1¾ ins.; in this space is the bearing surface. Between the two castings there is sufficient room for a 3-16-in. paper packing. No parts of the two castings come in connection with one another; no bolt holes are drilled, and the only machine work which is necessary is the grinding of the inside sides of the flanges and the bearing face, only to grind off rough spots and lumps, thereby avoiding lathe and drill press work. It is not necessary to grind to a polished surface.

The taper on the bearing face forms a wedge, which presses the paper packing between the two castings, and the pressure is secured by twelve or fourteen ¾-in. bolts and a wrench 20 in. long. In putting one of these wheels together the center and tire can go together about one-third of the bearing face before it comes to a solid bearing, and two-thirds is thus pulled up with bolts, furnishing with a suitable wrench from 12 tons to 15 tons pressure, and thus avoiding a hydraulic press.

The bolts and nuts used in the construction of these wheels are secured by nut locks. One nut lock is placed between the bolt head and casting, and another between the nut and casting. The bolts, nuts and the nut lock under the bolt head can be used over and over again, but the nut lock under the nut will split in two or more pieces in taking off the nut.

Among the advantages claimed for this wheel are the following: The paper packing between the two casting acts as a cushion; no ringing sound in the wheels; great reduction of noise when running; prolongs the life of the roadbed and truck apparatus; cheapness of the wheel after once placed in service, as it will cost little over one-half of an ordinary car wheel to renew the tire, which is the only part of the wheel that wears out; the wheel has a deep uniform chill all around, and no soft spots can form in its tread, as the tire is of uniform thickness with no spoke in it; no possible chance for this wheel to break in running over railroad crossings, frogs or by frost in cold weather, as the cushion in them prevents cracking; the tire on solid wheels is only supported at each spoke, but in this wheel it is equalized—a fact of great value.

It is interesting to note that this car wheel has been used for four years on the Chicago & Milwaukee Electric Railway, and that several of this company's officials have expressed themselves as being highly pleased with the results that this wheel has given in practice.

BROOKLYN POLYTECHNIC RAILWAY LECTURES

It may be remembered that last year the Polytechnic Institute of Brooklyn, N. Y., instituted a series of evening lectures on various branches of engineering by distinguished specialists. This innovation proved very successful, and was therefore continued this year on a broader scale than before. In the special transportation course, covering fourteen two-hour lectures and five extensive tests, the first lecture was given on October 17 by Prof. Lardner.

Mr. Lardner's subject was "How to Route the Line and Determine the Most Suitable Service." Not only did he consider the layout of entirely new lines, but also the methods that should be followed in arranging a more profitable routeing of an existing system. In taking up some recent census statistics covering track mileage and population, the lecturer called attention to the interesting fact that a strong relation exists between the size of the city and the number of times each passenger is carried annually. Going further into the government figures, Mr. Lardner took up the cities of different classes, and pointed out the special transportation conditions existing in various localities. He then went into the question of fares and their relation to earnings, concluding with a clear and concise explanation of schedule making.

FINANCIAL INTELLIGENCE

WALL STREET, Oct. 25, 1905.

The Money Market

Increased ease characterized the money market this week, rates for all maturities ruling somewhat below those recently quoted. The lower rates were due in part to the further substantial gain in bank reserves, as shown by the statement of the Clearing House banks, published on last Saturday, and to some pressure of funds by the near-by out-of-town institutions. Local lenders were inclined to regard the present ease as only temporary, and displayed no disposition to place their funds upon the market. A noteworthy feature of the market was the continued scarcity of cotton bills, which resulted in a further sharp advance in the price of demand sterling to 4.8685, or within a half cent of the gold export rate. Further advances in sterling are expected, and should the outward movement of the yellow metal begin, money rates in the local market would probably advance to a point which would make such operation unprofitable. The much talked of Russian loan was announced during the week. It amounts to $240,000,000, which is less than had been generally expected. Of the total amount Paris will take $130,000,000, Berlin $70,000,000, and London and New York $20,000,000 each. It is understood that payments will be so made as to relieve the international money market of any unnecessary pressure. It is expected that as soon as the Russian requirements have been satisfied, Japan will place a loan, which, with the other demands for funds, will be sufficient to hold money rates firm until currency begins to return from the interior. The foreign markets have remained firm, but discount rates at the principal European centers have not changed materially.

The statement of the Clearing House banks, published on last Saturday, was very satisfactory. Loans decreased $3,594,200, while there was an increase in cash of $1,797,200. The reserve required was $575,550 less than in the preceding week, which, together with the increase in cash, resulted in a gain in the surplus reserve of $2,371,750. The surplus is now $12,583,150, as compared with $17,853,925 in 1904, $17,944,450 in 1903, $17,781,475 in 1902, $14,713,175 in 1901, and $6,031,825 in 1900. Money on call loaned at 5 and 3 per cent, the average rate for the week being about 4½ per cent, as against 5 per cent last week. Three and four months accommodations were obtainable at 4¾ per cent, while six months maturities brought 4½ per cent. Commercial paper ruled extremely quiet but unchanged, at 5 per cent for the best names.

The Stock Market

Monetary considerations have again dominated the general share speculation during the past week, although in a somewhat different manner than has been the case of late. Heretofore the tendency for both time and call money has been upward, and in consequence of their speculation for the rise has been considerably restricted, while at intervals bearish aggressiveness has resulted from the same cause. In the week under review, however, rates for both time and call loans have shown a distinct declining tendency, largely because of a pronounced let up in the demand for currency from the interior, and the continued liberal offerings of funds here from out-of-town institutions, and this has led to more or less buying of stock for the bull account, and a general, if somewhat irregular, upward movement iin prices. The irregularity alluded to was occasioned mainly by a pronounced hardening in sterling exchange rates to a point which would seem to foreshadow early exportation of gold from this country. This was the one disturbing element in the situation, but apart from creating some hesitancy among buyers on different occasions, its effect was practically nil, as while speculation continued chiefly professional and the outside public refrained from coming in to any considerable extent, the buying of stocks generally was certainly better than the selling and of a very confident character. That this is so is evidenced by the fact that several stocks have, during the week, reached a higher level than for a long time past, a notable case in point being United States Steel common, which touches the highest figure in two years, while several made new high records, chief among them being the anthracite coal stocks and those of some of the railway equipment manufacturing concerns. Specific reasons for the buoyancy developed in the individual instances cited are to be found in the continued unprecedented prosperity of the steel industry, which promises to bring the earnings of the Steel Corporation to the highest point ever attained, the exceedingly heavy tonnage now being transported by the hard coal roads, and the unequalled business at present being carried on by all those companies having to do with the equipment of the railroads. Abundant evidence of this is afforded by the fact that in practically all cases these corporations now have on their books a very much larger amount of unfilled orders than ever before. In general, and apart from monetary conditions, the situation has been, and still is, in favor of higher prices in the stock market. The crop situation remains unchanged. Railroad earnings generally continue to show gratifying increases over those for the corresponding period of last year, and trade in practically all of the branches is still on a thoroughly satisfactory basis.

The varying phases of the local political situation have, to some extent, affected the market for the local traction stocks, and at different periods of the week these shares have been inclined to run off, a marked exception to this rule being Brooklyn Rapid Transit, which, in response to revived rumors of buying for control by Pennsylvania Railroad interests, developed pronounced strength and activity and sold at higher prices than for a long time heretofore. Therefore the rumors in circulation concerning this property have not been confirmed, and there are many who doubt their authenticity. However, the buying of the shares has been very good, and participated in largely by Boston and Philadelphia, which centers have become more than ever impressed with the immense earning capacity of that system.

Philadelphia

The dullness prevailing in the general securities market this week was reflected to a great extent in the local traction group. Dealings included an unusually small number of issues, none of which developed activity, and although prices generally ruled firm, the net changes were insignificant. Philadelphia Company, which has furnished the active feature for several weeks past, was extremely quiet, less than 5000 shares changing hands. From 48⅞ at the opening the price ran off ⅜, but subsequently it rose to 49, and closed at the highest. The preferred stock was almost entirely neglected, only twenty shares selling at 49. Philadelphia Traction ruled firm, about 300 shares changing hands at prices ranging from 100 to 100¼. Philadelphia Rapid Transit sold in small amounts at from 28⅜ to 28. Rochester Railway & Lighting preferred brought 96 for 155 shares, and 110 shares of United Traction of Pittsburg preferred brought 50. Union Traction was dealt in to the extent of about 400 shares, at from 63¼ to 62⅞.

Baltimore

There was a further sharp falling off in the dealings in the local traction issues, and apart from United Railway incomes and the stock, the price fluctuations were confined to extremely narrow limits. United Railway free stock sold to the extent of about 2000 shares, at from 16½ to 15½. The deposited stock sold at 16¼ and 16 for 1000 shares. The income bonds brought prices ranging from 66⅝ to 65¾, and back to 66¼, upwards of $65,000 changing hands. The 4 per cents were quiet, $34,000 selling at 93 and 92⅞. The investment demand was extremely quiet; $6,000 Norfolk Railway & Light 5s brought 97, and $5,000 City & Suburban 5s sold at 114¾. Other sales included $1,000 Baltimore City Passenger 5s at 107, $3,000 of the 4½s at 103¼.

Other Traction Securities

The feature of the Chicago market was the sale of a small lot of Chicago City Railway stock at 204, or 4 points above the price at which the present owners acquired control. North Chicago sold at 85 for 100 shares, and 300 Chicago Union Traction brought 11¾ and 11½. Metropolitan Elevated fluctuated between 26¾ and 28, 697 shares changing hands between those prices. The preferred stock brought 70¼ and 71 for 104 shares. In the Boston market, Boston Elevated declined a full point to 153, on the exchange of about 300 shares. Boston & Worcester common sold at 26 for a small lot, and odd lots of the preferred sold at 73 and 72⅞. Massachusetts Electric common was weak, transactions taking place at from 14⅝ to 13¼, while 100 preferred brought 56 to 56½. Other sales included West End common at 99½, West End preferred at 105¾, and $2,000 of the 4s of 1914 at 105¾. The feature of the New York curb market was the activity and strength in New Orleans Railway issues, all of which sold at the highest prices attained since the reorganization. The strength was based upon the belief entertained that the preferred stock will be placed upon the dividend-paying list in the near future. Of the common, 3400 shares were dealt in, at from 36 to 38¼, while 2100 shares of the preferred brought 79⅜ to 84¼. The 4½ per cent bonds brought prices ranging from 90⅛ to 90¾ for $62,000. Interborough Rapid Transit was fairly active, 2100 shares selling at from 215½ to 212. Other transactions included $1,000 Washington Railway 4 per cent bonds at 91¼, 300 Public Service Corporation stock at 101, $25,000 5 per cent notes at 96 and interest, and $50,000 certificates at 63 and 62, $20,000 North Jersey 4s at 76 and interest, and $20,000 Jersey City, Hoboken & Paterson 4s at 74 and interest.

Cincinnati Street Railway had a fractional decline on the Cincinnati market last week, selling at 146 to 146½, Cincinnati, Newport & Covington common had an upward movement, over 1000 shares selling with a range of 41½ to 45, the latter the close; the preferred sold at 95 for several lots. Cincinnati, Dayton & Toledo made a fractional advance to 24¼, and there were important sales in the 5s of this company, with an advance from 98¼ to 98½. Detroit United sold at 92, a decline of 2½ points from last sale. Toledo Railways sold at 34; Ohio Traction, preferred, sold at 107½.

The strong bull movement still continues on the Cleveland market and the heaviest week in tractions on that market was recorded. Nearly every issue shared in the advance. Western Ohio Railway was the strongest card, over 3000 shares selling up from 18½ to 20⅝; strong talk of leasing the property and the approaching completion of the through Cincinnati-Toledo connection being responsible for the movement. Western Ohio bonds came into great demand for the same reason, over $125,000 worth selling up from 85½ to 90. Northern Ohio Traction & Light re-entered the active list on hint of a stock dividend, about 300 shares selling with a range of 25 to 27⅞. The 4 per cent bonds sold up from 73⅜ to 76½, and the 5s from 87 to 90; $112,000 worth changing hands. Magnificent gains in earnings were responsible for the advance of Lake Shore Electric common from 15⅞ to 17⅜, sales about 1500 shares. The old preferred stock moved up from 60½ to 63, and the new preferred from 56 to 57; few sales however, as holders were inclined to hang on. Fifty thousand worth of the general 5s of this company sold up from 85½ 87½. Cleveland Electric sold at 84 to 84⅜. Aurora, Elgin & Chicago common had another sharp advance from 32 to 35 and the preferred from 91 to 94, but the sales were fewer in numbers than on previous weeks, as holders look for still higher prices. Thirty-five thousand worth of the 5s sold at 98 to 98½. Inside-pool buying and talk of consolidation with Lake Shore Electric was responsible for the advance of Cleveland & Southwestern common from 16½ to 19, and the preferred from 60 to 65. The early part of this week it became evident that the crest of the boom had been reached and there were fractional declines on nearly all issues, with fewer and smaller exchanges. Lake Shore Electric common sold at 16; Aurora, Elgin & Chicago at 33; Western Ohio at 19½.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Oct. 18	Oct. 25
American Railways	52	52
Boston Elevated	153	153
Brooklyn Rapid Transit	72¼	78
Chicago City	199	200
Chicago Union Traction (common)	11¾	11¼
Chicago Union Traction (preferred)	—	—
Cleveland Electric	75	—
Consolidated Traction of New Jersey	82	82
Consolidated Traction of New Jersey 5s	108½	108½
Detroit United	92	92
Interborough Rapid Transit	214	212½
International Traction (common)	39	36½
International Traction (preferred) 4s	73	74
Manhattan Railway	166	166
Massachusetts Electric Cos. (common)	13¾	13
Massachusetts Electric Cos. (preferred)	56	56
Metropolitan Elevated, Chicago (common)	25½	28½
Metropolitan Elevated, Chicago (preferred)	70½	71
Metropolitan Street	125⅝	125½
Metropolitan Securities	80⅜	80½
New Orleans Railways (common), W. I.	36	38
New Orleans Railways (preferred), W. I.	79¾	83½
New Orleans Railways, 4½s	89½	90¾
North American	97	97½
North Jersey Street Railway	28	28
Philadelphia Company (common)	48⅝	48⅝
Philadelphia Rapid Transit	28⅛	27¾
Philadelphia Traction	100	100
Public Service Corporation 5 per cent notes	96	96
Public Service Corporation certificates	64½	64
South Side Elevated (Chicago)	96	96
Third Avenue	124½	124
Twin City, Minneapolis (common)	116	117¼
Union Traction (Philadelphia)	62½	62½
West End (common)	99	99½
West End (preferred)	114	114

W. I., when issued.

Iron and Steel

The "Iron Age" says the bookings of finished iron and steel continue on an enormous scale, and thus far this month are nearly up to the record-breaking rate of September. The pressure in many quarters is enormous, and the plants are provided with work for long periods. There is a most intense activity in all directions. In the Eastern steel trade there has been another outburst of buying of basic pig iron for delivery during the winter, and fully 75,000 tons have been taken at advancing prices, with negotiations pending for at least half as much more. A scarcity of pig iron and steel is developing in the Chicago district, and it is likely that iron may be shipped from lower lake ports to that district by water before navigation closes. The United States Steel Corporation has secured options, at $16 and $16.50, on practically all the Bessemer pig available in the Mahoning and Shenango Valleys to the end of the year, the only exception being one lot of 10,000 tons held by a merchant. In the steel trade a number of fair orders have been booked, and some additional tonnage is looming up. Inability to make prompt deliveries of structural material continues to be the only serious phase of the situation in that branch. A large business has been done in bars, and sellers are holding back. The cast iron pipe shops are very busy. The reports from foreign markets are excellent.

ANNUAL MEETING OF THE MEXICO ELECTRIC TRAMWAYS, LTD.

The eighth annual meeting of the Mexico Electric Tramways, Ltd., was held Sept. 27, at the office of the company in London, under the chairmanship of Sir Chas. Euan Smith, president of the company. An abstract of the operating report for the year ending Dec. 31, 1904, follows. The Mexican account represents the report of La Compania de los Ferrocarriles del Distrito Federal de Mexico, and is in Mexican dollars. The London report is that of the holding company and is in English currency.

MEXICAN ACCOUNT

Traffic income		$3,236,549
Miscellaneous		38,199
Gross earnings from operation		$3,274,748
Operating expenses		2,046,073
Gross income less operating expenses		$1,228,675
Interest on funded debt	$600,000	
Dividends	175,000	
		775,000
Profit transferred to London		$453,675

LONDON ACCOUNT

Balance ($453,675, @ 22¾d.)		£43,004
Interest and dividends on Mexican securities ($415,000)		41,338
Transfer fees		6
Gross earnings		£84,349
Operating expenses	£1,812	
Interest and commissions on advances	7,263	
Interest on debentures	20,000	
Miscellaneous	1,377	
		30,452
Balance transferred to balance sheet		£53,897

In his report, the chairman explained that the company has now 234 km of track, of which about 149 km are equipped with electricity, 16 km by steam and 69 km by animal traction. The line has recently been put in very good mechanical condition and will have to be extended before long. The chairman spoke in the highest terms of the present manager, W. W. Wheatly, under whose direction the system has been rapidly developed during the past two years. He also stated that arrangements had been completed with the Necaxa Company for the supply of power from its water-power plant. The chairman had recently returned from a trip to Mexico.

AN EXTENSION OF RIGHT TO LIMIT TRANSFERS GRANTED MASSACHUSETTS COMPANY

The railroad commissioners have issued an order granting the Newton & Boston Street Railroad Company, controlled by the Boston Suburban Electric Companies, an extension of time for the withdrawal of certain free transfers in the city of Newton. A year ago the board sanctioned the discontinuance of these transfers for an experimental period. The commissioners are of the opinion from the operations of the company for the past year that the company should be allowed to continue the withdrawal of these transfers until the first of January, 1907, when the question may be taken up again.

SINGLE-PHASE LINE FOR MAINE

Plans are making by the Eastern Traction Company for building a 38-mile electric railway between Bangor and Dexter, Me. The company was incorporated in December, 1903, and its plans are sufficiently well advanced now to warrant it in stating that construction will be begun early next year. The road will start in Bangor at a point on or near Buck Street, and proceed to Hermon, crossing the Northern Seaport Railway at a point some 800 feet from the city limits of Bangor. From Hermon it will continue to Levant, from which place it will swing to the west, touch South Levant and continue up the valley of Black stream to a point a mile distant from West Levant village. From here it will extend westward to East Stetson, thence to South Exeter and to Exeter. From here the course is westerly into West Garland. After passing West Garland the road will follow the northern shore of Pleasant pond, thence through the valley to Dexter. It has been decided to equip the line with the single-phase system. The officers of the Eastern Traction Company are: H. Franklin Bailey, of Old Town, president; Edgar B. Weeks, of Old Town, treasurer; Forrest J. Martin, Esq., of Bangor, attorney and clerk. These officials, together with Charles W. Mullen and Fred T. Dow, of Bangor, and William H. Waterhouse, of Old Town, compose the board of directors.

MASSACHUSETTS COMPANIES MUST APPLY TO COURTS BEFORE ABANDONING ANY PART OF ROUTE

The Railroad Commissioners of Massachusetts have issued a decision which is important in all parts of the State as a precedent, though the case in question is in Essex County. In this case the Selectmen of Merrimac and Amesbury, making common cause with citizens along the Pleasant Valley line of the Citizens' Electric Street Railway Company, asked the Commissioners to approve their order that the company reopen the line, which had been abandoned for many months, so that the roadbed, for lack of repair, had become unsafe. The Pleasant Valley line was built in 1889 as an extension of a horse railway. Afterward the Haverhill & Amesbury Street Railway was built, making a shorter route and leaving the former route one side, so that it was run at a heavy annual loss. Then the company stopped running cars over it. The selectmen tried to compel the company to restore the service. After reciting the facts and the law relied upon by the selectmen and the company, respectively, in opposition to each other, the commission continues and rules as follows:

The company claims that it has lawfully abandoned this line, and asks for a ruling that the right to do so is recognized in section 36, chapter 112, Revised Laws, which authorizes Boards of Aldermen or Selectmen to order the removal of tracks from the streets in case their use has been discontinued for six months. The Board declines to make that ruling, being of the opinion that the statute in question provides a punishment for the discontinuance of a service rather than recognizes a right to discontinue it.

On the other hand, chapter 376, acts of 1905, the statute under which the Selectmen have acted, in our opinion has no application to a railway out of repair, out of use, and abandoned in fact if not in law. That statute originated in the days when horse cars threatened to encroach upon other uses of the streets. To protect such other uses the Legislature empowered Boards of Aldermen and of Selectmen to limit the number and routes of cars and the extent to which they should occupy public ways.

The question is whether or not the Citizens' Electric Street Railway Company may properly or lawfully refuse to operate its Pleasant Valley line and at the same time retain the right to operate the rest of its railway. To determine this, appeal should be had to the Legislature or to the courts, which can alone effectually deal with the situation. That has been the course taken to determine the rights of parties in cases of a kindred character in this and other States.

ELECTRIC-STEAM COMPETITION IN ENGLAND

United States Consul Murat Halstead, of Birmingham, England, in a recent report, speaks of the steam-electric traction competition in that country. He notes that the chairman of the Great Eastern Railway, at its eighty-sixth half-yearly meeting, complained of the competition of electric railways. The Great Northern seemed to have suffered more than any other company by electric street car competition. It carried 350,000 fewer passengers in York, and though it carried 400,000 more in the London district, they had received less money for doing so. Of the adverse influences from which the British railways have been suffering, increased taxation demands from local authorities, war abroad, and new forms of competition, the latter the "Times" considers the most serious because, in order to correct it "a graduated transformation of existing methods of haulage seems inevitable. The future is with electricity as an agent of transportation, although at present its application to long-distance traffic has not become practical. In the meantime a beginning will probably have to be made with short-distance business by providing electrical power on sections of the various systems. Several companies have been experimenting, with more or less success, with motor cars on short lengths of line, a measure which may be regarded as a half-way house to the use of electricity. It seems to us that in large cities served by more than one company whose directors are turning their minds to this problem it would be well, if possible, to work together, by erecting joint power houses, the cost of supplying current on a large scale being less than when it is produced in smaller quantities. No difficulty has been found in erecting joint stations in Nottingham and elsewhere with capital guaranteed by the companies concerned, and the principle could surely be applied to joint electrical works."

EXTENSION OF POLICE TRAFFIC SQUAD IN NEW YORK

A further extension is proposed of the work of the New York police traffic squad. The new application has to do with the Brooklyn Bridge, but this time with the Brooklyn terminal, as the solution of the regulation of traffic at the New York end was worked out satisfactorily some time ago, greatly to the betterment of street railway travel and the safety of pedestrians. Turning off the bridge roadway at Sands Street, Brooklyn, cars of various lines branch to the west toward Fulton Street and to the east toward Washington Street. Mixing with the cars now is traffic from Sands Street, Washington Street and Liberty Street, to which vehiclar traffic is diverted from lower Fulton Street. On Nov. 11, the date set for putting into use the plans adopted by the police, no teams of any kind will be permitted to pass on Sands Street between the north and the south roadways of the bridge, but all those desiring to reach the north roadway from the direction of Fulton and Liberty Streets, will be turned through High Street to the easterly curb of Washington Street, so that they will parallel the New York bound line of cars. Those approaching from the easterly direction will be diverted to Sands street, following the northerly curb and paralleling the cars on that street.

A mounted policeman will be stationed at the point where the two lines converge to enter the bridge roadway, who will hold up one line of cars and trucks while others enter the roadway. While the Washington Street cars and trucks are waiting to allow the Sands Street division to proceed, the crossing at High Street and Washington Street will be kept open to permit the trucks waiting on High Street to cross over to their proper place on Washington Street. During the rush hours no cars will proceed east on Sands Street from below Adams Street. All lines using either of those thoroughfares being diverted around the Prospect Street loop, so that under no circumstances will there be any crossing either by teams or cars of the Manhattan bound line of travel. Teams coming down Sands Street and not destined for the bridge will be turned down Washington Street to Prospect or any other convenient street. Coming off the bridge, all teams will be sent directly over the tracks to the Plaza between rope railings to Liberty Street, there to distribute themselves as required.

Only four lines of cars will turn east from the bridge roadway on Sands Streeet, toward Washington Street, namely, DeKalb Avenue, Smith Street, Vanderbilt and Park Avenue lines. As these will turn north along Washington Street, they will not cross the incoming line of travel until they reach High and Concord Streets, respectively, where there will be a better opportunity for turning off.

THE RIGHT TO LAY GUARD RAILS

An interesting case has just been decided in Wheeling, W. Va., which defies the rights of a railway company to use certain construction in the streets, even when this construction is opposed by the road commissioners. An injunction was secured recently by the County Commissioners, of Marshall County, against the Wheeling Traction Company, because it laid a guard rail on one side of its track where the roadway lay along the bank of a dangerous hill. The authorities claimed that the franchise of the company provided that the rails should be laid on a level with the roadbed; that the guard rail constituted a nuisance to vehicles, and that in spite of a notification to the company not to lay the rail, it did lay the rails. The decision which was rendered by Judge Hervey, of the County Court, dismissing the injunction declares that the franchise of the company does not state what kind of rails should be used, but that the company was under an obligation to make its road as safe as possible. The evidence did not indicate that the guard rail was a serious obstruction to vehicular traffic on the road, or that there was any better way of protecting the location. The court held, therefore, that the guard rail was as much a part of the road as the running rails or the wire and poles and must be held to be included in the original grant of right of way.

MEETING OF NEW ENGLAND STREET RAILWAY CLUB

The monthly meeting of the New England Street Railway Club will be held at the American House, Boston, on Thursday evening, Oct. 26. Dinner will be served at 7 o'clock sharp, and at 8 o'clock the regular business meeting will be held, followed by a talk by A. H. Armstrong, engineer of the railway department, General Electric Company, Schenectady, N. Y., on "Electric Locomotive in Heavy Haulage Work." The lecture will be illustrated by the use of a stereopticon.

KANSAS GAS, WATER, ELECTRIC LIGHT & STREET RAILWAY ASSOCIATION

The eighth annual meeting of the Kansas Gas, Water, Electric Light & Street Railway Association was held in the Mercantile Club Room, Kansas City, Kan., on Oct. 13 and 14. The secretary's report showed that the total membership on Oct. 13 was 94, including honorary, active and associate members.

Papers on the following subjects were read and discussed: "The Tantalum Lamp," by Prof. B. F. Eyer; "Public Utilities and Municipalities," by Prof. E. H. Bailey; "The High Efficiency of High Candle-Power Lamps," by J. F. Shaefer; "The Need of Sewage Disposal in Kansas," by R. E. McDonnell; "Co-operation in Management of Gas, Water, Electric Light and Street Railway Companies," by C. R. Maunsell; "Relative Heat-Producing Values of Natural Gas, Oil and Coal," by Prof. Erasmus Haworth.

Of especial interest to street railway interests was the paper by Prof. Bailey on "Public Utilities and Municipalities." In presenting his paper Prof. Bailey gave a summary of the waterworks, gas plants and electric light stations owned by the cities in which they are located. In proceeding he said frankly, that the present demand for municipalization of public utilities was due, in part at least, to the fact that private corporations have not in the past done their best to supply these necessities at a fair rate of compensation, and of good quality. He then quoted from an editorial in the "Kansas City World" dealing with government regulation of the railroads which closed with these words as a note of warning: "Those who deplore government ownership, or the agitation of it, should be foremost in encouraging all reasonable steps to avoid it. The present policy of the railroads is directly in line with the promotion of extremely radical agitation. The people, once they are aroused, must be met with fairness or they will go to extremes. That is not a matter of conjecture. It is a matter of human nature, demonstrated by abundant precedent."

Prof. Bailey said that in the case of street railways there are so many things that go to make what is called "good service" that they cannot be enumerated. The fact is that the supply of gas, water and electric lights to the people must be upon a different basis from the supply of potatoes, furniture or neckties. In the latter field, if the goods are inferior, we take them back or get a rebate, or patronize some other house, but when we do not find the gas or water or electricity satisfactory, we are told that "we can go without"—when the company knows that usually we cannot go without. Since the corporation that has these necessities to sell has the advantage, it would be the best policy to meet the public half way, even at the temporary loss of a little revenue.

The following officers were elected for the coming year: President, W. E. Sweezy, Junction City; first vice-president, S. W. Sterrett, Kansas City; second vice-president, F. B. Aley, Wichita; third vice-president, C. L. Brown, Albine; secretary and treasurer, James D. Nicholson, Newton. The next meeting will be held in Lawrence, Kan., the latter part of October, 1906.

THE MILAN EXPOSITION

It is the opinion of United States Consul Dunning that American manufacturers have considerably underestimated the relative importance of the Milan Exposition of 1906, which will continue from April to November in celebration of the opening of the Simplon Tunnel, and which will be a world's fair. Since the constantly increasing correspondence of the consulate at Milan seems to indicate a growing desire on the part of American exporters to sell their goods in Italy, Mr. Dunning believes the Milan Exposition affords an unusual opportunity for firms whose products naturally meet with the sharpest kind of European competition. If present tariff movements in more than one country in Europe may be taken to mean anything definite and significant toward American trade, it seems that our manufacturers will require a better representation of their goods on the Continent in future than ever before.

The exposition is to be on the grand scale with which visitors to Chicago, Buffalo and St. Louis are familiar. Every branch of art, science, agriculture and the industries will be given ample space and adequate opportunities for exhibition. The entire fair will cover more than 1,000,000 sq. m (10,764,200 sq. ft.), of which one-quarter will be covered by buildings which are already rapidly approaching completion. Japan, Germany, France, Mexico, Belgium, Switzerland, Austria, Great Britain and Italy will be officially represented at the fair; and nearly every other country in the world, including China, and the most active of the South American nations, will be largely represented as to their trades and evidences of their progress in every line of endeavor.

25,000-MILE RUN OF ELECTRIC LOCOMOTIVE

The New York Central locomotive No. 6000, which is being tested at the Schenectady experimental track and which was built by the General Electric Company and the American Locomotive Company, made its 25,000th mile at 1:15 p. m. on Oct. 20, 1905, thus completing the first half of the 50,000-mile test to which it is being subjected. The motors on the locomotive to-day are those with which the test began; the commutators are perfectly smooth; the brushes have run the 25,000 miles with a wear of only 3/8 in., and appear fit to complete the 50,000-mile run.

During these tests, the locomotive has been in service regardless of weather, running light or with trains up to twelve cars in length. A speed of 85 miles an hour has been indicated, and in competition the electric locomotive has easily beaten the fastest steam trains on the New York Central

The total cost of all repairs on the locomotive, excluding the injury caused when the shed in which it was housed was burned, has been $428.17 for 25,000 miles. This is an average of $0.017 per mile run, and every indication is that there will be a material reduction of expense on the second half of this run.

CONSOLIDATED GETS ANOTHER COMPANY

The Springfield Street Railway, one of the properties acquired by the Consolidated Railway Company, has leased the Springfield & Eastern Street Railway, a line operating 30 miles of track east of Springfield, Mass. For a number of years there has been keen competition between the two companies for the right to enter new territory. The statement of the terms upon which the lease is made has not been made public. What is considered important in the acquisition of the Springfield & Eastern Railway is that, by the construction of a line from Palmer to Fiskdale, as is proposed, a connection will be established between the New Haven trolley system of Western and Central Massachusetts. From Fiskdale, connection is made with the Worcester & Southbridge Street Railway, another New Haven property, and that connects with the line reaching from Worcester through Webster into Connecticut. The last annual report of the Springfield & Eastern filed with the Railroad Commission shows that the company is capitalized at $370,000, that it has a funded debt of $330,000, and gross liabilities of $756,994.87. During the fiscal year reported upon, the company earned $109,626.31, of which $108,949.41 was from passenger service. The total operating expenses for the year were $77,378.24. The line between Fiskdale and Palmer will be built by Fred T. Ley & Company, of Hartford, Conn., who built the Springfield & Eastern lines.

THE CAMBRIDGE SUBWAY

The officials of the Boston Elevated Railway Company and Mayor Daly, of Cambridge, have decided that two-track subways will be built between Harvard Square and Boston. One of these will be through Massachusetts Avenue and Main Street to the new Cambridge bridge, and the other through Cambridge Street to the new Charles River dam. The last legislature passed a bill for a four-track subway in Main Street and Massachusetts Avenue, but the railway company declined to accept it on account of the expense. The company still has the right to build an elevated road in Cambridge, and the two two-track subways, if authorized by the legislature, will take the place of that. Mayor Daly, in a statement issued a few days ago, said: "I have reason to believe that a bill which will provide for a new two-track subway from Harvard Square through Cambridge Street to the Craigie bridge, with the right of the city of Cambridge to purchase at the end of 20 years, will be acceptable to the elevated company."

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED OCT. 17, 1905

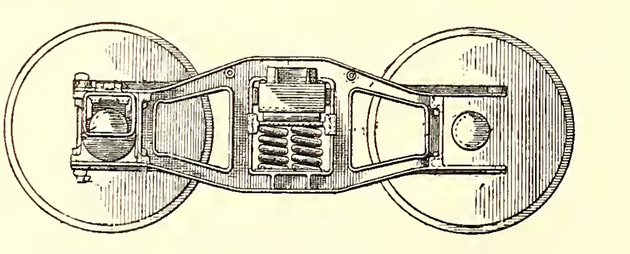
801,863. Car Brake; George Gremm, Chicago, Ill. App. filed July 22, 1905. Segment-shaped cams adapted to engage the rails and through frictional contact therewith are caused to turn on their axis and lift the car, thereby increasing the pressure upon the rails.

801,999. Trolley Wheel; George Loffi, Norwalk, Ohio. App. filed Jan. 7, 1905. The inner faces of the harp are cupped to provide a longitudinal bearing, and a hollow axle provides lubrication therefor.

802,067. Car Truck; William O. Bettendorf, Davenport, Iowa. App. filed Feb. 6, 1905. A car truck comprising a side frame consisting of an upper and lower arch-bar, guide columns and integral brake-beam lugs projecting inward from said side frame, all cast in one piece.

802,093. System of Overhead Electric Conduction for Vehicles; Ettore Bauco, Rome, Italy. App. filed Aug. 20, 1902. A small carriage adapted to travel upon and take current from the conducting wires, and a flexible connection between the carriage and vehicle to be driven.

802,160. Trolley Base; Charles E. Gierding, Newark, N. J. App. filed Jan. 30, 1904. A stud vertically mounted on the top of the car, a cap or sleeve, to which the fixtures for supporting the pole are attached, fitted over the stud, and roller bearings between the stud and cap.



PATENT NO. 802,067

802,168. Sand Box for Cars; David B. Keeports, Philadelphia, Pa. App. filed July 12, 1905. The bottom of the hopper slants from the center toward the sides, where slots are provided through which the sand may flow into an exit pipe, which is normally held closed by spring means.

802,173. Trolley Harp; Edward D. Rockwell, Bristol, Conn. App. filed March 11, 1905. The trolley wheel spindle is removable from the trolley harp in substantially the same way as an ordinary spring-shade roller is removed from its fixtures.

802,361. Car Fender; George F. Taylor, Randolph, Mass. App. filed Feb. 13, 1905. Relates to friction devices for holding the fender elevated from the track, and brake mechanism for the car controlled by the fender.

802,351. Brake Shoe; Charles F. Bingham, Buffalo, N. Y. App. filed June 2, 1905. Consists of a cast body and a reinforcing-rod completely wedge-locked in said body.

802,350. Brake Shoe; Charles F. Bingham, Buffalo, N. Y. App. filed May 25, 1905. A reinforcement for brake shoes consisting of an elongated plate having a series of upwardly extending projections arranged in staggered relation.

PERSONAL MENTION

MR. L. W. LEAHY has resigned as superintendent of maintenance of way of the Public Service Corporation, of New Jersey.

MR. F. A. AUSTIN, who was superintendent of the Erie Traction Company, at Erie, Pa., has taken a position with the Erie Foundry Company, of Erie, Pa., as manager of the machinery sales department.

MR. PERCY R. TODD, vice-president of the Consolidated Railway Company, controlling the electric railway lines in New England, owned by by the New York, New Haven & Hartford Railroad, has been granted a year's leave of absence by the directors.

MR. P. N. JONES, for some years employed by the Westinghouse interests at Pittsburg, has resigned to become mechanical engineer of the Pittsburg Railways Company, operating the electric railway lines in that city. He will have direct supervision over the power houses and machinery of the company.

MR. G. W. M'CLURE, who for some time has been connected with the Illinois Traction system at Danville, Ill., on Nov. 1 becomes master mechanic of the Lansing & Suburban Traction Company, at Lansing, Mich. He will have charge of the equipment of the new shops which that company is building.

MR. C. A. COFFIN, president of the General Electric Company, and Mr. E. C. Converse, director of the United States Steel Corporation, president of the Liberty National Bank and of the Bankers' Trust Company, of New York, have been elected directors of the American Locomotive Company to succeed Mr. George W. Hoadley and Mr. W. Seward Webb, resigned.

MR. J. R. CURTISS has resumed the position of superintendent of the Cleveland, Painesville & Ashtabula Railway, with headquarters at Geneva, Ohio, which he left some months ago to go with a Philadelphia company. Mr. C. B. Green, who has been acting superintendent of the company during Mr. Curtiss' absence, has accepted the position of superintendent of the Philadelphia, Lancaster & Christiana Railway, which is owned largely by Cleveland interests.

MR. ALBERT GALLATIN, for many years vice-president and manager of the Sacramento Electric, Gas & Railway Company, died very suddenly on Oct. 14, at his home in San Francisco. Mr. Gallatin was born in Switzerland. In 1859 he entered the employ of Huntington, Hopkins & Company, at Sacramento, Cal., and later was taken into the firm. Subsequently, Mr. Gallatin became interested in the development of electric power, and mainly to him is due the credit for putting through the Folsom Power Company's scheme for supplying power to Sacramento.

MR. R. D. JONES, foreman of car-building department of the United Railroads, of San Francisco, died suddenly on Oct. 16, 1905, of appoplexy. Mr. Jones spent practically all of his life in the car-building business, having been employed by the J. G. Brill Company, Jackson & Sharp Company, North Jersey Street Railway Company, and for the last three years by the United Railroads, of San Francisco. He possessed peculiar ability in his line, being an expert mechanic, as well as an able manager of men, capable of handling a large force in a manner that was pleasing and profitable to both his employer and the employees.

MR. PHILIP P. BARTON has been appointed general manager of the business and operations of the Niagara Falls Power Company and the Canadian Niagara Power Company. This appointment also includes that of general manager of the Niagara Junction Railway Company, and of the Niagara Development Company. Mr. Barton graduated from Cornell University in 1886 with the degree of Ph.B. After two years of post-graduate work in electrical engineering, he received from the same institution, in 1888, the degree of M. S. His professional career was begun in the electrical department of the Cambria Iron Company, at Johnstown, Pa. After several months of practical experience there and with the Allegheny County Light Company, of Pittsburg, Pa., he entered the engineering force of the Westinghouse Electric & Manufacturing Company. For some years he was engaged in installing electric lighting and power plants in various parts of the country, mainly in the South and the West. In 1892 he entered the service of the Brush Electric Company, of Cleveland, Ohio, in charge of engineering and sales at its Pittsburg office. After the closing of that office in February, 1898, he was connected for some months with the Pittsburg office of the General Electric Company. In September, 1890, he became assistant superintendent of the Niagara Falls Power Company, at Niagara Falls, and two years later was made superintendent of the operating department of the same company. In July, 1905, he was appointed superintendent of operation of the Niagara Falls Power Company and of the Canadian Niagara Power Company, which positions he has held until his present appointment. Mr. Barton is an active member of the American Institute of Electrical Engineers.

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Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

Of this issue of the Street Railway Journal 8200 copies are printed. Total circulation for 1905 to date, 360,150 copies, an average of 8185 copies per week.

Promotions from the Ranks

Of late years the practice of promoting deserving employees from the ranks has grown much in favor in transportation circles, and while it is not always possible to secure exactly the man needed within a company's own payroll, there is little doubt that the custom is a good one. In electric railway work there are distinct advantages in filling the higher positions with men whose apprenticeship has been worked out on home territory. The work of the great majority of street railway employees is of necessity routine duty, and unless every ambitious employee has the stimulus of better possibilities ahead, there is no escaping the fact that the quality of service will sag. It is just these promotions of deserving men from the ranks that furnish an incentive for other employees to exert themselves beyond the irreducible minimum necessary to hold a position. If an employee knows that his superiors are always on the lookout for the exceptional man his interest in his work is bound to be keener; his efforts more unsparing to do the best possible work each day. Progress is the natural tendency in every line of human endeavor, and the desire to assume greater responsibilities and to better one's own condition thereby is a legitimate and praiseworthy aim. Although thousands of men are to-day toiling under trying conditions, with a devotion and self-forgetfulness which may never be appreciated by their employers, that is no reason why street railway managers should fail to recognize faithful and intelligent labors, thereby raising the whole tone of the personnel. Finally, the work of an electric railway executive under modern conditions simply cannot be properly performed without special training, and unless an elected officer has "gone through the mill" in some way or other there is little chance of his rendering efficient service to his company and the public. The best training school in the world is therefore to be found in a company's own service and subordinate positions.

Competition Between Employees

In spite of the efforts of combinations of labor and combinations of capital to stop competition, the world has not yet arrived at a point where a certain amount of this useful stimulant is undesirable. We have in mind a company which makes it a practice to give a prize or bonus each month to the division shop foreman who makes the best record in the economy of maintenance of his equipment, taking into account the number of failures of equipment on each man's division during the month. We are aware that there are a number of good managers who do not believe in this kind of thing, on the theory that each employee is supposed to do his best and should not receive anything extra for so doing. While this is perhaps good theory, we very much doubt whether the results in practice are as good as if some kind of friendly rivalry existed to make the best records. It is not by any means necessary in the organization of a large company to give a cash bonus to an employee of any rank for making the best record in his particular work, but there is plenty of opportunity to establish a healthy rivalry simply by comparison of records at the end of each month. Comparisons are mainly odious when they are but infrequently made at unexpected times. When competition is perfectly open and understood, the whole game takes on a different aspect. The matter of exciting friendly rivalry among the employees of a company must be handled with much judgment by the manager in order that no bad feeling be stirred up. It is true that there will always be some who do not like any system which puts them on a comparative basis with other employees, but they are usually the kind that are least desirable for a company to retain. On the whole, it is very doubtful whether the records made under the spur of competition are ever in practice equaled by those made otherwise.

Motive Power Developments in Boston

The installation of a steam turbine and two gas engine plants on the Boston Elevated system is of more than passing interest in these days of motive power evolution, partly on account of the company's previous practice in adhering to reciprocating engines, and also because the new machinery illustrates in itself a marked departure in power house equipment. In another column will be found the details of the apparatus, which indicate pretty conclusively that the company intends to keep up its reputation for the economical generation of current in a group of allied stations whose load factor is far in excess of that found in many alternating-current systems.

Perhaps the most interesting feature of the gas engine plants is the excellent fuel economy which they offer, even in the rather small capacities planned for the West Medford and Somerville stations. As Mr. Hile has shown, in his recent paper at Philadelphia, the cost of power in the company's steam stations has been cut to a very satisfying figure—about .778 cent per kw-hour in the case of the five principal plants now in service, with coal at $3.60 per ton—and, singularly enough, the lowest figure obtained, .759 cent, was obtained from the smallest plant listed, which had a rating of 2000 kw. These stations are all located on tide water, though in certainly one case coal is hauled some 3 or 4 miles over the company's tracks before it reaches its destination. The new plants, excepting the turbine outfit for Dorchester, are to be located in the outlying parts of the company's system adjoining two division car houses, and the outlook for economical power generation upon a steam engine basis was certainly none of the best with units of 350 kw and the absence of favorable condensing facilities. Economy of coal consumption was therefore doubly important on account of the reduced fuel output per kw-hour and decreased cost of transportation, and the compactness and guaranteed inoffensiveness of the gas engine equipment in these residential districts were likewise desirable to secure. Doubtless the company considered the advantages of reduced attendance, as well. In coming down to about 1 lb. of coal of 13,500 B. T. U. per brake-hp-hour, the gas engine certainly approaches close to the bed rock of present-day economy, and for the class of service at hand there is no doubt that the choice was a wise one.

Turning to the steam turbine equipment, a notable advance is at once apparent in the production of a direct-current outfit in the 2000-kw size. We have often emphasized the importance of developing continuous-current turbo-generators to a point where they would be available for electric railway service, and unless unforeseen complications occur, it is evident that the problem has been solved. In the past three or four years the designers of direct-current machinery have devoted a great deal of attention to the deeper study of commutation, and in some factories at least, a machine which sparks to any extent under its specified safe limits of output is looked upon as a failure. At 750 r. p. m. the peripheral velocity of any ordinary commutator approaches the speed of a limited express train making up time, and the matter of building an armature that will run in perfect balance and hold together at such speeds is no easy one. If these questions work out satisfactorily in the commercial operation of the new Boston Elevated machine, it will certainly be a cause for rejoicing, and judging from the activities of the manufacturers in this direction at Portland (Maine), Philadelphia and other cities, there is every reason to predict the steady advance of the direct-current turbine into the railway field. As one would expect, the full and half-load economy of the Dorchester unit are characteristic of thoroughly good turbine practice—18 and 19.6 lbs. per kw-hour, respectively—which means that the extension of direct-current turbines into general electric railway work will do much to lighten the burden of wretched load factors from which the smaller stations so often suffer. The half-load efficiency of the gas engine plants will probably not work out as well on the percentage basis as that in the Dorchester station, but even here the gas engine can give the reciprocating engine a pretty hard rub. We do not for a moment believe that the steam engine has seen its last days in Boston, but the readily apparent fitness of the newer types of prime mover for the particular work under consideration raises some interesting speculations as to the future. The experience of the Boston Elevated in this new field is sure to provide interesting data for future problems in the motive power department.

Lighting of Shops and Car Houses

For an institution that is able to produce electric current as cheaply as a street railway company, the lighting of its shops and car houses is likely to be about as poor, from an illumination standpoint, as can be found anywhere. It seems to be somewhat a case of "the shoemaker's wife going without shoes." This does not refer so much to the large modern shops, which a few companies have built recently, as to the medium and smaller sized shops. Plenty of light, where any night work is to be done, is a mighty good investment. For the lighting of large interiors, such as shops, where there are a few obstructions, the common arc lamp offers the cheapest method of illumination for supply from 500-volt railway circuits, if we omit consideration for the present of the possibilities of the mercury vapor arc, which latter may cut considerable figure in the future. The lamp should not, however, be hung low and equipped with clear glass globes, as is frequently done. Unless lamps are placed well up out of the line of ordinary vision of the workmen, they should always have opal outer globes to reduce the intensity of the light and prevent the blinding effect that any intense light in the line of vision is sure to have. Mistakes are more likely to be made in the use of incandescent lamps than in the use of arc lights, because the natural distribution of light from an arc lamp is excellent, as the direct-current arc gives most of its light below the horizontal and at angles, which makes it well suited for interior lighting.

A large number of incandescents is usually necessary for special lighting in pits and around machinery in the machine shop and repair shop. The way these incandescent lamps are used in the average repair shop is an abomination. This is especially true of portable pit lamps. Everyone knows, who stops to think of it, how difficult it is to see past a bright light. The pupil of the eye contracts automatically when it encounters any bright light in order to protect the eye from injury. The result is that when an intense light strikes the eye, the pupil contracts so as to shut out the light and the surrounding objects appear to be in comparative darkness. It is an extremely simple matter to fix up these portable pit lamps as they should be. They are, or at least always should be, equipped with wire guard protectors. A piece of asbestos or sheet metal of any kind can be fastened just inside this guard for about one-half or one-third its diameter, so as to act as a shade. Then when a man holds this lamp in a close place, examining motors and trucks, he is not obliged to have the strong light shining directly into his eyes, but can shade his eyes and have a strong light on the parts he wishes to see. The same principle holds true in the drop lights used around machinery and other work benches. At such places shades should invariably be used. Conical tin shades, painted inside with aluminum paint, or aluminum shades with frosted aluminum finish inside, are probably the best for such locations on account of the danger of breakage. On machine tools provisions are sometimes made for holding the lamp with some kind of a clamping device wherever it is wanted about the machine. Here, too, one frequently sees the mistake of trying to see past a bright light with no shade. The best shade for such locations is usually one of the parabolic aluminum type, which is light and can be quickly turned at an angle. Nothing helps good work at night in a shop better than good illumination, but it is too frequently the last thing thought of.

The New and the Old Methods of Wiring Cars

To one who has made a close inspection of cars wired after the improved methods and has observed the small number of accidents resulting to the wiring of such cars after they are in operation, it appears rather strange that the movement toward better wiring of cars came as late as it did. Seemingly, it should have followed more closely the improvements in house wiring. In fact, it should have preceded them. House wires are usually well protected from the weather and injury, but car wiring, especially that under the floor, is subject to both in an extreme degree.

In the wiring of the modern steel cars and others there seems to be very little room for improvement. The motor and resistance leads and all wires under the car are carried in pipe or other forms of conduit, which practically insure them from damage, except in case of wreck. Heater wires and light circuits are likewise well protected by flexible conduit. All splices are usually made in iron junction boxes. The splices themselves are carefully soldered and taped. Even the terminals in the lamp sockets are soldered in place.

Such precautions evidently appear absurd to some managers. At any rate, they permit their cars to be wired after the methods in use eight or ten years ago. They seem satisfied to have a car run, no matter what the probability may be of it getting out of order. No doubt they are somewhat worried when on damp, rainy days frequent complaints come to the office regarding patrons getting shocks on grasping the grab handles, stepping on the platform bolts or accidentally getting their heels against the heater frames. Their worry may cause them to bring one of the cars complained of in for inspection, but all efforts to remedy the trouble are abandoned when so many leaks are discovered that only a complete rewiring of the car would have the desired effect. A wheel or a brake lever may cut a cable, causing a ground, which sends the car into the shops for a few days, or a light circuit becoming grounded on a carline may burn out the whole circuit; but, notwithstanding such incidents, the advocate of the simple wiring methods does not appear to be very much disturbed.

Probably the great reason for the continuation of old methods of wiring is the excessive first cost. Proper wiring is very expensive to install. Not only does the material used, the conduits, junction boxes and terminals, cost money, but the labor item is high. To properly bend and fit the conduits and install the cables in them requires a great deal of time, and often special machinery must be employed. The competition among car builders may also be partly blamed. In their endeavors to keep the price of cars as low as possible, the builders often do not suggest to the purchaser where the improvements can be made. Many purchasers are in complete ignorance of the details of cars, and the result is that specifications, so far as motor wiring is concerned, usually continue to be worded: "Cars shall be wired for four motors of 50-hp capacity each," or in some other manner just as indefinite as regards details. The specifications for light and heater wiring may be equally as vague. These clauses give the car builder the greatest possible latitude in the method of installing the wires, and he has every temptation not to depart from the usual practice in any direction that increases the cost.

Many cars, therefore, emerge from the shops with wires strung about them in any manner that will give proper connections. The motor and resistance cables are installed in hose, which, in some instances, is not even given a coat of waterproof paint. At irregular intervals the cables may be hung to the car body by leather straps. No precautions are taken to run them where dirt or mud from the wheel will not be thrown upon them. It is sufficient that they clear the wheels when the car is empty, no matter what may happen under load. Heater, light and pump wires are strung without system on bridgings, sills and floors wherever most convenient. Often double-pointed tacks secure them to the car. When wood or brass cleats are used, not infrequently tacks instead of screws hold the cleats in place. Each of the circuits may ground at any convenient bolt instead of being tapped to a common ground wire. It is not surprising that cars so wired are continually in the shops for repairs.

The maintenance expenses due to poor wiring of cars are usually so heavy that there is very little doubt that, considering these alone, better economy is obtained by wiring cars properly. But maintenance expenses are not the only items to consider. Loss of patronage through a reputation gained for unreliability, interest on the cost of extra cars required to replace those in the shop, and many other items throw the decision in favor of the best wiring that it is possible to obtain.

Controllers for Heavy City Cars

As the discussions at the Philadelphia convention indicated, the question of controllers for heavy city cars equipped with four motors is becoming more serious every year. This is not only on account of the increasing number of such equipments in the United States, but because of the fact that as the car wiring in such equipments gets older and deteriorates, short-circuits in car wiring are more frequent, but because of the inability of the ordinary drum type of controller, under many circumstances, to interrupt short-circuits in car wiring. The trouble is not so much that the controller will not handle the ordinary currents used in car operation, but that any little abnormal current due to defective wiring, or any abnormal arcs due to careless or the sluggish throwing off of current will be the immediate cause. Not many city companies feel that the time is yet ripe for the adoption of multiple-unit control for city cars, with all the expense and complication involved, but that something will have to be done before long is evident. The compromise between multiple unit and hand control, mentioned by Mr. Olds, of Milwaukee, at the convention, which consist in placing one or more contactors or magnetically-operated circuit breakers in series with the regular controller to be operated by pilot circuits from the controller, apparently has much to commend it, and we hope to hear soon some reports as to how it works out in practice.

THE ELECTRIFICATION OF THE LONG ISLAND RAILROAD

The western division of the Long Island Railroad consists of numerous lines within the limits of the city of New York, and while the main terminus of the road is in Long Island City, opposite Thirty-Fourth Street in the borough of Manhattan, the road has another very important terminus at the intersection of Atlantic and Flatbush Avenues in the borough of Brooklyn. The line to the latter terminus is four-tracked from Jamaica to East New York, thence double-tracked through Atlantic Avenue to Flatbush Avenue. It originally traversed open farming country, but the enormous growth of the outlying districts of the borough of Brooklyn has resulted in the building up almost solidly of the section traversed by the railway line from Flatbush Avenue out to East New York, and even beyond as far as Atkins Avenue, a distance of 5¼ miles.

THE TYPE OF STRAIN POLES USED AT TRANSMISSION CROSSINGS

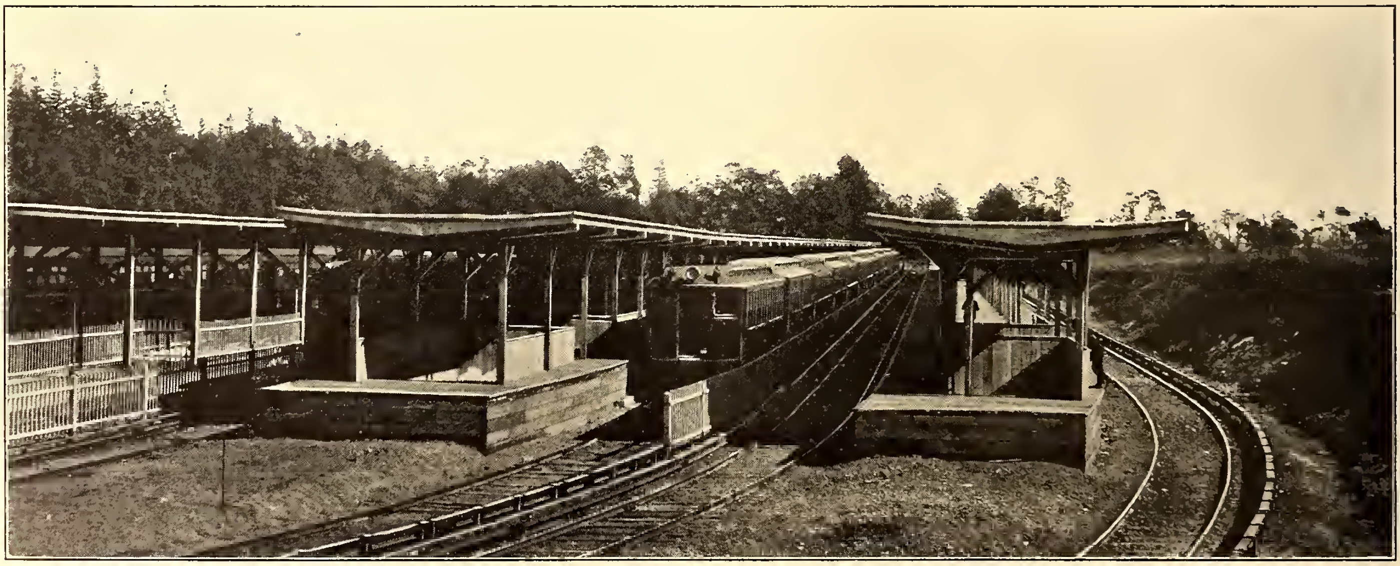
On agreement with the city, dated May 18, 1897, the railroad company undertook to remove its tracks from the surface of Atlantic Avenue and to operate passenger trains on the line by a motive power not requiring combustion. This requirement obviously pointed to electric traction, and the planning of a satisfactory train service in this short section has resulted in the installation of the most extensive system of electrification yet put in operation on any steam railway in the world.

It is the purpose of the present article to describe the main features of this important and interesting installation in its general scope, leaving for future articles the description in detail of the equipment.

NATURE OF TRAFFIC

As before stated, the Long Island Railroad at the extreme west end of the island, consists of a network of lines, having two important city terminals, and conducting a heavy through as well as local service. By reference to the map, it will be seen that the Flatbush terminal is in the heart of the borough of Brooklyn, and connects at that point physically with the Brooklyn Rapid Transit elevated lines leading to the Brooklyn Bridge and to the Broadway Ferry. It will also soon connect with the subway and tunnels being constructed by the Interborough Rapid Transit Company from the Battery, in the borough of Manhattan, under the East River, and thence to Flatbush and Atlantic Avenues. It will be seen that upon completion of the subway tunnel, passengers arriving at the Flatbush Avenue terminal from points on Long Island will have a short and direct route to the lower business section of Manhattan Island by either the subway or by elevated lines over the Brooklyn Bridge. Furthermore, direct connection will be established by the elevated lines over the new Williamsburgh Bridge.

The regular service on the Atlantic Avenue line consists not only of suburban trains carrying passengers from towns on the south and north shores of the island, but also quite heavy local business from Flatbush Avenue out to Jamaica, and very heavy excursion business to Rockaway Beach and three different race tracks, the Metropolitan track near Springfield Junction, and those located at Aqueduct and at Belmont Park.



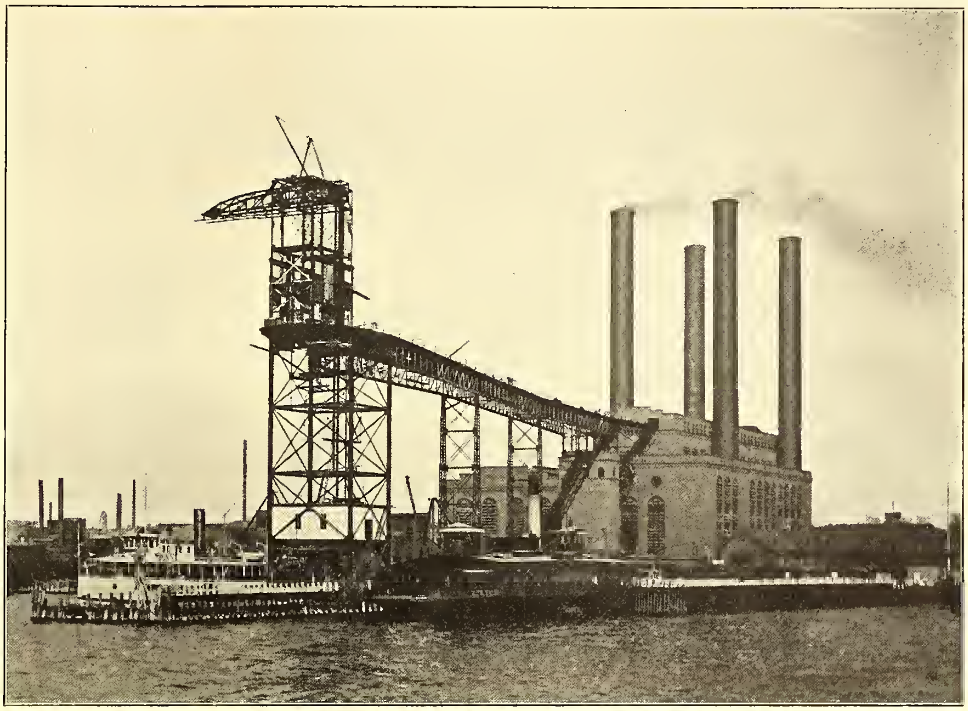
THE TERMINAL AT THE BELMONT PARK RACE TRACK FOR THE ACCOMMODATION OF THE LONG ISLAND ELECTRIC TRAINS

EXTENT OF ELECTRIFICATION

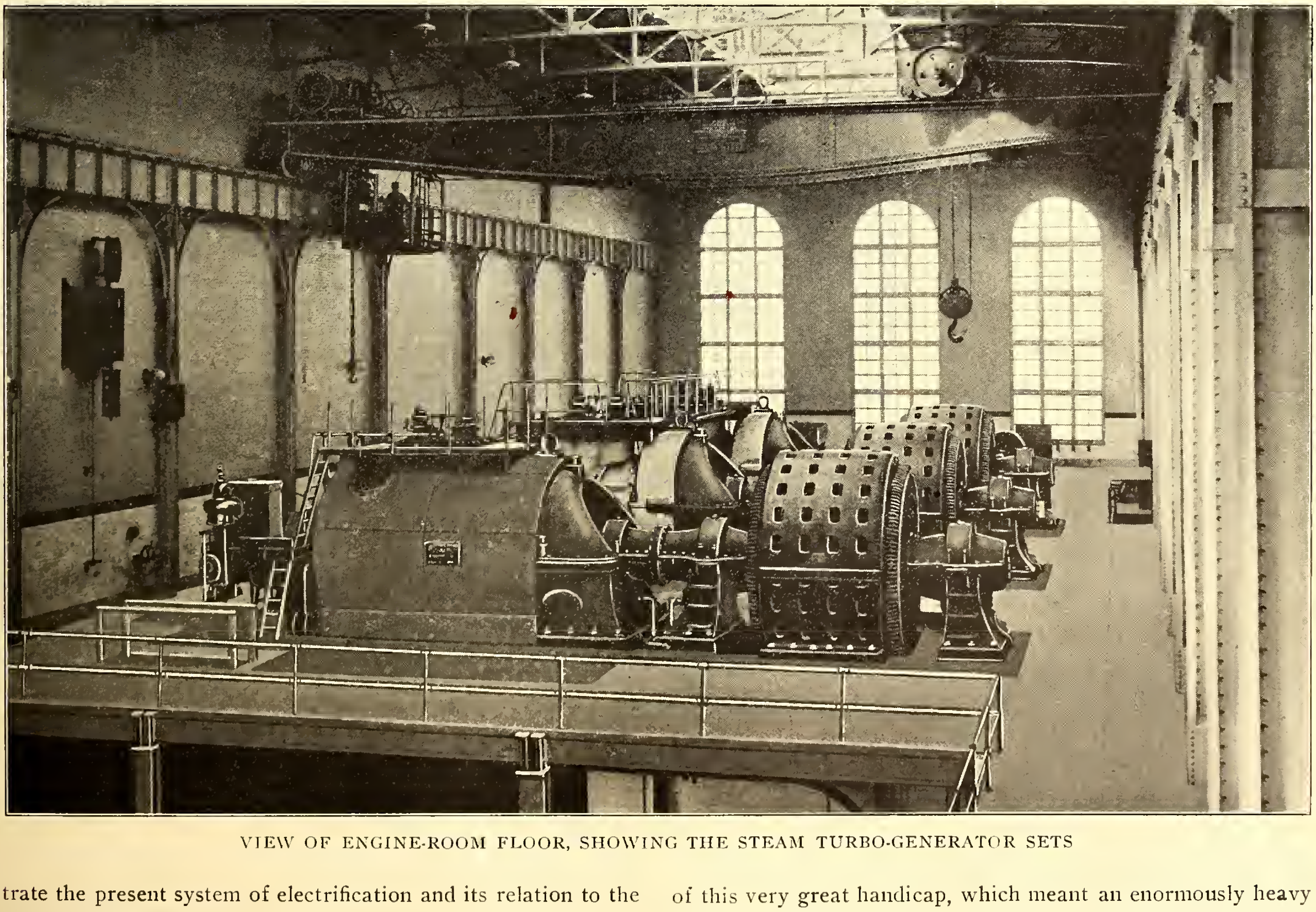
Considering the complicated train service above referred to, it was obviously impossible to adopt an electrification plan which contemplated electric haulage for part of the journey and steam haulage for the remainder of the journey to the principal points—beaches and race tracks—inasmuch as transfer of passengers en route to those points would occasion endless confusion and delay. It was therefore determined, in spite of the fact that immediate return on the very heavy outlay could not be expected, to electrify all lines leading out of the Flatbush Avenue terminal upon which heavy suburban or excursion business took place. This resulted in practically the electrification of the entire road south of Atlantic Avenue and the main line out to Queens, and as far east on the Montauk division as Valley Stream. It was not found necessary to electrify the line north of this dividing line, as no through traffic from Flatbush Avenue to the terminal in Long Island City at present exists. When the tunnel lines to the borough of Manhattan, now being constructed by the Pennsylvania Railroad Company, are completed, a new set of conditions will be introduced, which will require very considerable extension of the electric service, and will no doubt comprehend at that time all the lines of the company for, say, 25 miles out of both terminals.

Inspection of the map accompanying this article will illustrate the present system of electrification and its relation to the complete system.

The diverse character of the train service and its very fluctuating loading at different seasons of the year, due to character of excursion business, formed a condition the reverse of favorable for economical electric traction, for the reason that the load factor on any of the fixed portions of the complete system, as power house and transmission lines, would necessarily be a very low one throughout the year. In spite of this very great handicap, which meant an enormously heavy initial expenditure, the management of the railroad company determined to provide complete electric service at the outset,

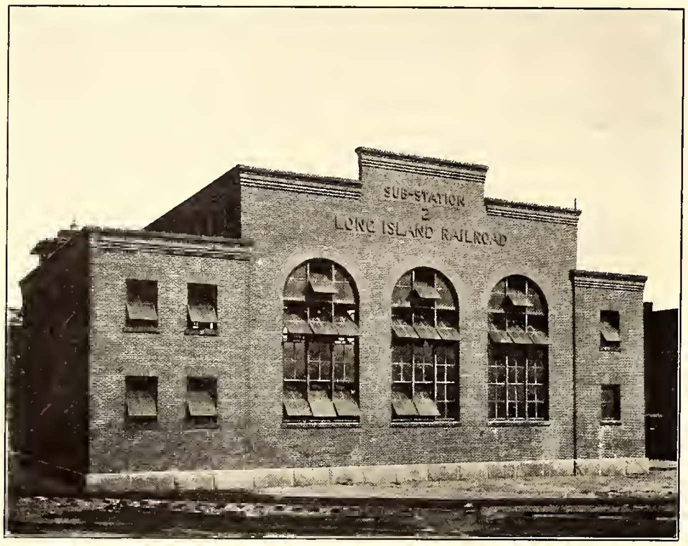


EXTERIOR VIEW OF THE LONG ISLAND CITY POWER STATION ON THE EAST RIVER, SHOWING ALSO THE COAL-HANDLING APPARATUS AND TRESTLE



VIEW OF ENGINE-ROOM FLOOR, SHOWING THE STEAM TURBO-GENERATOR SETS having faith that the improved facilities afforded would result in the growth of the territory adjacent to their line, and in the end afford them a fair return on their investment. It must be confessed, however, that for the present, and probably for some time to come, the expensive pioneering done by the company will result chiefly in increased convenience to its patrons rather than in enlarged net revenues.

Under normal conditions the loading of the power plant and sub-stations will be comparatively light, but in order to take care of the heavy race track and excursion movement, a power capacity has been installed sufficient to move simultaneously the following service:



EXTERIOR VIEW OF THE EAST NEW YORK SUB-STATION OF THE LONG ISLAND RAILROAD

Flatbush Avenue to Belmont Park.—Fifteen six-car trains per hour in each direction.

Flatbush Avenue to Rockaway Park.—Three six-car trains per hour in each direction.

Valley Stream to Hammel.—Two four-car trains per hour in each direction.

In addition to the above, power is supplied for the trolley car service between Rockaway Park and Jamaica.

SYSTEM ADOPTED

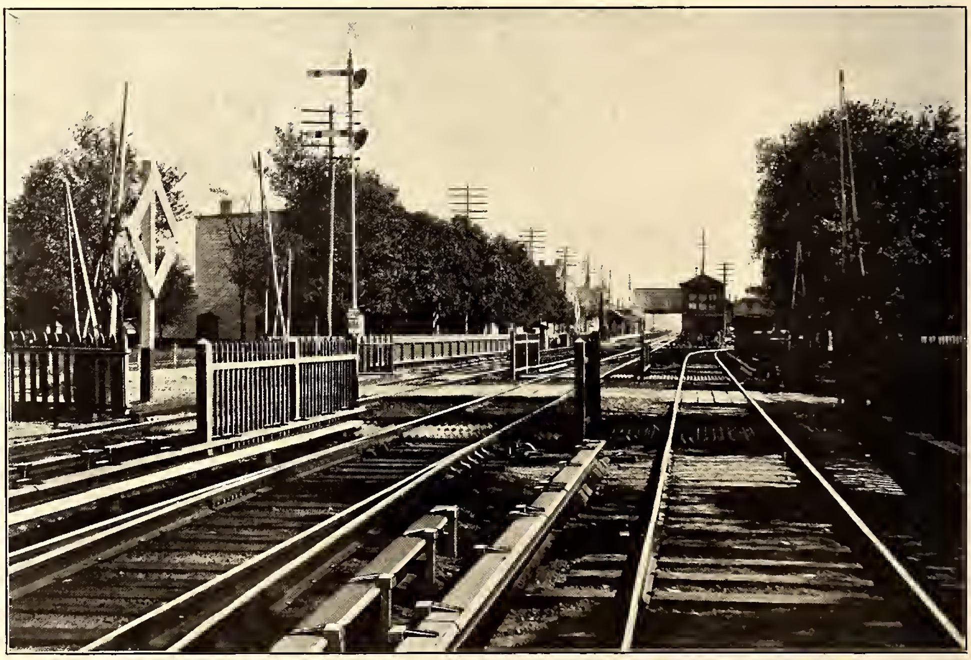
A decision upon the character of the equipment and the characteristics of the electrical apparatus involved reference to the possibilities of connecting with the lines of neighboring companies, including the Brooklyn Rapid Transit Company, the Interborough Rapid Transit Company and the Pennsylvania Railroad tunnels, as well as the physical character of the lines of the Long Island Railroad itself. In coming to a decision upon the work, therefore, operation over elevated lines, in subways, on the surface, and also in the Pennsylvania Railroad terminal and tunnels, had to be harmonized. It was decided therefore to adopt for the car equipment a type and dimension of car which would permit, if necessary, of through operation over connecting lines. It was also decided to adopt a system of electric distribution which was standard on connecting lines, namely, third-rail contact and direct current at 600 volts for the propulsion current, and alternating-current transmission at 11,000 volts for conversion at sub-stations.

GENERAL LAYOUT

Current for the entire system will be generated at the large power house, now nearly completed at Long Island City. This power house will eventually be one of the largest in the world, and has the distinction of being entirely equipped with steam turbines. There are at present installed three Westinghouse-Parsons turbine units, of 5500-kw capacity each, and the engine room provides facilities for three more such units. It will be noticed that this power house does not stand at the center of gravity of the electrified system at present, but it must be remembered that the Long Island electrification forms a part of the general scheme for the operation of the Pennsylvania Railroad terminal and the moving of trains in the North and East River tunnels. When all these improvements are in complete operation, and when the western division of the Long Island Railroad is entirely electrified, the Long Island City location will be in about the center of distribution.

The three-phase alternating current, generated at the power house, is carried in conduits through the built-up portion of Long Island City as far as the railroad yards. From here the cables are brought overhead and carried on a specially designed lattice steel-pole line. The construction of this pole line is most interesting, and represents an advance over anything hitherto attempted in this direction. The poles are of very strong construction and are mounted on concrete foundations. Wherever the transmission lines cross telegraph or telephone wires, the latter are led underneath the high-tension wires, the very substantial character of the heavy electric cables precluding their breaking and falling across the telegraph wires. A further precaution is taken by having the poles placed closer together at such points.

This pole line follows the railroad tracks to Winfield, from which place it is led across country on a special right of way to Glendale Junction, where it again follows the railroad to the sub-station at Woodhaven Junction. At this point the lines branch off in the direction of the different sub-stations.


THIRD-RAIL LAYOUT AT HIGHWAY CROSSING NEAR WOODHAVEN JUNCTION, SHOWING ALSO SIGNALS, CATTLE GUARDS, GATES, ETC.

In a transmission line of this kind, where bare wires are used, there is always a certain amount of danger to be feared from the effects of lightning. This has been very carefully guarded against in the present installation, as lightning arresters have been placed in all sub-stations and special arrester and cut-out houses have been erected at all places where the transmission wires are led from overhead and carried in underground or submarine conduits, and vice versa.

The sub-stations are five in number, and are located at the following places:

Sub-station No. 1.—Grand and Atlantic Avenues, Brooklyn.
Sub-station No. 2.—East New York.
Sub-station No. 3.—Woodhaven Junction.
Sub-station No. 4.—Near Rockaway Junction.
Sub-station No. 5.—Hammel.

It will be noticed that as far as possible sub-stations have been located at junction points, such points being more practicable, as they are the points at which the heavy loads occur. Such locations also make it possible and convenient for the arrangement of transfer switches for the high-tension circuit.

Taking up now the equipment of the different sub-stations: The one at Woodhaven Junction is the largest of all, being provided with an initial equipment of three 1500-kw rotary converters and nine static transformers of 550-kw capacity. Ultimately this station will be equipped with six 1500-kw rotary converters, with a corresponding increase in the number of static transformers.

The Grand Avenue sub-station is provided with an initial equipment of three 1000-kw rotary converters and nine static transformers of 375-kw capacity. The ultimate capacity, however, will include four 1500-kw rotary converters, with a corresponding increase in transformer capacity.

It might be said here that all these sub-stations, which are now equipped with 1000-kw rotary converters, are provided with foundations of sufficient size to accommodate converters of 1500-kw capacity, the idea being that as soon as the present sub-stations reach their maximum capacity with 1000-kw converters, the sections of railroad electrically equipped will have extended far enough to warrant the building of more sub-stations further out on Long Island. It will therefore be possible to move the 1000-kw converters from their present stations to the outlying ones and erect in their place converters of 1500-kw capacity.

INTERIOR VIEW OF EAST NEW YORK SUB-STATION, SHOWING ARRANGEMENT OF ROTARIES, TRANSFORMERS AND SWITCHING GALLERIES

The Rockaway Junction sub-station is provided at present with an initial equipment of two 1000-kw rotary converters and six static transformers of 375-kw capacity. The ultimate equipment will include four 1500-kw rotary converters and the proper number of static transformers.

THE STEEL-CONCRETE HOUSE AT BELMONT PARK, USED FOR HOUSING TWO PORTABLE SUB-STATIONS

The East New York sub-station has an equipment of three 1000-kw rotary converters, with nine 375-kw transformers, while the ultimate equipment will consist of four 1500-kw rotary converters and the corresponding number of transformers.

The sub-station at Hammel is equipped with two 1000-kw rotary converters and six 375-kw transformers. Ultimately, however, it will contain six 1500-kw rotary converters, with a corresponding increase in transformer capacity. In addition to the above, this sub-station is provided with a storage battery of 2000-kw-hours capacity, making it the largest storage battery in the world in use for electric railway work. Its installation was deemed expedient owing to the fact that the Hammel sub-station is the farthest from the power station and the transmission line is exposed to an unusual extent, being carried over Jamaica Bay for 4 miles. Furthermore, the load at Hammel is very light during the winter and the very large battery capacity makes it practicable to shut down the rotary equipment for much of the time during the winter months.

In external appearance all these sub-stations very much resemble each other, being built of brick and steel and of fireproof construction throughout. They also conform closely in interior arrangement, the rotaries and transformers being set up on the first floor, while the main switchboard is placed in a gallery on one side of the building, from which the operators have an uninterrupted view of all the machinery under their control. The high-tension cables are led to a carefully insulated board on the other side of the building facing the main switchboard.

Before leaving the subject of sub-stations, it might be well to mention that all of them are provided, on emergency, with the means of augmenting their capacity to the extent of 1000 kw through the use of portable sub-stations. These consist of steel cars, each carrying a 1000-kw rotary converter and three static transformers. Two such portable sub-stations have been built. They were designed primarily not only to reinforce the permanent sub-stations, but to maintain the potential at any points where traction might temporarily be very heavy. Such conditions would be met at the different race tracks, and therefore buildings have been provided at Belmont Park race track and at Springfield Junction, near the Metropolitan race track, where these portable sub-stations may be housed and connected up.

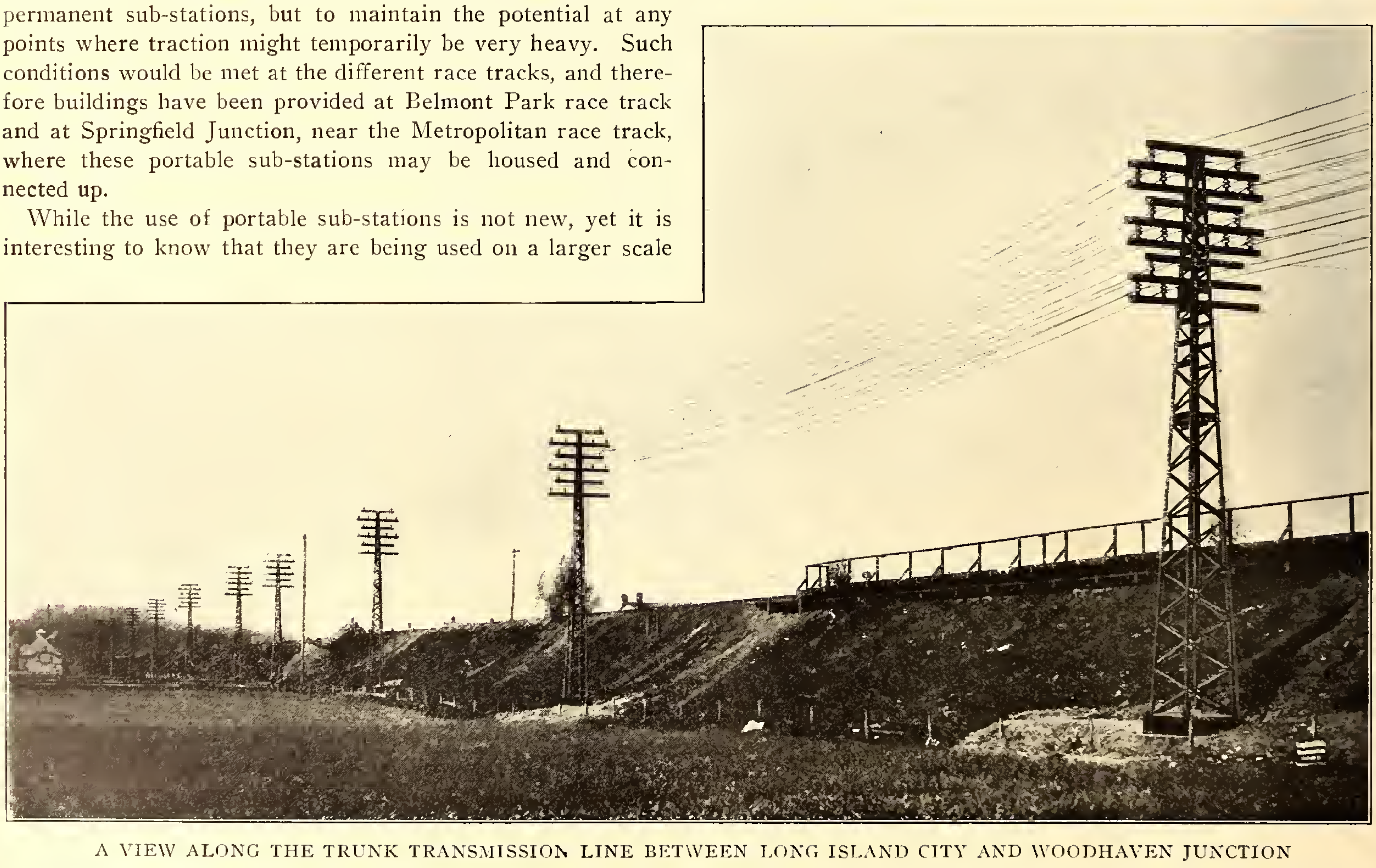
While the use of portable sub-stations is not new, yet it is interesting to know that they are being used on a larger scale in this installation than has ever before been attempted. One reason for their extensive use is found in the fact that no feeders are used for supplying the third rail, the high conductivity of these rails permitting of the dispensing of feeders for all ordinary conditions of traffic.

VIEW OF THE TWO PORTABLE SUB-STATIONS AND THE STEEL-CONCRETE BUILDING FOR HOUSING THEM

THIRD RAIL

Direct current at a potential of 600 volts is led directly to the third rail from the different sub-stations, and is carried in this way to considerable distances, great care being taken with this third-rail installation to guarantee the safety of pedestrians, and no expense has been spared to attain this result.

The rail is laid at the standard distance from the track rail adopted by this road, the Pennsylvania Railroad and the Interborough Rapid Transit Company, namely, 27 ins. from the gage line of the track to the center line of the third rail, and with top of rail 3½ ins. above the top of the track rail. Placing the third rail in this position will allow of interchange between the above-named railroads and will permit of proper clearances for steam equipment, especially the steel hopper cars now in general use.



A VIEW ALONG THE TRUNK TRANSMISSION LINE BETWEEN LONG ISLAND CITY AND WOODHAVEN JUNCTION

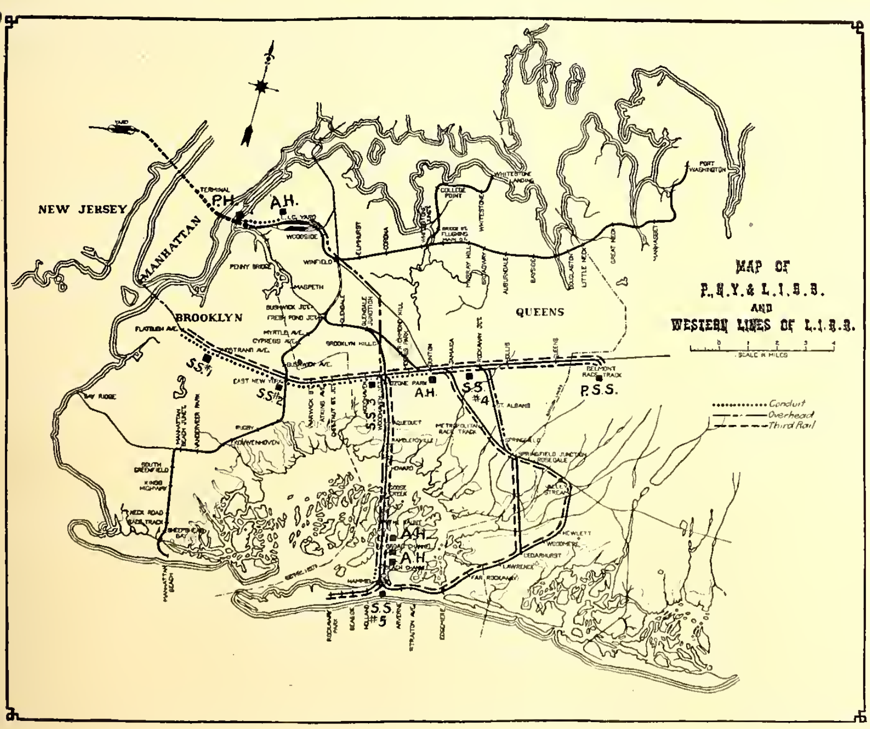
The rail is laid on sleepers, which extend at intervals beyond the line of track, and is supported by insulators made of vitrified clay. It is covered throughout its entire length by a wooden sheathing, held in place in the following manner: Brackets of steel attached to the rail are firmly bolted to wooden uprights outside the rail, and to these, by separate bolts, are attached a second set of strong brackets supporting a plank 2 ins. thick and at a height of about 4 ins. above the rail. Wherever the rail is led in front of stations, a special side sheathing is attached to both sides, making it practically impossible for pedestrians to come in contact with it. Another feature in connection with the protection of passengers at stations is the fact that a running board, similar to the one covering the third rail, is led along the outside edge of the platform, and effectually prevents passengers from coming in contact with the collector shoes of the motor cars.

At either side of a grade crossing, the third rail terminates in a broad sloping shoe, similar to that at switches and crossings in the subway or on the Manhattan Elevated. This is considerably within the line of protecting fences which enclose the entire right of way, and a heavy insulated wire cable connects it with the third rail, similarly situated beyond the break, the cable passing underground in a concrete duct situated at a depth not likely to permit of interference by crossing repairs.

The total mileage of third-rail installation reduced to single-track basis is 97½. This is divided up in the following manner: Miles of main line equipped, 42; main line single-track mileage equipped, 90; sidings, 7.5; making a total of 97½ miles for the system.

TRAINS

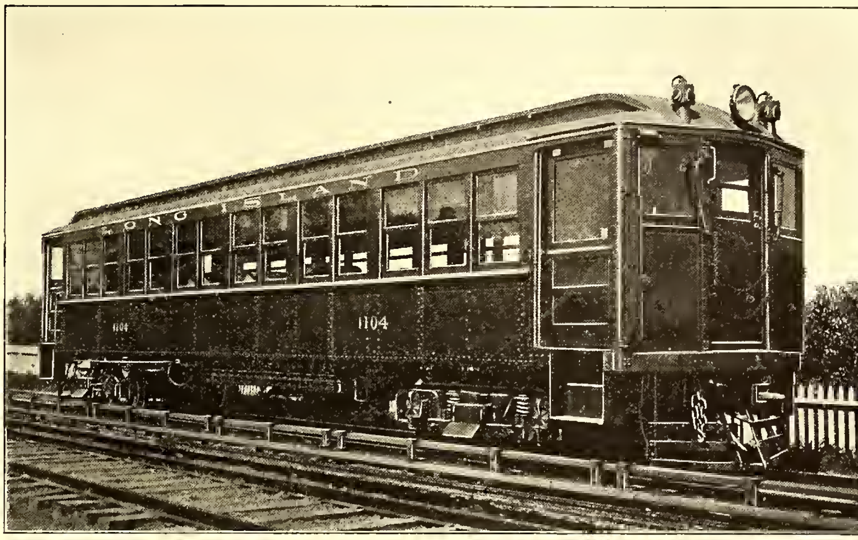
The trains are made up of steel motor cars, of which 130



MAP SHOWING THE LINES OF THE ELECTRIFIED PORTION OF THE LONG ISLAND RAILROAD

have already been equipped and trailers in the ratio of three to two—that is, a five-car train will consist of three motor cars and two trail cars, the motor cars being cars 1, 3 and 5. An eight-car train, however, will consist of five motor cars and three trail cars, the motor cars being 1, 3, 5, 6 and 8, or else Nos. 1, 3, 4, 6 and 8. By this arrangement it is possible to make up three-car trains, consisting of two motor cars with a trail car between them, by simply taking off two cars from either end of a five-car train.

All the cars are equipped with the Westinghouse pneumatic multiple-unit system of control, and each motor car has two propelling motors of 200-hp each, both of which are carried on the same truck. Both cars and trucks were designed by George Gibbs, chief engineer of electric traction for the Pennsylvania, New York & Long Island Railroad and for the Long Island Railroad, and were built by the American Car & Foundry Company and the Baldwin Locomotive Works, the cars being constructed by the former company and the trucks by the latter.



VIEW OF STEEL MOTOR CAR, SHOWING CONTACT RAIL PROTECTION

These cars are quite similar in appearance to the steel cars in use by the New York Subway (which were also designed by Mr. Gibbs), being constructed throughout of steel and finished in aluminum. The problem of their design has been considerably simplified through the experience already gained with the subway cars. The requirements of the Long Island Railroad, however, necessitated the embodying of a good many special features in order to conform to the requirements of the service. For instance, all the conditions and limitations which applied to the New York Subway, such as limited subway heights and clearances on curves, high speeds with frequent stops, maximum strength combined with smallest possible weight, etc., applied with equal force to the Long Island problem, since the Long Island cars were designed to interchange with the cars in the Manhattan Subway. An additional feature presented itself, however, in the fact that trains, after leaving the city limits, had to run on the ground and let passengers on or off at stations whose platforms did not come flush with the platforms of the cars. This necessitated the design of a special combination platform which should be the full width of the car when running within the city limits, but which would provide for a pair of steps to be used when running on the surface of the ground

These cars are now receiving their equipment at the shops of the Long Island Railroad between Locust Avenue and

Springfield, on the cut-off line to Valley Stream. The shops have a capacity for the equipment of about ten cars per week, which are received from the builders in an entirely completed condition as regards exterior and interior finish, but are bare of any electrical apparatus. After receiving their electrical equipment they are given many trial runs before being placed in active service. Each motor car weighs 83,000 lbs., and is capable of maintaining a maximum speed of 55 m.p.h. and a schedule speed, including stops 1.6 miles apart, of 25 m.p.h.

A noticeable feature of their operation is the fact that, although attaining their maximum speed under very short headway, there is no jerk or jar experienced in the process, acceleration being accomplished very smoothly and evenly. The trains are brought to a stop in the same even manner, being equipped with specially designed air brakes controlled by the new Westinghouse graduated release triple valve. In this respect the equipment is a great improvement over any electric trains hitherto tried.

In order that the rolling stock of the road be kept to its full efficiency, large car-inspection sheds have been erected at Rockaway Park, Dunton and at the Morris Park shops, the one at Rockaway Park being 100 ft. x 30 ft. in size, the Dunton shed 200 ft. x 50 ft., and the one at Morris Park 200 ft. x 75 ft. These sheds are large enough to accommodate trains of eight cars, and are fitted with all necessary tools and appliances, the pits being fitted with compressed air pipes in order that pneumatic tools may be used under the cars.

VIEW OF A TRAIN OF NINE CARS ON THE ELECTRIFIED DIVISION OF THE LONG ISLAND RAILROAD

ORGANIZATION

When it was decided three years ago to electrify the system, Westinghouse, Church, Kerr & Company were engaged to act as engineers and constructors for the road, the entire work being under the direction of George Gibbs, who acted first as electrical engineer of the road and first vice-president of Westinghouse, Church, Kerr & Company, and afterward as chief engineer of electric traction for the road, the general features of the work being under the supervision of the electrical committee of the road, composed of various officials. The construction work was under the supervision of George B. Caldwell, who acted as superintendent of that department.

Work was begun on the various sections as follows: Power house, September 15, 1903, the first engine being put in operation January 6, 1905, and regular operation was commenced July 26, 1905. Work on the sub-stations was begun May 24, 1904, and completed July 7, 1905, the sub-stations being put into operation July 26, 1905. The transmission system was started November 30, 1904, and finished May 27, 1905, while the third-rail work and bonding were begun October 6, 1904; finished August 31, 1905, and put into operation July 26, 1905.

NEW POWER-STATION EQUIPMENT OF THE BOSTON ELEVATED RAILWAY COMPANY

The engineering problems connected with the growth of the Boston Elevated Railway Company's system have always been of much interest on account of the exacting conditions of operation in the New England metropolis. As a large user of power, the company has always been watchful of the development of various forms of prime movers, but until recently the reciprocating steam engine has been employed to the exclusion of other motive power in all the stations of the system. In its adherence to the supply of power from a group of allied plants distributed over an extensive network of direct-current feeders, the road furnishes an excellent example of efficient operation under methods diametrically opposite from the more common practice of high-tension generation, transmission and conversion from a single large alternating-current station.

As the system has developed the need of additional power in certain suburban districts has become more and more insistent, while at the same time progress has been rapid in the evolution of prime movers. The steam turbine and the gas engine have pressed the reciprocating engine more and more closely of late, so that in the spring of this year the company decided to investigate the motive power question conclusively in connection with the building of two new plants and the extension of an existing station. The result is the addition of a d. c. 2000-kw turbo-generator outfit to the present Dorchester power station, the choice of a 975-kw gas-engine plant to be erected on the company's premises at Salem Street, Medford, and the selection of a 700-kw gas-engine plant to be installed in a new building upon the company's Clarendon Hill car house property in West Somerville. The completion of this equipment will increase the present available power supply of the company by practically 10 per cent, giving a total rating of 40,319 kw to the machinery distributed among the ten separate generating plants which keep the rolling stock in motion. Incidentally, a boiler installation of 1108-hp at Dorchester with the necessary condensing equipment for the turbine will be added, together with 2800 boiler-hp at the company's Central power station, the last equipment replacing 2000-hp in old boilers.

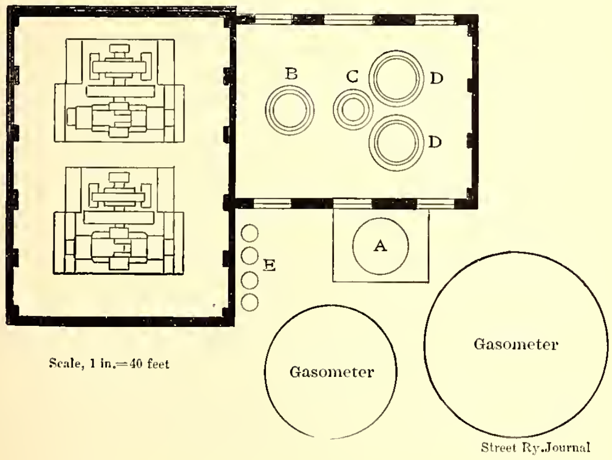
The Dorchester boiler equipment will consist of two 554-hp Stirling water-tube boilers designed for 200 lbs. working pressure, and equipped with superheaters capable of raising the temperature of the steam at least 150 degs. above the temperature corresponding to a pressure of 180 lbs. per sq. in. The boilers are rated on a basis of 10 sq. ft. of heating surface per hp, each having a total heating surface of 5544 sq. ft. and 91 sq. ft. of grate surface, giving a ratio of 61 to 1. The grates are 8 ft. deep, and each boiler is fitted with 343 3¼-in. hot-rolled seamless steel tubes, two 42-in. steam drums and one 42-in. mud drum, double butt-strapped and triple riveted. The superheaters are located in the middle passes and are each composed of an upper drum 36 ins. in dia. x 15 ft. 2¼ ins. long, and a lower drum 24 ins. x 13 ft., connected by 228 seamless steel tubes 2 ins. in dia. Each boiler is to supply steam through a 6-in. pipe, while the feed and blow-off pipes are 2½ ins. in dia. The two boilers are to be set in a battery 18 ft. 10 ins. long and 30 ft. wide.

An interesting departure of ordinary steam-turbine practice is found in the Dorchester unit, which is a direct-current 2000-kw Curtis-General Electric machine. This is probably the first direct-current turbo-generator of such large output to be produced. Its normal speed is 750 r. p. m.; it has ten poles and is designed for 575 volts. The machine weighs complete 190,000 lbs., or 95 lbs. per kw. Its height is 21 ft. and the diameter of the base is 11 ft. 2 ins. The guaranteed steam consumption in pounds per kw-hour at the switchboard is as follows:

KW.	Lbs.
1,000	19.6
1,500	18.8
2,000	18.0
2,500	18.4

at 180 lbs. steam pressure, 100 degs. F. superheat and not over 2 ins. absolute back pressure in the condenser. The step bearing of the turbine will be supplied with water by two steam pumps, either of which will be capable of delivering 7.5 gals. per minute at 800 lbs. per sq. in. The other bearings will be supplied with oil by two pumps, each capable of delivering 0.8 gal. per minute at 35 lbs. pressure.

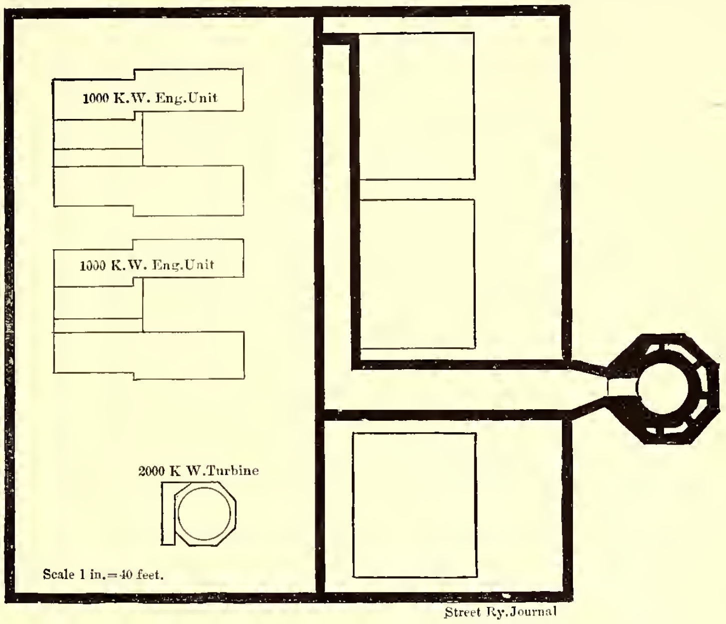
The condensing equipment is of Worthington manufacture. The condenser is of the cylindrical type, having 7000 sq. ft. of cooling surface. The tube heads are of rolled bronze. A dry vacuum pump of the straight line rotative type is supplied. It



PLAN OF WEST SOMERVILLE PLANT

is equipped with 10-in. x 18-in. steam cylinders and 18-in. x 18-in. water cylinders, and a slide valve of the balanced type for superheated steam. The vapors are drawn from the lowest and coldest point in the condenser, and are handled by the vacuum pump, which is equippeed with positive inlet and outlet valves, water jacketed air heads and a flash port which connects the two sides of the vacuum piston at the instant of reversal. This neutralizes the wasteful effects of the clearance space, which, at the beginning of the return stroke, is filled with vapors at approximately the same absolute pressure as that carried in the condenser. In this case, therefore, a two-stage pump is unnecessary. Tests upon this type of pump have shown that the condensed steam at the hot well can be carried within 2 degs. of the temperature corresponding to the absolute pressure of the steam vapor in the condenser as taken from saturated steam tables.

The hot-well pump is of the horizontal shaft three-stage turbine type, having single side suction and impellers. It has a capacity of 150 gals, of water per minute against a discharge pressure of 100 lbs. per sq. in. while taking its suction water under a head of not less than 2 ft. from the bottom of the surface condenser, in which there may be a 28-in. vacuum or more. This pump will be driven by a 25-hp motor



PLAN OF DORCHESTER POWER STATION, BOSTON ELEVATED

making 1300 r. p. m. Three impellers are provided, all of bronze construction.

The circulating water will be handled by a horizontal volute pump having a capacity of 5500 gals. per minute against a head of 30 ft., when operating at not over 325 r. p. m. The suction and discharge openings will be at least 14 ins. in dia., and the impeller is of bronze. The accompanying drawing shows the location of the turbo-generator and new boiler battery with respect to the original Dorchester equipment. The reduction in floor space is striking on account of the fact that the turbine plant is of the same capacity as the combined engine-driven units.

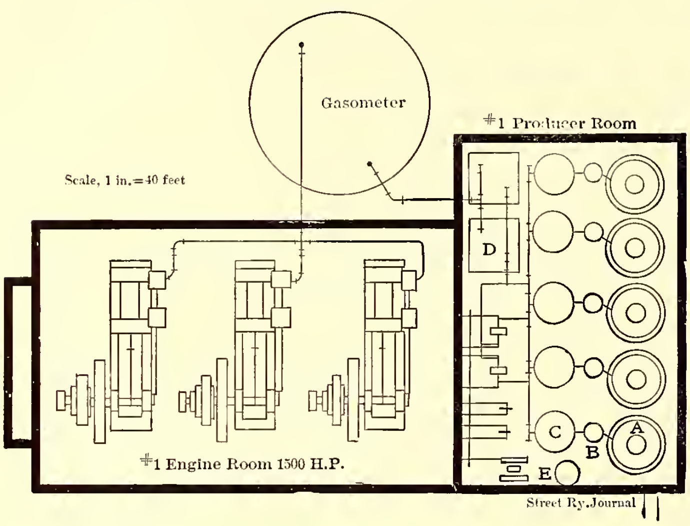
The new generating equipment at Central power station replaces wornout apparatus, and it comprises eight 350-hp Stirling water-tube boilers in four batteries. Each boiler has 3500 sq. ft. of heating surface and 68 sq. ft. of grate surface, ratio 51.5 to 1. Regan grates 72½ ins. deep are to be used, and each boiler has three 42-in. steam drums and one 42-in. mud drum, double-butt strapped and triple riveted, 304 hot rolled seamless tubes, 3¼ ins. in dia., a 6-in. steam outlet and two 4-in. safety valves set to blow at 185 lbs. If desired, the boilers can be operated at 200 lbs. working pressure. The floor space occupied by each battery, including the brickwork, is 22 ft. x 18 ft. 9 ins.

When operating at or about their rating with ⅝-in. draft pressure at the rear where smoke connections are made, the boilers are guaranteed to utilize 75 per cent of the heat units of any freshly mined run of mine Pocahontas, New River or other West Virginia coal containing not less than 14,500 B. T. U. per lb., and will furnish steam containing not over 1 per cent of moisture, or 1½ per cent when the boilers are operating at 30 or 40 per cent in excess of their rating.

An order of economizer sections from the B. F. Sturtevant Company, of Hyde Park, Mass., has also been placed, covering both Central and East Cambridge power stations. This equipment will also replace worn out apparatus.

The gas engine plant at Salem Street, Medford, is designed with special reference to cleanliness in handling coal, ashes and the removal of tar. The gas generating plant consists of water seal pressure type gas producers, economizers, scrubbers, tar extractors and purifiers, one gas holder and the necessary piping and connections, supplied by R. D. Wood & Company, of Philadelphia. The producer plant is adapted to the use of either bituminous or anthracite coal, and has a capacity of 1500-hp when working at full load. A general plan of the installation is shown herewith. The plant is guaranteed to gasify 1890 lbs. of Pocahontas or similar coal per hour, and will have an efficiency in gas produced of 70 per cent of the heat value of the coal, supplying gas at the valve of a 24-in. delivery main containing not over .01 gram of tar and not over .1 gram of dust per cubic meter at 62 degs. F. and atmospheric pressure. There are 5 water seal producers, 9 ft. in dia., each with hand-feed hoppers and water-cooled top plates, five No. 8 economizers and five coke scrubbers. The scrubbers are each 8 ft. in dia. and 25 ft. high. There are two sawdust purifiers, 10 ft. x 10 ft., a 60-hp boiler, two blowers, a lifting trolley for the purifier covers, a 15,000 cu. ft. gas holder in a steel tank, and two tar extractors, and a 40-hp engine with fittings.

In the pressure type of gas producer the air required for



PLAN OF MEDFORD PLANT

gas generation is delivered to the producer under pressure, as is also the generated gas to the engine. Although such a plant occupies more space than the suction type, it has far greater elasticity in meeting variations in quality of fuel and in the ability to utilize different kinds and cheaper grades of fuel. After the hot gases leave the producer they are cooled by an air blast; then the gas is forced through a wash-box, where the extraneous matter is largely deposited. At this point is the water seal against the gases stored in the holder and present in the rest of the apparatus. The gas then enters the scrubbers, whose compartments are filled with coke and showered with water sprays, and the removal of sulphur, ammonia and the bulk of the tar is finally completed in the purifier, the last element of the plant before reaching the holder. Besides storing a sufficient supply of gas for starting and for a few minutes' operation, the holder serves as a regulator of pressure, and it cares for variations in the consumption and mixture of gases.

The gas engine plant at Medford is composed of three 500 brake-hp Koerting gas engines, each direct connected to a 325-kw Crocker-Wheeler generator. The engines are of the box form design, 2-cycle double-acting type, and were built by the De La Vergne Machine Company, of New York. The normal speed is 100 r. p. m., and each engine will develop 500 brake-hp with gas containing not less than 125 effective B. T. U. per cu. ft. at 62 degs. F. and atmospheric pressure. Assuming 92 per cent generator efficiency from 75 per cent load to 25 per cent overload, the consumption of B. T. U. in the form of gas will not exceed 11,500 effective B. T. U. per brake-hp-hour from 75 per cent to full load, provided the gas contains not over 17.5 per cent hydrogen, .01 gram tar and .1 gram dust per cubic meter. The engines will operate with gas varying from not less than 110 B. T. U. to 160 B. T. U. per cu. ft. In operation they need not be stopped but once a week to change ignition plugs, and but once in three months for the cleaning of cylinder interiors.

The main bearings of each engine are 12⅝ ins. in diameter and 23⅝ ins. long. The motor cylinders, 25½ ins. x 45 ins. in diameter and stroke, are water jacketed, and the pistons are of a special grade of cast iron, having large bearing surfaces in the cylinders, and they are fitted with cast-iron packing rings. The cross heads are of forged steel, with pins 8¼ ins. in diameter x 7⅞ ins. long, and the bearing surface of the shoes is 19¾ ins. wide and 34⅝ ins. long. Each engine has a fly-wheel 17 ft. 10 ins. in diameter and weighing about 60,000 lbs. The crank shafts are built of forged steel, 16 ins. in maximum diameter and 12⅝ ins. in diameter in the bearings. The air pump and the gas pump cylinder diameters are each 26½ ins., the stroke of each being 33½ ins. The engine speed is controlled by centrifugal governors guaranteed to hold the speed variation within 2.5 per cent of the mean, with a sudden variation of load equal to 250 hp. With a sudden variation of load equal to 500 hp, the speed variation will be held within 3.5 per cent of the mean, and the speed will, in such event, immediately settle so that the regular speed will not exceed 2 per cent above or below the mean average speed. The outboard bearings are 12 ins. x 21 ins. in diameter and length, and the crank pins are 12⅝ ins. in diameter x 13¾ ins. long. When desired, the time of ignition can be changed while the machines are in operation.

The Crocker-Wheeler generators are each of the company's engine type, compound wound for 500 volts. There are twelve poles on each machine; the commutator diameter is 68½ ins. and the face 8½ ins. The current density in the brushes at full load is about 30 amps. per sq. in., and the machines each weigh, complete, 58,000 lbs. The armature weight is 22,000 lbs.

At West Somerville the equipment will be supplied by the Power & Mining Machinery Company, of Cudahy, Wis., and it is shown in plan on page 835. The gas-producer plant is of the intermittent type, generating both water gas and producer gas, and it consists of two Loomis-Pettibone generators 10 ft. in diameter and 16 ft. high, a boiler, scrubber, holder and tank. The boiler is 6 ft. in diameter and 23 ft. high, with 120 3-in. tubes built for 100 lbs. steam pressure; the scrubber is 8 ft. in diameter, 25 ft. 8 ins. high, with five trays, a 20-in. inlet and a 16-in. outlet; the tank is 37 ft. in diameter and 16 ft. 6 ins. high; while the producer gas holder has a capacity of 15,000 cu. ft., a height of 16 ft. and a diameter of 35 ft., with 20-in. inlet and outlet pipes. There are two American-Crossley double-cylinder gas engines rated at 600-hp each, with a maximum working load of 685 hp. The cylinder diameters and strokes are 32 ins. and 36 ins., respectively, and the normal speed 140 r. p. m. The speed variation with a sudden change in load of 300 hp is guaranteed not to exceed 2.5 per cent from the mean, momentarily, or with a change of 600 hp, 3.5 per cent, the speed settling to a regular speed not in excess of 2 per cent above or below the mean average speed. Each engine has a fly-wheel 156 ins. in diameter, weighing 60,000 lbs. The floor space occupied by each engine is 27 ft. 8 ins. x 14 ft. 8 ins., and the shipping weight of the complete machine is 225,000 lbs., but the largest single piece shipped is figured at 30,000 lbs. The engines are designed for normal operation upon gas having 120 B. T. U. per cu. ft., and the guarantee of coal consumption with the plant working commercially 16 hours per day is as follows:

Bituminous coal of not less than 13,500 B. T. U. per pound—

At 50 per cent load	2.25 lbs. per kw-hour
At 70-85 per cent load	1.75 lbs. per kw-hour
At 85 per cent load and above	1.6 lbs. per kw-hour

the generator efficiency being not less than 90 per cent at the switchboard. These figures apply to the entire plant, including fuel used in starting up, also during the night, and for all auxiliaries except water pumps.

Direct connected to each engine is a 350-kw Crocker-Wheeler generator, built for 550 volts. The commutator face is 11 ins., the diameter 62.5 ins., and the weight 41,800 lbs., of which the armature is 14,300 lbs.

The writer's acknowledgments are due to C. S. Sergeant, vice-president, and Paul Winsor, chief engineer of motive power and rolling stock, Boston Elevated Railway Company, for courtesies extended in the preparation of these notes.

PROGRAMME OF THE MILAN CONVENTION OF THE INTERNATIONAL ASSOCIATION

The preliminary list of topics to be considered by the International Tramways and Light Railways Association at its convention at Milan, Italy, next September, has just been published. It is as follows:

FIRST SECTION—TOPICS FOR GENERAL DISCUSSION

(1) Regulation of direct-current motors.

(2) Advantages and disadvantages of different kinds of brakes used on urban electric railways.

(3) The proper type of cars for urban railways, especially the most desirable length.

(4) The maximum desirable speed for interurban railways operating on the highway or over their own right of way.

(5) Track construction for suburban railways, especially (a) the proper length of rail; (b) the use of welded joints, such as the Falk, Goldschmidt, etc.; (c) the maintenance of joints; (d) methods of preventing the bolts from giving out.

SECOND SECTION—TOPICS FOR REPORTS

(6) Turbines for electric railway power stations.

(7) Progress of electric traction for urban and interurban railways.

(8) Gas engines for electric railway power stations.

(9) Track construction for urban railways.

(10) Advantages and disadvantages of sectionalizing the electric distribution system of urban railway.

(11) The use of wattmeters on city cars.

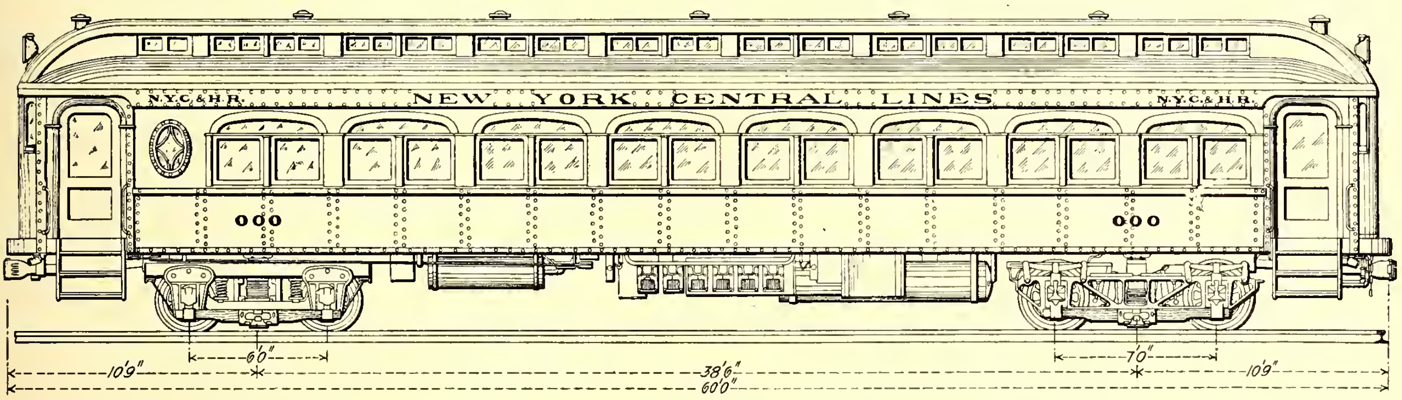
(12) Feed-water purification for locomotives on interurban railways using steam power.

NEW STEEL MOTOR CARS FOR THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD

As already announced in this paper, the New York Central & Hudson River Railroad Company is planning in its electrical equipment to operate multiple-unit motor-car trains for its suburban traffic. The company has placed an order with the American Car & Foundry Company for 125 steel motor cars to be used in this service. The railway company expects to purchase fifty-five additional cars later. The first forty cars are expected next March.

The main dimensions of these cars are shown on the accompanying engravings. In starting its electrical service, the company will first run motor trains as far as High Bridge, and the trains will be made up of motor cars and trail cars. The trail car bodies will be similar to the motor car bodies, but will be mounted on M. C. B. trucks. When the ultimate service to Croton and High Bridge is instituted, all of the cars in a train will be motor cars.

As will be seen from the drawings, the car is very similar in general appearance to the standard New York Central coach, and differs radically from the subway steel cars and from the steel cars of the Long Island Railroad. The floor is of the same character as the subway cars, being of corrugated steel with cement filler. The windows are of the Pullman double



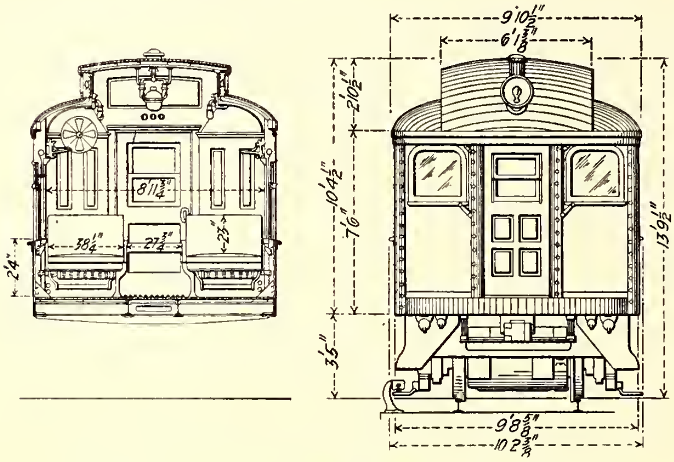
LONGITUDINAL ELEVATION OF NEW YORK CENTRAL STEEL MOTOR CAR

type, and the top arches and saloon windows are finished in leaded olive green cathedral glass. The interior finish is similar to that of the New York Central standard coach, as the steel is painted mahogany color. The seat frames are steel, and they are covered with fireproof rattan. Baggage racks are carried continuously from end to end of the car on each side, and the rack brackets and all fittings are of statuary bronze. The car wiring is all located in loricated conduit.

As these cars must be coupled up behind steam locomotives for part of their run during the period of initial operation, the lighting and heating arrangements have to be in duplicate. The electric lighting is very complete, and includes single lights over each seat, six groups of center lights, and lights in each saloon and at each end, making altogether fifty lights in the car. The electric heaters are placed under each seat, except the two middle seats of each side. For operating as part of a steam train, the cars will be fitted with Pintsch gas lights and steam heat.

The General Electric Company will furnish 125 motor equipments for these cars. These motors are rated at 200-hp each, and two motors will be used for each car, both motors being mounted on the same truck. They will be operated at 650 volts, although it would be possible to run them at 750 volts. The motors will be geared 49:26, or 1.885. A clearance of 4¾ ins. is provided between motor and truck.

The motor trucks are being supplied by the American Locomotive Company, and they are of all-steel construction, with axles 7 ins. in diameter at center and 7⅞ ins. in diameter at the wheel fit, and with journals 5½ ins. x 10 ins. The trailer trucks will have axles 6½ ins. in diameter at the wheel fit, and with 5-in. x 9-in. journals. Thirty-six-inch wheels will be used on the motor trucks and 33-in. wheels on the trailer trucks.



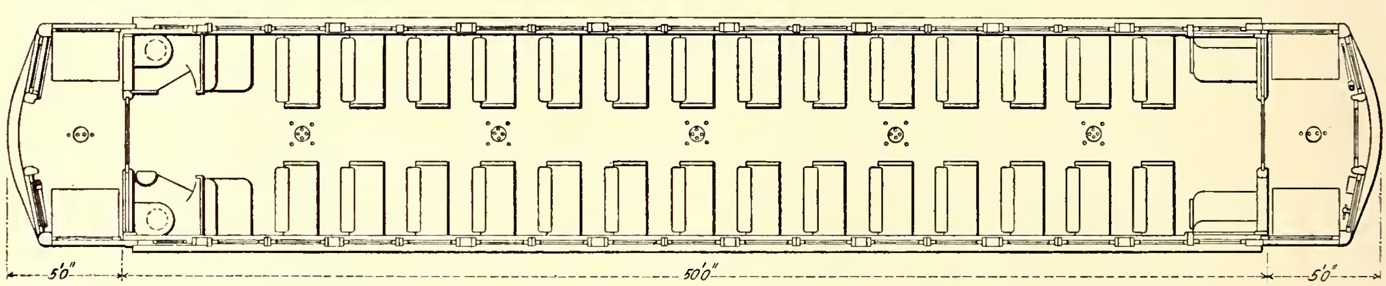
CROSS-SECTION AND END VIEW OF NEW YORK CENTRAL STEEL MOTOR CAR

The table below shows the weights, complete and ready for service, of the New York Central motor car and trailer car.

TABLE SHOWING WEIGHTS OF COMPLETE CARS READY FOR SERVICE

		Motor Car Lbs.	Trailer Lbs.
Total weight, light		102,600	78,600
Total weight, loaded		111,560	87,560
Weight light, per passenger		1,603.1	1,228.1
Weight of car body		53,000	53,000
Weight of motor truck without motors		15,400	.....
Weight of motors, per truck		12,400	.....
Weight of trailer truck		11,800	11,800
Weight per wheel, loaded	motor truck	16,195	10,945
	trailer truck	11,695	

The weight of the electrical equipment of the motor car, exclusive of the motors, is 6000 lbs. at the motor end of the car and 4000 lbs. at the trail end of the car.



SEATING PLAN OF NEW STEEL MOTOR CAR FOR THE NEW YORK CENTRAL RAILROAD

The following comparison of a steam and electric train of six cars each may also be of interest:

Steam	Lbs.
Locomotive (average suburban type)	275,600
Six cars (standard type, loaded)	424,560
Total	700,160
Electric	**Lbs.**
Four-motor cars	446,240
Two trailer cars	175,120
Total	621,360

This table shows a difference of 78,800 lbs., or 39.4 tons, in favor of an electric train having the same seating capacity.

The design of both motor and trailer cars was prepared under the directions of W. J. Wilgus, vice-president of the New York Central & Hudson River Railroad Company, Edwin B. Katte, electrical engineer, being in direct charge of the work.

NOVEL SWISS COMBINATION SNOW-PLOW AND SWEEPER

Owing to the high altitude of Switzerland, the railways of that country find the snow-fighting problem a very difficult one, and this condition naturally has resulted in the construction of unusually efficient apparatus for the removal of snow. The type shown in the accompanying illustration is one recently adopted by the St. Gall-Speicher-Trogen Electric Railway. The car body of this plow has an extreme length of 7.5 meters (23 ft. 9 ins.) and a width of 2.1 meters (6 ft. 10 ins.). The total height from the top of the rails to the roof is 3.47 meters (11 ft. 4 ins.). The body is pointed at both ends and is mounted on a cast-iron truck frame. The sills and posts are of oak and the monitor of ash. The roof, floor and wall coverings are of soft wood. Both sides are furnished with sliding doors and barred windows. These windows may be opened if desired.

To make room for the revolving brooms and other snow-cleaning apparatus, the height of the truck above the rail is somewhat greater than usual, namely, 1.3 meters (4 ft. 3 ins.). The car body, which is supported by four leaf springs mounted on the axles, can easily be taken off the truck by loosening a few bolts.

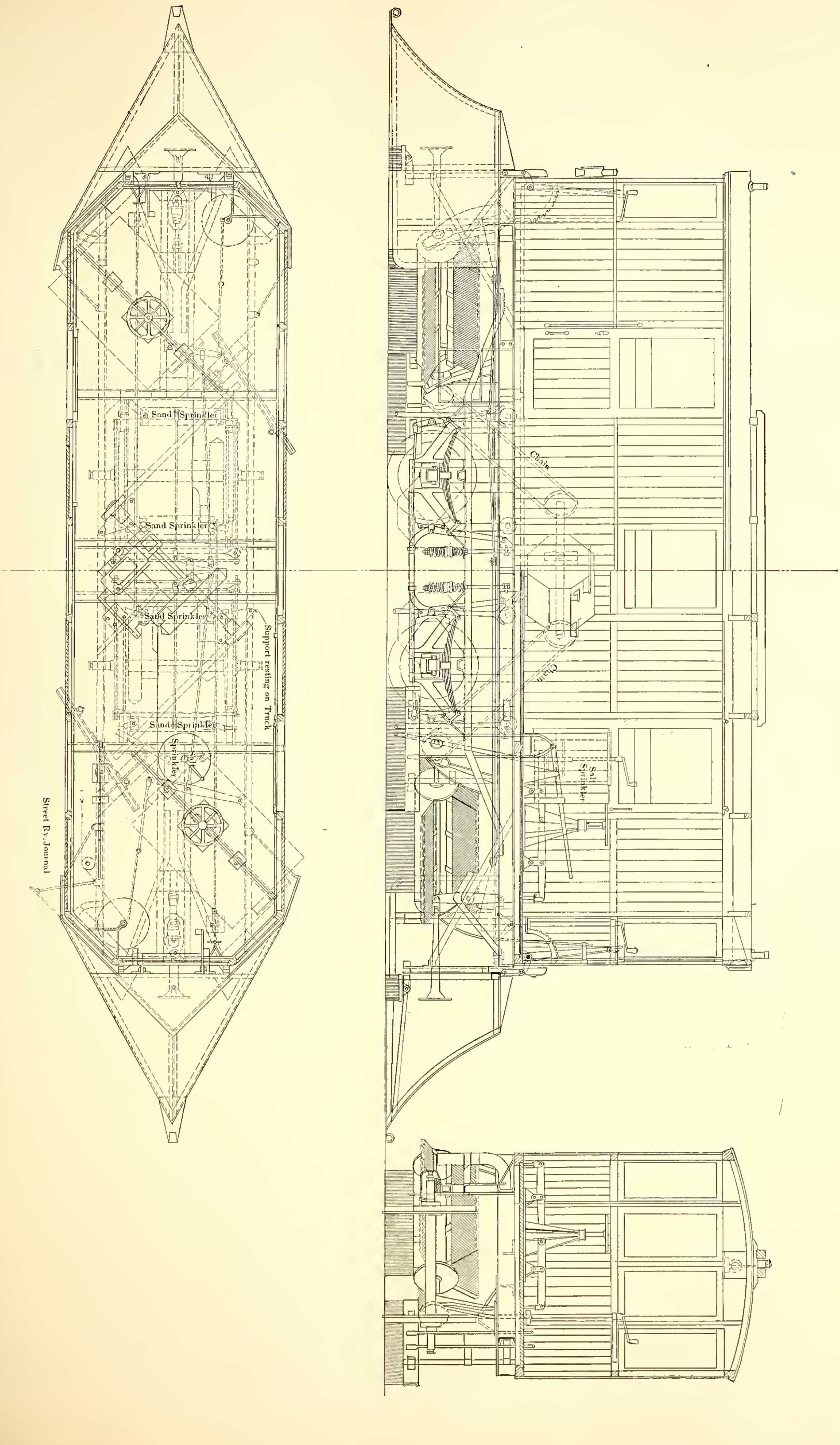
A hand brake with eight shoes is used. For each of the four wheels a drum sander is placed under the floor of the car, arranged to be filled from the interior. The car also contains a salt hopper and track-sprinkling apparatus.

To each end of the car body is attached a sheet-iron snow plow, the point or nose of which is turned upward to prevent it from boring into the ground in case it drags. The wings for clearing the snow alongside the track are connected to a common movable perpendicular shaft. The heights of the plows are controlled independently from the interior of the car.

The snow-cleaning apparatus also includes rotary brooms placed at an angle of 45 degs. to the longitudinal axis of the car and easily adjustable as to height. These brooms are motor-driven through a sprocket chain from the interior of the car. The material used for these cylindrical brushes consists of flat strips of especially elastic steel, bent around a piece of ash wood. A number of these strips form one flat brush, and a combination of five of them on a central shaft makes a complete rotary brush. In extension to the brushes, horizontal boards are used to push the snow away still further. These boards are self-adjustable for variations in the roadbed. In light snowstorms the triangular brushes placed in front of the wheels are sufficient to keep the track clear.

The electrical equipment consists principally of two Oerlikon 35-hp railway motors, type T. M. 840, operating on 750 volts, together with the regular series-parallel controller at each end of the car. A third 35-hp motor of the same type is employed for the rotary brooms, but as a constant-speed, or shunt-wound, motor appears better for such work, it is intended to replace the present series motor by one of the more suitable type.

The total weight of this apparatus, including the electrical equipment, is about 12,500 kg. (27,500 lbs.). The motors, controllers, etc., were furnished by the Maschinenfabrik Oerlikon and the car and snow-fighting apparatus by the Maschinenbaugesellschaft Nürnberg.



PLAN AND LONGITUDINAL AND END ELEVATIONS OF THE COMBINED SNOW PLOW AND SWEEPER USED BY THE ST. GALL-SPEICHER-TROGEN ELECTRIC RAILWAY

NEW ELECTRIC ROAD IN HASTINGS, ENGLAND

Among the recently equipped tramways in England, that belonging to the Hastings & District Tramways Company possesses a number of interesting features. One of these is that the system is one of the most important on the south coast of England. Another, that it is a combination city and interurban system, a common condition in this country, but still somewhat rare in the United Kingdom. The city system has just been put in operation, but some little time will elapse before the interurban line is completed. The English construction is always interesting on account of its permanent character.

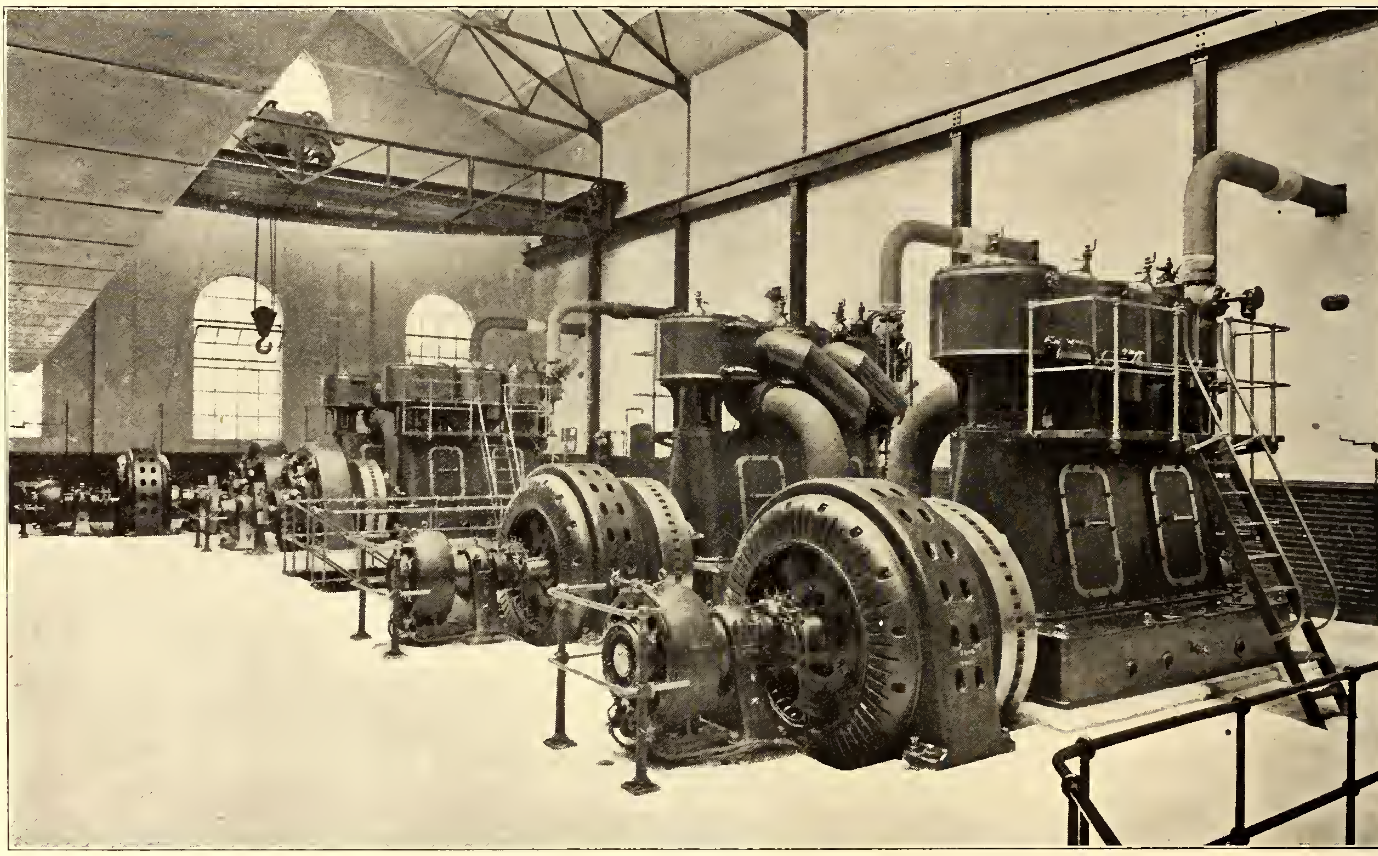
The city system is of the usual tramway construction, but on a section of the interurban route toward Bexhill, the line leaves the main road and uses a special right of way 30 ft. in width. When complete, the system will be some 30 miles in extent.

The contractors for the whole of the work have been Dick, Kerr & Company, Ltd., the consulting engineers for the scheme being Messrs. Kincaid, Waller, Manville & Dawson.

Owing to its extent, the system necessitated high-tension transmission with sub-stations. The power house is situated at Hastings, where alternating current is generated at 6600 volts, and transformed at the sub-stations to direct current of 500 volts. One sub-station is erected at Silverhill, and is now in complete working order; the second one at Bulverhythe is nearly completed.

The total length of tramways now in operation is approximately 16 miles of single track, laid to a gage of 3 ft. 6 ins. The form of track construction mostly used is macadam with granite blocks serration, the rails and blocks being laid on a 6-in. bed of 6 to 1 Portland cement concrete. In cases, however, where the traffic is heavy, the roadway between the rails and for an average space of 18 ins. on either side is paved with granite blocks 5 ins. deep and 4 ins. wide. On part of the route near the center of the town, wood paving throughout has been adopted. In all such cases a 6-in. bed of Portland cement extends for the full width of the tramway. The portion across country along the new roadway is ballasted to rail level. The rails are of the girder type, weighing 90 lbs. per yd., and are laid in 45-ft. lengths, with the customary proportion of shorter lengths to allow for closures. The rails are generally, in accordance with standard British tramway practice, 6 ins. deep, with a groove of 1⅛ ins. width; ordinary butt joints are used with 6-hole angle plates secured by bolts. Each joint is also strengthened by a 24-in. length of rail bolted on the under side and embedded in concrete. Neptune copper bonds are used for bonding throughout.

The construction of the overhead lines is carried out generally on the side pole system, with bracket arms and flexible suspensions. The poles, which have an over-all length of 31 ft., are made up in three sections of lap-welded mild steel, and erected about 40 yds. apart in holes of a depth of 6 ft. These excavations are entirely filled in with concrete. The trolley wires are hard-drawn copper wire No. 0000 S. W. G., having a diameter of .400 in., with a breaking strain of 22 tons per sq. in. Section insulators are provided so that each ½ mile of trolley can be disconnected if necessary. The extra high-tension feeders are composed of 3-core, paper-insulated, lead-covered and armored with steel wire. Each cable is laid in a separate trough and run in solid with bitumen. The low-tension cables are insulated with vulcanized bitumen, and are also laid solid in troughs. The whole of the feeder cables, both high tension and low tension, were supplied by Messrs. Callenders.



GENERAL VIEW IN POWER HOUSE

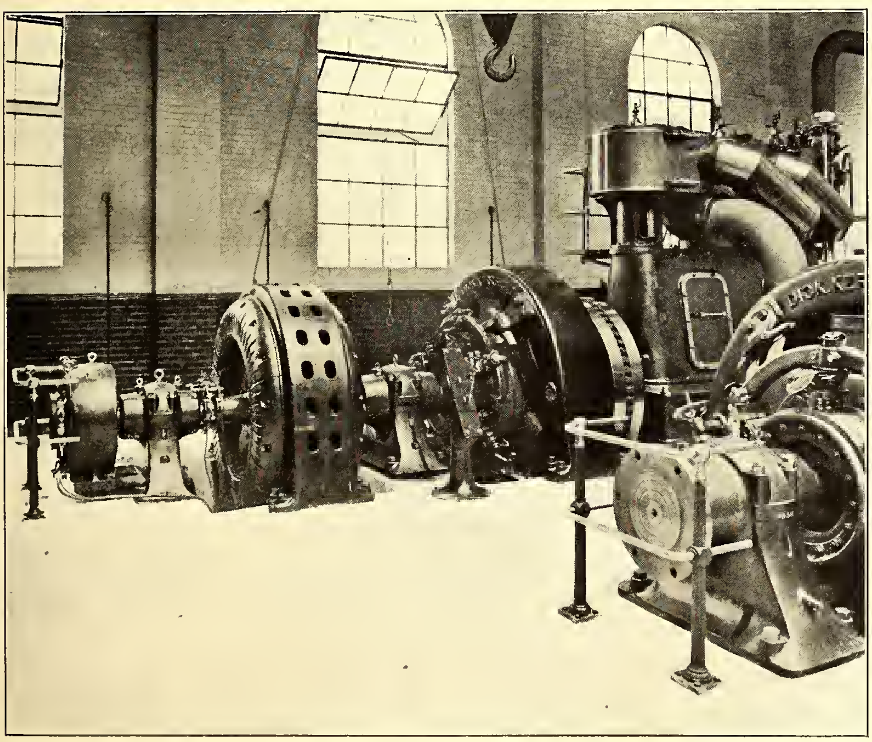
The steam plant consists of three Babcock & Wilcox patent marine water-tube boilers, with a working pressure of 180 lbs. per sq. in. Each boiler is provided with a steam superheater fitted with all the usual accessories., and is capable of evaporating 14,000 lbs. of water into high pressure superheated steam with natural draft. The superheaters—also of Babcock & Wilcox make—are so proportioned that an increased temperature of 120 degs. F. can be maintained.

The gases and products of combustion are carried through a main horizontal steel flue, constructed above and behind the boilers into a self-supporting chimney, also of steel, 8 ft. in diameter and 175 ft. high, which has been erected quite clear of the building. The area of both flue and chimney is so proportioned as to admit of necessary extensions in the boiler plant, which, judging by the appearances of traffic, will soon become necessary.

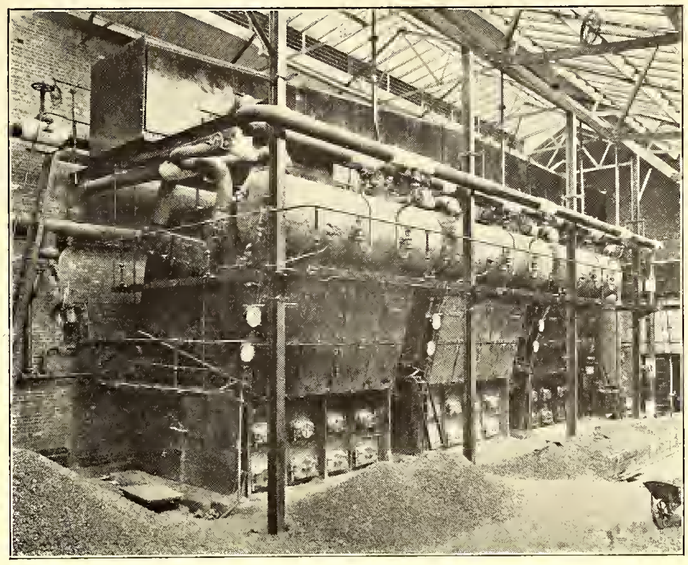
The feed-water supply is provided for by two of J. P. Hall & Company's direct-acting differential steam pumps, which are housed in a separate pump room, and as each pump is capable under normal circumstances of dealing with from 30,000 lbs. to 40,000 lbs. of water hourly, ample provision has been made for supply and reserve.

The piping plan has been designed to give security against accident, at the same time that duplicate supply is provided, in the event of imperfection showing itself in any direction.

The main steam pipe is of solid-drawn mild steel, 8 ins. internal diameter, arranged on the "ring" system. The "ring" is divided up into a suitable number of sections by means of through way valves, and one-half of it is arranged vertically above the other, the whole "ring" being suspended upon the boiler house side of the wall, which divides the power house in two. Each of the boilers is connected by means of a 5-in. pipe to the lower half of the main steam range; while each of the four steam engines, already installed, derives its supply from the upper half of the ring main, by means of branch pipes of the same bore as the engine steam inlet. The drainage of the ring has been amply provided for, as each section has its own particular draining pocket, in addition to which a separate pocket is provided at each end of the ring to intercept any water which might be carried over on its way to the engines. It is hardly necessary to add that all these pockets are fitted with automatic apparatus for the instant clearance of such water as may reach them. Automatic isolating valves have also been fitted into each separate boiler supply pipe, in order that security may be felt against the faraway possibility of any local accident to a boiler.


VIEW OF COMBINATION A. C., D. C. RESERVE UNIT

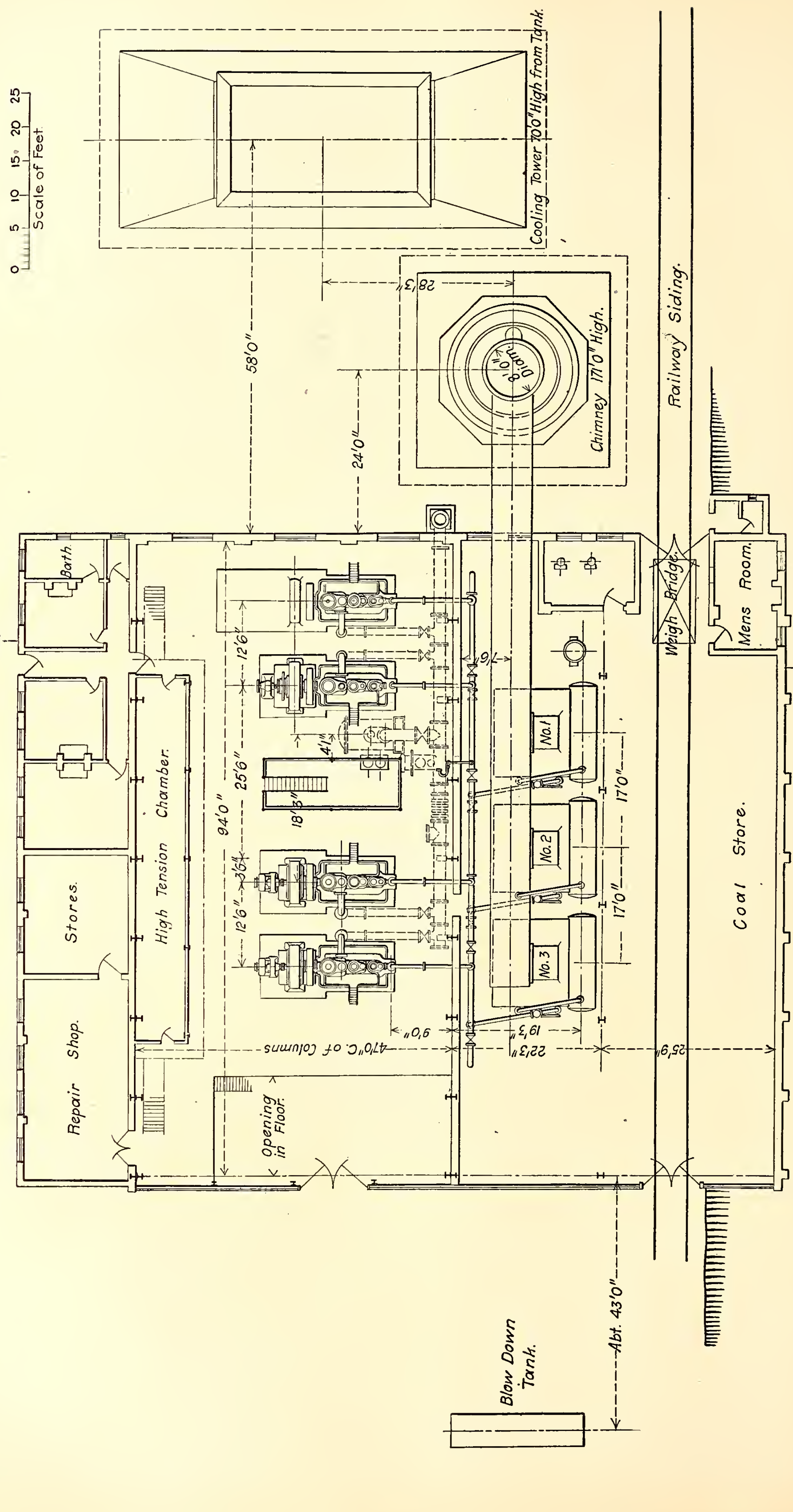
Besides the main steam ring, a second of smaller diameter has been erected, through which steam is supplied to the feed-pump engines, the condensing engines and other auxiliaries. The small ring is a miniature of the main ring, its features in all respects are similar, and the same care has been devoted to considerations of safety, handiness and general utility as in the design of the hardly more important main range. The branch pipes to the auxiliaries from the secondary ring are all of copper, solid drawn, and have flanges of gun metal brazed on. The bodies and covers are of Siemens-Martin acid process cast steel, and those on the main ring are provided with by-pass valves to facilitate operation. Special attention has been paid to the design and construction of these valves, because of the fact that they are required to work upon a pressure of 180 lbs. of steam, superheated 120 degs. F. The pipes are all covered with a composition containing 85 per cent of magnesia, which is wired every foot. The whole is then covered with plastic material, over which strong canvas has been neatly sewn and suitably painted.


BOILER ROOM IN HASTINGS POWER HOUSE

The feed suction and delivery, and all the pipe system in connection with the condensers, have been designed with the same care and the same considerations which were devoted to the steam system.

The steam upon leaving the engines is dealt with by a surface condensing plant, which has been supplied by W. H. Allen & Company, and which has been erected in the basement of the engine room. Its pumps are driven by means of a vertical-compound enclosed high-speed steam engine, the circulating pump being coupled direct; while the air pumps are driven through a single-reduction system of gearing. The condenser is designed for dealing with about 30,000 lbs. of steam per hour, and produces a vacuum to within about 4 ins. of the barometric pressure. The air pumps are of the two-throw, vertical, single-acting "Edwards" pattern, and are worked from a pair of cranks upon a shaft working in cast-iron bearings mounted on A frames, which is connected to the engine shaft through a rawhide pinion gearing into a spur wheel.

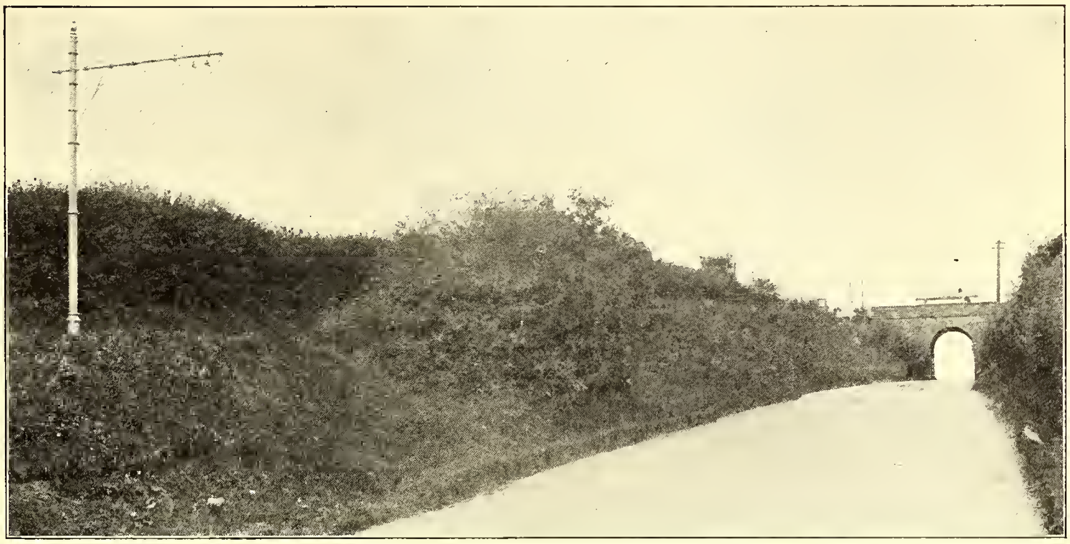
The circulating pump is of centrifugal type, and is capable of providing the requisite circulating water and of delivering it to the distributing troughs of the feeding trays inside the cooling tower, which is of the Klein Company's usual standard construction. The pump casing and disc are of cast iron, and the latter is carried on a steel shaft coupled direct to the



STEAM PIPING PLAN OF THE POWER HOUSE OF THE HASTINGS & DISTRICT TRAMWAYS COMPANY, HASTINGS, ENGLAND engine, which runs, if necessary, at a speed of 425 r. p. m.

The discharged water from the air pumps is taken by means of a small pump driven by the same engine, and is delivered into the cleaning apparatus. When freed from oil and other deleterious matter, it is taken once more by the feed-pumps to recommence its cycle of operations.

The cleaning apparatus, to which reference has just been made, and which is capable of dealing with the maximum amount of feed-water required, is constructed upon the Davis-Perrett system, which combines an electrical treatment of water with a filter of the Wilson automatic self-cleaning type. In this process the condensed water is received in wooden treating tanks, divided by metallic electrodes, which are so arranged as to cause the water to circulate from inlet to outlet. In its passage it is subjected to the action of electric current, with the result that the emulsive character of the oily water is destroyed and the oil forms a flocculent precipitate with the oxides of the metal, which can be easily removed by a simple filter. A continuous current at a pressure of about 500 volts is used. The tanks are supported upon insulators carried upon an overhead platform within the boiler room and just above the pump room. A galvanized wrought-iron tank having a capacity



TRACK ON RIGHT OF WAY PARALLEL TO HIGHWAY

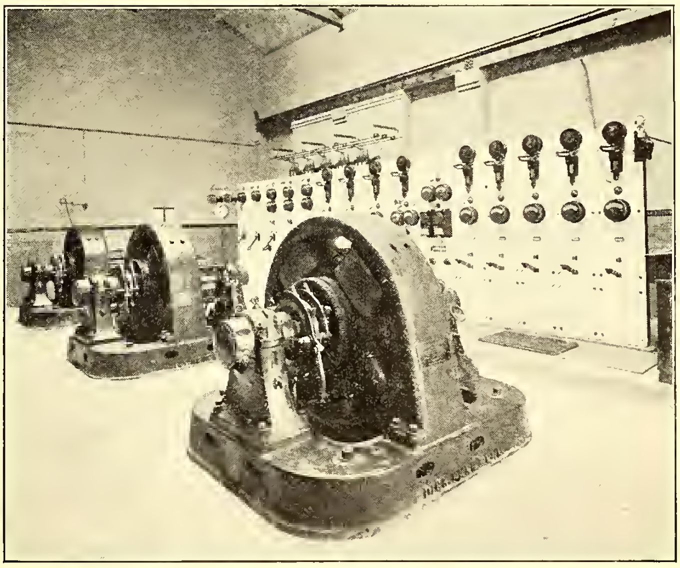
STANDARD CAR AND TYPICAL GRADE

of 1000 gals. is installed for the reception of the clean water from the filter, and this tank acts as a hot well from which the feed-pump suction is taken, and into this tank such small make up as is necessary is supplied from the feed-tank.

The engines, of which there are four in number, are of the "Belliss" three-crank, triple-expansion type, with forced lubrication. Each engine is capable of giving a normal output of 540 hp when running at a speed of 375 r. p. m., condensing or non-condensing, with a steam pressure of 175 lbs. per square inch at the stop valve.

The electrical plant consists of three of Dick-Kerr's standard alternators and two of the same firm's standard direct-current generators. Two alternators and one d. c. generator are each direct coupled separately to a "Belliss" engine. The fourth engine drives an alternator and generator coupled together so as to form a reserve in case of the break-down of either an a. c. or a d. c. unit. The alternators generate three-phase current at 6600 volts, 25 cycles, each machine being provided with a direct-driven exciter. They are designed for a continuous output of 300 kw and to sustain an overload of 25 per cent for one hour with a moderate rise in temperature. All three machines are designed to run in parallel with each other, and means are provided for raising their voltage up to 6600 when running at a constant speed to compensate for loss in the mains.

The direct-current machines are designed to give an output



INTERIOR OF SILVERHILL SUB-STATION

of 300 kw when running at 375 r. p. m. at a pressure of 500-550 volts.

The switchboard consists of twenty marble panels, each supported independently on an iron frame. The board consists of three a. c. generator panels, one a. c. spare generator panel, one a. c. total output panel, four a. c. outgoing feeder panels, two d. c. generator feeder panels, one d. c. total output panel, one B. O. T. panel, one negative booster panel, six d. c. feeder panels.

The whole of the high-tension oil switches is contained in a special chamber beneath the main switchboard gallery. Each switch is isolated in a separate cell and the front is closed by a sheet-iron door. The switches are operated from the main gallery by wooden rods and levers, and the panels on the gallery contain no instruments or switches carrying current at high pressure.

The sub-stations are fed from the main station by Callenders' three-core high-tension lead-covered cables. At the Silverhill sub-station there are three Dick-Kerr standard 200-kw compound-wound rotary converters, running at 750 r. p. m. and generating direct current at 500-550 volts. Each rotary has its complement of three single-phase, oil-cooled, step-down transformers. The rotaries are capable of dealing with an overload of 25 per cent for one hour. The Bulverhythe sub-station is similar to the one at Silverhill, and is equipped with a similar number of rotaries with the necessary transformers and switch gear. Each rotary has three 70-kw single-phase oil-cooled transformers. The transformers, which are mesh-connected, transform current from 6600 volts to 340 volts; they are contained in ribbed cast-iron tanks. The secondary coils are insulated from the iron by mica insulation and oil-proof material; the high-tension coils, outside the secondary coils, are insulated in the same manner. Special circulating ducts are provided for free circulation of the oil between the iron and secondary and secondary and primary, in order that the core and winding may be thoroughly cooled. The cores and yokes of the transformers are built up of annealed iron plates of special quality and high permeability, and of minimum hysteresis loss. The plates are insulated from one another by special varnish. The laminations used are free from ageing or increase in hysteresis loss. For mechanical reasons, the corts and yokes are securely clamped together in order to reduce the magnetic resistance.

SILVERHILL CAR SHED

Two car sheds have been constructed. The principal depot is situated at Silverhill, has six tracks, and is capable of accommodating thirty-six cars; the other car shed is in course of construction at Bulverhythe. A well-equipped repair shop has been provided in the former depot.

The rolling stock, of which there are already thirty cars in use, and ten more almost ready for delivery, is of the double-deck, single-truck (non-reserved), staircase type, with a seating capacity of twenty inside and twenty-two outside. They are built in accordance with the most up-to-date designs, and have all the latest improvements in the way of ventilation and finish. The car bodies were built by the United Electric Car Company, of Preston. They are mounted on Brill 21-E type trucks and fitted with a complete standard equipment, consisting of two 6a type traction motors. The controllers are of the D. B. I. form E type, with the patent metallic shield blow-out. Each controller is provided with a "run-back preventer," which makes it absolutely impossible for the car to run away down hill; the movement of the handle to the "off" position short-circuits the motors, in consequence of which there could be only a slow reverse movement of the car.

NOTES ON OVERHEAD LINES

BY H. V. SCHREIBER

The following comparative notes on overhead work of street and interurban railways may serve to bring out some new ideas or good and bad features of old methods:

HANGERS

To avoid switches, as well as to save an equivalent amount of feeder, two trolley wires are frequently installed. Sometimes these wires are both supported from a single hanger, which, of course, puts a greater mechanical strain on the hanger. At other times two separate hangers are used, a plan which cuts down the mechanical strains but doubles the number of hangers and consequently the number of points where the insulation may break down. A recent device that is of value on single-track branches, like gravel pits, etc., where one car goes in and out, is an overhead switch that is automatically closed by the trolley wheel when going in and automatically opened when going out. This device avoids the necessity for a switch or circuit breaker located on the pole, and should not cost much more than an ordinary trolley section insulator. The device as now manufactured (Fig. 1) uses a section insulator, on which is mounted an oblique L-shaped connector pivoted at the center. When the switch is open one end is against the bottom of the section insulator and in line with the live end of the trolley wire, and the wheel passing over the other end forces it against the bottom of the section insulator, thereby closing a switch and making the other end fly up ready to be again opened by the wheel in passing out.

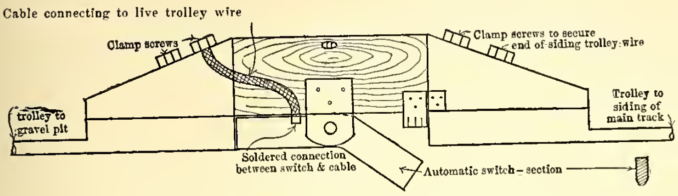
BRACKET ARMS

Bracket arms are made in a variety of forms, and shaped arms, angle irons and T irons are all used. If the outer end of the bracket arm is bent down to take the end of the span wire, the casting which is usually used for that purpose is saved. On the other hand, this plan necessitates drilling two holes, one for the span wire and one for the wire or rod supporting the arm.

POLES

While most interurban lines employ wood poles with bracket construction, a better installation consists of span construction with wood poles in the country and latticed or tubular iron poles in the city. Speaking of lattice poles, a very satisfactory form consists of four angle irons or two channel irons suitably spaced and braced with diagonal bracing. Another form (Fig. 2) has two U-shaped pieces with outwardly projecting flanges which are placed face to face and are separated by ferrules. Rivets passing through the ferrules and through the flanges hold the parts in place. It is desirable, with a lattice pole, to extend the concrete base to a height of 2 ft. or more above the ground. The top should then be levelled off to allow water to drain off. This strengthens the pole and protects it from corrosion at the point at which it is most subject to oxidization, i. e., where it enters the ground (see Fig. 3). Round iron poles can be protected at this point by a sleeve, and by filling the space between the sleeve and the pole with some sulphur.

In some towns there seems to be a strong objection to placing poles inside the curb line, and they are therefore placed in the gutter next the curb. This gives more room on the sidewalk and avoids disturbing it when setting new poles. On the



AUTOMATIC OVERHEAD SWITCH FOR GRAVEL ROADS

other hand, the greater depreciation from decay or corrosion, the obstruction of the gutters, the loss of support of the curbstone, as well as the greater danger both to teams and to poles from collision, ought to outweigh in most cases what advantages there might be.

Where wooden high-tension poles are located so that people easily come in contact with them, it is a good precaution to nail a strip of galvanized iron around the pole some 6 ft. or 8 ft. above the ground, and ground this band either by a strong iron wire or similar strip run into the foot of the pole. The value of this device has been demonstrated, and where nothing of the sort exists, linemen often find it necessary before climbing, to feel a pole on all sides from the ground up.

The high-tension wires, when on the same poles with telephone and signal wires, do not interfere if 6 ft. to 8 ft. above them, unless the high tension becomes grounded or leaks. It is much better to build a separate pole line for the high-tension circuit where this practice can be afforded, and it is followed by several companies on their cross-country runs. Sometimes this transmission line is on same right of way, at other times it makes short cuts independently, or skirts around towns or places where inspection would be difficult. Arrangements for gates so inspectors may travel on horseback reduces the cost of inspection and of repairs at times.

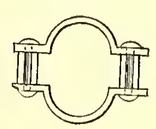


FIG. 2.—SECTION OF RIVETED POLE WITH U-SHAPED CHANNELS

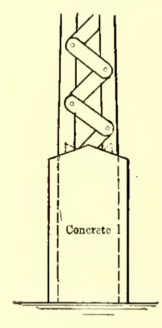


FIG. 3.—METHOD OF PLACING CONCRETE ABOUT BASE OF LATTICED POLE

Where two three-phase lines run on the same pole, the placing of the two-pin arm on the bottom allows greater freedom of access to all pins and greater clearance from braces to insulators. A barb wire is often placed on insulators at the top of the pole and grounded about every ten poles. By some this is considered to be of great service, but by others to do more harm than good.

PROTECTING CRADLES AND OTHER SAFETY DEVICES

Consideration of the possible and far-reaching effect of a crossing between a high tension and telegraph or telephone wire easily justifies the small expense of protecting cradles. These cradles are made sometimes of extra strong chicken netting, and sometimes with only parallel wood cross-strips or wires turned up at ends and supported on two or more wires running from pole to pole above or below the wires to be protected as may be necessary. This cradle is, of course, thoroughly grounded and is supposed to catch the broken wire when it falls and keep it from curling around so as to get through and reach the other wires. A network completely surrounding the high-tension wires has been used, but was abandoned as causing more damage than it prevented.

A device has recently been brought out which is placed in each wire near each pole at the crossing, and when the tension on any wire is removed the device is arranged to unhook this wire and let it loose. Arranged on the principle of the hook and eye, this little device is light and compact, and if strong enough to take the strain, and if making good contact, ought to avoid considerable trouble. The question arises, however, will the broken wire curl up enough before falling to hook over any other high-tension wire? The only sure way to make a safe crossing is to place two long poles close together near the lower line, and have them so arranged that any wire which breaks between the poles will be too short to reach any of the wires in the lower line.

TRANSPOSITIONS

Transpositions of telephone wires to avoid induction from high-tension wires on the same pole are often made with ordinary transposition insulators, but these do not always prove satisfactory. A better way, where pole brackets are used, is to rotate the line by passing from, say, the bottom bracket when both are on same side of the pole, to the opposite side of the next pole, thence to the top bracket on third pole. Or, where a bracket on each side of each pole is not too objectionable, then the two lines can be staggered up and down; the right-hand bracket being the lower on one pole and the higher on the next pole. This is effective because the disturbing lines of force are horizontal and the above arrangement alternates the opposing loops.

Telephone insulators must be good, and several engineers are beginning to use porcelain for this purpose.

LIGHTNING

Lightning in some cases is cared for without trouble with one or two arresters per mile of trolley, while others have found four or five to the mile none too many. If the arrester is grounded independently of the track, it may often prevent current following a stroke on account of the dead short circuit which would otherwise be produced. High-tension or telephone or telegraph lines when carried parallel to the trolley and above it exercise a very appreciable protective influence.

NUMBERING POLES

It is always of great advantage in locating trouble and right of way, etc., to number all poles. With clearly marked figures on a white background, a track or overhead inspector can locate bad joints, trolley ears, insulators, etc., while traveling along on a regular passenger car. This plan can be extended to advantage by the erection of signs indicating the approach to station, road crossing, turn-out, etc. These signs should be placed about 1000 ft. from the point indicated, and should be supplemented at the crossings, circuit breakers, bridges, etc., by suitable numbered signs.

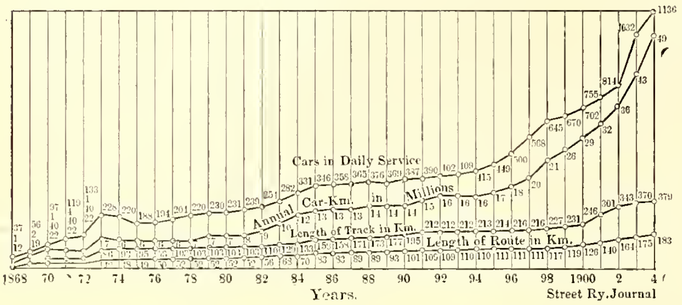
ELECTRICITY ON THE FARM

The Fort Wayne & Wabash Valley Traction Company has issued a circular entitled "Electricity on the Farm," descriptive of power installations along its line and that of the Elgin, Aurora & Southern Traction Company and of other interurban railway companies. The pamphlet is being distributed by conductors and has evoked many inquiries as to the uses to which electric power from the trolley circuit can be employed, such as driving threshing machines, churns, saws, etc.

The records for high speeds on electric lines are said to have been smashed Oct. 11, when the special car "Josephine" traveled over the Lake Shore from Toledo to Rocky River in 3 hours and 6 minutes. The distance from Ceylon Junction to Beach Park is 19 miles and, it is said, the "Josephine" covered the distance in 19 minutes.

VIENNA TRAMWAY STATISTICS

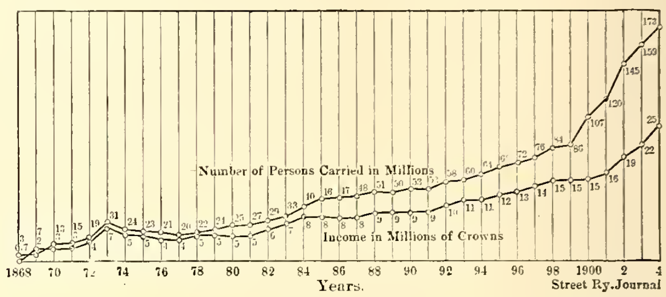
The celebration of the fortieth anniversary of the opening of Vienna's first street railway lends especial interest to a study of the growth of that city's railway system since the original horse car started running on October 4, 1865. The first line was 3.2 km (2.5 miles) long, and ran from the Schotten Gate to Hernals. The system was gradually extended until in 1898 the Vienna Tramway Company operated over 162 km (129.6 miles), and had an equipment of 481 horse cars, 44 motor cars and 34 trailers. The total number of employees was 4661.



CURVES SHOWING INCREASE IN THE NUMBER OF CARS IN SERVICE, MILEAGE AND LENGTH OF TRACK AND ROUTE, FROM 1868 TO 1904, INCLUSIVE

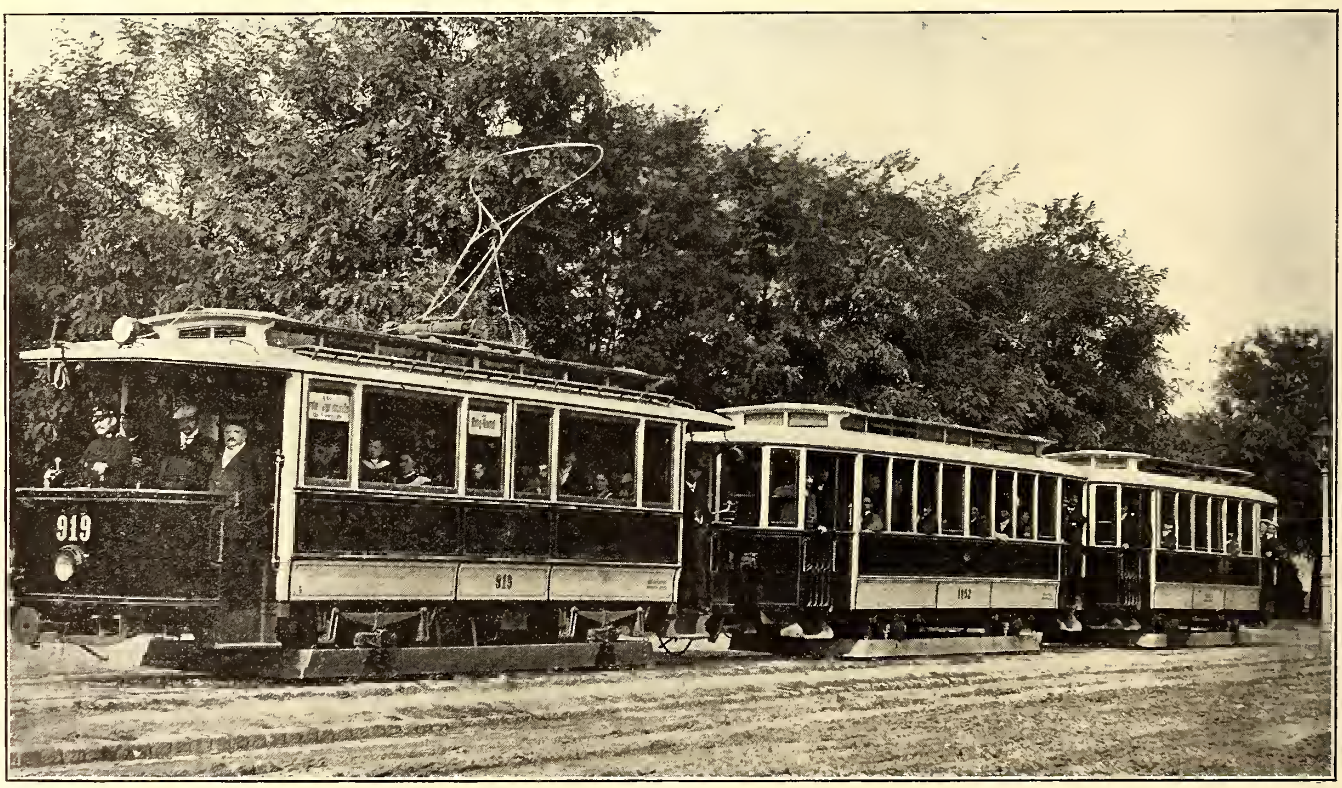
Statistics are given for 1898, because in that year the tramway company was liquidated and the system was taken over, through an arrangement with the city, by a construction and operating corporation formed by Siemens & Halske. By the terms of its contract the latter company equipped the lines electrically and then turned them over to the Vienna municipality on January 1, 1902, at which time the electrification of the lines had been largely completed. The municipality also purchased during the same year the New Vienna Tramway Company, which operated 57 km (45.6 miles) of track, partly by steam and partly by animal traction; and in 1904 absorbed the electric railway running from Vienna to Kagran, which was 6.2 km (5 miles) long, and included ten motor cars and nine trailers. The municipality now controls all of the surface traction lines in Vienna outside of a few steam routes.

The present system comprises 343 km (275 miles) of track, of which 29 km (23.2 miles) are operated on the underground conduit system. The total length of the line is 184 km (157 miles). The system includes fourteen car houses and one construction and repair shop. The rolling stock comprises 959 motor cars, 876 trailers, together with a number of special cars, such as snow sweepers, sprinklers, freight cars, repair cars, etc. At the end of 1904 the number of people employed was 6843, and the total capital invested 127,000,000 crowns ($25,400,000). During the first six months of 1905 the traffic amounted to 26,000,000 car-km (16,120,000 car-miles); the number of passengers, including commutation tickets, 90,000,000, with a total income of 13,000,000 crowns ($2,600,000).



CURVES SHOWING INCREASE IN PASSENGERS CARRIED, AND INCOME FROM 1868 TO 1904, INCLUSIVE

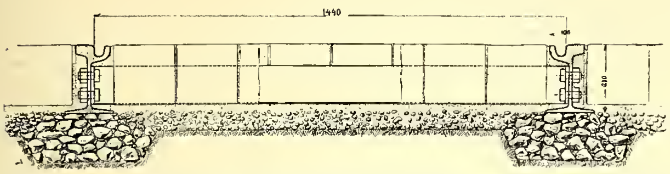
The fares are based on the zone system, and are as follows: 10, 12, 20 and 30 hellers ($.020, $.024, $.040 and $.050), with a very liberal transfer system, depending on the length of the distance traveled. The fare on the original line was 20 hellers ($.040) for a distance of 3.2 km (2.5 miles), but in 1895 the Vienna Tramway Company reduced the rates to an average of 17.6 hellers ($.037) per passenger. The present average fare is 14.43 hellers ($.029), while the average distance traveled is much greater. Direct current at 500 volts is transmitted for



VIEW SHOWING STANDARD TRAIN ON THE VIENNA TRAMWAY SYSTEM DURING THE RUSH HOURS, CONSISTING OF ONE MOTOR CAR AND TWO TRAILERS the operation of the street railway from the municipality's power and lighting station.

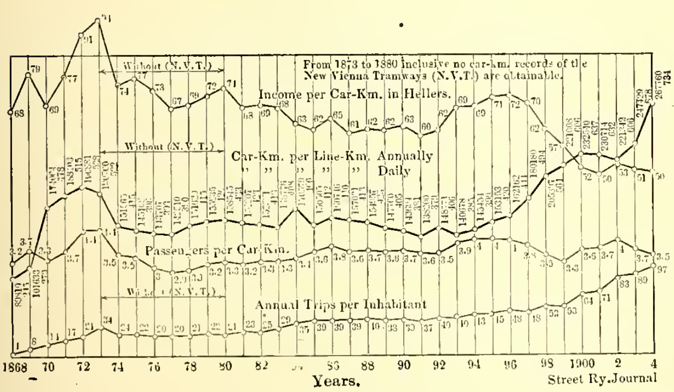
The general growth of this railway system is clearly shown in the accompanying diagrams, which are based on data from 1868 to the present time. An extraordinary growth took place in the years 1900 to 1902, due to electrifying the lines and the adoption of the liberal transfer system.

The latest motor cars used on this system weigh 10,850 kg (23,870 lbs.) when empty, have a body 9.9 m (32 ft. 6 ins.) long, a width of 2.1 m (6 ft. 10 ins.), and a height of 3.2 m



CROSS-SECTION OF PRESENT TRACK IN VIENNA
(Note.—All measurements given are in millimeters.)

(10 ft. 6 ins.). They are furnished with twenty-four seats, and can also accommodate eighteen standing passengers. The wheels are 800 mm (31.5 ins.) in diameter, have axles of 116 mm (4.57 ins.) diameter and weigh about 550 kg (1210 lbs.) each. The new trailers weigh 6900 kg (15,180 lbs.) without passengers, have bodies 9.3 m (30 ft. 6 ins.) long, a width of 1.97 m (6 ft. 2 ins.) and a height of 3.2 m (10 ft. 6 ins.). They have a seating capacity of twenty-four and standing room for twenty passengers. When required, two of these trailers can be attached to one motor car. The wheels used on the trailers are 800 mm (31.5 ins.) in diameter, have axles 95 mm (3.9 ins.) in diameter and weigh about 420 kg (924 lbs.) each. When animal traction was used a car drawn by two horses carried thirty-two passengers, whereas the present trains, con-



CURVES SHOWING DENSITY OF TRAFFIC AND INCOME PER CAR-KM FROM 1868 TO 1904, INCLUSIVE

sisting of one motor car and two trailers, are capable of transporting 130 passengers. The average speed of the horse cars was 8 km to 8.5 km (6.4 miles to 6.8 miles) per hour, while the electric cars are operated at 10 km to 10.5 km (8 miles to 8.4 miles) per hour. All of the cars are equipped with electric brakes.

It is of interest to note that in 1895 the average working time of an employee was 14¼ hours, of which 11¾ hours were spent on the cars. To-day, under electrical operation, the average working time is 11½ to 12 hours, of which only 7½ to 7¾ hours are spent on the cars. At the same time the average annual income per employee has increased from 1,200 to 1,380 crowns ($240 to $276).

A description of the physical features of the Vienna system was published in the STREET RAILWAY JOURNAL for February 6, 1904.

SOME WIRING DIAGRAMS FOR CAR LIGHTING

BY CALE GOUGH

On cars intended to be operated in one direction only, the diagrams of the lighting circuits are comparatively simple, and usually consisting of one or more circuits of five lights in series. The diagrams of the lighting circuits of "double-end"

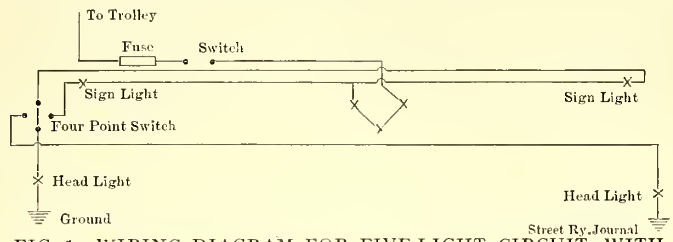


FIG. 1.—WIRING DIAGRAM FOR FIVE-LIGHT CIRCUIT, WITH FOUR-POINT SWITCH FOR HEADLIGHTS AND PLATFORM LIGHTS

cars, however, are often rather complex. This is due to the fact that at the end of the run the headlight, the platform lights and sometimes the sign lights, must be turned off on one end of the car and lighted on the other. Three-point and

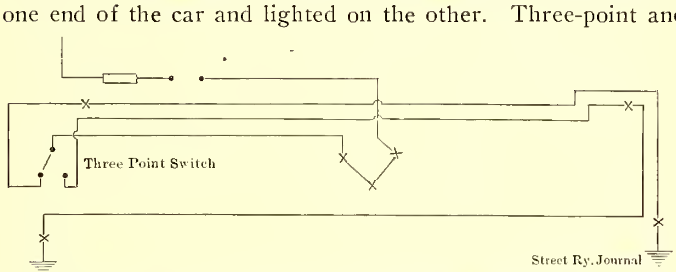


FIG. 2.—WIRING DIAGRAM TO ACCOMPLISH THE SAME PURPOSE AS IN FIG. 1, BUT USING THREE-POINT SWITCH

four-point switches play important parts in the wiring of such cars. In designing the circuits the all important aim is to accomplish the purpose with the least amount of wiring.

Fig. 1 shows a diagram suitable for a small car. A single

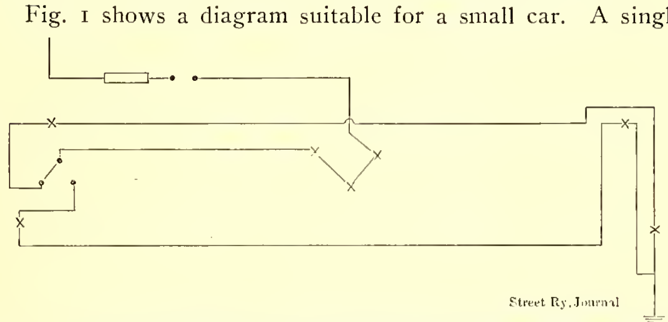


FIG. 3.—ILLUSTRATING THE CONNECTION USED WHEN THE HEADLIGHTS ARE PLACED ON THE HOODS

circuit of five lights is required. Three of the lights are located in the interior of the car, the remaining two consisting of the platform light on the rear end and the headlight on the dash of the front end. The headlights and platform lights

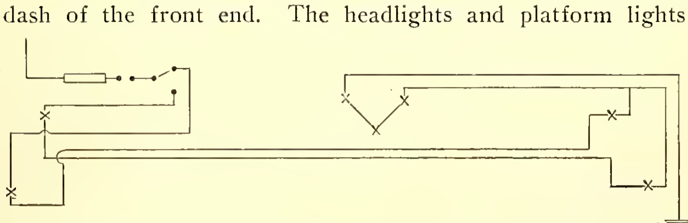


FIG. 4.—SECOND WIRING SCHEME, WHERE HOOD HEADLIGHTS ARE USED, USING A THREE-POINT SWITCH ON THE TROLLEY SIDE OF THE CIRCUITS

are interchanged at the end of the run by turning a four-point switch.

If the stock room is short on four-point switches, or if for any other reason it is desired to use a three-point switch, the same results as were obtained in Fig. 1 may be accomplished with the use of a three-point switch connected as in Fig. 2.

When headlights are placed on the hoods, the more economical method shown in Fig. 3 may be employed. In this scheme of wiring, the circuits pass the full length of the car but three times, as against three and one-half and four times in Fig. 1 and Fig. 2, respectively. Still another scheme where the head-

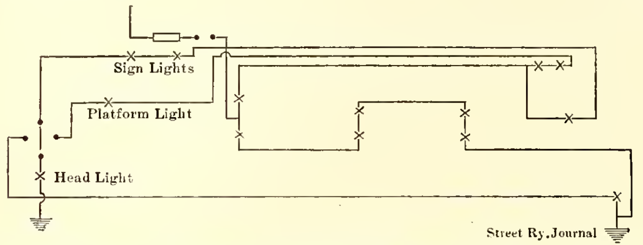


FIG. 5.—SHOWING WIRING DIAGRAM WHERE TWO CIRCUITS ARE EMPLOYED, AND WHERE HEADLIGHTS, PLATFORM LIGHTS AND SIGN LIGHTS ARE INTERCHANGED

lights are placed on the hoods is that of Fig. 4. In this case a three-point switch is located on the trolley side of the circuits.

In Fig. 5 is shown a more complicated diagram. Two circuits are employed. In addition to the headlights and platform lights the sign lights are interchanged. The sign lights on one end are in series with the platform light on the opposite end of the car. A four-point switch connects one or the other of the circuits containing the sign lights and platform lights to the proper headlight. One objection to this method of connection is that when one of the lamps of the circuit in the interior of the car burns out the passengers are left in almost complete darkness, as but a single light remains burning.

On many systems a headlight stronger than a 16-cp lamp is preferred. The wiring scheme shown in Fig. 6 permits of the use of a 32-cp headlight. Each of the two circuits uniting at the four-point switch contains three lights in the body of the car and either a platform light or a sign light.

Some peculiar results follow the burning out of a platform light or a sign light. Suppose lamp "A" burns out when the four-point switch is in the position indicated. The lamps in the body of the car nearest "A" are not completely extinguished. They burn at a dull, red glow, since the circuit is still

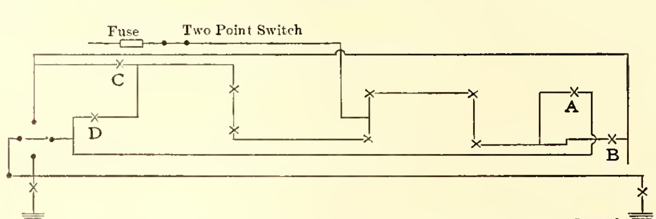


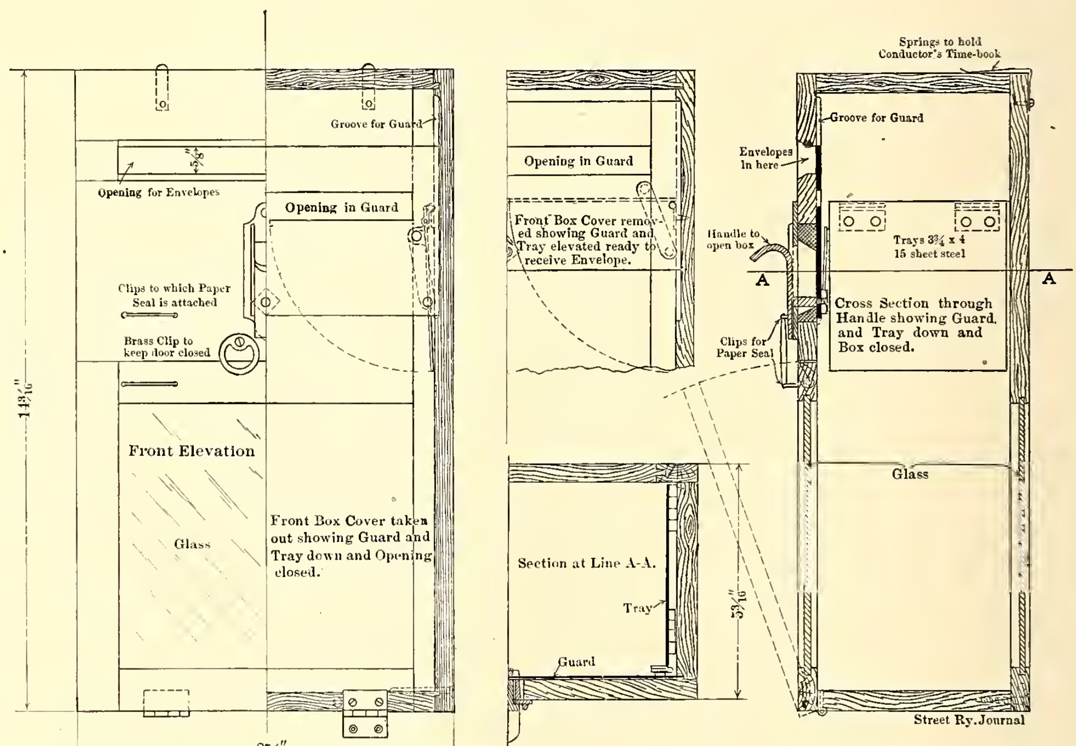
FIG. 6.—WIRING ARRANGEMENT ADAPTED TO PERMIT THE USE OF A 32-CP HEADLIGHT

completed through lamps "B," "C" and "D." Lamp "D" burns with increased brilliancy, receiving current from both circuits, one of three lamps and the other of five lamps in series. The headlight is dimmed to about half brilliancy. If lamp "B" burns out, with the four-point switch in the position opposite to that shown, the circuit is completed through "A," "D" and "C," and the same results as when "A" burns out are observed, with the exception that the brilliancy "C" instead of "D" is increased.

In larger cars, on which a greater number of lights are required, these may be added, in as many simple circuits of five lights each as may be desired without interfering with the circuits containing the lamps that are to be changed when the direction of running is reversed. The essential features of the diagrams described can, therefore, be used on cars of any size.

NOVEL CAR RECEIPT BOX FOR TRANSFER ENVELOPES

The accompanying diagram illustrates an interesting new design of transfer-receipt box which has been applied to surface cars of the Brooklyn Rapid Transit Company for receiving the trip transfer-receipt envelopes which the conductors are required to deposit immediately upon completion of each half trip. It has been a commendable practice upon the surface lines in Brooklyn to compel all conductors to enclose the transfer checks received each half trip in a special form envelope and deposit same in a special envelope box in the car. This measure is found greatly to assist the accounting department in protecting against expired-time-limit transfers, as the time of the deposit of each envelope is recorded. This permits accurate records to be kept of all transfer receipts, while the possibilities of manipulation and fraudulent practice that exist when transfers are collected from conductors only at infrequent intervals are almost entirely eliminated. The difficulty has heretofore been in the use of enclosed boxes with which it was impossible to ascertain whether the envelopes were being promptly deposited every half trip or not. The new form of box was designed not only to permit the inspector to examine the envelope after it is deposited, but prevent its being placed in the box with the top or record side down.



DETAIL DRAWING, SHOWING CONSTRUCTION AND OPERATION OF RECEIPT BOX FOR TRANSFER ENVELOPES PLACED IN THE CARS OF THE BROOKLYN RAPID TRANSIT COMPANY

The detail sketch will show the construction and arrangement of the depositing mechanism which has been designed to accomplish the above desideratum. The box is $13\frac{1}{4}$ ins. x $7\frac{1}{2}$ ins. x $4\frac{3}{8}$ ins. in size inside, which is sufficient to hold the standard transfer-receipt envelope used. To enable all envelopes deposited to be readily seen from outside, a pane of glass 6 ins. square is set in the lower end of both front and back sides, so that when the box is hung against a platform window the inspector may examine the contents at a glance from within the car or from the platform. To prevent conductors removing the contents of the boxes, and at the same time obviate the trouble and uncertainty of locks, which may be tampered with and "picked," a form of paper seal was adopted which, if found intact when envelopes are collected, indicates that they have not been removed from the box after deposit. The seal consists of a narrow piece of gummed paper, with distinctive numbering and the company's name and monogram, which is merely passed through the sealing clips or staples, moistened and gummed fast, after each removal of envelopes. Access to the box is impossible without either breaking this seal or the glass. This form of seal is found most effective, and is simple, inexpensive and convenient.

The tray mechanism for dropping the envelopes in the box right side up is operated in conjunction with a guard which closes the envelope opening and prevents their insertion, except when the dropping tray is in position to receive them. The envelope hole is opened by lifting the guard, by means of the handle at the front, until the opening in the guard comes up opposite the hole in the box, when an envelope may be inserted. This guard, which is of No. 15 sheet steel, is connected by short links with two trays, one hinged on either side of the box, so that, when raised to open the envelope hole, it brings up both trays, forming a shelf across the box to receive the envelope. Then, in closing the hole and dropping the guard, both trays go down together and are effectual in dropping the envelope right side up. This feature of the box has been found very effective and works successfully.

This system of collecting transfers and the particular design of box adopted was the work of George R. Folds, who recently left the Brooklyn Rapid Transit Company to accept the general management of the South Chicago City Railway Company. The details of the box were worked out in the mechanical department of the company.

REQUEST FOR APPLICATION BLANKS AND REQUIREMENTS FOR EMPLOYEES

At the Lake George convention, the New York State Street Railway Association decided to appoint a committee of five to consider and design standard application blanks for motormen and conductors, and design a standard system of uniform physical examinations and re-examinations for electric railway employees, giving consideration to the respective needs of urban roads, suburban roads and high-speed interurban roads. President R. E. Danforth, of the association, announces the appointment of the following members to serve on this committee: Dr. F. H. Peck, of the Utica & Mohawk Valley Railway Company, Utica, chairman; C. A. Coons, superintendent of the International Railway Company, Buffalo; J. E. Duffy, superintendent of the Syracuse Rapid Transit Railway Company, Syracuse; D. L. Schoemaker, of the New York City Railway Company, and J. P. E. Clark, general manager of the Binghamton Railway Company.

This committee is very desirous of receiving copies of all the blanks and forms used in examining and employing conductors and motormen on as many roads as possible, together with any suggestions from superintendents and general managers as to what the standard system of blanks and forms and physical requirements should contain. Any forms, data or suggestions in this connection should be mailed promptly to Dr. F. H. Peck, 230 Genesee Street, Utica, N. Y., and the committee will cordially appreciate any material of this nature that will aid it in its work, whether sent by roads in New York or in other States.

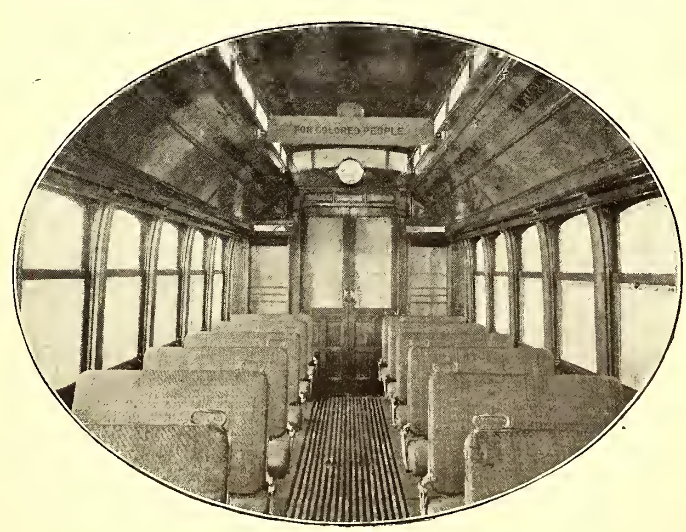
CONVERTIBLE CARS FOR LAKE CHARLES, LA.

The Lake Charles Street Railway Company, Lake Charles, La., has recently purchased from the American Car Company five cars of the Brill convertible type shown in the accompanying views. This car company has lately furnished similar convertible cars to Alexandria and Shreveport, two of the most important cities in the State. The cars for the latter place were described in the Street Railway Journal of Sept. 30.

DOUBLE-VESTIBULE CONVERTIBLE CAR OPERATED BY THE LAKE CHARLES STREET RAILWAY COMPANY

Lake Charles is one of the principal railway and commercial centers of Southwestern Louisiana. The railway company operates 8 miles of lines in Lake Charles and vicinity.

It speaks well for this convertible car that it is being successfully operated in the Gulf States, for the climate is semi-tropical with a heavy rainfall, and if there were a tendency for the sliding panels and sashes to stick on account of the swelling of the wood, the moist atmosphere would doubtless create difficulty. But such conditions are fully taken into account in the plan and construction, and the car therefore has demonstrated its suitability to all climates. It is obviously desirable in a warm climate, where the rains are frequent, to have a car which may be readily changed from closed to open, and vice versa. The ordinary type of summer car has been largely employed in the past, but having to rely entirely upon storm curtains in bad weather, such cars are unsatisfactory because of their discomfort and dreary appearance. No one will ride in them unless necessity requires. The comfort and protection assured to passengers using the convertible cars and their attractive appearance makes them popular with the public, and



INTERIOR OF LAKE CHARLES CONVERTIBLE CAR, SHOWING CROSS SEATS WITH GRAB HANDLES, ETC.

therefore very largely increases the earnings of the road. This has been demonstrated in all places where convertibles are in use. The builders state that during last spring, in a city in one of the Gulf States, a street railway which had been operating with the ordinary type of rolling stock added a number of convertible cars of the Brill type, which immediately showed their large earning capacity. The competing line of the city opened an up-to-date electric amusement park and expected to divert the extra traffic which was being secured by the convertible cars to its line, by admitting passengers free to the park, while those carried in the convertible cars were charged 10 cents admission; but strange to say, the convertibles continued to have the larger part of the traffic, and it seemed evident that the people preferred to ride in the convertible cars to the park, even though they were required to pay the admission fee.

The Lake Charles cars measure 20 ft. 7 ins. over the body and 30 ft. over the vestibules; the platforms are 4 ft. 8½ ins. long. The width over the sills is 7 ft. 6½ ins.; width over the posts at the belt, 8 ft. 4½ ins.; sweep of the posts, 4⅞ ins.; height from the under side of the sills over the trolley board, 9 ft. 1 in.; height from the track over the trolley board, 11 ft. 3⅝ ins.; height from the track to the platform step, 16 ins.; from the step to the platform, 12 ins., and from the platform to the car floor, 6½ ins. The side sills are 5¼ ins. x 6 ins., reinforced with Z-bars. The seating capacity is twenty-eight. Spring cane upholstered seats of the Brill manufacture are used, which have push-over backs, with brackets between the seat backs and the car posts to serve as grab handles, thus doing away with the necessity of grab handles on the outside of the post. The interiors are finished in ash, with ceilings of birch veneer. The cars are mounted on No. 21-E trucks. The weight of the car and the truck, without motors, is 15,500 lbs.

AN EFFECTIVE OIL FILTER

In the accompanying illustrations are shown a sectional and an exterior view of the Turner oil filter, made by M. A. Turner, of South Bend, Ind. The exterior view shows a 600-gal. filter

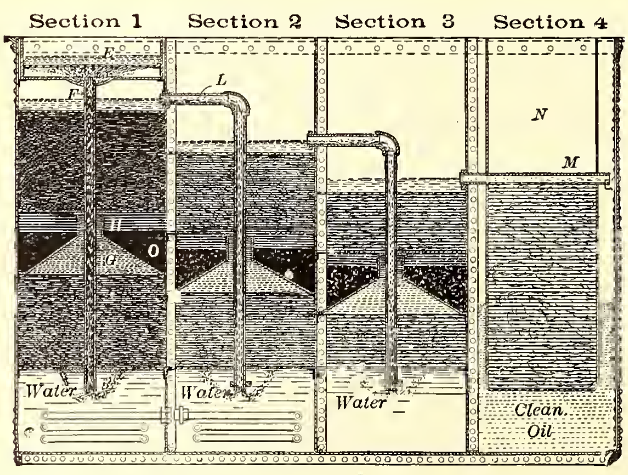


FIG. 1.—SECTIONS OF OIL FILTER TO ILLUSTRATE ITS OPERATING PRINCIPLES

unit, complete with circulating pumps. Referring to Fig. 1, the dirty oil is poured into the hopper *E*. It passes through a sieve into a pipe, projecting down into the water in the bottom of that section of the filter. The oil then rises through the water and passes through a perforated plate and up through filtering material and water into the cone *G*. Escaping through the collar in the top of this cone, it passes into another filter chamber, which is similar to the one below. *H* is a dirt chamber for the settling out of dirt in this part of the filter. Provisions are made for drawing off dirt from this chamber. As soon as the oil rises to a level of the pipe *L*, it begins to overflow into section 2, in which the same process of filtering is repeated, except that the depth of filter material is not as great.

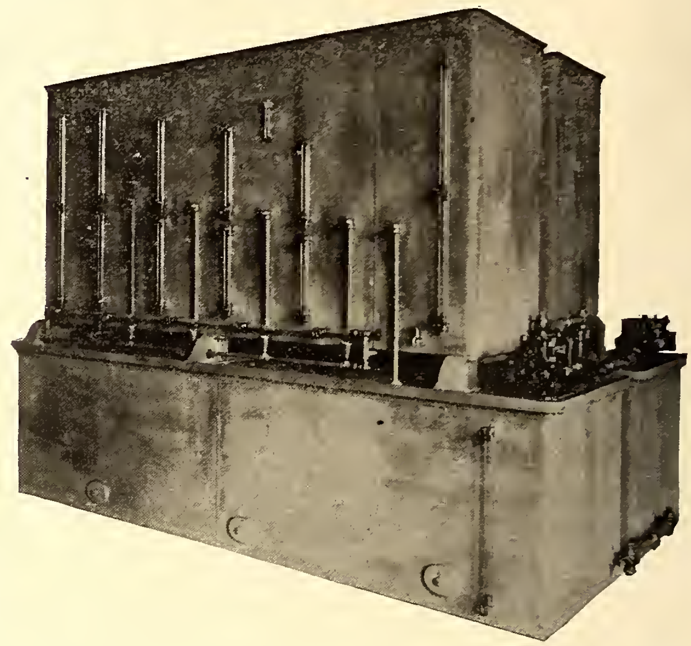
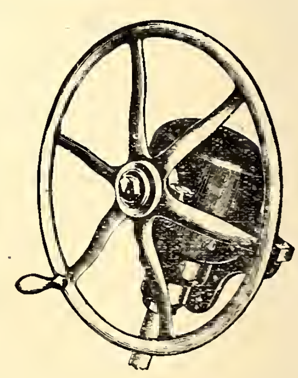


FIG. 2.—EXTERIOR VIEW OF OIL FILTER, 600-GAL. CAPACITY

Section 3 is similar to section 2, except that the filtering material is not as deep. From section 3 the oil flows into *M*, section 4, and descends through the last filtering material into the clean oil reservoir.

RATCHET-CLUTCH VERTICAL BRAKE WHEELS AND HANDLES

For use on vestibuled cars where the space for the motorman is rather limited, John S. Baker, of Beverly, Mass., manufactures. the ratchet-clutch vertical brake shown in the accompanying cut. It is a very simple and powerful device, made to give a leverage equal to a 15-in. handle. The clutches are of machine-cut steel. Compactness is one of the strong features of this brake wheel, as it takes up no more than 10 ins. of space on the car platform.



RATCHET-CLUTCH VERTICAL BRAKE

Mr. Baker also makes a ratchet-clutch brake handle, and, like the vertical wheel brake, it is widely used on electric railways.

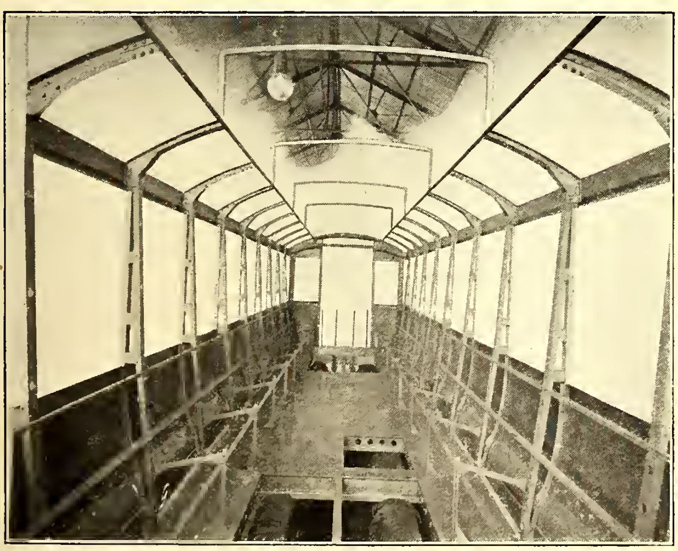
Returning from a trip of inspection of the express business done by street railways in Cleveland, Schenectady and elsewhere, General Superintendent Edward P. Shaw, Jr., of the Boston & Worcester Street Railway, is quoted as saying: "The carrying of freight by electric cars is surely coming, and I have great hopes that the Boston & Worcester will soon have express cars in operation between Boston and Worcester, with a branch line to Marlboro and Hudson." Every city and town along the route covered by this company, except Newton, has given the necessary permit for the operation of express cars.

NEW TYPE OF STEEL CAR FOR NEW YORK CITY RAILWAY COMPANY

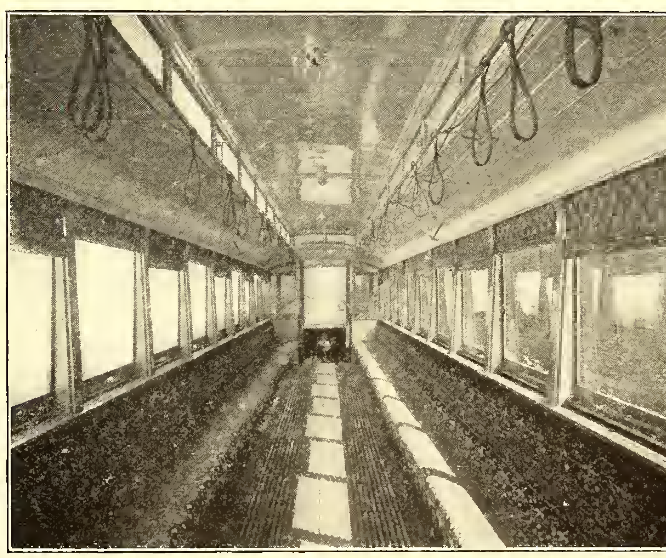
In a lot of seventy-five standard double-truck closed cars which the J. G. Brill Company is delivering at present to the New York City Railway Company is one which is built entirely of steel, with the exception of the ventilator sash frames, the upper and lower parts of the window sash frames and the doors. So closely does this steel car resemble those built of wood, that unless one raps on the panels and other parts, the statement that it is "all steel" will hardly be credited. The car was exhibited at the recent street railway convention at Philadelphia, and made a profound impression on steam as well as street railway operators, as it convincingly illustrated the possibility of metal construction without bulk, weight and unsightly finish. The small number of rivet heads in evidence is due to a method of riveting peculiar to the builder, which permits the rivet heads being ground flush with the plates, so that after the paint is applied the location of these rivets cannot be detected. There is no sacrifice of strength in this method of countersinking; in fact, strength is increased by adding to the bearing surface under the rivet heads.

EXTERIOR OF THE COMPLETED STEEL CAR FOR THE NEW YORK CITY RAILWAY COMPANY READY FOR SERVICE

An interesting and significant feature in connection with the construction of this car is in the fact that no pressed steel was employed. The builder claims that pressed steel has not the strength of structural material, because in pressed steel the metal is weakened at the bending points, while structural material is filleted at these points. The bottom framing is comprised of angles and channels riveted together, and the posts and rafters are also riveted. In fact, the only bolts used in the car are to secure the platform supports to make removal convenient in case of accident. Gusset plates are used at certain of the joints in the bottom framing and superstructure to assist in maintaining alignment. The posts are composed of 2-in. channels shaped in a bulldozer. Spacing castings at the center of posts provide strength at the point where it is most required—that is, at the belt-rail. The illustration of the unfinished interior of the car gives a good idea of the form and configuration of these posts. It will be seen that their attachment makes a trussed cantilever out of each post, resulting in a comparatively light but immensely firm support to the roof. No. 14 steel is used for the side and end facia. The floor and platform are covered with No. 16 steel, and No. 16 steel is also used for the side roofs. The monitor, hoods, headlinings and seats consist of No. 18 steel.



VIEW OF UNFINISHED INTERIOR, SHOWING THE GENERAL CONFIGURATION OF THE STEEL CAR FRAMING



VIEW OF FINISHED INTERIOR OF STEEL CAR, SHOWING ITS GENERAL RESEMBLANCE TO REGULAR WOODEN CAR

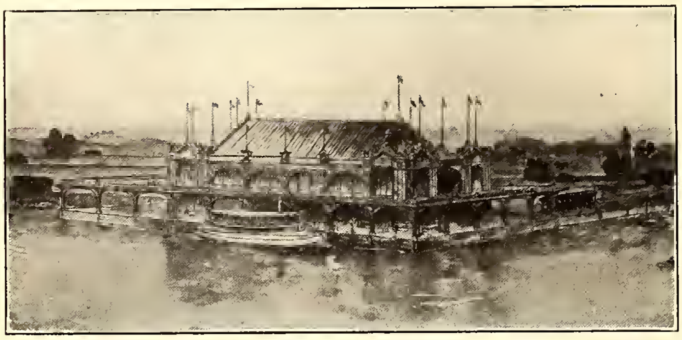
The illustration of the finished interior of the car shows it to have the same appearance as the standard wooden car, with the exception that aluminum-painted, steel headlinings take the place of the usual maple veneer. Corrugated maple flooring forms a covering for the steel plates between the seats, and the platforms are also covered with a thin maple flooring. The seats are covered with Wilton carpet as in the other rolling stock furnished for the New York City Railway Company.

The question has been frequently raised by persons unfamiliar with the subject, whether a steel car is not dangerous to passengers on account of short-circuiting of the electric current. The fact is steel cars are less dangerous, because of supplying a direct lead from any part to the rails. Of course, greater care has to be exercised in regard to insulation of cables and lighting circuits. The cables in this car are laid in loricated pipe and the car wired according to fire underwriters' rules.

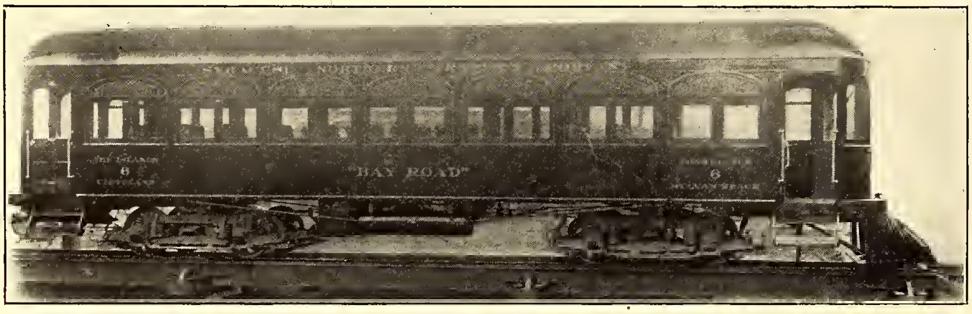
The general dimensions of the steel car are the same as of the seventy-five standard wooden cars being delivered by the Brill Company at present, and are as follows: Length over the end panels, 28 ft., and over the crown pieces, 36 ft.; length of the platform, 4 ft.; width over the sills, 6 ft. 6 ins., and over the posts at the belt, 7 ft. 6 ins.; height from the track to the top of the floor, 34¼ ins.; height from the floor over the roof, 8 ft. 1½ ins. The car is mounted on Brill "Eureka" maximum-traction trucks, which is the company's standard truck for this size of car.

THE SYRACUSE & SOUTH BAY COMPANY'S NEW SYSTEM AND ROLLING STOCK

The Syracuse & South Bay Railway, which is nearly completed and will be in full operation early this winter, has just received ten large motor cars, ten trail cars and two baggage cars from the G. C. Kuhlman Car Company, of Cleveland, Ohio. As the illustrations show, the cars are fine examples of modern interurban construction and form an equipment quite in keeping with the company's fine railway system. The cars are to start from the heart of the city, using the lines of the Syracuse Rapid Transit Railway Company, with which it has a traffic contract, and from the city line of Syracuse to South Bay, Oneida Lake, a distance of 10 miles, they will run over private right of way, the width of which is 100 ft. The tracks are double and nearly straight for the entire distance, with a maximum grade of only 1.75 per cent. Eighty-five-pound rails are used; the roadbed is rock ballasted, the culverts are of concrete and the construction throughout of the most substantial character. The lines are connected with the New York Central, West Shore and Lackawanna Railroads, and being of the same gage, cars may be operated by steam over the system when desired.



VIEW OF THE TERMINAL AT SOUTH BAY



REGULAR PASSENGER CAR FOR THE SYRACUSE NORTHERN TRACTION COMPANY

Besides the large summer excursion and regular business between Syracuse and the lake, the company expects to develop an important passenger and freight service in the broad territory tributary to Syracuse, consisting of a good portion of Central New York. This will be done with the assistance of a fleet of large new passenger steamers operated by a company owned by interests allied to the railway company. Oneida Lake contains 78 sq. miles of water and has important towns around its shores. The 1000-ton barge canal, which is to be built by the State of New York, extending from Buffalo to Albany, will traverse Oneida Lake, and the State is soon to commence operation at Sylvan Beach at the east end of the lake and Brewerton at the west end, which will cost several million dollars. This canal, in conjunction with the Syracuse & South Bay Railway, the steamship lines and other transportation facilities, cannot fail to result in an enormous growth in the commercial interests of this section of the State.

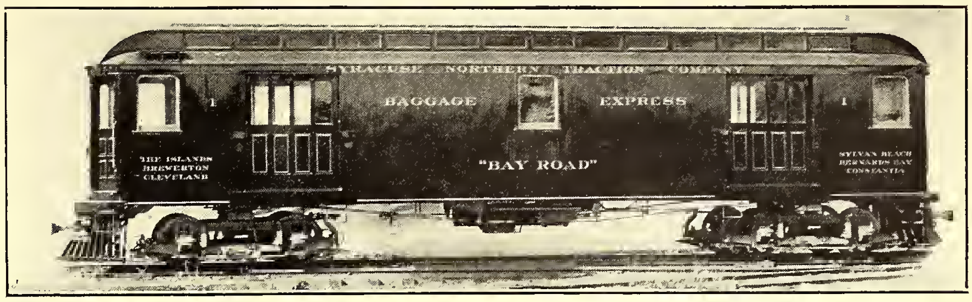
The natural beauties of the lake make it an ideal objective point for summer excursion service, and for this purpose the company has purchased a large amount of property at South Bay and at various advantageous points around the lake, giving it virtually a monopoly of docking privileges. It has also secured two islands at the entrance of South Bay, which contain about 25 acres each, and are thickly wooded in parts and have the best bathing beaches on the lake. The company is preparing, at large expenditure, to make these islands attractive to excursionists by instituting high-class amusement features. A ferry system will be established between the islands and the terminal of the railroad at South Bay, a mile distant, with a capacity of several thousand passengers per hour.

The company's largest expenditure at the lake has been devoted to the terminal loop of the railroad and the steamboat dock, which are built out over the water several hundred feet. Between the terminal loop and the dock a large steel and glass pavilion, which will include waiting rooms and restaurant, is being built. The company owns Sagamore Inn, an excellent summer and winter hotel at South Bay, and is planning to establish more hotels and restaurants at that place.

Special attention will be devoted by the company to the development of freight business, which will include the handling of coal, ice, milk, lumber and agricultural products. This business will be largely supplemented from different points around the lake, from which points it will be handled by large freight boats in carload lots. The company owns an important freight division which extends from the track of the Syracuse Junction Railway to a branch of the New York Central Railroad, enabling it to make local freight deliveries throughout the city of Syracuse and its suburbs.

FRENCHMAN'S ISLAND, ONEIDA LAKE, SHOWING THE NEW DOCK AND STEAMER "NORTH SHORE" OF THE ONEIDA LAKE NAVIGATION COMPANY

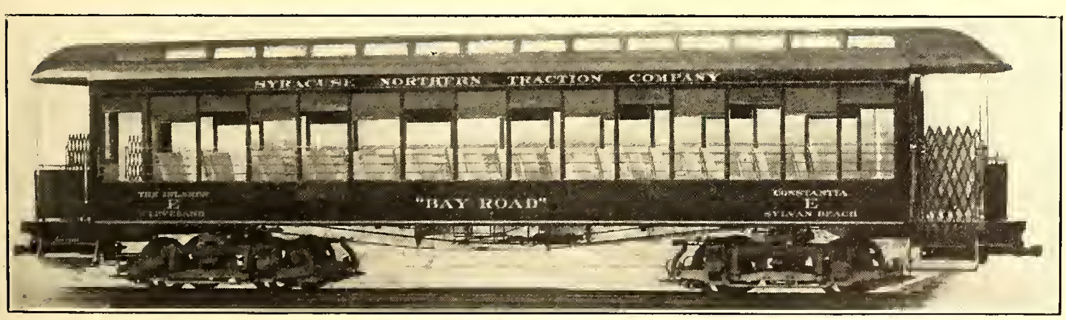
The first installment of rolling stock, as noted above, consists of ten motor cars, ten trail interurban cars and two baggage cars, mounted on high-speed trucks. The trail cars are intended for summer excursion service, and have low sides and are without window sashes. The motor cars are 48 ft. long over the vestibules and 8 ft. 1 in. wide over the side sheathing. They are divided into passenger and smoking compartments, and have high back upholstered seats in the passenger compartment and rattan-covered seats in the smoking compartment, manufactured by the J. G. Brill Company. These seats have stationary backs and furnish a total seating capacity of fifty-eight. The full Empire treatment of the dome corresponds with the arched top twin-window arrangement. The window sashes are arranged to be raised in the usual steam car method. The upper section of each pair of sashes is filled with leaded cathedral glass. The partition between the compartments is of solid mahogany, with glass in the upper part and a single sliding door. The cars are vestibuled at each end, with the motorman's compartment occupying the larger part of the front platform, and provided with a partition with sliding door, leaving a small vestibule with folding doors at the entrance for the use of passengers. The bronze trimmings, basket racks and electroliers are of dull bronze, which with the dark mahogany of the woodwork, the light green tinted ceilings and dark green plush seats and curtains backed with dark green silk, makes an attractive appearance. The bottom framing is powerfully constructed and includes 4-in. x 8½-in. side sills, with 15-in. x ⅜-in. sill plates on the inside of the sills, under trusses and double truss needle beams. The platform timbers are reinforced with angle iron and strengthened and protected by Brill angle-iron bumpers.



CAR FOR THE SYRACUSE NORTHERN TRACTION COMPANY, BAGGAGE AND EXPRESS


INTERIOR OF TRAILER, SHOWING CANE SEATING


INTERIOR OF MOTOR CAR, SHOWING PLUSH SEATING



STANDARD TRAIL CAR FOR THE SYRACUSE NORTHERN TRACTION COMPANY

The ten trail cars have a seating capacity of sixty passengers each. The seats, which were built by the J. G. Brill Company, are upholstered in spring rattan and have reversible backs. The interior woodwork is of cherry, with ceilings stained to the same color. This treatment of the ceilings is an unusual feature and gives a very pleasing effect. Four bar window guards furnish protection to passengers at the side, as the walls of the cars are but a trifle higher than the seat cushions. These cars measure 41 ft. 2⅜ ins. over the end panels and 51 ft. 9⅜ ins. over the crown pieces; the width over the side sheathing is 8 ft. 1 in. The sill plates are the full width of the side walls, 18 ins., and are ⅜ in. thick. The baggage and express cars are arranged for operation in both directions. They are 48 ft. long over the vestibules, and have two 5-ft. sliding doors on each side and swinging doors at diagonally opposite corners.

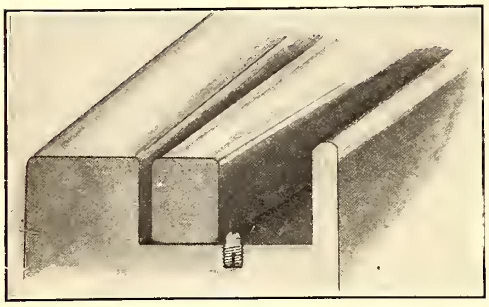
CAMPAIGNING VIA ELECTRIC RAILWAYS IN OHIO

The plan adopted by Gov. Herrick, of Ohio, of using the electric railways in his campaign for re-election has proved even more efficient than was anticipated. The electric lines touch over two-thirds of the county seats, and he has been able to get into country districts where a Governor never appeared before. He has been welcomed at cross roads and country hamlets, as well as in the more pretentious villages, by more people than ever listened to political speeches in such places, and the efficiency of the plan has been a revelation to men old in politics who have been traveling with him. Two weeks ago the Governor covered all the lines in Central Ohio. Week before last was spent along the various roads in the western part of the State, while last week was devoted to lines out of Toledo.

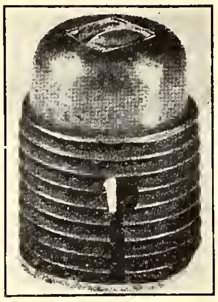
The New Holland, Blue Ball & Terre Hill Electric Railway, of Lancaster, Pa., has been placed in operation between Blue Ball and Terre Hill.

A NEW RAILWAY SWITCH LOCK

A very simple contrivance for locking switch tongues in either position on any switch made, whether hand or electric-thrown, has been placed on the market by the Blanchard Railway Switch Lock Company, of Boston, Mass., after the lock had proved its value in all kinds of weather on the lines of the



SECTIONAL VIEW



SWITCH LOCK

Boston Elevated Railway Company. The simplicity of this lock and the manner of its installation are easily apparent upon examining the accompanying cuts.

Since the effectiveness of this device depends upon its proper installation, the manufacturer furnishes to the purchasing railway company complete instructions covering this point. If the lock is properly installed it will be impossible for the switch tongue to jump back and cause the forward truck of a car to take one set of rails and the rear truck another. Provided the switch is kept reasonably clean, its operation will not be affected by snow, ice and dirt. The lock cannot be stolen by mischievous parties, nor can it be brushed or thrown out by street sweepers and snow plows. The manufacturers offer a trial lock without charge.

WELDED FLANGES FOR STEEL PIPE

The shop for the manufacture of steel pipe with welded flanges, which has recently been fitted up by the Ball & Wood Company at Elizabeth, N. J., was mentioned briefly in the issue of Oct. 14. There is a good demand for pipes with welded flanges, and the Ball & Wood Company is now ready to furnish such pipe from 2 ins. to 30 ins. in diameter. The work is being carried on under the direction of O. M. Jones, long connected with the National Tube Works. A welded flange is particularly appropriate for steel pipe because, when it is properly made, the flange and the pipe become one piece of metal. The fact that such lap-welded pipe is so largely used ought in itself to convince the engineer of the entire practicability of welded flanges, even without all the refinements introduced at the Ball & Wood shop. The flanges are made of wrought steel of the same grade that is used in the pipe. The pipe is carefully tested, and then specially prepared to receive the rough flange. This is placed on the pipe close to the end, and the flange and pipe are heated. The welding is done by machinery designed for the purpose, but the process is practically the same as that employed by the pipe makers in welding the seams or lap. Special flanges of other dimensions can be supplied if desired, and they can be furnished with plain, tongue and groove and male and female faces, or with raised faces and with smooth lathe finish for grinding to a ground joint. After completion, each piece of pipe is tested under hydraulic pressure.

The company's shop was started up on July 15, and it has already furnished welded flange pipe to the Detroit Edison station, the power plant of the Long Island Railroad, the Narragansett Electric Light Company and the Rhode Island Company at Providence, to mention only a few sales for important plants. It might also be added that about the strongest confirmation of the reliability of welded flanges is furnished by their use by the Otis Elevator Company for the cylinders of high-pressure elevators. This service is far more severe than that to which any ordinary piping is subjected, for the pressures sometimes run as high as 2500 lbs. per square inch.

1500-VOLT, D.-C. ROAD IN SWITZERLAND

According to an article in "Elektrische Bahnen," the German firm of J. J. Rieter & Company is constructing an electric road between Bellinzona and Mesocco, in Southern Switzerland, in which from 1500 volts to 1600 volts d. c. will be used. Each motor car will carry four 1500-volt motors, and will be able to haul a maximum load of 60 tons up a grade of 6 per cent with a speed of 20 km per hour.

Quite an extensive description is given of the motors, in which the difficulties with respect to sparkless commutation and to perfect insulation are stated to have been completely overcome. The following data are given: Gage, 1 m (39.36 ins.); wheel base of truck, 1.80 m (70.85 ins.); wheel diameter, 840 mm (33 ins.); normal voltage, 1500; power for continuous operation during one hour, 75 hp (at axle); number of revolutions, 430 per minute; weight, including gear case, 1750 kg (3850 lbs.). The construction is in general the same as in an older motor of the same firm for lower voltages. The necessity of providing an absolutely sufficient insulation reduces, of course, greatly the available space on the armature circumference. With three segments per armature slot, the motor capacity would have been reduced too much; it was, therefore, decided to use five segments per slot. With an increase in the number of segments per slot, the commutation becomes more difficult, not so much on account of the mutual induction of the armature conductors placed in one slot, as on account of the different position of the coils in a slot to be commutated at a moment with respect to the external field. As the use of special commutation poles did not seem advisable, a large neutral zone was provided, the ratio of pole arc to pole pitch being .067. By employing a high flux density, especially in the armature teeth, and by specially constructing the field coils, the external field is rendered very stable. The field magnet coil is turned up on either side so as to get closely to the armature circumference in the neutral zone, whereby some sort of compensation of the armature field is produced. The insulation was made very carefully, so that a testing voltage of 6000 to 7000 between winding and frame could be applied. The main dimensions of the motor are: Armature diameter, 440 mm (17.3 ins.); armature breadth, 220 mm (8.7 ins.), including a ventilation slot of 10 mm (0.4 in.); number of slots, 53; number of segments, 265; diameter of commutator, 360 mm (14.2 ins.); useful breadth of commutator, 90 mm (3.5 ins.); motor resistance at 70 degs. C., 2.65 ohms. It is stated that the motor runs absolutely sparkless below 90 hp, and at 90 hp small sparks occur at times. Even when at full power, 28 per cent of the armature current was shunted away from the field coils, there were no sparks; and this shunt circuit could be switched in or out any number of times without producing sparks. The motor is designed, as stated, to operate on 1500 volts, but even at 1700 volts and 90 hp the behavior of the motor was perfectly satisfactory. Although it was not tested at higher voltages, the article states there is no reason why the motor should not be considered safe at 1800 volts to 2000 volts. With the shunt connection, mentioned above, shunting 28 per cent of the current, the speed increased 12 per cent with constant torque. At times of heavy traffic this would be sufficient to make up for delays. When operated for a full hour at 75 hp, the increase of temperature (over that of the atmosphere) was 72.5 degs. C. in the armature iron, 62.5 degs. C. in the field coils and 44.5 degs. C. in the commutator.

LEGAL DEPARTMENT*

LIABILITY FOR ACTS OF SPECIAL POLICEMAN OR OFFICER

On June 3, 1905, there was considered in this place the subject of false imprisonment and measure of damage therefor. Attention was specially called to the risk assumed in requesting or procuring the arrest of persons without a warrant for offenses not committed in the presence of the officer making the arrest. A cognate subject is that of the liability of the proprietor of an establishment for the acts of a special policeman or officer. With variations in matters of detail, the system quite generally prevails of appointing or assigning by public authority a peace officer to do special duty at a particular place, his compensation to be paid by the person to whose premises he is so assigned. In the city of New York, for example, the matter is regulated by a section of the charter providing in substance that, whenever expedient, upon the application of any person or corporation, showing necessity therefor, regular policemen may be detailed, or special patrolmen may be appointed, to do special duty at any place in the city, upon the person by whom the application is made paying in advance for such services. The regular or special patrolmen so appointed are subject to the orders of the chief of police, and must obey the rules and regulations of the police department and conform to its general discipline and to such special regulations as shall be made, and must wear such dress as the department may direct, and during the term of their appointment, such special officers shall possess all the powers and may discharge all the duties conferred upon regular members of the police force.

It is held by the courts in cases of such special appointment or detail that the officer retains his public character as a peace officer; that he may act on his own initiative as such; and that if he makes unlawful and unjustifiable arrests so acting upon his own responsibility and without the request or special connivance of the proprietor of the establishment, the latter is not liable for the officer's acts. On the other hand, if the proprietor of the establishment or his agents expressly request a particular arrest, or otherwise act in complicity with the officer, the proprietor may be responsible for a false imprisonment. Two department store cases illustrate the distinction. In Tyson vs. Bauland (68 App. Div., 310; 85 App. Div., 612), it appeared that defendants had given instructions to the special police officer to submit all cases of shop-lifting to the president of the company before taking action, and the court, although saying that the question was not free from doubt, decided that upon the facts appearing, the jury might properly have found the act of the officer was done in the appellant's service and pursuant to his employment, to which the public appointment was under the circumstances but incidental. In Samuel vs. Wanamaker (N. Y. "Law Journal," Oct. 20, 1905), it appeared that, upon the application of defendants and pursuant to the city charter, an officer had been appointed and designated as a special officer at the defendants' department store, and that he—no special directions of the defendants being shown—followed the plaintiff out of the store, accusing her of having stolen property therein, arrested her and forced her to return to the store and submit to a search of her person. It was held that the evidence did not justify a verdict rendering the defendants liable for the acts of the special officer.

The distinction in question has recently been exemplified in a street railway case. In Foster vs. Grand Rapids Railway Company, in the Supreme Court of Michigan (July, 1905, 104 N. W., 380), the legal principles were laid down that where a special deputy sheriff, paid by a street railway company, acts solely in his capacity as an officer in assaulting a passenger, and not by the direction of the conductor in charge of the car, the street railway company is not liable for the act, and that when a disorderly person is arrested by a police officer, the presumption is that the officer is acting in his official capacity, and not as an agent for the party who pays him.

* Conducted by Wilbur Larremore, of the New York Bar, 132 Nassau Street, New York, to whom all correspondence concerning this department should be addressed.

It is true that upon the actual facts appearing in the latter case it was held that the action of the deputy in assaulting plaintiff was upon the express or implied request of the conductor, so that the street railway company was liable, but this was without in any wise impugning the abstract rules above stated.

CHARTERS, FRANCHISES AND ORDINANCES

ALABAMA.—Street Railroads—Construction—Rights in Streets—Abutting Owners.

A street surface passenger railway, constructed at grade in the usual manner, operated by animal or electric power, does not constitute a substantial impairment of the private property rights of abutting owners, so long as its use of the street does not unnecessarily interfere with the ordinary modes of travel, though the street in which the tracks were laid was so narrow as to render it difficult for the passage of street cars and vehicles.—(Morris et al. vs. Montgomery Traction Company, 38 S. Rep., 834.)

ARKANSAS.—Injunction—Reciprocal Operation—Municipal Corporations—Exercise of Invalid Franchise—Estoppel—Annexation of Territory—Commencement of Jurisdiction—Franchises—Enjoyment—Conditions Precedent—Reasonable Time.

1. Kirby's Dig. Section 5522, authorizes parts of one municipal corporation to be annexed to another, and provides that, if a majority of those voting at the election held to determine the advisability of annexation shall vote in favor of annexation, the council shall so declare and record it, after which the consolidated territory shall constitute a municipal corporation. After an election to determine the question of consolidation had been held, the council of the annexing municipality was, at the instance of the other municipality and a private corporation, enjoined from declaring the result, which was in favor of annexation. Pending the injunction the municipality to which the annexed territory had formerly belonged granted to the private corporation a franchise to construct and operate a street railroad in the annexed territory. Held, that the franchise was void; the city having no right to grant it during the pendency of the injunction.

2. The fact that pending the injunction the private corporation expended a large sum in partially constructing its road without objection from the annexing municipality did not estop the latter from asserting the invalidity of the franchise.

3. Kirby's Dig. Section 5522, authorizes parts of one municipal corporation to be annexed to another, and provides that, if a majority of those voting at the election held to determine the advisability of annexation shall vote in favor of annexation, the Council shall so declare and record it, after which the consolidated territory shall constitute a municipal corporation. Held, the jurisdiction of the annexing municipality over the annexed territory commences when the result of the election is declared, and does not relate back to the time when the election was ordered.

4. Where an ordinance granting a franchise to a street railway company provided that before the rights conferred should be enjoyed, the company should obtain from the county court a confirmation of the right of way over a bridge, the obtaining of the consent of the county court was a reasonable and enforceable condition precedent to the acquisition of any rights under the franchise.

5. Where an ordinance granting a franchise to a street railway company provided that, before the rights conferred should be enjoyed, the company should obtain from the county court a confirmation of the right of way over a bridge, the company was required to obtain the consent of the county court within a reasonable time, but one month was not a reasonable time.—(Little Rock Ry. & Electric Co. vs. City of North Little Rock, 88 S. W. Rep., 827.)

CONNECTICUT.—Railroad Commissioners—Powers on Appeal—Appeal to Court—Form of Decision.

1. Under Gen. St. 1902, Section 3832, authorizing an appeal to the Railroad Commissioners from any decision or order of municipal authorities, and providing that the petition of appeal shall state specifically the portions of the decision, etc., appealed from, the Commissioners have power to affirm, disaffirm, or modify the order as they deem equitable, and the power of the Commissioners to review the whole order is not taken away by the fact only certain portions of the order are specified by appellant as objectionable.

2. Under the statute authorizing appeal to the superior court from the action of the Railroad Commissioners, the court has power to direct the Commissioners to exercise their equitable powers in disposing of an appeal to them from a decision of municipal authorities.

3. Where, on appeal to the Board of Railroad Commissioners from a decision of municipal authorities, the board fails to exercise the powers of review given it by statute, it is proper for the court, on appeal from the decision of the board, to annul the decision of that body and direct them to proceed further, and the

court is not required to make a decision of its own.—(Appeal of City of Waterbury, 61 Atl. Rep., 547.)

CONNECTICUT.—Ways—Dedication—Use by Public—Acts of Dedication—Evidence—Railroads—Evidence—Prejudice.

1. The mere opening of a passageway by a landowner over his land, as a convenient means of access to his store, etc., for himself and his customers, does not amount to a dedication of the land so opened, though such passageway may also be used by the public generally.

2. Where the owners of a triangular piece of ground in a city opened the same to the public as an approach to the place of business of such owners, and thereafter stated to the street commissioner of the city that the space was open to the public, and would always be open, and that the city should be willing, for the rights and privileges so given, to macadamize the whole of the strip, such facts were sufficient to sustain a finding that the strip was dedicated to the city for street purposes.

3. While a railroad has power to dedicate land to the public as a highway, such intention, in the absence of fraud or conduct calculated to mislead others, will not be inferred from use of the land by the public generally necessary to or consistent with the public use for which the railroad company holds the property claimed to have been dedicated.

4. In a suit to restrain the laying of street railway tracks in a street according to a resolution of the Board of Aldermen of the city, evidence as to whether the tracks could have been laid in a different course was not objectionable on the ground that, if they could not have been laid as directed, a change of location should have been applied for.

5. Where street railway tracks were laid in a street substantially in accordance with the resolution of the Board of Aldermen, a question, in a suit to restrain the use of the street in the manner attempted, as to whether there was any discussion at the meeting of the Board of Aldermen as to the location of the street lines, was properly excluded.

6. Where, in suit to restrain a street railway company from a certain use of a street, it appeared that neither the tracks nor any part of the cars were outside of the highway, as found to exist, and did not trespass on land claimed by defendant to have been dedicated to the city, the admission of evidence of an alleged dedication of such land by the secretary and general manager of a corporation owning the same was harmless.

7. Where, in a suit to restrain a specified use of a street by a street railway company, it was claimed that the location of the tracks was temporary, and that negotiations were pending for the purpose of widening the street, when the tracks would be changed, it was not error to admit testimony of the Mayor of the city concerning his conversations with the representatives of the owner of land desired to be taken to widen the street, etc.—(Loomis et al. vs. Connecticut Ry. & Lighting Co. Connecticut Ry. & Lighting Co. vs. Morganstern et al., 61 Atl. Rep., 539.)

IOWA.—Constitutional Law—Impairment of Obligation of Contract — Statutes — Corporations — Reservation of Power to Change Franchise Conditions—Street Railways—Street Paving —Liability—Franchise—Construction—Appeal—Questions for Review.

1. Code, Section 1619, provides that the articles of incorporation, by-laws, rules and regulations of domestic corporations shall at all times be subject to legislative control, and that every franchise obtained by such corporations may be subjected to conditions imposed on the enjoyment thereof whenever the General Assembly shall deem it necessary for the public good. Held, that section 834, providing that all street railway companies shall be required to make, reconstruct, and repair all paving between the rails of their tracks and 1 ft. outside thereof at their own expense, is not repugnant to the constitutional inhibition against the impairment of the obligation of a contract merely because it was made applicable to a corporation that had been granted a franchise, prior to its enactment, for the operation of a street railway, purporting to exempt it from liability for street paving.

2. An ordinance granting a franchise for operation of a street railway, providing that where the streets are not paved the railway shall spike to the ties outside and inside the rails a strip of lumber 4 ins. wide, and of sufficient thickness to come within ½ in. from the top of the rail, and that such strips shall run the entire length of the railway and its switches where the streets are not paved, but that the railway shall not in any case be required to pave the streets except as provided therein, does not require the street railway to pave, and brings the railway within the obligation of Code, Section 834, providing that all street railroads shall pave between the rails of their tracks and 1 ft. outside thereof, unless by their franchises they are not bound to pave.

3. Irregularities in the levy of an assessment for street paving, of which no complaint is made before the City Council, cannot be questioned in the District Court nor on appeal to the Supreme Court.

4. An objection presented to a City Council, that its proceedings in attempting to levy and assess taxes against a street railroad for paving are in many respects irregular, invalid, and without authority of law, is insufficient to raise the question as to the validity of the act of the Council in estimating the number of square feet of paving for which the street railroad should pay, arising out of the fact that it included not only the space between the rails and the space of 1 ft. outside the rails, but also the space occupied by the rails themselves.—(Marshalltown Light, Power & Ry. Co. vs. City of Marshalltown et al, 103 N. W. Rep., 1006.)

MASSACHUSETTS.—Eminent Domain—Elevated Railroads—Abutting Property—Elements of Damage—Noises—Evidence—Admissibility.

1. In a petition for the assessment of damages to abutting property by an elevated railroad, the noise from the elevated railroad, and the aggravation of the noise from cars running on a surface track previously constructed, due to the elevated structure, are elements of damage, rendering admissible the testimony of an expert as to the aggravation of the noise caused by cars running on the surface track.

2. In a petition for the assessment of damages to abutting property by an elevated railroad, it was not error to permit an expert as to the value of real estate, who had given his opinion in regard to the amount of petitioner's damages, to testify in support of his opinion that the building of the elevated railroad had diminished the salability of property along the line.—(Logan vs. Boston Elevated Ry. Co., 74 N. E. Rep., 663.)

MISSOURI.—Constitutional Law—Delegation of Power—Municipal Corporations—Police Power—Regulation of Street Railroads—Street Railroads—Negligence—Breach of Ordinance—Degree of Care Required—Imputed Negligence—Contributory Negligence—Personal Injuries—Damages—Street Railroads—Collision—Evidence—Evidence as to Speed.

1. The granting to a municipal corporation of power to pass all necessary ordinances for the protection of the safety of citizens is not an infringement of the maxim that legislative power may not be delegated.

2. Scheme and Charter of St. Louis, Art. 10, Section 1, gives the Municipal Assembly power to determine by ordinance all questions arising with reference to regulating or controlling street railroads; and by Article 3, Section 26, the Mayor and Assembly have power by ordinance to establish, etc., all streets, and to regulate the use thereof. An ordinance of the city of St. Louis provides that the motorman propelling a street car shall keep a vigilant watch for vehicles, and, on the first appearance of danger therefrom, shall stop the car as soon as possible. Held, that such ordinance is a valid exercise of the city's police power, and an acceptance or agreement of a street railroad company is not necessary to give the ordinance binding force.

3. A breach of the requirements of the ordinance amounts to negligence, for the results of which a street railroad company is liable to an individual.

4. The ordinance is not void on the ground that it exacts a higher degree of diligence and care than the common-law rule of ordinary care.

5. Where plaintiff contracted with a livery stable keeper for a carriage to convey him to a certain place, and when the carriage and driver called for plaintiff, he merely told the driver where he was going, and gave no other directions, any negligence of the driver was not imputable to plaintiff on the theory that the relation of master and servant existed.

6. Where plaintiff was being driven in a closed carriage, on a dark winter night, by a driver who was not known to plaintiff as a negligent or reckless driver, and the first knowledge that plaintiff had of danger from a street car was when, looking through the window of the carriage, he saw a car rapidly bearing down on him, he was not guilty of contributory negligence.

7. In an action for injuries to a physician, which interfered with his practice, it was proper to permit him to testify as to his earnings for that month in the previous year.

8. In an action for injuries to one whose vehicle was run down by a street car, it was proper to permit him to testify as to the rate of speed at which the car was running; such testimony not being given as an expert.

9. Where, in an action for injuries received by plaintiff in a collision between his vehicle and defendant's street car, the actual physical facts, not controverted by defendant, tended to show an excessive speed of the car, the admission of plaintiff's testimony as to his opinion as to the speed of the car was no ground for a reversal.—(Sluder vs. St. Louis Transit Co., 88 S. W. Rep., 648.)

NEW JERSEY.—Electric Railroads—Crossing Another Road—Authority—Evidence—Consent of Abutting Owners—Evidence.

1. Upon an application to the Court of Chancery under the act of March 22, 1895 (Gen. St. p. 2717), to define the mode in which one railroad may cross another, it was incumbent upon the petitioner to show it had lawful power to construct its road.

2. One of the steps to that end being an ordinance of the township committee granting permission to the petitioner to construct its road under the railroad act of April 21, 1896 (P. L. p. 329), it was incumbent upon the petitioner to show the jurisdiction of the township committee to pass such an ordinance.

3. The written consent of frontage property owners required by the street railroad act of April 21, 1896 (P. L. p. 329), in order to confer jurisdiction upon the township committee to pass such an ordinance, must be a consent that municipal permission may be granted for the construction of the line of street railway for which application was made to the township committee.

4. Upon an application to define the mode of crossing, under the act of March 22, 1895 (Gen. St. p. 2717), it was shown to the Court of Chancery that the petitioning corporation had resolved upon the construction of its line on May 20, 1903; that on May 21, 1903, it had petitioned the township committee for permission to construct its said line; and that the ordinance granting said permission was on the same day introduced and passed upon its first reading. It further appeared that the signatures to the consent of the frontage property owners, filed with the township clerk, were all acknowledged prior to May 20, 1903. Held, that these facts failed to show that the property owners had consented to the granting of permission to construct the line of railroad for which application was made to the township committee.—(Mercer County Traction Co. vs. United New Jersey R. & Canal Co. et al., 61 Atl. Rep., 461.)

NEW JERSEY.—Limitations—Contract to Pay Annual License.

The construction of its railroad by the defendant under the municipal consent that was required by statute, and that was given by the plaintiff upon condition that the defendant would pay to the plaintiff an annual license fee for each car run by the defendant on its road, constituted an obligation resting in contract to pay such fees, to the enforcement of which obligation by legal action the statute of limitations may be pleaded.—Mayor and Aldermen of Jersey City vs. Jersey City & B. R. Co., 59 Atl Rep., 15.)

NEW JERSEY.—Statutes—Construction—Street Railroads—Construction—Contract with City—Modification—Ordinances—Estoppel—License Tax.

1. Statutes are not to be so construed as to interfere with vested rights, if their terms admit of any other reasonable construction.

2. The supplement of 1867 to the charter of the Jersey City & Bergen Railroad Company (P. L. 1867, p. 53), in enacting that it should not be lawful for the municipal authorities of any city or town to interfere with, hinder, or obstruct the company in constructing or running its railroads, provided the same should be constructed and run according to the provisions of said act, had not the effect of discharging the company from its contractual obligations to Jersey City, previously undertaken by the company pursuant to legislative authority.

3. The supplement of 1867 to the charter of the Jersey City & Bergen Railroad Company (P. L. 1867, p. 53), has not the effect of modifying the express terms of contracts thereafter entered into between the company and Jersey City.

4. Where ordinances of a city gave to a street railway company permission to construct lines of railway in the streets, and to operate cars thereon, upon terms of paying annual license fees for each car so operated, and the company accepted the ordinances upon these terms, constructed the lines of street railway, and for many years operated cars thereon, held, that the company and its successors who acquired its railways lines and assumed its obligations are estopped from setting up that the terms imposed by the ordinances were ultra vires the municipal corporation.

5. The averments of the pleas under review, with respect to the construction alleged to have placed by Jersey City and by the Jersey City & Bergen Railroad Company upon the supplement of 1867 to the charter of that company (P. L. 1867, p. 53), held, not to modify the express agreements entered into by the company, requiring it to pay to the city annual license fees for each car operated by the company.—(Mayor, etc., of Jersey City vs. North Jersey St. Ry. Co., 61 Atl. Rep., 95.)

NEW YORK.—Street Railroads—Transfers—Leased Lines—Right to Penalty—Payment of Fare—Payment by Escort—Actions for Penalties—Waiver of Previous Penalties.

1. Laws 1892, p. 1398, c. 676 (Railroad Law), Section 78, provides that any railroad may contract with any other railroad for the use of their respective roads, but further provides that nothing therein shall apply to any lease in existence prior to May 1, 1891. Section 104 (Laws 1892, p. 1406, c. 676) requires "every such corporation entering into such contract" to issue transfers entitling passengers to a continuous trip to any point or portion of any railroad embraced in the contract. The Broadway Railroad Company on May 13, 1890, leased its line to the Houston Company. On April 25, 1893, the Twenty-Third Street Railroad Company also leased its line to the Houston Company, which afterwards consolidated with the Metropolitan Street Railway Company, which transferred its rights to the New York City Railway Company. Held, that since the lease of the Twenty-Third Street line to the Houston road was made subsequent to May 1, 1891, the City Railway Company is bound to transfer passengers between the Twenty-Third Street and Broadway lines, although the lease of the Broadway line to the Houston road was in existence prior to that date.

2. Under Laws 1892, p. 1406, c. 676 (Railroad Law), Section 104, requiring railroads operating within a city "upon demand and without extra charge [to] give to each passenger paying one single fare, a transfer," etc., and providing that, "for every refusal to comply with the requirements of this section, the corporation so refusing shall forfeit $50 to the aggrieved party," a passenger for whom a transfer was rightfully demanded is entitled to recover the statutory penalty for the conductor's refusal to give her one, although her fare was paid not by herself, but by her escort.

3. Where three actions to recover separate penalties prescribed by Laws 1892, p. 1406, c. 676 (Railroad Law), Section 104, for the refusal of a street railroad to issue transfers to plaintiff, are commenced on the same day, the institution of the action for the penalty last incurred is a waiver of previous penalties, and plaintiff is entitled to recover only the single penalty incurred.—(McLaughlin vs. New York City Ry. Co., 94 N. Y. Sup., 653.)

LIABILITY FOR NEGLIGENCE

MICHIGAN—Carriers—Injuries to Passengers—Damages—Instructions—Variance—Objections not Raised at Trial—Elements of Damage—Requested Instructions—Modification—Trial—Misconduct of Counsel—Arguments—Remarks of Court—Curing Error.

1. Where, in an action for injuries to a passenger, plaintiff claimed that her injuries had caused the indefinite postponement of a contemplated marriage, an instruction that if her injuries would preclude her working in any capacity, acting as a housewife, that was a matter for the jury to consider, as it was quite possible that the injuries were such as to preclude her from being married for some time, was not objectionable as permitting the jury to give compensation for the value of earnings lost by plaintiff as a housewife.

2. An objection that a declaration averred that plaintiff was so injured that she could never be married, while the evidence showed that her marriage was merely postponed, merely raised the question of variance, and, not having been presented to the trial court, was insufficient to justify a claim on appeal that plaintiff was not entitled to recover damages for the postponement of her marriage.

3. Where, in an action for injuries to a passenger, there was evidence that before plaintiff's injury the day for her marriage had been set, and preparations were then being made therefor, and that after the injury the marriage was indefinitely postponed because of her injuries, which were permanent, such proof was sufficiently definite to warrant a recovery for the postponement of plaintiff's marriage.

4. Defendant requested a charge that plaintiff could not recover for any aggravation of any disease or condition that existed prior to the day of the accident, as the declaration did not count for any aggravation of any pre-existing condition, which the court gave; adding that he did not understand the testimony on plaintiff's part to be that she suffered from any of the injuries complained of prior to the accident, and that therefore there could be no question of aggravation to be presented to the jury. Held, that the court's statement was the mere repetition of a thought already expressed, and did not destroy the force of the request.

5. Where, in an action for injuries to a passenger, defendant's expert had made an examination of plaintiff, during which he carried away some pus discharged from plaintiff's womb, for the purpose of making a microscopical examination, but there was nothing in his testimony to indicate that such examination was not necessary, or that the witness was moved by a purpose or desire to discover that plaintiff was afflicted with gonorrhea or syphilis, a statement made by plaintiff's counsel to the jury, in which he claimed that such microscopical examination was unnecessary, and had been made by the witness for the purpose or with the desire of discovering that plaintiff was afflicted with gonorrhea or syphilis, was prejudicial error.

6. Mere remarks by the court that none of the physicians had reason to believe that there was any reason for them to look for such disorders, and that the remarks of counsel were unwarranted, whereupon plaintiff's counsel stated that he would drop the matter,

and requested the court to instruct the jury on the point, to which the court stated that all that was essential had been said on the subject, were insufficient to cure the error.—Remey vs. Detroit United Ry., 104 N. W. Rep., 420.)

MINNESOTA.—Street Railroads—Collision with Vehicle—Negligence—Care Required of Motoneer—Care at Crossing—Contributory Negligence—Questions for Jury.

1. Where an electric car collides with a vehicle, which, while being driven along a public street parallel and in the same direction with an advancing street car, turns at a street crossing to go over the track in front of that car, the negligence of the street car company is to be determined in accordance with rules of law giving both the car and the vehicle the right to use the streets and intersections, and imposing on both the reciprocal duty of the exercise of due care to avoid harm.

2. The exercise of care on the part of the motoneer has special reference to the rate of speed at which the car was moving, his control and exercise of control over it, and his opportunity for observing that the vehicle was about to cross, including the distance from the track at which the vehicle turned and the rapidity with which it was then traveling.

3. The test of the care to be exercised at a street car crossing is not necessarily the same as is required at a steam railway crossing.

4. If a driver of a vehicle approaching a street railway track to cross it at an intersection with another street looks and listens and sees and hears no car approaching for such a distance that he could probably make the crossing safely, he is not guilty of contributory negligence, as a matter of law, if, while attempting to cross the tracks, the car strikes and overturns his vehicle.

5. In this case, held, the negligence of the defendant and the contributory negligence of the plaintiff were for the jury, and its verdict was justified by the evidence.—(Smith vs. Minneapolis St. Ry. Co., 104 N. W. Rep., 16.)

MINNESOTA.—Street Railroads—Injury to Passenger—Instructions.

In the trial of an action based upon the alleged negligence of defendant in suddenly starting its car while it was standing still at a crossing, and thereby throwing plaintiff to the ground, it was asserted by defendant and denied by plaintiff that the latter jumped from a rapidly moving car at a considerable distance from the place of the alleged injury. Held, the trial court erred in charging the jury that, if they believed the defendant stepped or jumped off the car while in motion, they could consider the question whether a person, in the exercise of ordinary care and prudence, under the same circumstances, would have jumped or stepped off. Such an issue was not tendered by the pleadings or litigated in the presentation of the case.—(Cody vs. Duluth St. Ry. Co. et al., 102 N. W. Rep., 201.)

MINNESOTA.—Street Railroads—Injury to Child on Track—Imputed Negligence—Contributory Negligence—Instructions—Damages.

1. The evidence was sufficient to sustain the findings of the jury with reference to the following issues, which were properly submitted by the trial court: That the parents of the child were not guilty of negligence in intrusting the child to the care of an older sister; that the children were not guilty of contributory negligence in attempting to cross the street railway tracks in front of an approaching car; that the motoneer of the car was guilty of negligence in not attempting to slacken the speed of his car, and get it under control, in anticipation of injury to the children who were approaching the tracks.

2. The court did not err in refusing to instruct the jury that the motoneer was not guilty of wanton or wilful negligence, inasmuch as the cause was not tried upon the theory, and such issue was not submitted to the jury by the court.

3. It was not error for the court to permit a certain witness to testify with reference to the speed of the car, for the reason that proper objection was not made, and the answer was not stricken out.

4. A verdict of $2,000 was not excessive, considering the age of the boy and the nature of his injuries.—(Cameron vs. Duluth-Superior Trac. Co., 102 N. W. Rep., 208.)

MISSOURI.—Damages—Personal Injuries—Obligations Incurred—Pleading—Physician's Services—Measure of Recovery—Evidence—Appeal—Harmless Error—Husband and Wife—Injuries to Wife—Measure of Husband's Recovery—Loss of Wife's Services—Independent Vocations.

1. The fact that reasonable obligations, such as medical attention and nurse and servant hire, resulting from personal injuries, have not been paid, does not prevent a recovery therefor.

2. A petition alleging the payment by plaintiff of sums of money for medicine, medical attendance, and nurse and servant hire, made necessary by personal injuries, does not authorize a recovery of damages for liabilities incurred for such items, but not paid.

3. The measure of damages for personal injuries, as dependent on physician's services, is the reasonable value of such services, unless the charge made is less than the reasonable value, in which case the recovery cannot exceed the charge made.

4. Where testimony as to the rendition of physician's services, made necessary by personal injuries, merely shows that liability has been incurred on account of such services, but fails to show either the amount of the charge or the reasonable value of the services, a recovery of damages for the liability so incurred cannot be sustained.

5. Where a verdict for injuries to plaintiff's wife greatly exceeded the sum of the actual disbursements made by plaintiff for medical attention and nurse and servant hire, error in the charge in permitting a recovery, under the pleading and proof, for liabilities incurred for such services, but not paid, could not be deemed harmless.

6. Under Rev. St. 1899, c. 51, relative to the rights of married women, a married woman who runs a boarding house is entitled to the profits thereof; and in case of injuries to her, rendering her unable to pursue her vocation, the right to recover the damages thus sustained, including the consequent expense of servant hire, belongs to the wife, and not to the husband, and the latter's recovery in this respect is measured by the value of his wife's services in the work performed for the family.—(Nelson vs. Metropolitan St. Ry. Co., 88 S. W. Rep., 782.)

MISSOURI.—Street Railroads—Injuries to Pedestrians—Contributory Negligence—Discovered Peril—Questions of Fact—Proximate Cause—Evidence—Inflammatory Statements—Trial—Objections to Evidence—Improper Answers—Time of Taking—Form of Objection—Damages—Personal Injuries—Future Pain and Suffering.

1. A woman of good eyesight and hearing, who walked across a street car track, in broad daylight, oblivious to her surroundings, and who was struck by a car which she would have seen approaching had she been on the lookout, was guilty of contributory negligence.

2. In an action against a street railroad for injuries to a pedestrian, the motorman testified that he had shut off the power, and was standing with his hand on the brake wheel; that he noticed plaintiff, unmindful of the presence of the car, when she was 12 or 15 ft. from the track, and the car was 25 ft. from the place of collision; that he shouted to plaintiff, and started to apply the brakes with all possible speed, whereupon plaintiff tried to run across ahead of the car. An expert witness testified that, under the conditions described, the car could have been stopped in 15 ft. Held, that an issue of fact was raised, as to whether the motorman could have stopped the car, by the exercise of a reasonable effort, after he observed plaintiff's peril.

3. The negligence of a pedestrian who starts to cross a street car track, heedless of the approach of a car, is superseded, as a proximate cause of the injury which she sustains in being struck by the car, by the negligence of the motorman, where the latter, knowing of the former's peril in time to prevent the injury, negligently fails to do so.

4. In an action against a railroad for injuries to a pedestrian, testimony that it was a good thing that the motorman did not get out of the car after it stopped, as he would have been mobbed, was extraneous to the issues, and highly prejudicial to defendant.

5. Where a question is proper, but the answer is improper and prejudicial, an objection immediately following the answer is timely.

6. While the proper course to follow where an improper answer is made to a proper question is to move to strike the improper statements to the answer, yet an objection to the answer on the ground that it is the opinion of the witness and irrelevant, etc., may be regarded as a motion to strike, and may be deemed to have fulfilled the office of such a motion.

7. An allowance of damages for future pain and suffering likely to result from personal injuries should be confined to such damages as are reasonably certain to result from the injuries, and should not extend to speculative, contingent, or probable results of the injuries.—(Waddell vs. Metropolitan St. Ry. Co., 83 S. W. Rep., 765.)

MISSOURI.—Carriers—Injuries to Passengers—Degree of Care Required — Pleading — Instructions — Damages — Appeal—Harmless Error.

1. A petition alleging that plaintiff was a passenger on a street car, and signaled to stop the car, and that while the car was stopped in pursuance to her signal and plaintiff was alighting, defendant's servants negligently caused the car to be started forward with a sudden jerk, causing plaintiff to fall, etc., was sufficient after verdict, although it did not allege in express terms that the car did not stop a reasonable time to allow plaintiff to alight, or that the conductor knew or should have known that plaintiff was getting off.

2. Defendant cannot complain of a variance in the issues presented to the jury from those raised by the pleadings, where it presented an instruction containing the variance objected to.

3. While common carriers are not insurers of the safety of passengers, and are only answerable for casualties attributable to neglect of duty, yet the degree of care imposed upon them to secure the passenger's safety while he is getting off the vehicle is of the same lofty degree as that imposed while he is in course of transit.

4. The rule imposing on carriers of passengers the highest degree of care is applicable to an injury in the production of which the passenger is a factor.

5. The instructions should be construed as a collective whole.

6. In an action for personal injuries, a charge to assess plaintiff's damages at such sum as would fairly compensate her for any pain of body or mind which she has suffered or may suffer, for any earnings which she has lost or may lose, and for any expenses for medicines or medical attention which have been necessitated or may be required, is bad.

7. In an action for personal injuries, where it was shown that plaintiff, a woman of about 60 years of age, had sustained serious and painful injury, probably her earning capacity, and the jury returned a verdict of but $1,000, which was not assailed by defendant as excessive, the judgment entered on such verdict would be affirmed, notwithstanding error in a charge on the measure of damages.—(McKinstry vs. St. Louis Transit Co., 82 S. W. Rep., 1107.)

MISSOURI.—Bill of Exceptions—Amendment—Carriers—Passengers—Personal Injuries—Instructions—Error Affecting Merits Personal Injuries—Measure of Damages—Excessive Damages.

1. The amendment of defendant's bill of exceptions incorporating into it an admission of defendant's counsel, contained in plaintiff's bill, that the accident was the result of defendant's negligence, if allowable, would not materially alter the case, where the admission was nothing more than what the uncontradicted evidence showed was the fact.

2. In an action against a street railroad company, where it appeared that defendant received plaintiff as a public carrier, and he was being carried as a passenger when he was injured, it was not error to instruct a finding for plaintiff if the jury found, among other facts, that defendant received plaintiff as a passenger to be carried for hire, though there was no evidence that plaintiff paid his fare, or that fare was demanded.

3. In an action against a street railroad for injuries; where it was alleged that defendant, by a "negligent and violent rate of speed" of another car, caused the collision, an instruction to find for plaintiff if the jury found that defendant so negligently ran and operated its cars, or either of them as to cause the collosion, though broader than it should have been, was not error affecting the merits, which will be regarded on appeal.

4. In an action for injuries, an instruction that in estimating the damages the jury may consider plaintiff's diminished capacity for earning money, if any, and on account thereof make such allowance as may be fair and just for any loss they may believe from the evidence he has sustained in the past by reason thereof, and for any loss they may believe he may sustain in his future earnings by reason of such diminished earning capacity, is not erroneous, as authorizing a recovery for loss of time, and also for diminished earning capacity during the same period, and for loss of what he "may" sustain in the fututre.

5. An award of $23,400 for injuries sustained is excessive, though plaintiff was 42 years old, in good health, and his injuries have resulted in diabetes and paralysis of both legs, and he is a helpless cripple, and may remain so permanently.—(Reynolds vs. St. Louis Transit Co., 88 S. W. Rep., 50.)

MISSOURI.—Erroneous Instructions—Objections after Verdict—Misleading Instructions.

1. Where plaintiff alleges that she boarded a car for the purpose of becoming a passenger, defendant cannot complain, after verdict, of instructions submitting to the jury to find whether she was a passenger.

2. In an action for injuries sustained in alighting from a street car, where plaintiff alleged that after the car came to a full stop at the usual place for cars to stop for the purpose of permitting passengers to alight, etc., and there was no evidence that the car stopped from any other cause than to discharge passengers, instructions submitting the hypothesis of the car stopping at a place where passengers were in the habit of alighting, and of the car stopping at the place where passengers were in the habit of alighting from some other cause than that of discharging passengers, were misleading and confusing.—(Corum vs. Metropolitan St. Ry. Co., 88 S. W. Rep., 143.)

MISSOURI.—Street Railroads—Negligence—Question for Jury—Contributory Negligence—Municipal Corporations—Ordinance Regulations of Street Railroad—Action for Injuries—Pleading—Uniting Actions Ex Contractu and Ex Delicto—Street Railroads — Negligence — Injuries — Action — Instructions — Negligence — Discovered Peril — Negligence — Injuries — Damages.

1. In an action against a street railroad company for injuries to plaintiff in a collision between his vehicle and a car, held, that the question of defendant's negligence was one for the jury.

2. In an action against a street railroad company for injuries to plaintiff in a collision between his vehicle and a car, held, that the question of plaintiff's contributory negligence was one for the jury.

3. In an action for injuries to plaintiff in a collision between his vehicle and a street car, the petition alleged negligent operation of the car, and also alleged negligence of defendant's motorman in failing to keep such "vigilant watch" for vehicles and persons as was required by a certain ordinance. Held, that it was proper to refuse to require plaintiff to elect whether he would stand on the allegations as to general negligence, or on the allegations as to the ordinance.

4. The petition was not open to the objection that it combined in one count a cause of action ex contractu and one ex delicto.

5. In an action against a street railroad company for injuries to plaintiff in a collision between his vehicle and a car, plaintiff's evidence tended to show that, while his horses were on defendant's track, defendant's servants negligently caused the collision; and the defense was that plaintiff negligently assumed such position when a collision could not have been avoided by ordinary care. The court instructed for plaintiff that though plaintiff, while trying to get his wagon out of a hole in the street, got it on the track, and could, by the exercise of ordinary care, have prevented the collision, but failed to do so, plaintiff was entitled to recover, even if he did not exercise ordinary care in pulling his horses on the track. An instruction for defendant was that if the motorman saw the horses near the track, but so far away as not to be in danger, the motorman had the right to assume that they would remain there, but that if thereafter plaintiff's horses changed their position, and got in front of the car, and thereby directly contributed to the injuries, and the motorman could not have stopped the car and avoided the accident, plaintiff could not recover. Held, that the instructions, taken together, properly presented the issues.

6. Though one may have bee guilty of contributory negligence in being on a street car track, the company is liable for any injury it could have prevented by ordinary care after the discovery of the danger.

7. In an action for injuries owing to the alleged negligence of defendant, it appeared that plaintiff was rendered unconscious, and his body bruised; that one of his feet was so crushed that it was necessary to amputate one of his toes and a part of another one; that he would always be crippled more or less; that he suffered great pain, was confined to his bed for five months, and obliged to use crutches for about six weeks, and that his surgeon's bill was between four and five hundred dollars. Held, that a verdict for $6,000 was not excessive.—(Rapp vs. St. Louis Transit Co., 88 S. W. Rep., 865.)

MISSOURI.—Street Railroads—Action for Injury of Passenger—Instructions.

In an action by a passenger against a street railroad company to recover for a personal injury, it appeared that, after stopping at the place where plaintiff intended to alight, pursuant to a signal from her companion, the car started up before she got off; that in response to a signal it again stopped, after moving about its length, with something of a jerk; that at that time plaintiff was standing on the platform or near the door, and was thrown down by the jerk and seriously injured. There was evidence tending to show that plaintiff was still in her seat when the car started after the stop, and that she moved to the door afterward, while the car was in motion. Held, that it was error to refuse an instruction asked by defendant that if the jury found such to be the fact, and that the car had stopped at the crossing a reasonable length of time to allow passengers to alight, and the motorman exercised proper care under the circumstances in making the second stop, plaintiff could not recover, even though there was a jerk which caused plaintiff to fall.

2. Under such evidence, the jury should have been instructed that if the circumstances were such that the conductor, in the exercise of the utmost care, was authorized to call for the emergency stop, and if that stop was made with the utmost care there could be no recovery, and the failure so to instruct was error.—(St. Louis Transit Co. vs. Thompson et al., 137 Fed. Rep., 713.)

NEBRASKA.—Carriers—Street Railways—Degree of Care—Presumption of Negligence—Burden of Proof—Defenses—Instructions.

1. Street railway companies are common carriers of passengers, and are liable as other common carriers upon common-law principles. They are required to exercise the utmost skill, diligence, and foresight, consistent with the business in which they are engaged, for the safety of their passengers, and they are liable for the slightest negligence.

2. In an action for damages for an injury received while being transported by such common carrier, proof of mere injury, without more, does not raise the presumption of negligence sufficient to impose on the company the burden to prove due care on its part.

3. In such cases the burden is on the plaintiff to prove that he was a passenger, was injured, the extent of his injuries, the accident from which the injury resulted, and circumstances of such a character as to impute negligence.

4. But where negligence is proved, or where, from the nature of the accident, which was the proximate cause of the injury, negligence is presumed, the carrier is then required to show that it was in no wise at fault, or that the plaintiff was guilty of some negligent act which contributed to the injury complained of.

5. In such a case it is error to instruct the jury, in substance, that it is only necessary for the plaintiff to prove that he was a passenger and was injured, and that the burden of proof is then upon the defendant to show by a preponderance of the evidence that it was not guilty of the negligent act complained of.

6. Paragraph 4 of the syllabus to Lincoln Street Railway Co. vs. McClellan, 74 N. W. 1074, 54 Neb. 672, 69 Am. St. Rep. 736, is disapproved, and the opinion is modified to conform to the rule above stated.—(Lincoln Traction Co. vs. Webb, 102 N. W. Rep., 258.)

NEBRASKA.—Carriers—Injury to Passenger—Burden of Proof.

1. In an action against a common carrier, on its common-law liability for negligence, to recover damages for an injury causing the death of a passenger, it is error to instruct the jury that "when the plaintiff was shown that the deceased met with an injury while being transported by the defendant, and the plaintiff has sustained damages thereby, then the burden of proof is upon the defendant to prove by a preponderance of the evidence that it was not guilty of negligence, the proximate cause of his death."

2. Lincoln Traction Co. vs. Webb, (No. 13,712) 102 N. W. 258, approved and followed.—(Lincoln Traction Co. vs. Heller, 102 N. W. Rep., 262.)

NEW JERSEY.—Carriers—Negligence—Contributory Negligence—Questions for Jury—Relation of Passenger and Carrier—Continuance During Transfer by Passenger.

1. In an action against a carrier for injuries sustained by a passenger by his being run into by a car while transferring from one car to another, held, that the question of the carrier's negligence was one for the jury.

2. In an action against a carrier for injuries sustained by a passenger by his being run into by a car while transferring from one car to another, held, that the question of his contributory negligence was one for the jury.

3. The relation of passenger and carrier continues while the passenger is transferring from one car to another, he having been furnished a ticket enabling him to do so.—(Walger vs. Jersey City, H. & P. St. Ry. Co., 59 Atl. Rep., 14.)

NEW JERSEY.—Attorney and Client—Contract of Employment—Compensation—Contingent Fee—Transfer of Action—Assignments—Right of Action for Personal Injuries—Statutory Provisions—Construction—Attorney and Client—Employment to Prosecute Action—Stipulations—Public Policy—Settlements of Actions—Rights of Parties.

1. A contract between attorney and client, stipulating that the former, in consideration of his services to be rendered in prosecuting an action for the client, shall receive a part of the recovery, is executory merely; the cause of action remaining in the client, and the attorney obtaining no interest therein, either by way of assignment thereof or lien thereon.

2. A right of action for personal injuries negligently inflicted by another is not assignable before judgment, in the absence of a statute authorizing it.

3. Gen. St., p. 1426, Sec. 4, 5, which preserve to an executor or administrator a right of action for a trespass to the person of the decedent, occurring in his lifetime, does not render such actions assignable by the party injured, but merely provides that they shall survive to the personal representative of the injured person for the benefit of his estate.

4. A stipulation, in a contract for the employment of an attorney to prosecute a claim for injuries sustained by a client by reason of another's negligence, that the client shall not settle without the attorney's consent, is contrary to public policy.

5. The stipulation cannot deprive the person liable for the injuries from his right to compromise with the person injured, if made in good faith without attempt to defraud the attorney.—(Weller et al. vs. Jersey City, H. & P. St. Ry. Co., 61 Atl. Rep., 459.)

NEW YORK.—Street Railway—Killing of Person on Track—Negligence—Contributory Negligence.

1. A street railway was not negligent in causing the death of a person killed while attempting to run across a street a few feet in front of an approaching cable car at a point where there was no cross-walk, in the absence of evidence justifying a conclusion that, at the time deceased ran in front of the car, anything that the gripman could do would have avoided the accident.

2. The mere fact that a child ten years of age is non sui juris does not absolve him from all care in crossing street railway tracks, but he is bound to exercise the care that can reasonably be expected of a child of his age and intelligence.—(West vs. Metropolitan St. Ry. Co., 94 N. Y. Sup., 250.)

NEW YORK.—Street Railroads—Injuries to Pedestrians—Contributory Negligence.

Where plaintiff left a sidewalk, and walked in the roadway of a street, because of alleged defects in the sidewalk, when it was so dark that witnesses were unable to see plaintiff at a distance greater than 10 ft., and, though there was a space between the sidewalk and certain car tracks in the street of 30 ft., plaintiff, with full knowledge of the locality, walked so close to the track that he was struck by a car approaching from the rear, he was guilty of contributory negligence.—(Dooley vs. Union Ry. Co. of New York City, 94 N. Y. Sup., 635.)

NEW YORK.—Street Railroads—Personal Injuries—Evidence—Ordinances — Duty of Motorman — Trial — Misconduct of Counsel.

1. In an action against a street railroad company for personal injuries caused by a collision in a street, an ordinance giving the railroad company the right of way in the street was admissible as bearing on the degree of caution imposed on the motorman.

2. A motorman operating a street car is only required to use ordinary care, under the circumstances; so that a charge that the motorman was obliged to use more than ordinary caution because the day was wet was erroneous.

3. It is highly improper for counsel to persist in repeatedly asking a question which has been excluded.—(Quinn vs. New York City Ry. Co., 94 N. Y. Sup., 560.)

NEW YORK.—Street Railroads—Injuries to Pedestrian—Evidence—Sufficiency—Personal Injury—Testimony of Physicians—Admissibility.

1. In an action for injuries to a pedestrian while attempting to cross street railway tracks, evidence held insufficient to sustain a verdict for plaintiff.

2. It is error to permit a physician testifying in a personal injury action that he did not know the condition of the hearing of plaintiff, a man 80 years of age, prior to the accident; that he had not examined his ears; and that it was not unusual to find the hearing impaired in old men—to testify to the permanency of the impairment of hearing, with no foundation for the assumption that the impairment was proximately caused by the accident.—(Lamm vs. Metropolitan St. Ry. Co., 94 N. Y. Sup., 583.)

NEW YORK.—Carriers—Injuries to Passengers—Amount of Recovery—Instructions.

Where, in an action against a street railway for injuries to a passenger, the jury were justified in finding that the injuries were slight, the refusal to charge that, if the passenger was not materially injured, a verdict for nominal damages might be awarded, and the giving of a charge that the verdict should be for such a sum as would compensate the passenger for the injuries received was erroneous, because in effect directing the giving of substantial damages, though the injuries received were insignificant.—(Rosenberg vs. New York City Ry. Co., 94 N. Y. Sup., 1115.)

NEW YORK.—Trial—Direction of Verdict—Questions of Negligence—Street Railroads—Care in Equipment of Cars—Screens Protecting Windows—Injury of Passenger—Contributory Negligence.

1. While the questions of negligence and contributory negligence are ordinarily questions of fact to be passed on by a jury, yet if it clearly appears from the undisputed facts, judged in the light of that common knowledge and experience of which courts are bound to take notice, that a party has not exercised such care as men of common prudence usually exercise in positions of like exposure and danger, or where the evidence is of such conclusive character that the court would be compelled to set aside a verdict in opposition to it, the case may properly be withdrawn from the jury.

2. Screens with large meshes fastened across the lower half of the windows of a street car on the side next to the poles supporting the trolley wires are a sufficient protection against the accidental injury of passengers from such poles, and a sufficient warning of the danger of such injury to absolve the railway company from the charge of negligence in that regard.

3. A passenger in a street car who, on account of a sudden ill-

ness, extended her head through a window, above a screen which covered the lower half of the window, and was injured by striking against a trolley pole beside the track, being obliged in order to so reach the window to stand up or kneel upon the seat, was chargeable with contributory negligence, as matter of law, which precludes a recovery against the company for the injury.—(Christensen vs. Metropolitan St. Ry. Co., 137 Fed. Rep., 708.)

TEXAS.—Appeal—Harmless Error — Evidence — Conclusions—Admissibility.

1. In an action against a street railroad for injury to a passenger, where the case was submitted to the jury only on the alleged negligent act of the conductor in releasing his hold on the injured person while she was on the running board, and on the issue of her contributory negligence, any error in the admission in evidence of a city ordinance inhibiting street cars from stopping on street crossings, and compelling them to stop after passing such crossings, to take on and let off passengers, was not prejudicial to plaintiff.

2. The admissibility of the testimony of an eye-witness as to the cause of the fall of the injured person was not affected merely because he stated that the only conclusion he could come to was that the injured person slipped and fell.

3. The conclusions or opinions of common observers, testifying to the results of their observations made at the time as to common appearances or facts, and a condition of things which cannot be reproduced and made palpable to a jury, are admissible under an exception to the general rule excluding the conclusions of a witness.—(McCabe vs. San Antonio Traction Co., 88 S. W. Rep., 387.)

TEXAS.—Street Railroads—Injuries—Instructions—Unauthorized Issues—Appeal—Failure to Assign Error—Effect—Fundamental Errors.

1. Where plaintiff charges negligence in defendant's permitting its rails to become charged with electricity, causing his horse to fall and throwing him from his cart, and alleges that, after the horse was on the ground, defendant's servants, not having the car under control, ran it against plaintiff, an instruction to find for plaintiff if the jury believe that defendant's car collided with plaintiff's cart by the negligence of defendant's employees, and such negligence was the proximate cause of the collision, or if the car was being operated with ordinary care, but plaintiff was on defendant's track in a position of peril, and defendant's employees knew his position of peril, and failed to exercise ordinary care to avoid injuring him, is erroneous, as not presenting the issues involved.

2. Where an instruction authorizes a finding for plaintiff on an issue not made by the pleading, the error, though not assigned, is so fundamental as to require the court to act on it.—(San Antonio Traction Co. vs. Yost., 88 S. W. Rep., 428.)

TEXAS.—Carrier and Passenger—When Relation Begins—Contributory Negligence—Appeal—Harmless Error—Instructions—Injury to Passenger—Burden of Proof—Assignments of Error—Briefs—Rule of Court.

1. When a person desiring to become a passenger on a street car stations himself at a place where the cars are accustomed to receive passengers, and signals or calls to the motorman of an approaching car, to stop the car, and such signal is seen by the motorman, and the car slows up, an acceptance of the offer to become a passenger will be implied from the act of the motorman; and such person is entitled to be regarded as a passenger while in the act of getting on the car, though he attempts to board the car before it comes to a full stop, and irrespective of whether the motorman intended to stop the car for the purpose of allowing him to get on.

2. The attempt of a passenger to board a street car while it is in motion is not contributory negligence, as matter of law.

3. In an action for injuries to a passenger, where the court charged that plaintiff was required to prove that the injuries were caused by the failure of the defendant's employees to use ordinary care, and failed to give a charge defining negligence as between a carrier and a passenger, or stating the degree of care required of a carrier for the protection of a passenger, defendant's contention that the error was harmless, because the undisputed evidence showed that defendant's servants failed to use any care whatever to prevent the injury, and therefore, if the jury had found plaintiff's statement of the circumstances under which he was injured was true, they must have found in his favor, notwithstanding any error in the charge, was untenable.

4. In an action for injuries to a passenger, where plaintiff's evidence did not show negligence on his part, as matter of law, the burden was on the defendant to establish its plea of contributory negligence.

5. Where some assignments of error are not discussed in appellant's brief, and those discussed are permitted to retain their original numbers, instead of being consecutively numbered, as required by rule 29 for the Courts of Civil Appeals (67 S. W. xv), but are discussed in the same order as if they had been consecutively numbered, there is a mere technical violation of the rule, which is insufficient to require the court to refuse to consider the assignments.

6. Where assignments of error discussed in appellant's brief are followed by statements containing no reference to the pages of the record for verification, as required by rule 31 for the Courts of Civil Appeals (67 S. W. xvi), but otherwise sufficient, there is a mere technical violation of the rule, which is insufficient to require the court to refuse to consider the assignments.—(Lewis vs. Houston Electric Co., 88 S. W. Rep., 489.)

TEXAS.—Carriers — Passengers — Trespassers — Street Railway Cars—Minors — Injuries — Proximate Cause — Negligence—Contributory Negligence—Evidence—City Ordinances.

1. A street railway company was liable for the motorman's negligence resulting in injuries to a minor whom the motorman permitted to ride on the car in consideration of certain services rendered, though the motorman had no authority to make such arrangement.

2. A street railway motorman permitted plaintiff and certain other boys to ride on the front platform of a street car in consideration, as plaintiff claimed, of certain services performed for the motorman. After they had ridden several blocks, the motorman, without stopping the car, directed them to get off, and plaintiff in so doing was injured. Held, that the proximate cause of the injury was plaintiff's attempt to alight from the moving car, and not the act of the motorman in permitting him to ride on the front platform.

3. Where plaintiff, a minor, was injured while attempting to alight from the front platform of a moving street car, it was not actionable negligence on the part of the street car company to permit plaintiff to ride on the car, as distinguished from a place on the car which was especially dangerous.

4. Where plaintiff, a minor, was injured while alighting from a street car, and he claimed that he got off on the demand of the motorman, who testified that plaintiff and others entered the car without his permission, and that, on his stating to them that they must ride inside the car or get off, plaintiff jumped from the car, and was injured, as it was slowing up, evidence of a city ordinance making it a misdemeanor for any person other than an employee or officer of the railroad company to jump from a street car while in motion was admissible on the issue of plaintiff's contributory negligence.—(Denison & S. Ry. Co. vs. Carter, 82 S. W. Rep., 782.)

WISCONSIN.—Street Railroads—Crossing Accident—Contributory Negligence—Special Verdict—Evidence—Sufficiency.

1. Due care in approaching a street railway crossing can be satisfied only by the full use of the senses of sight and hearing at the last moment of opportunity before passing the line between safety and peril, and it is only when deprived in some degree of the opportunity to observe that one may rely on his judgment as to chances in driving across the tracks.

2. No right of way exists in favor of one crossing the tracks of a street railway when a diminution of the speed of the car is necessary to enable him to pass in safety.

3. Plaintiff was driving south, and came to a cross-street on which the defendant street railroad company had double tracked. As he reached a point where he was substantially on the north crosswalk of the street, and his horse's head some 15 feet north of the track, he stopped, and looked west, and saw no car; then looked east, and saw one about a block (389 feet) away, coming towards him very slowly. He started his horse at a speed of about 2 miles an hour to cross the street without again looking for a car. When his horse was on the track, and the front wheels close to the north track, his little daughter cried out to look out for the car. He then looked, and saw it about half a block away, coming very rapidly. He urged his horse to greater speed, reaching a velocity of about 3 miles an hour, but before getting across was struck and injured. Held, that plaintiff was guilty of contributory negligence precluding recovery.—(Goldmann vs. Milwaukee Electric Ry. & Light Co., 101 N. W. Rep., 384.)

INTERCHANGE OF CARS

NEW YORK.—Railroads—Connections—Interchange of Cars.

Where an order directing defendant steam railroad to connect its line with the line of a street railway company which subsequently became a part of plaintiff railroad company was affirmed on appeal, such judgment was res adjudicata of defendant's obligation to interchange cars and carload lots of freight over such connections.—(Hudson Valley Ry. Co. vs. Boston & Maine R. R., 94 N. Y. Sup., 545.)

LONDON LETTER

(*From Our Own Correspondent.*)

The city of Belfast is now in possession of an electric tramway system, the first electric cars having been put into service about the first of last month. There has as yet been no formal opening ceremony, but the first running of an electric car seems to have attracted a tremendous amount of attention in Belfast, as the advent of electric tramways in that city has been long looked for. We shall not give any particulars at present, as we expect in an early issue to publish a full illustrated description of this system.

It would appear that all the troubles which the Perth Town Council has had with the electrification of its system will soon be at an end, although for a small city it seems to have had more trouble and more disputes than any other city in Great Britain. Some of the new electric cars have already arrived, and trial trips have been made over the system with entire success. The dispute as to the proper size of the cars has not yet been settled, but this will doubtless thrash itself out in due time, and a more important question is now agitating the citizens of the Fair City, namely, that of running Sunday trams.

In connection with the question of Sunday cars, it is interesting to note that the city of Dundee has recently been through this agitating matter. Several previous attempts have been made to run Sunday trams in Dundee, but they have always been defeated. Recently, however, the Town Council determined upon having another plebiscite, and issued over 22,000 post cards to the citizens so as to have a decisive vote on the question. The majority in favor of the tramways amounted to something over 4000, so that since about the middle of last month Dundee has been in the enjoyment of a service of Sunday trams. The service will naturally not be so full as on other days, and will be entirely stopped during the hour for Sunday morning church service. It is interesting to note that on the first Sunday on which the cars ran there were about 30,000 travelers, which would go largely to prove that the Sunday cars in Dundee will be popular.

So far as the Inner Circle of the Underground Railways is concerned, there are now no steam trains in operation with the exception of the half-hourly trains of the London & North Western Railway Company from Broad Street to Mansion House. There is comparatively little left of the old condition of smoke, and it is to be hoped that before long the London & North Western trains will also be operated electrically. In its case, however, as has already been stated, the same trains will be used but electric locomotives substituted on the portion of the route where they run in tunnel. The District Railway has already been making preparations for cleaning its tunnels, and has procured a flat car equipped with a trolley mast, to which is attached a pole something in the shape of an ordinary trolley pole, having a revolving steel brush at the upper end. It is hoped by means of this to get rid of the accumulation of soot and dirt in the tunnel of twenty-five or thirty years' standing.

After being closed for nearly two years the tramway between Wednesbury and Darlaston has been reopened for passenger traffic, and the appearance of the electric cars in place of the old steam trams has evidently given general satisfaction. Under the auspices of the South Staffordshire Tramways Company (Lessee) the permanent way has been relaid, and a through service is in operation between Darlaston and Handsworth. Arrangements to reopen the Dudley section are being proceeded with.

The new electric tramway track from the Archway Tavern to Highgate-archway, connecting with the through line to Finchley and Whetstone, has been completed. The section, which is only half a mile long, and has been constructed jointly by the London County Council and Middlesex County Council, will now make a through tramway connection between the City and Totteridge, a distance of 10 miles. The extensions from Green-lanes to the Alexander Palace, by way of Hornsey and Munswell Hill, are also completed, and are to be formally opened next month. The districts of Tottenham, Edmonton and Finsbury Park will thus be brought in direct communication with the main entrances to the Palace.

The foundation stone was recently laid, with fitting ceremonial, of extensive new offices which are in course of erection in Hatton Garden, for the Liverpool Corporation Tramways department. The present premises in Sir Thomas Street are altogether too small and inconvenient for the staff which is required to deal with the still developing system of tramways in that city. The Hatton Garden site will be in a central position for dealing with the work of the department, and the plans, which have been prepared by T. Shelmerdine, the corporation architect and surveyor, suggest that a very handsome and commodious buliding will, in the course of the next year, be seen at Hatton Garden, a thoroughfare which recently has been so greatly improved.

The Sheffield and Rotherham Tramways committees have already proved the success of running through cars between the two towns. This is shown by the jump in the weekly traffic receipts issued by Mr. Fearnley on behalf of the Sheffield Corporation, which showed an increase of £171. This is eminently satisfactory. It shows that other than penny fares may sometimes be charged with great success. The number of through tickets issued during the week between the two towns was 21,206. The figures more than justify the arrangement entered into by Sheffield and Rotherham.

Notice has been given of the sale by private tender, on the order of the Court of Chancery, of the County Palatine, of Lancashire, of all the valuable goodwill, undertaking, business and property of the South Lancashire Electric Traction & Power Company, Ltd., comprising the freehold and leasehold lands, with the electrical generating station and sub-station and depots erected thereon situated at Atherton and Hindley, in Lancashire; the whole of the issued share capital of the South Lancashire Tramways Company, and of the Lancashire Light Railways Company, Ltd.; and also all book and other debts owing to the company on Aug. 31, 1905, all fixed and loose plant, machinery, stores, etc., the benefit of existing contracts. The South Lancashire Electric Traction & Power Company was registered in 1900, to acquire the entire issued share capital of the South Lancashire Tramways Company and the Lancashire Light Railways Company, Ltd. The authorized capital was £850,000 in £1 shares, £600,000 being in 6 per cent cumulative preference shares, and £250,000 in ordinary shares, while all the ordinary shares were issued fully paid to the vendors, who also took £50,000 preference shares, and of the remaining preference shares £51,132 was allotted and paid up. There was also £597,170 (part of £850,000 authorized) of 4½ per cent first mortgage debenture stock. Resolutions were subsequently passed to exchange this debenture stock for 5½ per cent second mortgage debenture stock, and provide for a new issue of first debenture stock. Interest on the debenture stock, due on June 30, 1904, was not paid, owing to the "attitude adopted by some of the ordinary shareholders, whose shares were to be transferred as one of the conditions on which the resolution authorizing the creation of fresh capital was passed last year." The company then went into liquidation, and the sale now announced is apparently the result. There is a total length of 108½ miles single track authorized, of which 28 miles have been constructed and worked.

An extremely pleasant day was spent this month by a party of journalists, who were invited by Messrs. Dick, Kerr & Company, to visit the city of Hastings for the purpose of inspecting the newly inaugurated system of tramways in that city, now being operated by the Hastings & District Electric Tramways Company, Ltd. It will be remembered that Messrs. Dick, Kerr & Company were the contractors for the whole system, including power house, substations, overhead work, track construction, etc. The visitors enjoyed a trip on the circular route, which extends for about 9 miles round the city, and at certain points attains an altitude of from 300 to 400 feet above the sea level. The trip was most enjoyable, and as the morning was cold a most ravishing appetite was attained for the excellent luncheon provided. Afterwards visits were made to the power house, sub-station, car sheds, etc., while a few minutes were left to get a little sunshine on the famous "front." A full description of the system appears in another column in this issue.

The London County Council is still vigorously pursuing its scheme of electrification of all the tramways in the metropolitan area, and work has now been commenced on a new section which will extend from the Borough of Southwark, via Lambeth Road and Albert Embankment, to Wandsworth, two routes being equipped from the junction of Nine Elms Lane and Wandsworth Road. Large sums of money will necessarily be spent in widening and straightening the various thoroughfares. In the meantime, the London County Council and the City Corporation are conferring with a view to re-introducing the bill which was recently rejected by the House of Lords for the construction of tramways across Blackfriars Bridge and Westminster Bridge, the London County Council intending to enter a bill for its portion of the work, and urging the City Corporation to introduce a bill for the purpose of either widening or rebuilding Blackfriars Bridge. The London County Council is also intending to seek Parliamentary powers for the building of an electric tramway along Edgware Road from the Marble Arch, in Oxford Street, to Cricklewood, and is asking the borough of Paddington to share with it the necessary expense of widening the thoroughfare in the east end of London. A deadlock seems to have arisen between the London County Council and the borough of Stepney. The London County Council intends building a large system of electric tramways in Stepney and Poplar, and quite naturally after its experience with the tramways in the south of London, it is anxious to avoid the unnecessary expense of a conduit system in the east of London. The borough of Stepney, however, seems to be determined to have conduit trams, but the borough of Poplar has intimated its willingness to have the overhead system. Doubtless the borough of Stepney will finally give way, as it would seem ridiculous to resort to the greatly increased cost of a conduit system in such a vicinity as Stepney, where the æsthetic aspect of the case is surely not necessarily to be considered.

The Anglo-Argentine Tramways Company, Ltd., has just issued to its shareholders a remarkably satisfactory statement as to the result of the first half-year's (to June 30) working of its system combined with that of the city of Buenos-Aires Tramways Company. The net receipts amounted to £142,487 for the combined systems, as compared with £97,327 for the Anglo-Argentine Company's system alone for the June half of 1904. There is, therefore, an increase of over £45,000, equal to 46 per cent. This result is the more remarkable because the City Company's system is at this time being converted from horse to electric traction, which has greatly interfered with its gross earnings. After deducting all prior charges, including the dividend on the 5½ per cent preference shares, and the proportion of the annuity of £71,000 per annum paid as rental for the City Company's lines, there is left a net balance of, in round figures, £63,000. Out of this an interim dividend of 3s. 6d. per cent per annum is paid, free of income-tax, on the ordinary shares, leaving a balance of upwards of £37,000, to which has to be added £6,000 brought forward from last year. The foregoing balance of £63,000 for the half-year is equal to £126,000 per annum, and represents a dividend of nearly 15 per cent per annum on the total ordinary capital of £850,000. This expansion in the earnings is of good augury for the future of the combined undertakings when the City Company's lines are worked completely by electricity, which is expected to take place in June next. The future of this undertaking promises to be one of increasing prosperity. When the company took over the property of the city of Buenos-Aires Tramways Company the directors estimated that, even if the latter's earnings increased when the lines are converted from horse to electric traction, at only half the rate at which those of the Anglo-Argentine Company expanded when similarly transformed, it would at once earn sufficient to pay 8 per cent dividend on an additional ordinary capital of £75,000, and still leave a balance of £22,000.

At the ordinary general meeting of the shareholders of Dick, Kerr & Company, Ltd., John Kerr, M. P., presided. The net profits to be dealt with were £85,007, 8s. and £836, 10s. 10d. better than 1904. The amount of reserve originally settled to be provided for was £150,000. That amount was made up last year, so that the liability had been discharged. This year it was proposed to take from the profits £23,388, 16s. 2d., and, coupled with a sum of £16,611, 3s. 10d., previously reserved to no particular object, to open an account for "special reserve for extensions of manufactures or replacements of machinery." The chairman urged the meeting to remember that an industrial concern like theirs should make a study of safeguarding itself in every direction. In these days of rapid change of machinery, it was wise to provide a fund in excess of the ordinary ample depreciation, so that they could, if the necessity arose, provide either works extension or the most modern machinery without issuing fresh capital. He hoped to see the special reserve fund considerably augmented in the near future. He trusted they would support the board in their recommendation in setting aside this very considerable amount of £40,000. The board, who represented a very large proportion of ordinary stock, had done it merely to strengthen the position of the company. The investments stood at £109,354, 7s. 9., as against £109,701, 14s. 10d. He thought anyone would be fortunate if they could acquire them at that valuation. The amount in the bank was £90,609, 12s. 3d., against £55,151, 19s. 8d. last year, and the amount carried forward was £42,387, 16s. 5d., against £39,922, 11s. 4d.

Claude T. Cayley, deputy chairman, seconded the adoption of the report and accounts, the motion being agreed to *nem con.*

A dividend of 6 per cent per annum on the preference share capital, and a dividend of 10 per cent on the ordinary share capital were declared, a balance of £42,387, 16s. 5d. being carried forward, and £23,388, 16s. 2d. being set aside to special reserve.

At the invitation of J. G. White & Company, Ltd., of London, a large party of journalists was conveyed to Bournemouth in a special train provided by Messrs. White & Company, on the occasion of the opening ceremony of the extension of the Bournemouth Corporation Tramway system to Christchurch. On arrival at Bournemouth station a specially decorated car was in waiting to take them to the Square, where about half a dozen other gaily decorated cars were prepared, already filled with the guests of the Mayor and Town Councillors of Bournemouth. Soon after a start was made for Christchurch, which is about 4 miles away, and as the October weather was everything that could possibly be desired, the trip was of the most enjoyable character. At Christchurch a stop was made for a short ceremony, the Mayor of Christchurch proposing success to the undertaking, to which the Mayor of Bournemouth responded. After the return to the Square in Bournemouth, the whole party proceeded to the Winter Gardens, where a reception was held by the Mayor and Mayoress, and light refreshments were provided. A most excellent concert was also provided by the municipal orchestra under the conductorship of Dan Godfrey. Speeches were made by the Mayor of Christchurch, the Mayor of Bournemouth and the Mayor of Poole, and mutual congratulations were the order of the day on the happy completion of a work which has brought a good many anxieties in the past few years. In the evening a banquet at the Grand Hotel was tendered by J. G. White & Company to the Mayor and Town Councillors of Bournemouth, Poole and Christchurch. About 250 guests were present, and a most enjoyable evening was spent. The toast list was not a long one, and after the usual loyal toasts, the toast of the County Borough of Bournemouth and the tramways undertaking was given by the chairman, J. G. White, which was responded to by the Mayor of Bournemouth. After the toasts of "The neighboring boroughs of Poole and Chirstchurch" and "The other contractors" were given, and were ably responded to by various gentlemen who had connection with the undertaking. Undoubtedly the most important speech of the evening was by J. G. White, who, on referring to the contract which they had just completed, together with the previous contract for the system of tramways in Bournemouth itself, stated that the work had been carried out in the most pleasant manner, and that the contractors felt that they had been rendered the greatest assistance by the Corporation of Bournemouth at all times. Mr. White in his speech made a strong plea for the better understanding between contractors and corporations for whom they may be doing work, and altogether made a most happy and felicitous speech in the interests of all concerned, both for the work completed and in the interest of future contracts with other corporations.

A. C. S.

PARIS LETTER

(*From Our Regular Correspondent.*)

Up to the present time the question of municipal ownership has scarcely been raised in France with regard to the more important enterprises, and although Paris has led the way in the recent discussions of the possibilities attending the municipalization of the gas untertakings, yet the outside tramways and light railway companies have hitherto been left in peace. With one or two unimportant exceptions, all of the tramways of France are in the hands of private companies, which have franchises of various lengths, according to the nature of the undertaking, although a term of sixty years may be taken as a fair average of the more important. The charter generally contains conditions to the effect that at the end of the franchise the material shall be handed over gratis to the authorities, or taken over at a bare valuation. The municipal enterprises in England and elsewhere, however, have recently attracted the attention of the French authorities, and the immediate result is that concessions and franchises are now being given out with less freedom than formerly and with greater restrictions. One town (Boulogne) has even gone as far as deciding on the construction of a municipal electrical station, and has voted the sum of Frs. 500,000 towards this object.

Although electric traction has made great progress in France within the last decade, steam tramways are not entirely out of the running, and the interdepartmental commissions appointed to examine the schemes for light railways in their districts are not always favorably inclined to electric traction. One example of this recently occurred in connection with the Lormes-Avallon scheme where the commission accepted the light railway proposal, but rejected the part relating to electric traction, except for a tramway to be installed within the town limits. Another somewhat similar instance occurred at St Etienne. On the other hand, at Valenciennes (Nord), the steam tramway company has made an application to the town, which has been allowed, to cease the steam traction in favor of electric.

Although no important single-phase lines are as yet in operation in French territory, the system is naturally attracting considerable attention, and schemes hitherto considered to be too costly for the application of the direct current systems with sub-stations are being revived.

A French syndicate has recently been formed to obtain a franchise from the city of Paris, for the supply of electric current for all purposes. The syndicate includes many well known names in the electrical world, and the proposed concession to be obtained is to cover very wide limits.

A YEAR OF THE SUBWAY IN NEW YORK

On Oct. 27, 1904, the New York Subway was opened to the public. A hundred and six million passengers have since paid to ride in it. William Barclay Parsons, who, as chief engineer of the Rapid Transit Commission, planned the subway and saw it completed, said last Thursday:

"The record of the first year's operation has been exceedingly gratifying to me as showing that it has fully and successfully met the public demand so far as it can. The full measure of the success of the subway, from the point of view of the public, will not be fully realized, however, until the original plans of the commission, including lines north of Forty-Second Street on the east side and south of Forty-Second Street on the west side, are completed. When this is done the public will have the full benefit of the subway.

"The line to Brooklyn is in such condition that next year will see direct rail connection between that borough and the financial, commercial, shopping, amusement and residential districts of Manhattan."

Based on the number of fares paid, the stations rank in importance as follows: Brooklyn Bridge, Grand Central, Fourteenth Street, Fulton Street and Times Square. Times Square is far ahead of all other local stations. Five million persons, a number exceeding by half a million the estimated total population of New York City, boarded subway trains there during the year. Supposing that just as many got off at Times Square, 10,000,000 persons have passed through the station since Oct. 27, 1904.

Eighteen million fares were paid at the Brooklyn Bridge, 10,000,000 at Grand Central and nearly 7,000,000 at Fulton Street. The average number of passengers carried in the subway every day was about 300,000. The estimated number of passengers on all the elevated lines for the same period is 261,666,686, an average of 716,895 a day. A fair estimate of the number of passengers carried by both subway and elevated is 1,000,000 a day.

Only part of the subway was opened a year ago. Since then the Lenox Avenue branch to West Farms, the section from the Brooklyn Bridge down Broadway to South Ferry, and a mile stretch north of 135th Street, under Broadway, have been opened. The Interborough Company expects to run trains under Fort George and over the long viaduct to the Ship Canal by Jan. 1. The Brooklyn branch will be opened next year.

Of the problems that a year's operation of the subway has raised none has interested the public as much as that regarding ventilation. On hot days the air in the tunnel was almost insufferable, and hundreds of thousands forsook rapid transit for the surface cars. The engineers have been wrestling with the question of ventilation and think they have devised a remedy. Mr. Parsons and Mr. Rice, who is now chief engineer of the commission, expect to submit their report on the matter to the Rapid Transit Commission within a few weeks.

Mr. Rice says that in the new subways the tracks will be separated by partitions. "Every track," said Mr. Rice, "will not necessarily be in a tunnel of its own. Trains running in the same direction will be separated from those running in the other. In this way a steady draft of air will be created in each compartment. But we are confident of being able to cool the air in the present subway. The means will be described in the report soon to be put before the commission."

E. P. Bryan, the operating head of the Interborough Company, when asked to say something about the subway's anniversary, said:

"During the first year of operation the subway has justified our most sanguine expectations. The popularity of the subway has, we think, been demonstrated by the patronage. Unforeseen engineering difficulties have prevented the completion of the section to Fort George and across the Dyckman Meadows. The delay in the construction of the Ship Canal Bridge has also prevented the completion of the work called for under contract No. 1."

General Manager Hedley said:

"For several months the operation of the subway was hampered by incomplete terminals and the newness of the system, so that the train service could not be run up to the maximum. Since the completion of the lines to South Ferry conditions have been much improved.

"Five hundred of the first cars purchased have passed through the shops; the end doors have been made considerably larger, and the bulkheads inside the cars have been removed. This has been the subject of favorable comment on the part of the passengers and has led to a marked difference in the time it takes to embark and disembark."

A plan to lengthen the local platforms so that they can accommodate seven cars instead of five is now under consideration. It is likely that work on the platforms will begin in the next month or two.

AN ALLIANCE ORGANIZED AGAINST ACCIDENT FAKIRS

Representatives of a dozen large corporations in various parts of the country met at the Hotel Gotham, New York, one day last week and formally organized the Alliance Against Accident Fraud, the object of which is completely to suppress the accident fakir. The Alliance will be operated much after the plan of the American Bankers' Association, which has done much toward diminishing attempts at burglarizing banks. Out of a common fund the Alliance will carry on the prosecutions of all who attempt accident fraud on its members. It aims to pursue all engaged in presenting fraudulent claims, including fake lawyers, unprincipled physicians, ambulance chasers and false witnesses. It will insist on its companies dealing fairly with honest claimants, and advise the payment of reasonable damages in such case. An effort will be made to gain the confidence of the public in regard to this. The officers of the Alliance are: R. B. Armstrong, president of the Casualty Company of America, president; James R. Pratt, United Railways & Electric Company, Baltimore, first vice-president; R. C. Richards, of the claims department of the Chicago & Northwestern Railway Company, second vice-president; Chauncey S. S. Miller, secretary and treasurer. Among the corporations which have already entered the Alliance may be mentioned the New York Central, the Delaware, Lackawanna & Western, and the Chicago & Northwestern Railroad companies, the New York City Railway Company, the United Railway & Electric Company, of Baltimore; the Washington Railway & Electric Company, the Boston Elevated Railway, the General Accident Corporation, the Hudson River Day Line, the Philadelphia Casualty Company, the Casualty Company of America and the United States Casualty Company.

THE TOLEDO TERMINAL STATION

The Toledo Railway & Light Company will proceed at once with the construction of the new terminal station in Toledo, to cost $250,000.

The building is to be erected entirely by the Toledo company, the interurbans having no financial interest in the enterprise, though, of course, they will all enter the scheme and deposit their passengers at the new depot. The building, as has heretofore been announced, will be located at Beech, Huron and Superior Streets, with a frontage on the first named thoroughfare of 342 ft., 125 ft. on Huron and 125 ft. on Superior. It will have three stories and basement, with foundation and walls of sufficient strength to sustain three more stories, in event of the structure proving inadequate. The building will be of fireproof construction. An arcade, 16 ft. in width, will run through the center of the building from Huron to Superior Streets. The structure proper will occupy but 65 of the 125 ft. of depth, the remaining 60 ft. being covered by a two-story steel and brick train shed which will be inclosed with glass. This arrangement will give a three-story building, 65 ft. x 340 ft., and a train shed, 60 ft. x 340 ft., making one of the finest and roomiest interurban stations in the country In the main building there will be a waiting room 50 ft. x 85 ft. This room will be two stories high with marble wainscoting and mosaic floor. Adjoining this on either side will be check and lunch rooms, newsstand, ticket office and ladies' rest room. The Beech Street front will contain eleven shops, each of which will be 16 ft. wide and 50 ft. deep. It is the intention of the company to lease these stores to high-class retail merchants.

In the basement underneath the waiting room will be a barber shop, smoking room and men's toilet room. The second and third floors will contain offices. The company will move into these rooms and vacate its present quarters in the Smith & Baker Building, the lease on which has one year yet to run. It is hoped to secure the offices of all the interurban roads that run into Toledo, so that the building will be devoted entirely to street railway business.

There will be four tracks in the train shed and cars may enter from either the Huron or Superior Street sides. A railing will run along each track, preventing the people from crossing one track to the other and thus avoiding accidents. When passengers are landed from a car they will make their exit down a flight of marble stairs into the basement of the train shed and reach the main building through a passage underneath the tracks.

There will also be a carriage and wagon drive under the tracks, so that baggage may be delivered close to the cars. The baggage room will be in the basement of the main building, and elevators will be installed to convey baggage to the street level. The driveway under the train shed will be wide enough to enable two teams to pass and to turn around after unloading. The walls of the basement are to be of glazed brick.

The contract will be let for the building in a short time and work rushed on the structure this winter, so that the building will be ready for occupancy about June 1 next.

MR. BICKNELL TO EXTEND HIS INFLUENCE

It is understood that Warren Bicknell, president of the Lake Shore Electric Railway, of Cleveland, will resign from that position about Jan. 1 to become the managerial head of the Cleveland Construction Company, which represents a coterie of Cleveland financiers and bankers which has been active in the promotion and building of a number of traction propositions. It is understood that Mr. Bicknell will be in active charge of the building of the Missouri Valley Electric Railway, which as stated in the issue of Sept. 28 will be built between St. Joseph and Kansas City, and that he will also be in charge of the building of the Youngstown & Ohio River Railway, which will be one of the most important lines in Eastern Ohio.

Mr. Bicknell took charge of the Lake Shore Electric about three years ago. At that time it was in poor condition physically, and far from meeting its bonded obligations. He will leave the property in the best of physical condition, with earnings considerably in excess of fixed charges and with exceedingly bright prospects.

It is believed that Mr. Bicknell's successor will be one of the members of the Everett-Moore syndicate, as it is generally understood that on or before Jan. 1, the voting trust committee which has been in charge of the property since the receivership was raised, will release its control in favor of the owners of the property.

MEETING OF NEW ENGLAND STREET RAILWAY CLUB

The first fall meeting of the New England Street Railway Club was held at the American House, Boston, on the evening of Oct. 26, President Potter being in the chair. Dinner was served at 7 p. m. to members and invited guests. A brief business meeting was then held, at which several new members were elected. The speaker of the evening was Albert H. Armstrong, of the railway department of the General Electric Company, of Schenectady. His topic was "The Electric Locomotive in Heavy Haulage Work." Mr. Armstrong's address was quite informal, and it was illustrated by a large number of lantern slides, showing the development of electric locomotives for terminal yard, short run and main line service. Conspicuous among these were the General Electric Company's early 35-ton and later 40-ton 600-hp yard locomotives, which have proved to be much more economical on the score of maintenance than the steam locomotives which formerly performed this task at the works; the 50-ton electric locomotive used in shunting work on the St. Louis & Belleville line; the 1000-hp Baltimore & Ohio 80-ton locomotives, and finally, the New York Central 6000 type of electric locomotive, representing the climax of evolution in direct-current machines for heavy steam railroad passenger haulage.

Mr. Armstrong brought out the point that the present maximum schedule speed in use on interurban lines in the West is about 35 m.p.h. or 36 m.p.h., with a maximum speed of 65 m.p.h. and a motor equipment of 500 hp per car in two or three-car trains. A three-car interurban train of this character can easily develop as much power as the heaviest steam locomotive.

Mr. Armstrong emphasized the importance of small wheel diameters in electric locomotives, and stated that the dead weight per axle, even with the armature directly mounted thereon, is actually less in the New York Central electric locomotive than in many steam locomotives. An interesting illustration of the New York Central locomotive's enormous accelerating power was given by the speaker, who said that on the test track near Schenectady the 6000 type locomotive with seven passenger cars attached has started from a standstill, when the steam locomotive of the Empire State Express, traveling at full speed, reached the rear of the electric train's last car and has caught up with the steam train before the last car of the latter could pass the electric locomotive. The New York Central locomotive has now been run about 27,000 miles in a 50,000-mile endurance test, with very satisfactory results. The speaker closed his address with a brief description of the single-phase compensated type motor, touching incidentally upon the field of the gasoline-electric car for thinly populated branch line service.

General Manager E. G. Connette, of the Worcester Consolidated Street Railway Company, has created the position of superintendent of tracks, and to fill this place he has selected R. H. Bullock, previously with the company as general inspector. Heretofore the several division superintendents have been responsible for the condition of the tracks of their respective divisions.

SERIOUS ACCIDENT ON WILLIAMSBURG BRIDGE, NEW YORK

A heavily loaded car of the New York City Railway ran wild down the incline at the Manhattan end of the Williamsburg Bridge Thursday morning, Oct. 26, and crashed into a stalled car of the same company that was jammed to its doors with passengers from Brooklyn. Twenty-five persons were hurt. The stalled car was demolished, but the runaway car was practically undamaged. Its passengers were shaken up and the motorman was hurled into the wreckage of the car ahead. The collision occurred in the height of the rush hour. It was just 6:55 when car No. 2757 of the Christopher Street line left the plaza on the Brooklyn side. This car was crowded with perhaps seventy passengers. Immediately behind the Christopher Street car was No. 458 of the Fourteenth Street line, also crowded.

Just ahead of No. 2757 was No. 2057 of the same line. No. 2057 was rolling down the incline in Delancey Street toward the Bowery, when an accident occurred that brought it to a stop. No. 2757 came to a stop just behind the burned-out car. This stop was about 200 ft. from the end of the incline and was almost above Attorney Street. Here it was that the accident happened.

CANADIAN COMPANY DECLARES ANOTHER CASH DIVIDEND TO EMPLOYEES

Again has a portion of the earnings of the British Columbia Electric Railway Company for the year been distributed among the employees in accordance with the profit-sharing plan inaugurated three years ago. This time the total dividend was $17,000, of which each of those entitled to share in the distribution received $40. According to the terms of the system the employees receive a third of the total dividend in excess of the regular 4 per cent dividend divided among the shareholders. This applies to all men who have been a year previous to the distribution in the company's employ. In 1903, the first year the men shared in the plan, each employee who had been in the service of the company for a year or over received $25 as a bonus. This bonus was paid shortly before Christmas. Last year the earnings of the company increased, and each man received $35 as his premium. Again have the earnings increased, and this time, as previously stated, each man gets $40 as his share of the prosperity of the company.

NEW YORK-PENNSYLVANIA INTERSTATE SINGLE-PHASE LINE—GAS ENGINES A FEATURE

The Warren & Jamestown Street Railway Company's single-phase line between Warren, Pa., and Jamestown, N. Y., is now in regular operation. The electrical equipment had several weeks' preliminary run from a small gas-engine driven unit, temporarily installed in the power house at Stoneham, but on Oct. 19 the large gas engines were placed in service for the first time, and a permanent operating schedule was inaugurated.

Probably the most interesting feature of the system is the exclusive employment of horizontal double-acting gas engines of the heavy duty type for the generation of power to operate the road. Two of these engines are now installed, the first of which is already operating. The second will be placed in service in a short time. These two engines will be called upon to operate in parallel on the electrical end. Parallel operation is particularly difficult in service of this kind on acount of the violent fluctuations in load which occur, due to the size of the cars employed and the small number in operation at any particular time. As it is not possible to utilize storage batteries to absorb these fluctuations, the engines are called upon to sustain them and are thus put to the severest possible test occurring in the operation of electric power plants.

The two units installed are each of approximately 500-B. hp capacity direct connected to 260 kw revolving field engine-type single-phase generators. Each has two cylinders arranged in tandem with a single crank. They will operate entirely upon natural gas distributed by a local company. In this district the gas has a calorific value of 1000 B. T. U. per cu. ft. A 55-hp vertical Westinghouse engine of the single-acting type is also in operation driving air compressor and exciting unit for the main equipment.

Current is generated directly at a voltage suitable for transmission without the use of transformers. Transformer sub-stations are located along the right of way, which reduce the line voltage to 3300 volts for the trolley, at which pressure it is collected by the cars.

The Warren & Jamestown Street Railway, although recently organized upon its present basis, has been running part of its present line for eleven years. Three years ago it began experimenting with gas power with sufficient success to induce the use of gas engines for the entire power generation.

OHIO COURT SAYS SUBURBAN LINES MUST GIVE TRANSFERS TO LINES OF CITY COMPANY OVER WHICH IT OPERATES

The Superior Court of Ohio has rendered a decision that the interurban lines entering the city over the tracks of the Cincinnati Traction Company must give transfers to and honor them from connecting city lines. The matter has been in controversy ever since the interurbans entered the city under traffic agreement with the city company. The interurban companies maintained that the use of the city tracks was a mere traffic agreement and had nothing to do with any agreement which the city company had with the city. The court holds that the traffic agreement is in effect a sublease of the tracks of the city company, and that such lease is subject to the terms of the franchise granted the city company.

CONSOLIDATION OF WEBER, CONTINUOUS AND INDEPENDENT COMPANIES

The Rail-Joint Company was organized last week by filing a certificate of incorporation. It has a capital stock of $1,500,000, of which $1,000,000 is common and $500,000 preferred. The officers of the company are: Frederick T. Fearey, president; Lawrence F. Braine and Percy Holbrook, vice-presidents; Fernando C. Runyon, treasurer, and Benjamin Wolhaupter, secretary. This company will take over the business and properties of the Continuous Rail-Joint Company of America, the Weber Railway Joint Manufacturing Company and the Independent Railroad Supply Company. It is expected that the new organization will work economies of management that will materially reduce the cost of manufacture and distribution. It does not, however, in any way monopolize the rail-joint business.

FIREMEN MAKE TROUBLE FOR AN OHIO ROAD

The Canton-Akron system, which embraces the lines between Akron and New Philadelphia and Uhrichsville, has for several weeks been laboring under the disadvantage of labor troubles. The union representing power house firemen attempted to force General Manager E. S. Dimmock to employ union firemen, and upon his refusal to be coerced, the station was tied up. This was about six weeks ago. Since then the power station has been operated with non-union labor. Urged on by labor union representatives, the county and village authorities of a number of localities along the line called upon Manager Dimmock in a body and threatened to bring suits for forfeiture of franchises. Mr. Dimmick said that the company was making every effort to give efficient service, and that personally he had even gone to the extreme of shoveling coal in the boiler room to keep the station in operation. He declared he would not be coerced into signing a contract which meant a large increase annually for power station expenses. At present time he has an efficient force and cars are being run on schedule.

SEVERAL MILLIONS FOR INVESTMENT IN CALIFORNIA PROJECT

The electric power syndicate headed by Eugene de Sabla and John Martin, which is purchasing the San Francisco Gas & Electric Company, proposes to spend $2,000,000 in building a railroad to connect Nevada City and Grass Valley with Auburn and Marysville, so says the San Francisco "News Bureau." The line is to be 67 miles in length. The same syndicate is also planning to build an electric road from Sacramento down through the Sacramento Valley. Work on both lines is to begin within 90 days. Martin predicts that Sacramento will be the hub of a big system of electric railways running out in every direction, like the spokes of a wheel. In connection with the Marysville project the people of Grass Valley and Nevada City are now being asked for rights of way. Yuba and Placer Counties have granted all the rights of way asked for. Mr. Martin says, whether the rights of way between Grass Valley and the Bear River are granted or not, work will start within about 90 days between Auburn and Marysville. Grading will commence out of Auburn and Marysville at the same time provided the condition of the river at Marysville permits it. If high water interferes, arrangements will have to be made with the Southern Pacific Railroad to run a spur south of the river to enable the work to be started. Passenger coaches on the new road are to be propelled by electric power, although freight cars may be hauled by steam. The new line will connect with the Southern Pacific at both Auburn and Marysville, and penetrate and develop an entirely new section of mountain country.

MUNICIPAL ENDEAVOR MISDIRECTED

The action of the city authorities of Los Angeles in regard to the South Park Avenue line of the Los Angeles Railway Company has resulted as was predicted in the last issue of the Street Railway Journal, and the people in the district affected are in open revolt. A desire to pose as the champions of the people and the use of spectacular methods are responsible for the present state of affairs, which is deplorable. It seems that the Los Angeles Railway Company in building the South Park line finished only a little more than a mile of the road before the expiration of the time limit set by the ordinance for the completion of the entire line. The company was, however, permitted to complete the line without interference from the authorities. Then of a sudden a move was made by the city against the company. At this stage the company secured an injunction to restrain the city from interfering with the conduct of its business. This injunction was dissolved Oct. 12. Immediately the guardians of the public welfare proceeded to demolish enough of the property to prevent the company from operating cars over the line. The residents of the district, deprived of the service which was especially easy of access, are thoroughly aroused and are demanding that the Mayor take action to secure for them the privileges of which they have been deprived, and upon which depends to a large degree the security of their investment in the territory affected. On the whole, the situation presents a fine example of municipal endeavor misdirected.

QUICK SERVICE BRAKE TEST

An interesting series of tests of the new quick-service brake of the Westinghouse Air Brake Company was conducted Aug. 23, at West Seneca, N. Y., under the auspices of the Lake Shore & Michigan Southern Railroad. These tests demonstrated the improved braking qualities of the quick-action brake and its ability to work in harmony with the old type of brake. The tests were conducted on a train of 50 cars of the gondola type, of 100,000 lbs. capacity, or a light weight of 45,000 lbs., and drawn by a consolidated-type engine. Twenty-three tests in all were conducted, showing, among other points, that the quick-service brake would stop a 50-car train in 34.6 per cent less distance than the M. C. B. standard brake when both are set with full-service application; that the quick-service brake with a light application will stop the same train in substantially the same distance as the older brake when set with full-service application; that it is possible to release brakes at low speeds when the train is equipped with improved brakes with greatly reduced draft gear strains; that with quick-service triples a light reduction results in a prompt and positive response from all valves; that the results are secured with a less expenditure of air, and that it is possible to release the rear brakes first if desired.

Tests were also made with the new automatic brake-slack adjusted, which insures uniform piston travel; with friction draft gear, which provides for an easy buffing effect, and with the new Westinghouse automatic air coupler by which the brake coupling is fastened automatically by impact so adjusted as to make the coupling positive without the necessity of hand adjustment.

NEW PUBLICATIONS

Data Book for Power Plants. By Prof. C. E. Lucke; 140 pages. Published by B. Van Nostrand Company, New York. Price, $1.50.

This Data Book has been compiled by Prof. Lucke for keeping of professional inspections of power plants by himself, and also for the recording of the same data by students in Columbia University, who are required to return a memorandum on this subject during the summer of their third year. It contains spaces for all of the most important data in power-plant investigation.

"Physics," by Charles Riborg Mann and George Ransom Twiss. 453 pages. Published by Scott, Foresman & Company, Chicago. Price, $1.25.

A text-book in which are applied to the teaching of physics the methods of instruction advocated by Herbert Spencer, in that examples are given of things in every-day use to illustrate the application in practice of the truths laid down by science. The examples that are given are interspersed into the text at intervals sufficient to keep the interest of the pupil from lagging, and have not, apparently, as innovations of this kind sometimes do, resulted in the sacrificing of anything that is essential. It is a book that teachers will do well thoughtfully to consider when the question of a suitable physics text book is up for consideration. In any event, the book should be in the reference library of every school where elementary science is taught.

"Zum Entwurf einer Schwebebahn in Berlin," 42 pages, 8½ ins. x 13 ins., and 24 plates. Published by the Continentale Gesellschaft für Elektrische Unternehmungen, Nürnberg, Germany.

For several years past the Continentale Gesellschaft für Elektrische Unternehmungen (the Continental Company for Electrical Undertakings) has been endeavoring to secure permission from the Berlin municipality to build a suspended monorail system similar to that now in use at Barmen-Elberfeld. In connection with these negotiations the company has published an elaborate treatise on the transit situation in Berlin, going into the most minute details. The first chapter discusses the arguments for and against elevated and underground railways, and special emphasis is laid on the point that the latter type of traction would be enormously expensive and difficult owing to the sandy character of the Berlin soil, and the impracticability of changing the level of most of the sewer piping. A comparison is then made of both kinds of elevated railways, and the conclusion drawn that the monorail would be cheaper and of greater æsthetic appearance than the usual type. The second chapter is a most thorough analysis of the passenger traffic of Berlin, its distribution and means of transit—all illustrated by numerous tables, maps and half-tone illustrations. The third chapter deals with the solution offered, namely, the construction of an overhead monorail system along certain of the present congested routes. Construction costs, operating charges and fares of the present and proposed systems are fully dealt with in the fourth chapter. The final chapters deal with the layout of monorail lines, including a calculation of probable schedules on the important Gesundbrunnen-Alexanderplatz-Rixdorf route.

"Electric Traction," by Robert H. Smith, published by Harper & Bro., London and New York, 1905; 442 pages, illustrated. Price, 9 shillings.

The author of this book was formerly professor of engineering in the Imperial University of Japan, and is now professor emeritus of engineering in the University of Birmingham, and the book itself is devoted entirely to European practice. The reader naturally turns to the preface to learn the reason for such a remarkable limitation in a work with so broad a title as "Electric Traction," and finds it in the following words: "The reasons for confining the book to European practice have been twofold. The author labors under a constitutional inability to write about things he has not seen with his own eyes and examined himself, while he has had very limited opportunity for more than cursory observation of trans-Atlantic work. Then, again, the most recent and progressive developments of traction design are to be seen here, and not there. American electric traction engineering has already become standardized and conservative; its European pupil is still eagerly striving after new and higher things." We can readily agree with the wisdom of the first reason. It has undoubtedly saved the author from following in the footsteps of several other foreign writers on American practice, whom we could name, and who have filled their pages with cuts taken from old catalogues of manufacturers, and which represent apparatus and methods which have been obsolete for several years. But the claim that American manufacturers are conservative and that Europe is the place where the latest and best practice should be studied is the hardest hit that has been given America for some time. The same lack of perspective exhibited in this remark is present elsewhere in many places in the book. Thus in a chapter of forty pages on surface contact systems in which some half dozen systems are described in the minutest detail, the only two which have shown any degree of success are not described, and one of them is specifically condemned.

The book opens with three chapters devoted to general and economic considerations. Then follow chapters on "Overhead Trams," "Conduit Railways," "Surface Contact Tramways," "London Deep Level Electric Railways," London Surface and Shallow Electric Railways," "Berlin Electric Railways," "Italian Direct-Current Railways," "High Tension Alternating Current Railways in Italy," and "Swiss Three-Phase Railways and Zossen High-Speed Trials."

The subject matter for each chapter is usually a descriptive article upon some road of that class; thus the chapter on overhead trams is devoted almost entirely to a description with map of the Glasgow system, that on deep-level railways to the Central London Underground, and that on surface and shallow electric railways to the Metropolitan and Metropolitan District. This has its advantages in some respects, but does not give the reader a broad idea of the subject. For instance, the chapter on overhead trams, or the trolley system, describes only the section of rail, type of track construction, method of bonding, etc., used in Glasgow. Now, while these have their good points the ordinary reader, so far as anything which we have discovered shows, might go on thinking that the only rail used by trolley roads is a 100 lb. 7-in. grooved rail, and that these rails are always bonded by two bonds attached to the base of the rail and two 36-in. bonds spanning the fish-plate. We might go on multiplying examples of this lack of perspective on the part of the author, to which we have already alluded, as where fifteen pages are devoted to the Elberfeld monorail road, and ninety-six pages to three-phase railways, while all multiple-unit systems except one are dismissed with six lines, but it would be unnecessary. If the writer had given us a really good and well-rounded book on European electric railway practice, it would be read with interest by American managers and engineers, as well as by those in Europe, but he hasn't. There are good features in the book, as in the analytical discussion of motor performance and of Kevlin's law, but in its practical application the volume is woefully lacking.

PERSONAL MENTION

MR. ARTHUR WARREN has resigned his position as manager of the Publicity Department of the Allis-Chalmers Company, and will sail for Europe on a journalistic mission about the end of November.

MR. C. E. A. CARR, late manager of the London Street Railway Company, of London, Ont., has been appointed manager of the Helena Light & Railway Company, of Helena, Mont., which is controlled and operated by J. G. White & Company, of New York.

MR. S. E. WOLFF, for a number of years manager of the Jackson Gas Company, of Jackson, Mich., has been appointed to the position of assistant general manager of the entire properties of the Saginaw-Bay City Railway & Light Company in Saginaw and Bay City.

MR. RUSSELL SELFRIDGE, of Berkley, Cal., who has recently been associated with Westinghouse interests abroad, has taken a position as electrical engineer with the Ocean Shore Railroad Company, which is building an electric railway from San Francisco along the coast to Santa Cruz.

MR. BARRY DIBBLE has opened an office as consulting engineer in the "Pioneer Press" Building, St. Paul, Minn. He will specialize in electric railway and high-tension work. Mr. Dibble was formerly connected with the Cincinnati & Columbus Traction Company, the Jackson & Battle Creek Traction Company and the Shawinigan Water & Power Company.

MR. J. M. GRAHAM, fourth vice-president of the Erie Railroad Company, has recently returned from a visit to Northern Italy, where, in company with Mr. de Kando, chief engineer of Ganz & Company, and Mr. Gustave Leve, second vice-president of the Railway Electric Power Company, he made a thorough inspection of the Ganz three-phase railway system, which has now been in operation over three years. Mr. Graham rode over the line in the cabs of motor cars hauling express and local passenger trains, and on locomotives hauling freight trains. He also made a thorough inspection of the overhead equipment, stationary transformers, power houses and repair shops.

MR. JOHN LINDALL has been appointed superintendent of motive power and machinery of the Boston Elevated Railway Company, to succeed Mr. C. F. Baker, who, as previously noted in the STREET RAILWAY JOURNAL, has become connected with the Brooklyn Rapid Transit Company as engineer in charge of all power stations. Mr. Thomas Davis has been appointed superintendent of power stations, which is a new position. He will report directly to the superintendent of motive power and machinery and will be assisted by the superintendent of power distribution. Mr. Davis will be responsible for the proper maintenance and operation of all the company's power stations and power-station equipment, including storage batteries. These appointments became effective Nov. 1.

MR. C. F. BAKER, who, as previously noted in the STREET RAILWAY JOURNAL, became connected Nov. 1 with the Brooklyn Rapid Transit Company as engineer in charge of all power stations, was tendered a reception Friday evening, Oct 27, at the American House, Boston, by more than 200 officers, heads of departments and employees of the Boston Elevated Railway Company, with which he has been connected since 1893 as superintendent of motive power and machinery. Regret was expressed at his leaving Boston, and then to show their esteem Mr. John Lindall, assistant superintendent of motive power and machinery, acting for the employees, presented Mr. Baker with a diamond ring. Dinner was served during the evening. Previous to his coming to Boston Mr. Baker was chief engineer of the Pillsbury-Washburn Flour Mill Company, at Minneapolis for several years. Before he went to Minneapolis he was with the Edward P. Allis Company, in Milwaukee.

TABLE OF OPERATING STATISTICS

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	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Available for Dividends
AKRON, O. Northern Ohio Tr. & Light Co	1 m., Sept. '05	88,269	44,858	43,411	23,167	20,244
	1 " " '04	80,785	41,353	39,432	22,667	16,766
	9 " " '05	716 514	381,010	335,505	207,303	128 203
	9 " " '04	669,714	363,683	306,031	203,661	102,370
AURORA, ILL. Elgin, Aurora & Southern Tr. Co	1 m., Aug. '05	49,479	24,333	25,146	9,333	15,813
	1 " " '04	41,893	20,983	20,910	9,333	11,577
	2 " " '05	96,985	46,883	50,101	18 506	31,596
	2 " " '04	88,373	42,456	45,918	18,506	27,412
BINGHAMTON, N. Y. Binghamton Ry. Co	1 m., Sept. '05	25,476	13,238	12,238	7,248	4,990
	1 " " '04	22,418	12,599	9,818	6,967	2,852
	3 " " '05	87,855	39,717	48,138	21.565	26.573
	3 " " '04	78,817	37,191	41,626	20,941	20,685
BUFFALO, N. Y. International Tr. Co	1 m., Sept. '05	430,386	202,341	228,045	138,738	89,307
	1 " " '04	384,961	193,195	191,766	136,383	55,383
	9 " " '05	3,417,185	1,780,710	1,636,475	1,237 394	399,081
	9 " " '04	3,124,797	1,836,613	1,288,184	1,189,594	98,590
CHICAGO, ILL. Aurora, Elgin & Chicago Ry. Co	1 m., Aug. '05	71,373	33,117	38,256	------	------
	1 " " '04	53,553	26,1-9	27,424	------	------
	2 " " '05	146,204	66,046	80,158	------	------
	2 " " '04	112,071	53,260	58,811	------	------
Chicago & Milwaukee Elec. R. R. Co	1 m., Sept. '05	64,788	22,774	42,014	------	------
	1 " " '04	53,712	17,396	36,316	------	------
	9 " " '05	411,862	172,843	239,020	------	------
	9 " " '04	324,277	125,744	198,533	------	------
CINCINNATI, O. Cincinnati Northern Tr. Co	1 m., Aug. '05	54,028	------	------	------	------
	1 " " 04	51,343	------	------	------	------
	4 " " '05	197.846	------	------	------	------
	4 " " '04	194,602	------	------	------	------
CLEVELAND, O. Cleveland, Painesville & Eastern R.R. Co	1 m., Sept. '05	25,695	13,290	12,405	6,806	5,599
	1 " " '04	23,157	12,701	10,456	6,723	3,732
	9 " " '05	185,319	107,012	78,306	60,714	17,592
	9 " " '04	172,190	102,158	70,031	60,290	9,741
Cleveland & Southwestern Traction Co.	1 m., Sept. '05	52,966	28,986	23,980	------	------
	1 " " '04	46,289	25,908	20,381	------	------
	9 " " '05	400,704	235,463	165,241	------	------
	9 " " '04	353,072	224,139	128,933	------	------
Lake Shore Elec. Ry. Co.	1 m., Sept. '05	79,600	* 37,056	42,544	------	------
	1 " " '04	67,465	* 36,661	30.804	------	------
	9 " " '05	589,067	* 318,719	270,348	------	------
	9 " " '04	491,171	* 332,771	158,400	------	------
DETROIT, MICH. Detroit United Ry	1 m., Sept. '05	493,517	* 267,863	225,654	92,974	132,680
	1 " " '04	424,478	* 234,585	189,893	89,802	100.091
	9 " " '05	3,858,529	*2269435	1,589,094	829,185	759,909
	9 " " '04	3.417,451	*2074705	1,342,746	803,069	539,677
DULUTH, MINN. Duluth St. Ry. Co	1 m., Sept. '05	56,974	27,110	29,864	17,382	12,482
	1 " " '04	50,959	23,477	27,482	16,510	10,972
	9 " " '05	489,674	253,403	236,271	152,790	83,481
	9 " " '04	461,894	246,300	215,594	148,470	67,124
FINDLAY, O. Toledo, Bowling Green & Southern Tr. Co	1 m., Sept. '05	29,867	13,738	16,129	5,879	10,250
	3 " " '05	85,652	43,458	43,194	17,637	25,557
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co	1 m., Sept. '05	85,855	51,099	34,756	------	------
	1 " " '04	78,669	45,712	32,957	------	------
	9 " " '05	700,704	434 952	265,752	------	------
	9 " " '04	622,978	400,950	222,028	------	------
HANCOCK, MICH. Houghton County St. Ry. Co	1 m., Aug. '05	20,771	13,038	7,733	3,732	4,001
	1 " " '04	18,811	9,828	8 983	3,454	5,529
	12" " '05	168,310	167,407	903	42,264	† 41,361
	12 " " '04	190,106	131,409	58,698	38,338	20,360
HOUSTON, TEX. Houston Electric Co.	1 m., Aug. '05	45,810	25,866	19.945	9,059	10,885
	1 " " '04	24,688	22,959	1,729	8,317	† 6,588
	12" " '05	480,253	289,402	190,851	102,798	88,053
	12" " '04	339,194	223,349	15,845	93,794	† 77,949
MILWAUKEE, WIS. Milwaukee El. Ry. & Lt. Co.	1 m., Sept. '05	282,089	122,287	159,802	80,138	79 664
	1 " " '04	281.516	128,491	153,024	79,153	73,871
	9 " " '05	2,388,797	1,156,642	1 232,155	689,142	543,014
	9 " " '04	2,376,095	1,193,109	1,182,986	677,944	505,042
Milwaukee Lt., Ht. & Tr. Co	1 m., Sept. '05	67,020	23,549	43,471	23,358	20,114
	1 " " '04	48,615	18,569	30.046	18,653	11,393
	9 " " '05	464,227	194,294	269,933	188,767	81,166
	9 " " '04	348,735	165,887	182,849	150,346	32,503
MINNEAPOLIS, MINN. Twin City R. T. Co	1 m., Aug. '05	422,051	175,539	246,513	103,208	143,304
	1 " " '04	389,197	178,598	210,600	92,425	118,175
	8 " " '05	3,028,626	1,402,119	1,626,508	793,800	832,708
	8 " " '04	2,834,228	1,344,151	1,490,077	725,291	764,786
OAKLAND, CAL. San Francisco, Oakland & San Jose Ry. Co.	1 m., Aug. '05	46,288	22,455	23,833	13,425	10,408
	1 " " '04	35,615	15,448	20,167	9,891	10,277
	8 " " '05	346,308	149,768	196,540	106,139	90,402
	8 " " '04	257,551	115,001	142,551	67,365	75,186
OLEAN, N. Y. Olean St. Ry. Co	1 m., Aug. '05	13,388	5,716	7,672	2,793	4,879
	1 " " '04	11,991	5,109	6,882	2,631	4,251
	2 " " '05	26,828	11,718	15,109	5,587	9,522
	2 " " '04	23,349	11,077	12,272	5,262	7,010
PEEKSKILL, N. Y. Peekskill Lighting & R R. Co	1 m., Aug. '05	12,158	*6,137	6,021	------	------
	1 " " '04	11,465	*5,772	5,693	------	------
	2 " " '05	24,492	*12,020	12,472	------	------
	2 " " '04	22,273	*11,508	10,764	------	------
PHILADELPHIA, PA. American Rys. Co	1 m., Sept. '05	143,362	------	------	------	------
	1 " " '04	127,902	------	------	------	------
	3 " " '05	465,454	------	------	------	------
	3 " " '04	415,071	------	------	------	------
ROCHESTER, N. Y. Rochester Ry. Co	1 m., Sept. '05	154,473	79,585	74,888	27,821	47,067
	1 " " '04	123,278	65,049	58.229	26,360	31,868
	9 " " '05	1,318,194	698,759	619,436	248,472	370,964
	9 " " '04	1,111,103	608,653	502 449	239,210	263,238
SAN FRANCISCO, CAL. United Railroads of San Francisco	1 m., Aug. '05	609,930	------	------	------	------
	1 " " '04	552,234	------	------	------	------
	8 " " '05	4,573,288	------	------	------	------
	8 " " '04	4,294,352	------	------	------	------
SAVANNAH, GA. Savannah Electric Co.	1 m., Aug '05	51,164	30,128	21,037	10,554	10,482
	1 " " '04	49,932	27,376	22.556	10,645	11,911
	12" " '05	572,144	333,438	238,705	126,843	111,862
	12" " '04	534,342	304,148	230,194	125,649	104,545
SEATTLE, WASH. Seattle Electric Co	1 m., Aug. '05	224,936	140,580	84,356	23,796	60,559
	1 " " '04	192,368	133,935	58 433	25,358	33,074
	12" " '05	2,455,720	1,650,391	805,329	299.628	505,701
	12" " '04	2,246,168	1,570,959	675,209	279,040	396,170
SYRACUSE, N. Y. Syracuse Rapid Transit Ry. Co.	1 m., Aug. '05	79,932	44,683	35,248	20,351	14,897
	1 " " '04	71,328	40,192	31,136	20,131	11,005
	2 " " '05	162,481	88,728	73,753	40,772	32,981
	2 " " '04	146,620	81,075	65,545	40,454	25,090
TERRE HAUTE, IND. Terre Haute Tr. & Lt. Co	1 m., Aug. '05	58,050	34,134	23.915	10,998	12,917
	1 " " '04	54.426	32,315	22,111	9,640	12.471
	12" " '05	601,848	392,944	208,904	117,169	91,735
	12" " 04	546,633	363,738	182,895	111,398	71,497
TOLEDO, O. Toledo Rys. & Lt. Co.	1 m., Sept. '05	163,643	*83,081	80,562	42,636	37,926
	1 " " '04	150,344	*79,408	70,936	41,868	29,0 8
	9 " " '05	1,407,782	*719.650	688,132	382,194	305,938
	9 " " '04	1,289,947	*692,151	597,796	375,303	222,493
UTICA, N. Y. Utica & Mohawk Valley Ry. Co	12 m., June '05	798,795	520,737	278,058	177,460	100,598
	12 " " '04	728,811	492,863	235,948	167,844	68,104
YOUNGSTOWN, O. Youngstown-Sharon Ry. & Lt. Co	1 m., Aug. '05	45,80	*23,187	22,612	------	------
	1 " " '04	38,617	*22,181	16,436	------	------
	8 " " '05	350,578	*190,033	160,546	------	------
	8 " " '04	302,905	*181,844	121,061	------	------

Street Railway Journal

Vol. XXVI. NEW YORK, SATURDAY, NOVEMBER 11, 1905. No. 20.

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NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

Of this issue of the Street Railway Journal 8000 copies are printed. Total circulation for 1905 to date, 368,150 copies, an average of 8181 copies per week.

Topeka Lessons

Students of what can be done in the way of profitable improvement of small street railway properties will find much to interest them in the article on the Topeka Railway elsewhere in this issue. The experience of this company in scrapping a lot of old track and equipment, and along with them certain operating methods, is that the extra investment and interest charges made necessary in reconstructing a property of this kind are not at all to be feared. It does not do to generalize too much from specific cases, but this specific case is an interesting one and may aid those contemplating improvements in other small cities to come to an intelligent decision. The effect of poor track in increasing operating expenses is well brought out, and emphasizes the statement that good track is literally the foundation of all successful operation. Not only does it affect the life of the rolling stock and its cost of maintenance, but it decreases gross receipts and necessitates slow schedules, which in turn increase the platform expenses.

Saving Repair Parts

A great deal of carelessness is sometimes shown in repair shops regarding the disposition of broken or worn-out pieces of apparatus. As soon as these pieces are taken from the machines they are often relegated to the junk pile without having been stripped of special nuts, bolts, terminals or other parts which may be used in case of break-down of similar machinery. After the junk is disposed of and a break-down occurs, a special order is sent to the factory for the part just sold for junk, or a machinist must be put to work to make the article desired before the broken machine can again be put into service. All this trouble and delay might have been avoided had the previously discarded piece of machinery been stripped and the good parts removed and placed where they could have been gotten at quickly when needed.

We do not mean to recommend that every broken piece of machinery should be carefully stripped. Were this done the value of the time required might, in many cases, be greater than that of the parts saved. The value of the parts and the probability of their future use should determine largely whether or not they should be saved.

Generators for Single-Phase Lines

In planning a road to be operated by single-phase alternating current, the question usually comes up whether it is better to purchase single-phase generators or three-phase generators. The three-phase generator costs less per kilowatt than the single-phase, but if used, the road must be divided up into sections, different phases of this generator supplying different sections of the road. We are inclined to think that the same reasons that have prevented the extensive use of the three-wire direct-current system of distribution on electric railways will prevent the use of three-phase generators for single-phase railway work. It is a serious drawback in the operation of any railway not to be able to deliver a large per cent of the capacity of the generating machinery to any section of the line upon which there may be unusually heavy loads. The variations in load between one section of the line and another on a single-phase line make it necessary frequently either to overload one phase of the generator while the others are underloaded, or to operate considerably larger generator capacity than the total load would demand if the generators were only single-phase. Of course, such extra heavy load is likely to be but temporary on any one section, but it is a drawback nevertheless. The whole tendency of modern engineering practice is to operate in parallel everything possible. The splitting up of a road into various phases is contrary to this general tendency, and is somewhat akin to giving each section an independent power supply.

The Unit of Acceleration

A tart bit of correspondence appears in a recent number of the London "Electrician" touching the proper measure of acceleration. It is in the form of a sharp protest from Mr. Mailloux against aspersions cast upon the American practice of stating acceleration in miles per hour per second. Our English friends reckon it in feet per second per second, and at this point of departure the row begins. A more beautiful example of the confusion which is unnecessarily introduced into what would otherwise be a perfectly simple condition by rival nomenclatures we have seldom seen. The only additional touch that could be suggested is the appearance of a third disputant insisting on the use of rods per minute per hour or furlongs per second per minute. Fortunately, as to one thing, there is no dispute. Everybody understands what is meant by acceleration. At this point let us start then and see what form the unit problem really takes. Acceleration is variation of velocity with respect to time, i. e.,

$$\frac{dv}{dt}$$

and its unit value obviously depends on the units chosen for v and t. From a physicist's standpoint, the only system which is actually correlated with any completeness is the C. G. S. system that forms the basis of scientific discussion the world over. In this system the fundamental units are the centimeter, gram and second, and the purely scientific unit of acceleration is 1 cm per second per second, and nothing else.

Outside of this, all alleged units require definition and an apology for existence. They all stand upon the same plane of illogical derivation. It is obvious, however, that in countries employing our English nomenclature, it is convenient and even necessary to make up a working unit to suit our habits. Such a unit is empirical on its face, but entirely justifiable, like the electrical "practical" units in common use, there being no law, written or unwritten, compelling one to use absolute units when multiples or sub-multiples are more convenient. What such a practical unit of acceleration should be depends on the practical units of velocity and of time from which it is derived, and not upon reference back to any theories about the absolute system. From this standpoint Mr. Mailloux has altogether the best of the case. If engineers, as they do in English-speaking countries, reckon the speed of trains in miles per hour, then

$$\frac{dv}{dt}$$

is miles per hour per (second, minute, hour) as the time unit may be chosen, preferably the first. The information desired in studying acceleration is generally the time required to gain or lose a certain velocity in miles per hour, and until people reckon the speed of trains in feet per second or in yards per minute or in fathoms per hour, it would seem the part of wisdom to measure acceleration in units which give the required facts without the solemn application of a reduction factor. For the same reason, if the engineers in France, Germany and Italy usually reckon the speed of trains in kilometers per hour, as they do, then for simplicity's sake the acceleration ought to be in terms of kilometers per hour per second instead of in meters per second per second, as it is often figured. If the units of both length and time concerned were interrelated on a decimal system, things would not be so bad. But so long as the decimal system is used in neither the English measurements of length or time, and is also omitted from the latter measurement in countries using the metric system for length, it seems the height of absurdity to employ any unit of acceleration which involves conversion every time that it is used in practice.

Still another and even more annoying variance between English and American engineering practice is found in the "long" and the "short" ton to which Mr. Mailloux also made feeling reference in his communication. The Englishman uses his misnamed hundredweight and ton pretty consistently, but while the American usually uses the short ton, he is never quite sure which he should employ, and sometimes fails to state which he has adopted or forgets himself and shifts from one to the other. The short ton is so convenient for conversion into and from pounds that it would seem to be by far the wisest plan for both to unite upon it, but if this were not possible, possibly a compromise might be made on a ton of 2200 lbs., which is simply related to both units, and also corresponds to the metric ton, so far as practical calculations are concerned. This, if adopted, would give a common basis of weight for all railway matters and would result in very little difficulty to anybody and in gains to all. We trust that ere long both English and Americans will drop their unnecessary differences in weights and measures, not to mention the matter of street railway accounting to which we have frequently referred, and will agree upon something which both can understand. So far as the ton is concerned, our own countrymen are perhaps the more culpable, since they shift from one to the other without proper warning. But we certainly think they have the best of the discussion of a proper acceleration unit, on the plea of convenience, which in the case of purely empirical or commercial measures is the natural criterion.

Tool Rooms in Small Shops

Although a tool room is usually considered as necessary only in larger repair shops, many advantages would no doubt be derived by their establishment in those of smaller size. In these shops there is usually no special place for keeping tools. No one person is responsible for them, and consequently they are often either left where last used, locked up in individual tool boxes, or otherwise misplaced, so that when needed an extended search must be made for them. Were the time spent by workmen in searching for tools about the average small repair shop summed up and brought to the attention of the superintendent, in many cases no additional argument would be needed in favor of a tool room.

The establishment of a tool room would usually be an incentive toward providing a sufficient supply of tools with which to do repair work properly. When no means is provided for keeping the tools, so many are destroyed or lost and, in some cases, stolen, that the management despairs of keeping a proper supply. Moreover, some superintendents would be so chagrined at the few on hand, were all the tools of their shop brought together, that they would no doubt increase the supply at once.

In shops employing only from fifteen to thirty men or thereabouts, to let one man devote all his time to the tool room would be rather expensive. But this is not necessary. The room may be conducted in connection with the storeroom or some other department, and the maintenance expenses kept very small.

Repair Shop Locations

From the earliest days of electric railway work the importance of locating power houses at points favorable to the economical generation and distribution of current has been generally appreciated. It would be stretching matters a little, perhaps, to urge the equal importance of locating repair shops near the principal centers of rolling stock movement, yet the question deserves very careful consideration on the part of managers contemplating extended improvements in the car maintenance department. In large centers of population the cost of real estate almost always prohibits the establishment of car houses and shops within the congested districts, and there is no doubt that the larger areas, better natural light, purer air, improved facilities for the shipment and storage of raw material, frequent convenient supply of water from ponds or lakes independent of the city mains, and other advantages common to outlying or even suburban districts go a long way toward offsetting the conveniences of a more centralized location. The decreased fire risk in the suburban location is another point worth mentioning.

The main point to be determined, however, in the long run is the comparative cost of maintaining the rolling stock, including the loss of time incurred by the absence of the cars from the service, in a shop or car house centrally located and in one situated in the outlying regions. The problem is enormously complicated when one considers the reduction in earnings caused by break-downs and resulting blockades on various parts of the system—questions which cannot be overlooked in comparing the cost and facility of repairs in different localities. Each system has its own peculiar features, yet the general limitations of the problem are pretty well defined. What every manager desires is the maintenance of his schedules at the minimum cost, and it is small satisfaction to repair a broken down car for $100 in an outlying shop and lose $150 in gross earnings on account of a prolonged blockade, when with a more centralized shop the repairs might have cost $150 and the gross earnings been decreased but $50—thanks to half an hour's saving in the time required to get the crippled car off the main lines of traffic. The actual cost of repairing a car includes the fixed charges pro rated upon the investment in real estate, buildings and appurtenances, as well as the shop expenses and injury to the earning power of the system as a whole. Taken over a year's time, all of these points but the last should be easily obtainable, and if the car-mileage records are accurate and available for each day's runs it ought to be possible to obtain at least a very rough idea of the actual money lost by blockades. The larger the system the more it will pay to figure up these details. It may seem like splitting hairs to attempt to evaluate the effect of such delays, but there is no doubt that an opportunity exists for some interesting analyses along these lines. Long ago the steam railroad people figured out the extra cost of stopping trains, and matters of similar import are no longer to be regarded as fanciful problems in electric railway finance.

Experience has clearly shown that elaborate repairs can almost always be carried out more economically in a large modern outlying shop than in the usual cramped and costly quarters available in the center of a densely populated community. Here the time required to reach the shop from the point of break-down is so small a precentage of the total repair time that there is nothing gained in attempting to carry out extended maintenance work in the congested district. It is more a question of providing facilities for making emergency repairs that leads to the establishment of small shops in division car houses and to the equipment of emergency stations with car replacers, jacks and other tackle. In every case the first thing to be done is to clear the main line so that traffic can proceed. Opinions differ as to the character of work which it is desirable to perform in car house shops, and probably no general rule could be satisfactorily applied, other than the desirability of confining car house repairs to emergency work. On a modern street railway system emergency repairs predominate, but the car house shop is not usually adapted to the most economical maintenance methods. Space is very limited; motor-driven tools are liable to be set up and operated wherever they can be squeezed into place; shafting, belts and supplies have a habit of getting pretty well mixed up; time is lost in hunting for tools, and labor-saving appliances are not as frequently available as in regular repair shops where the production cycle is recognized. For these and other reasons which readily occur to one after inspecting numerous shop facilities in car houses, there is little doubt that long-time repairs or overhauling should be treated in due course at the main shops of the operating company.

Such a course prevents the overcrowding of the shops at both ends of the line; it provides that the car house repairs shall be more in the nature of temporary relief, leaving the lasting cure to the main shops themselves. When the shops can be located without undue expense in a situation central to the movement of the rolling stock in service, just so much convenience is gained. Given provision for emergency repairs in the congested regions and facilities for permanent maintenance wherever the maximum shop economy can be secured, a road is in a fair way to enjoy the profits resulting from minimum delays and low cost replacements of rolling stock. The financial side of the matter is well worth investigating, with the intention of ultimately evaluating the strategics of car shop location in both large and small cities.

Overhauling According to Mileage

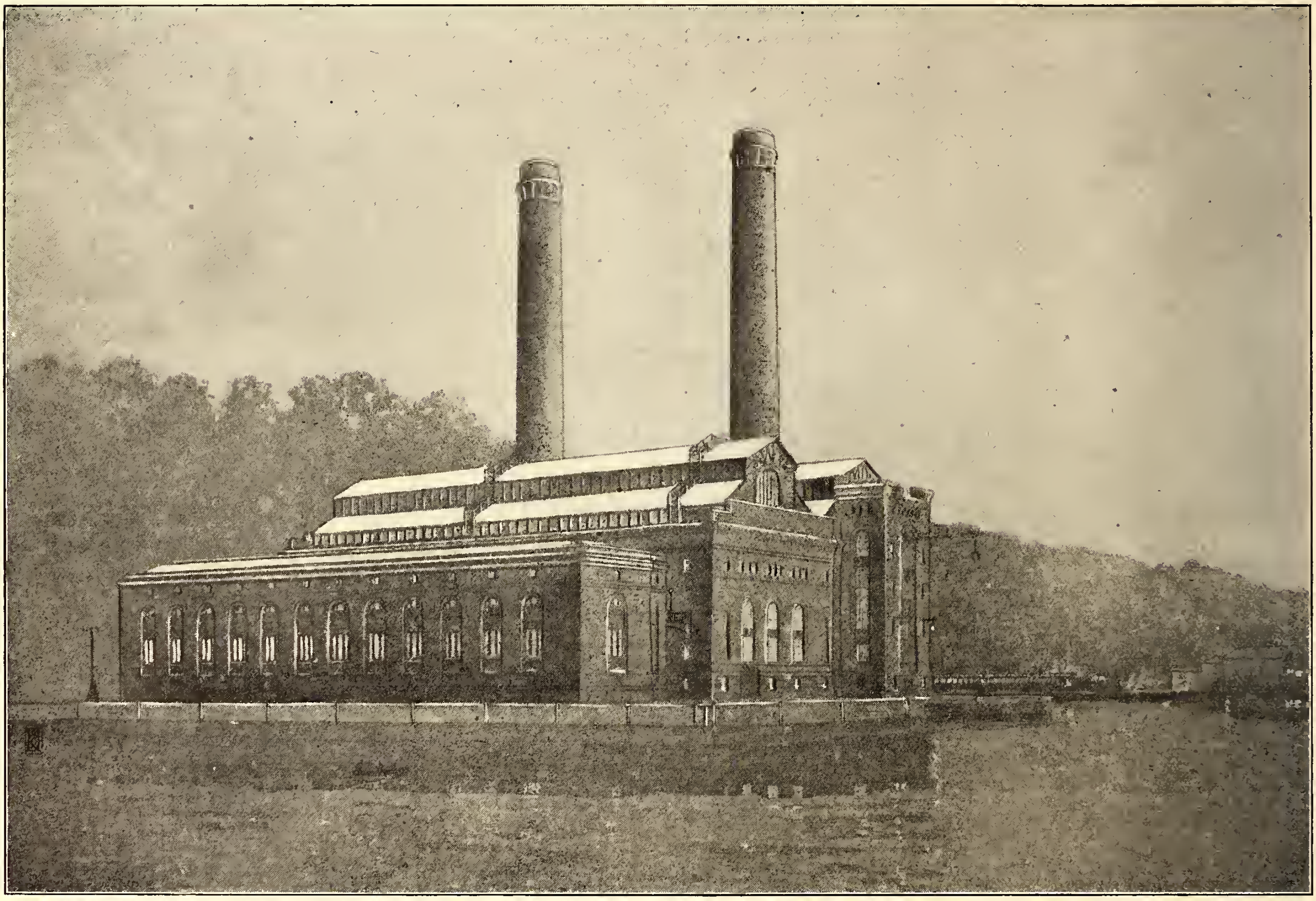
Just at present there is considerable interest among master mechanics in plans for overhauling motor cars according to the mileage they have run rather than according to the time that may have elapsed since the last overhauling. The communication from Mr. O'Brien, of St. Louis, on the system of overhauling according to mileage which has been put in operation on the lines of the United Railways Company, of St. Louis, is therefore very timely, and gives detailed information as to how the mileage records are kept and made use of that many who are thinking of adopting some such scheme may wish to know. The system is apparently by no means a difficult one to carry out, and even on a system as large as that at St. Louis, requires very little clerical labor. One of the striking things in connection with Mr. O'Brien's description of the system used at St. Louis is the great difference in the number of miles that various types of equipment are allowed to run before they are taken in for overhauling. The mileage that can be allowed, of course depends on the armature bearing wear, and it is quite evident that the motors lubricated with oil run a much greater mileage than those lubricated with grease, and the more complete the oiling arrangements, the greater the mileage that can be allowed. The normal amount of armature clearance and thickness of babbitt, of course, has also to be taken into consideration.

POWER STATIONS OF THE ELECTRIC ZONE OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD

As already stated in this paper, the current for operation in the electric zone of the New York Central & Hudson River Railroad will be generated at two power stations, one at Yonkers, on the Hudson division, and the other at Port Morris, on the Harlem division. These two stations will be cross-connected electrically, and each will have an ultimate capacity of 30,000 kw, which is sufficient to carry the entire load of a train service much greater than that now operated by means of steam locomotives.

The main buildings which enclose the boiler rooms, coal bunkers and the generating rooms are 167 ft. wide, 237 ft. long and 105 ft. high. The switch houses are separate buildings, located about 40 ft. distant from the main power stations.

The design of these power stations is such as to secure economy in space for the power generated, as the number of cubic feet per kilowatt capacity is only 102. The number of square feet of building per kilowatt is 1.49.



YONKERS POWER STATION OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD

LOCATION

The locations adopted for the two power stations, besides being near the load centers of the electric traction system, are advantageous because they are on the water front and are also adjacent to existing tracks. They are thus convenient of access for delivery of coal by boat or car.

FOUNDATIONS

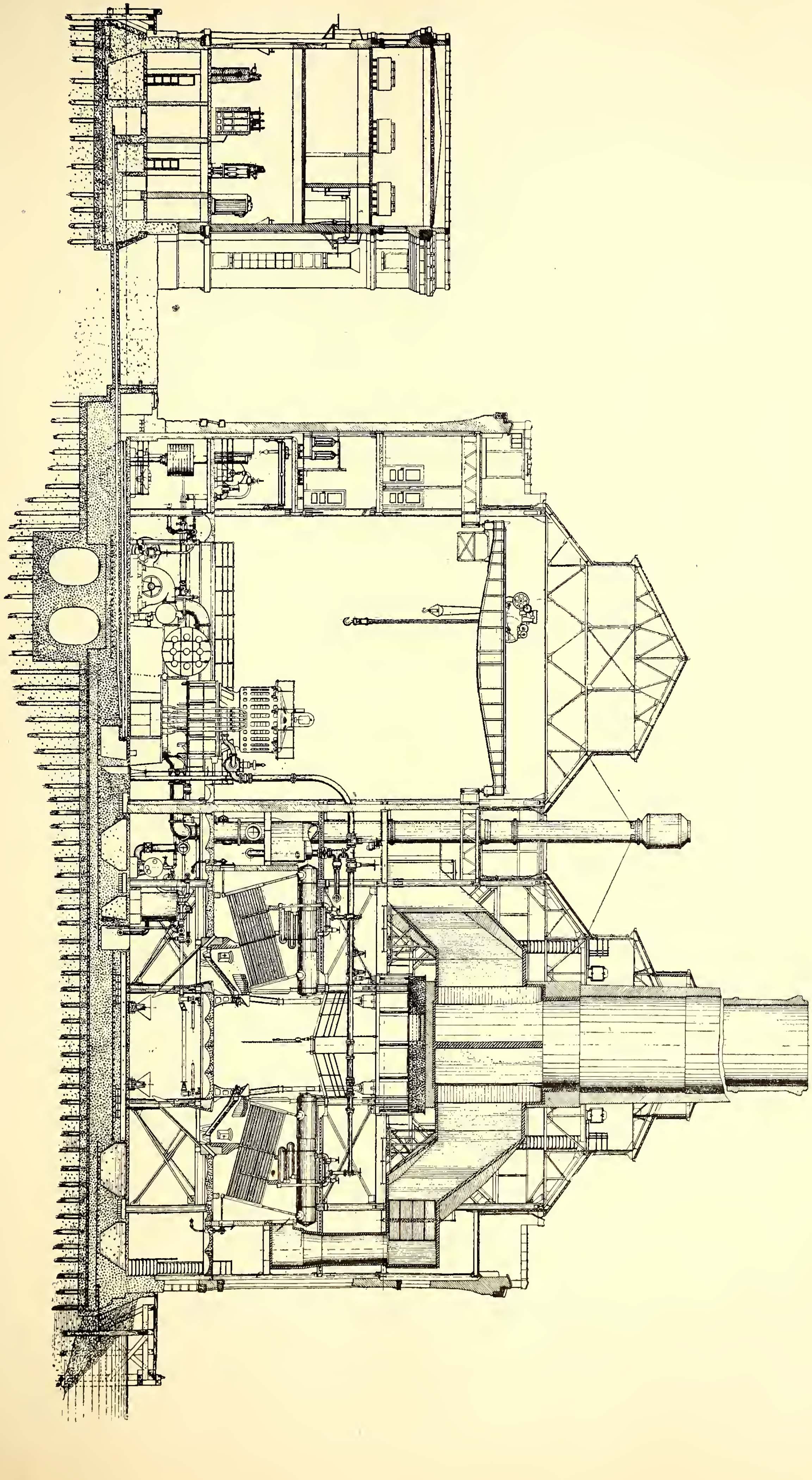
At Port Morris the solid rock is sufficiently near the surface to warrant carrying the concrete foundation down to it, and at Yonkers a bed of hard sand and gravel forms a good bottom for a pile and concrete foundation on the particular location selected. On the other hand, borings taken along the river front over all other portions of the territory near the load center of the electric traction system showed either a great depth of silt or other unfavorable conditions.

At Port Morris a concrete bulkhead, built along one side and the outer end of the building to form a slip and dock, was used as a portion of a cofferdam for the excavation of the foundation. An existing embankment over a sewer forms one wing to reach the shore and a timber cofferdam forms the other. An intercepting ditch on the land side caught the water which drained in from a swamp, and this, together with the seepage through the cofferdam, was easily disposed of with pumps.

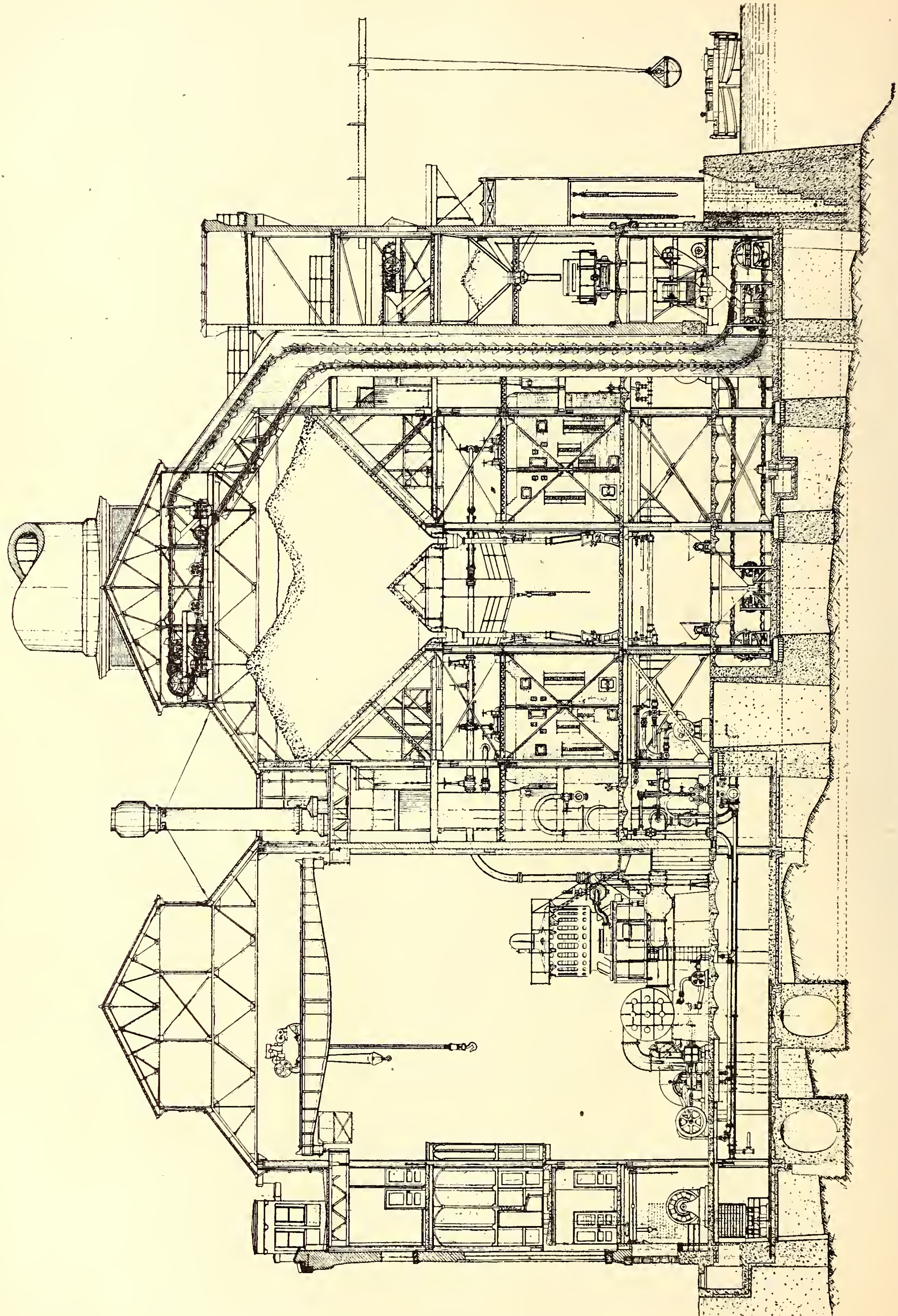
Excavation was made to rock over the entire area covered by the buildings. In some places the rock was disintegrated and in others it was extremely hard. The surface also was very irregular, so that there was a wide variation in the height of the piers. The maximum height was about 34 ft. A portion of the rock was excavated in order to build the intake and discharge tunnels of the circulating system for the condensers at the proper elevation.

At Port Morris the piping for steam and other connections to the turbine room is carried through tunnels under the floor of the power house. After building the tunnels and piers for columns and foundations for the generators and boilers, the area was filled with sand up to the level of the floor. The concrete floor and walls of the pipe tunnels, which extend below the water line, are waterproofed with alternate layers of coaltar pitch and felt.

The work on the foundations included 26,000 cu. yds. of earth excavation, 4500 cu. yds. of rock excavation, 16,500 cu. yds. of concrete, 5000 sq. yds. of waterproofing and 25,000 cu. yds. of back filling. The slip and bulkhead wall required 11,000 cu.



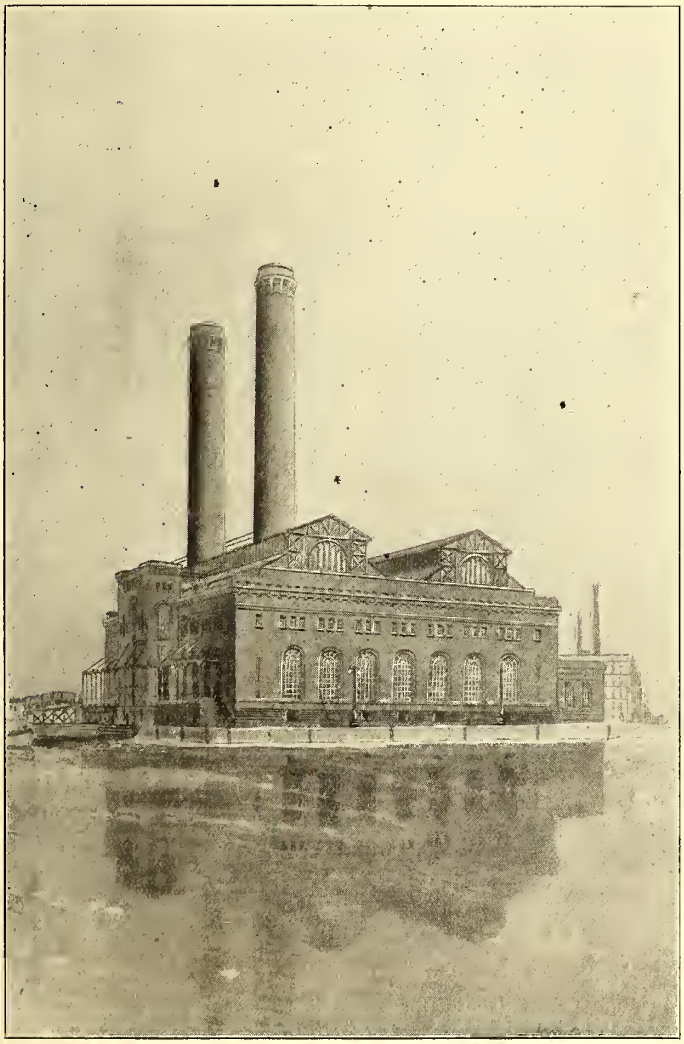
CROSS SECTION OF YONKERS POWER HOUSE AND SUB-STATION FOR THE ELECTRIFIED DIVISION OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD



CROSS SECTION OF THE PORT MORRIS POWER STATION FOR THE ELECTRIFIED DIVISION OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD yds. of earth excavation, 5000 cu. yds. of rock excavation and 3500 cu. yds. of concrete.

The Yonkers power station is built entirely on land under water at a point where the main line of the Hudson division runs along the bank of the Hudson River, with only a rip-rapped slope outside of the tracks. The land on the other side of the tracks rises abruptly and is valuable for residential purposes.

On the site selected for the power station, the water runs from a depth of 8 ft. near the shore to 16 ft. at the outer end, the bottom being sand and gravel. As the first step in construction, the piles forming the foundation, spaced in general 3 ft. apart under walls, piers and machinery, and somewhat further apart under the floor, were driven to refusal. Four



PORT MORRIS POWER STATION

marine pile drivers were employed in the work. The area was then surrounded with a cofferdam formed of a single course of 12-in. x 12-in. timbers with 3-in. x 4-in. strips spiked to the edges so as to form a tongue and groove joint. The driving point of each timber was beveled on the edge away from the timber previously driven, in order to force them as close together as possible, and great care was taken to see that no pebbles or other obstructions were allowed to get between the timbers and open the joint. Some of the joints which leaked between high and low water as the water was being pumped out were battened with canvas and a few joints under water were caulked by a diver. When the water was finally pumped out, however, there was no difficulty in keeping the bottom dry with an 8-in. pump, although the interior was excavated to a depth of about 20 ft. below the surface of the water at the outshore end. The piles were in general cut off at an elevation of 8 ft. below mean high water and the bottom of the concrete foundations was laid one ft. below the heads of piles, or at an elevation minus 9.

Under the intake and discharge tunnels for the circulating system for the condensers the bottom of the concrete reached a depth of about 18 ft. below high water, and under the tunnel for the coal and ash hoist, a depth of 13 ft. In the Yonkers power house there is no pipe tunnel under the floor as at Port Morris, the piping in the turbine room being carried under transverse galleries.

The main bed of the concrete foundation is 4 ft. thick, bringing the elevation up to minus 5, above which the walls and piers for the superstructure and machinery are carried up individually, the spaces between being filled with sand up to elevation zero, over which a 6-in. concrete floor is laid. Waterproofing consisting of alternate layers of coaltar pitch and felt is laid in a horizontal plane in the concrete bed at an elevation 6 ins. above the tops of piles and is carried up the side walls above high water. Six-ply waterproofing is used in all horizontal planes, five-ply in all vertical planes in the building and four-ply around all ducts exposed to surface or tidewater.

In order to take up any tensile stresses in the foundation, two courses of round steel rods 1 in. in diameter are laid in each direction at right angles to each other in the bed of concrete above the plane of the waterproofing. The foundation work includes 5540 piles, 16,500 cu. yds. of concrete, 270 tons of reinforcing rods and 9000 sq. yds. of waterproofing.

SUPERSTRUCTURE

Aside from the foundations, the two power stations are similar in general design. The base and floors are of concrete, the framework of steel, all designed so as to give no inaccessible surfaces; the walls are brick and tile, and the roofs are of concrete roofing slabs covered with copper, with standing seam joints. There are 2800 tons of steel structure in each power station.

Architecturally, the power stations have been designed with the idea of using the large proportions to obtain an impressive effect merely by the use of common brick and terra cotta of the same general color, relieved through careful design of the openings and recesses, but without any special ornamentation. The result gives economy in construction in proportion to the capacity. Special consideration was given to the design of the windows, not only to obtain a well-lighted interior, but also to present a striking and attractive appearance from the exterior at night, both power houses being located along the line of important water travel, besides being adjacent to railroad lines. The prominent feature of the design is a row of eleven arched windows of 10-ft. span on each side, lighting the main floors. A good effect is obtained by placing three small windows over each arch, these windows serving to light the upper gallery floor. The large window frames are all of built-up steel, the mullions being glass and steel, giving the largest possible area of lighting surface.

In the gable ends the lines of the end roof truss are left exposed, the spaces between the members being filled with concrete slabs, giving the effect of half-timbered stucco construction.

There are two Custodis radial brick stacks, 15 ft. 6 ins. inside diameter and 250 ft. high above grates, at each power station. They are supported on steel columns and a concrete and steel staging 40 ft. above the boiler room floor, the main boiler room alley passing underneath.

In interior arrangement the power stations are divided by a brick wall into the turbine room, 69 ft. x 231 ft. 8 ins., which is open to the roof, and a boiler room 88 ft. x 231 ft. 8 ins., over which the coal bunkers of 3500 tons capacity are placed.

At Port Morris there are three galleries on one side of the turbine room, the first gallery being used as a shop, the second as an operating gallery and the third for offices. At Yonkers the level of the first gallery is carried across the room as the operating floor, with walkways between the generators. The exciters are placed under the galleries on the level of the operating floor, the operating gallery being immediately above them and the top gallery being used for offices and shops.

COAL-HANDLING APPARATUS

Coal delivered at the power stations on cars is dumped from the cars into pockets, from which it is delivered by suspended flight scraper conveyors into the hoppers of crushers, where it is reduced to the proper size for handling with the mechanical stokers. From the crushers it passes into a pocket conveyor, which lifts it to the top of the building and delivers it to longitudinal conveyors of the suspended flight scraper type, which dump it into the coal bunkers over the boiler room. From the bunkers it is delivered through vertical down-spouts to Roney mechanical stokers, operated by steam.

The ashes drop from the grates into hoppers, from which they are collected in push cars of 1-ton capacity running in an ash tunnel in the boiler room basement. These cars are dumped into a hopper, from which the ashes are lifted by means of a bucket conveyor into an ash storage bin directly over the coal trestle, from which they can be dropped through a spout in the bottom of the hopper into a car. Cars on the trestle are spotted by means of an electric winch. Coal delivered by boat is hoisted in a clamshell bucket of 1-ton capacity, operated by a steam hoist. The coal-handling capacity is 80 tons per hour and the ash-handling capacity is 25 tons per hour. The maximum coal consumption at the power stations will be about 220 tons per day.

Aside from the hoist for unloading coal from boats, which is operated by steam, the coal-handling apparatus is all driven by electric motors. The conveyors are driven by 220-volt three-phase induction motors, varying in capacity from 7½ hp for the ash conveyor to 40 hp for the coal crusher and conveyors.

BOILERS

Each power station is designed to accommodate a battery of 24 Babcock & Wilcox water-tube boilers, rated at 625 hp each, all located on one floor and arranged 12 on each side of a central alley. Sixteen boilers will be installed for initial operation. The total heating surface of each boiler is 6250 sq. ft., and the grate surface is 112 sq. ft., giving a ratio of 55.8. The boilers are designed for a normal working pressure of 185 lbs., and the steam will be superheated to 200 degs. F. over and above the temperature due to steam pressure. The superheaters in each boiler will contain 1230 sq. ft. of heating surface, and they are made up of 168 2-in. tubes, each 13 ft. 5 ins. in length. Each section of the power station containing four boilers is equipped with one boiler feed-pump of the duplex outside-packed piston type. The pumps are designed for hot water, and each pump has a capacity to supply eight boilers under full load conditions. The feed-water heaters are of the closed type corrugated tube Wainwright counter-current design.

PIPING

The piping is all mild steel with flange joints of a modified Van Stone pattern. Four boilers are piped direct to one turbo-generator, and by means of cross connections adjacent boilers can be arranged to supply turbo-generators of the next group. The sectional system of piping has been followed throughout for the auxiliary machinery.

CRANES

The turbine room of each power station will be equipped with a 50-ton traveling crane having an auxiliary 10-ton hoist.

TURBO-GENERATORS

Each power station is designed to accommodate six 5000-kw turbo-generators, four of which are being installed for initial operation. The turbines are of the Curtis five-stage vertical type. These machines are about 15 ft. in diameter at the base and 35 ft. high from the floor to the top of the generator.

The turbine structure is mounted upon a cast-iron base, forming an exhaust chamber, in which is provided the opening to the condenser and to free atmospheric exhaust. The shaft of the turbine is separated from that of the generator above, the connection between the two being made by a coupling, so that the machine can be readily taken apart.

The shaft is borne by a step bearing consisting of two cast-iron blocks, between which water is used for lubrication under a pressure of 800 lbs. per square inch, exerting a sufficient force to raise the moving structure slightly. One individual pump is provided for each turbine for the lubricating system, and in addition to this, two larger pumps, in connection with two accumulators, insure uninterrupted pressure at the step bearings.

The governing will be effected by successive opening and closing of automatic hydraulically-operated valves, which deliver steam to the different sections of two sets of nozzles.

The turbines will be fitted with two centrifugal devices to check any excess of speed. After either one of these devices operates, the next revolution of the machine will bring it into engagement with a lever, which will trip the main steam valve, cutting off immediately the driving power and allowing the machine to come to rest in the shortest possible time.

CONDENSERS

The condensing apparatus is external to the turbines. The condensers are of the counter-current surface type, and each is directly connected to its turbine base and contains about 17,000 sq. ft. of cooling surface. They are guaranteed under full load to maintain a vacuum of 28 ins. with cooling water at a temperature of 70 degs. F., 30-in. barometer.

APPEARANCE OF A CABLE TOWER AND PART OF THE TRANSMISSION AND THIRD-RAIL SYSTEM ON THE LINE OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD

The auxiliary condensing apparatus is composed of independent units. Circulating water pumps are of the centrifugal type, directly driven by horizontal reciprocating engines. The dry vacuum pumps are of the rotative fly-wheel type, with air and steam cylinders in tandem, erected on a common base. The hot-well pumps are of the two-stage turbine type, and are driven by direct-connected d. c. electric motors.

As an evidence of the high efficiency expected of the condensing system, it may be stated that the manufacturer has guaranteed that the temperature of condensed steam measured in the condenser hot well will be within 1 deg. F. of that corresponding to the pressure measured in the condenser. All parts of the machinery have been designed to operate smoothly and quietly under all loads up to 50 per cent above the normally rated capacity of the turbines. The intake and discharge circulating tunnels for the condensing system are elliptic in shape, 7 ft. 3⅞ ins. x 9 ft. 11 ins.

GENERATORS

The generators each have a capacity of 5000 kw, and are wound for three-phase current of 25 cycles and 11,000 volts pressure. The armatures are star-connected, and the neutrals are grounded through individual cast-iron grid resistances connected to a common ground bus, limiting the ground current to an amount sufficient to operate the line overload relays. The leads of the generators are brought down to the floor through brass pipes to the ducts leading to the high-tension switches, the arrangement being such that no high-tension conductors are exposed in the turbine room.

EXCITERS

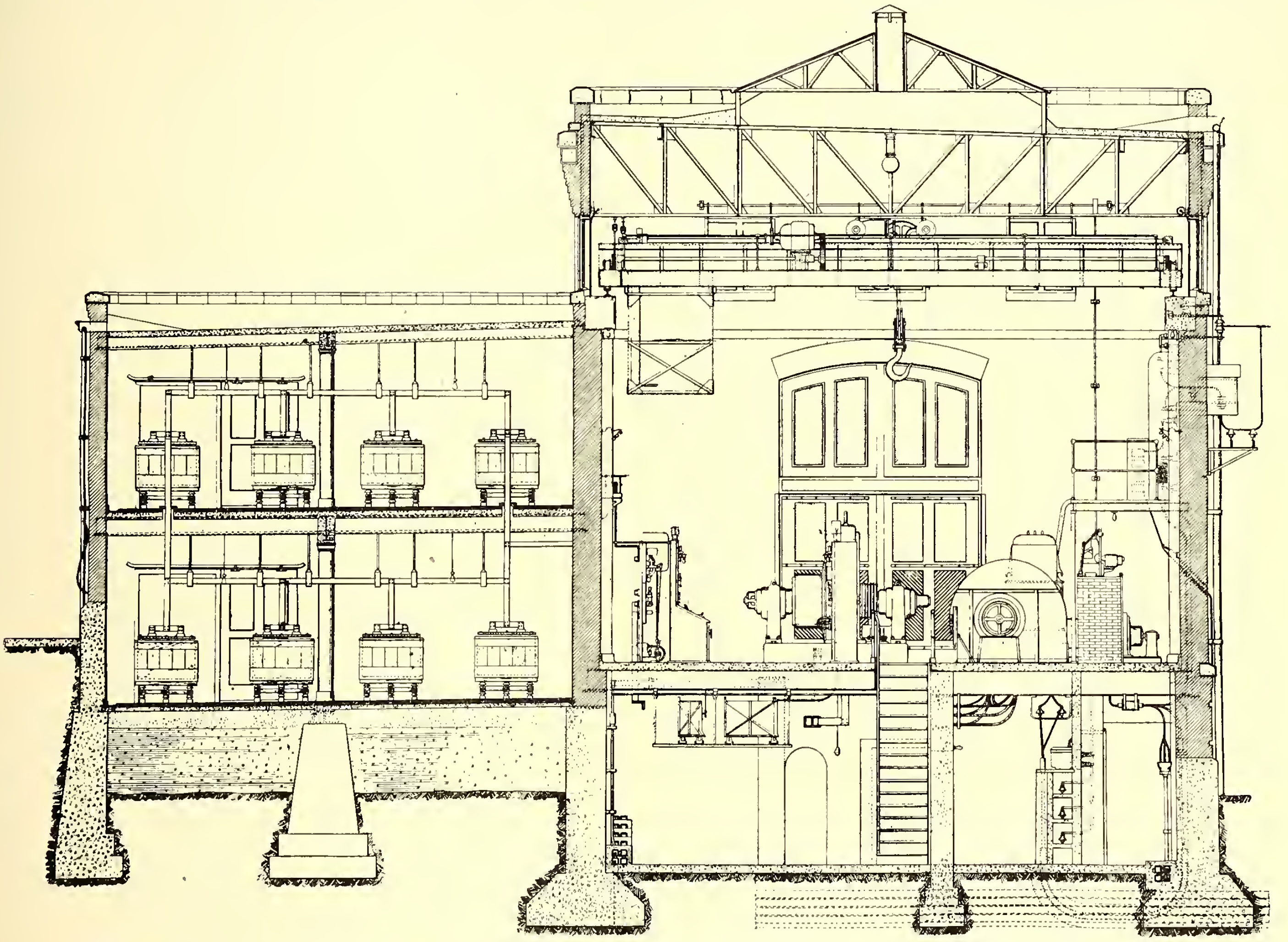
The exciter system at each power station will consist of two 150-kw turbo-generators and one 150-kw induction motor-generator, furnishing current at 125 volts pressure; also one exciter storage battery consisting of seventy-four cells, type R-21, having a capacity of 1200 amps. for one hour, with spare space in the tanks for increasing the capacity to 1800 amps. for one hour. The exciter generators and battery are connected to two independent positive busses and one common negative bus. The battery has two end cell switches on the positive side. One positive bus serves for field excitation of the 5000-kw generators only, while the other serves for certain lights and motors in the station.

OPERATING GALLERY

The stations will be operated from the operating gallery on the north side of the turbine room. The arrangement of the switchboards in this gallery is symmetrical, and all cables and copper connections running to the switchboards are carried in concrete trenches under an Alberene stone floor. The main operating switchboard containing all the control switches and the instruments necessary for the operation of the station is located in the center of the operating gallery. A set of two exciter switchboards is located on each side; the main operating switchboard as well as the exciter switchboards are enclosed in an operating booth constructed of steel and wire glass. Three field switchboard panels are located outside on each side of the operating booth. An a. c. and a d. c. light and power switchboard on either end of the operating gallery complete the switchboard installation in the turbine room.

SWITCH HOUSES

At both power stations switch houses have been provided, separate from the main building, with the idea of obtaining the best conditions for the installation of high-tension switching apparatus, and at the same time increasing the safety of operation. At Port Morris the switch house is 50 ft. 10 ins. wide x 100 ft. long. At Yonkers the switch house and the sub-



CROSS-SECTION OF A TYPICAL SUB-STATION ON THE ELECTRIFIED DIVISION OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD station for that district are combined in one building, 37 ft. 4 ins. wide x 255 ft. 4 ins. long; the switch house occupies 147 ft. 8 ins. of the length and the sub-station 107 ft. 8 ins. In the switch houses are installed the high-tension switching equipment, consisting of bus-bars, oil switches, instrument transformers, etc.; also such instruments as are required for the complete equipment of generating stations, but which are not essential for the operator.

The switch house also contains auxiliary boards, which allow the main operating switchboard in the turbine room to be put out of service if it should be desirable for the purpose of cleaning and repairs. These boards will also permit the operation of the station should by an accident the main operating board become disabled.

High-tension busses, to which the generators are connected by means of a main switch and two selector switches, are installed in the basement of the switch houses. The feeders are equipped with selector switches only. Overload relays are installed in the generator and feeder circuits, but the generator relays will operate only under very extreme conditions.

In the generator circuits, in addition to overload relays, reverse current relays will be installed; these, however, are connected to indicating lamps only, not tripping the oil switches. All relays are of the inverse time-limit, bellow type.

All high-tension connections and apparatus are located in the basement of the switch house, and no such apparatus is located on the first floor, except the oil switches, to which connections are made from the basement through the floor. The basement is made inaccessible to any but authorized workmen. This precaution and the removal of the high-tension apparatus from the power house itself into a confined space in a separate building reduce the danger of coming in contact with high-tension apparatus to a minimum.

On the second floor are located the load despatcher's office, the exciter battery with booster and switchboard, laboratory, storeroom, toilet rooms and the apparatus for the hot-air heating and ventilating systems.

The arrangement of oil switches and connections is such that the apparatus belonging to one generator and three feeders form a unit which is entirely separated from the others by fireproof walls in the basement. All connections between oil switches and bus-bars are made with bare copper tubing 1¼ ins. outside diameter, the construction being such that practically no insulators will be required. The busses are enclosed in vertical brick and Alberene stone compartments, and all high-tension connections will be separated by brick or Alberene stone barriers. The oil switches can be disconnected from the high-tension system by means of knife switches located in the bottom of the oil switches accessible from the first floor. This arrangement prevents accidents which might be made by mistake in disconnecting switches from live parts. All cables coming through the duct system from the power house enter manholes in the basement of the switch house, and are so arranged that the high-tension cables enter the high-tension compartments entirely separated. Low-tension cables enter through manholes in a passage separated from the high-tension compartments by a fireproof wall, and are brought up in enclosed chases in the wall, so that they are positively insured against any accidental connection with high-tension conductors. The oil switches have a rated capacity of 500 amps., except the bus-tie switches, which have a rating of 1200 amps. The switches are of the motor-operated type, H-3, and have all recent improvements.

CABLES

All high-tension cables and the majority of the single-conductor low-tension cables are cambric-insulated and lead-covered. The insulation is 10-32 in. for high-tension cables and 4-32 in. for low-tension cables, with a lead cover 3-32 in. Multiple conductor cables for instrument and control wiring have a combined cambric and rubber insulation. Single conductor cables will be used for connecting the generators with the oil switches.

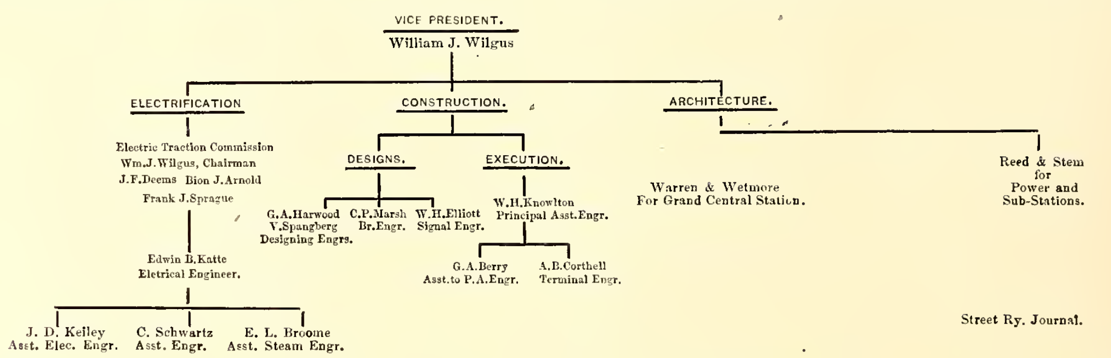
LIGHTS AND AUXILIARY POWER

About 1000 incandescent and thirty-six arc lamps will be required for lighting the Port Morris power station, and 1000 incandescent and forty-two arc lamps for lighting the Yonkers power station. The amount of power required for operating auxiliary machinery equals 240-hp a. c. and 180-hp d. c. at Port Morris, and 260-hp a. c. and 180-hp d. c. at the Yonkers power station.

LOAD DESPATCHER'S OFFICE

In each power station a load despatcher's office has been arranged for the proper distribution of power over the system and in order to give quick relief in case of accident or trouble. Only one of these will be in service at a time. Each load despatcher's office will be equipped with a record board, indicating by means of lights and plugs which generators, lines, rotaries, etc., are in or out of service and which switches are open or closed.

An independent telephone system, exclusively for the use of the load despatcher, interconnecting both power stations, all sub-stations and the train despatchers in the electric zone, will be installed.



ENGINEERING ORGANIZATION

The accompanying chart shows the organization of the engineering department of the New York Central Railroad, which includes the design and construction of these two power stations, and which is under the direct management of Vice-President William J. Wilgus:

CONTRACTORS

The principal contractors on the work are as follows:

Foundations at Yonkers, Walter Butler; foundations at Port Morris, D. C. Weeks & Son; steel work, both power stations, American Bridge Company; superstructure at Yonkers, Butler Bros. Construction Company; superstructure at Port Morris, Thompson-Starrett Company; turbo-generators and complete switching equipment, General Electric Company; exciter storage batteries, Electric Storage Battery Company; boilers, Babcock & Wilcox Company; piping, M. W. Kellogg & Company; valves, Best Manufacturing Company; stacks, Alphons-Custodis Chimney Construction Company; Condensers, Henry R. Worthington; feed-water heaters, Taunton Locomotive Manufacturing Company; boiler feed pumps, Epping-Carpenter Company; flues, B. F. Hart, Jr., & Company; coal and ash-handling apparatus, Exeter Machine Works; mechanical stokers, Westinghouse Machine Company; electric traveling cranes, Alfred Box Company; light and power equipment, Thompson-Starrett Company.

THE RECONSTRUCTION OF THE TOPEKA RAILWAY

The Topeka Railway Company, of Topeka, Kan., has a property which is remarkable in a number of respects. It is a good example of what can be done by thorough reconstruction of the physical equipment and reorganization of operating methods of a street railway in a city of 40,000 inhabitants. While the street railways in cities of this size are as a rule in much better condition physically than they were ten or fifteen years ago, the owners of such properties, on account of their present small earnings, are too frequently inclined to let them run down or to hesitate to give them a thorough overhauling because of the risk that the net earnings will not be sufficient after the change to pay the great increase in fixed charges on the investment. The Topeka Railway was purchased by its present owners for about $400,000, and most of the property was immediately, figuratively speaking, thrown into the scrap heap, involving an investment of practically double its original purchase price in reconstruction. The result of the improvement in equipment and operating methods has been to increase the net earnings to such an extent that the returns are entirely satisfactory on the present investment.

These statements will no doubt be sufficient to arouse the interest of all street railway men connected in any way with similar properties, and an account of how these things were accomplished is of value. Before going into details, a general statement of how and why these results were attained is in order. To begin with, the tracks and rolling stock were in such a dilapidated condition that it was impossible to maintain a rapid schedule. Since the property has been overhauled, the car mileage per day has been increased 33 per cent without increasing the number of cars. This has an important bearing on the net earnings in two ways: First, it gives the public a more frequent and more rapid service, and second, it reduces platform expenses. This increase in schedule speed and car mileage was, of course, made possible by providing good tracks and rolling stock and sufficient feed wire to maintain such schedules, which would have been impossible with the property in the condition it was originally. Besides this, a number of other things have been done to stimulate travel, while at the same time decreasing operating expenses. It was formerly the practice to reduce the car service during the evening. The result was that cars were so infrequent people either stayed at home or walked. The present policy is to keep the same schedule, 18 hours per day. The result is that the evening business has been converted from a losing to a paying one. Trippers are added during the rush hours, morning and evening. Routes have also been changed in some cases better to accommodate travel and decrease the useless mileage.

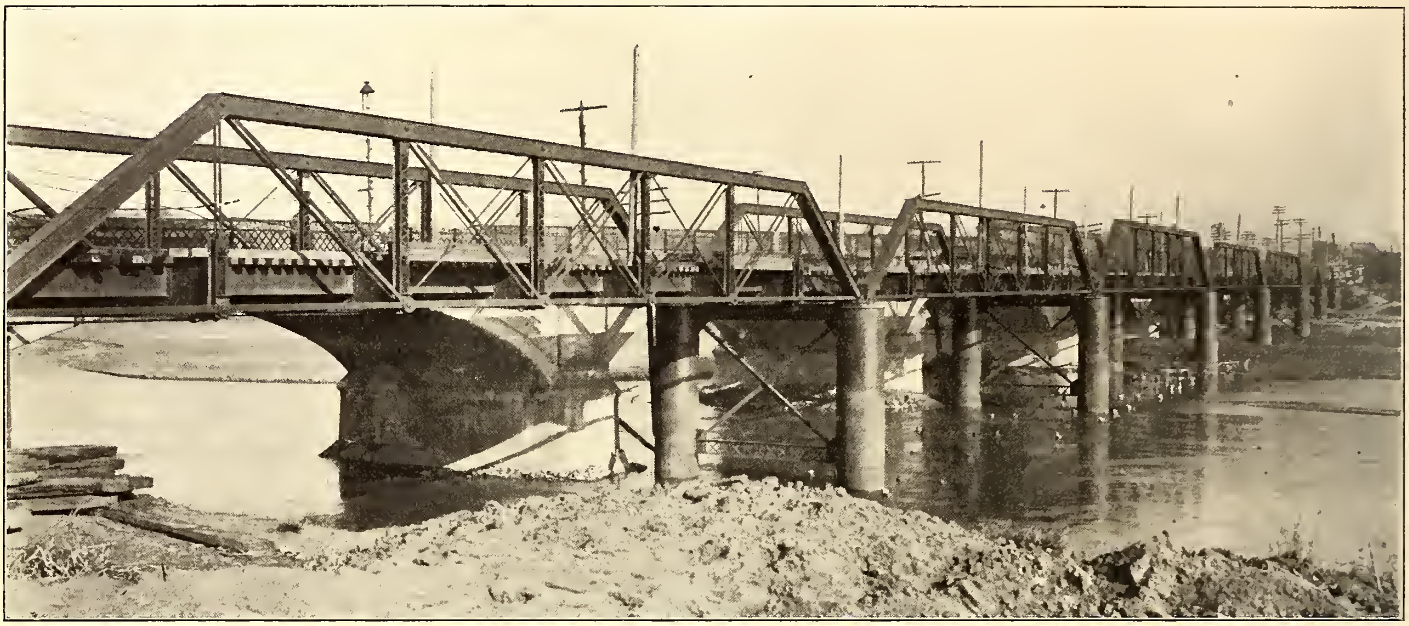
TOPEKA RAILWAY BUILDINGS, FROM STREET

SPECIAL WORK AT KANSAS AVENUE AND SIXTH STREET

TRACK AND OVERHEAD WORK

It is unusual to find a road of this kind provided with such heavy and well ballasted track. The company has 36 miles of track, 8 miles of which is suburban and 28 miles in the city, with 17 miles in paving. The track in paving is 80-lb. Shanghai T. The balance is 75-lb. standard T-rail. The track is laid in 6 ins. of concrete where in paving. In the unpaved city districts there are 6 ins. of broken stone ballast, while the suburban track is ballasted with 12 ins. to 18 ins. of broken stone. Sections of the different standards of track and overhead construction are shown on the opposite page.

The company owns its own cast-welding outfit, furnished by the Falk Company, and has cast-welded considerable track in paving. It is intended to cast-weld all such track ultimately. It has a well-equipped machine shop, where it made the special work used in reconstruction, except a large piece at Kansas Avenue and Sixth Street, which was furnished by the Falk Company.



KAW RIVER BRIDGE, BUILT BY RAILWAY COMPANY, TOPEKA

The city system consists of nine different lines, as seen on the map, requiring for their operation twenty-five cars on regular schedule. Besides this, there is a line to Vinewood Park and stone quarry over which passenger service is given during the summer months while the park is open, and stone is hauled the year round. The company owns two important steel bridge structures: one a bridge over the Kaw River between Topeka and North Topeka; and the other on the Vinewood line, a viaduct over the Santa Fe and Missouri Pacific Railroad tracks. The bridge over the Kaw River is owned and used exclusively by the railway, being alongside the Kansas Avenue wagon and foot bridge. It is 900 ft. long, with seven spans double track, set on tubular steel piers. These piers are filled with concrete and are 6 ft. in diameter, extending 28 ft. into the river bed. The bridge structure is 27 ft. above low water. It was designed by L. H. Stebbins, consulting engineer, of Chicago, and built by the Leavenworth Bridge Company, with steel furnished by the American Bridge Company. It is designed for supporting a weight of 200 tons. The piers of this bridge are set opposite the piers of the Milan arch bridge of Kansas Avenue, before referred to, the railway bridge being on the down stream side. The Vinewood viaduct is 112 ft. long, with a fill 1500 ft. long at one approach, 35 ft. high at the viaduct.

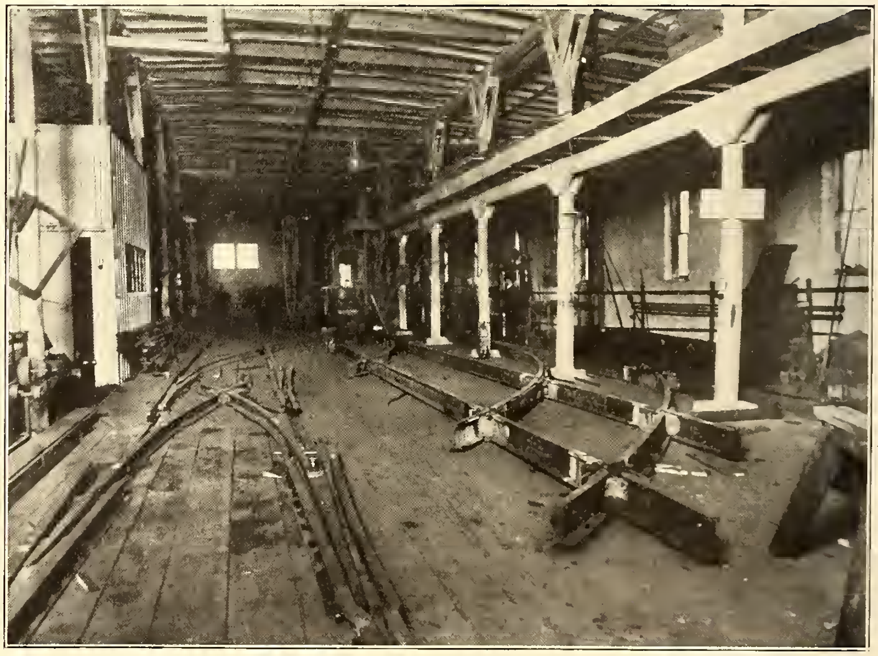
Power is obtained from the Topeka Edison Company, which has a power plant near the center of the city, and is controlled by the same interests as the railway. There are seven positive feeders, as indicated on the map, with cross sections from 1,000,000 circ. mils to 350,000 circ. mils. The positive feeders are as follows:

Feeder No. 0—South Kansas Avenue section, 500,000 circ. mils.

Feeder No. 1—North Kansas Avenue section, 350,000 circ. mils.

Feeder No. 2—Oakland & East Topeka division, 500,000 circ. mils.

Feeder No. 3—West Sixth Street division, 350,000 circ. mils.



VIEW IN THE COMPANY'S SPECIAL WORK SHOP

Feeder No. 4—West Eighth and Tenth Street division, 350,000 circ. mils.

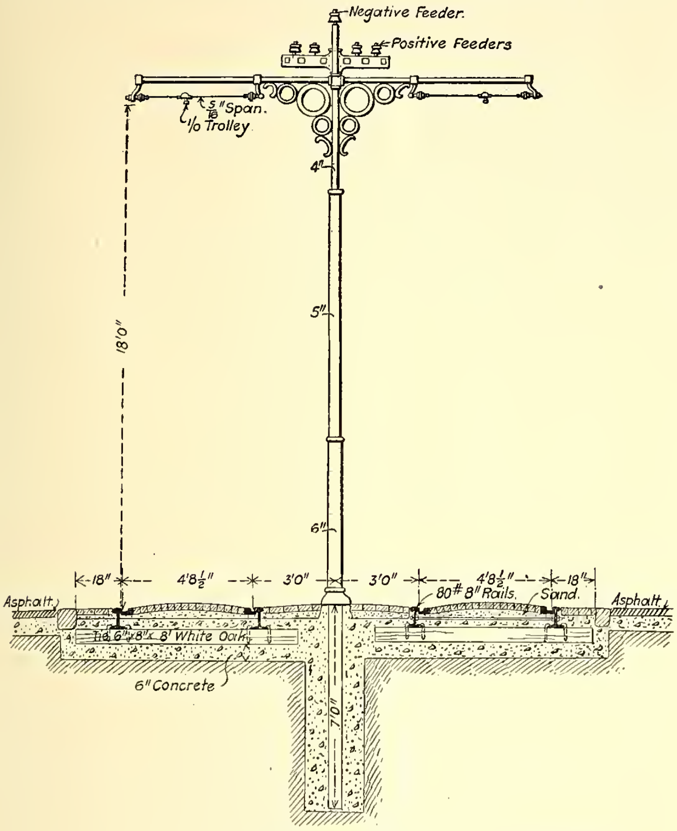
Feeder No. 5—Vinewood division, 1,000,000 circ. mils.

Feeder No. 6—Washburn & Quinton division, 500,000 circ. mils.

Feeders tap the trolley every 1000 ft.

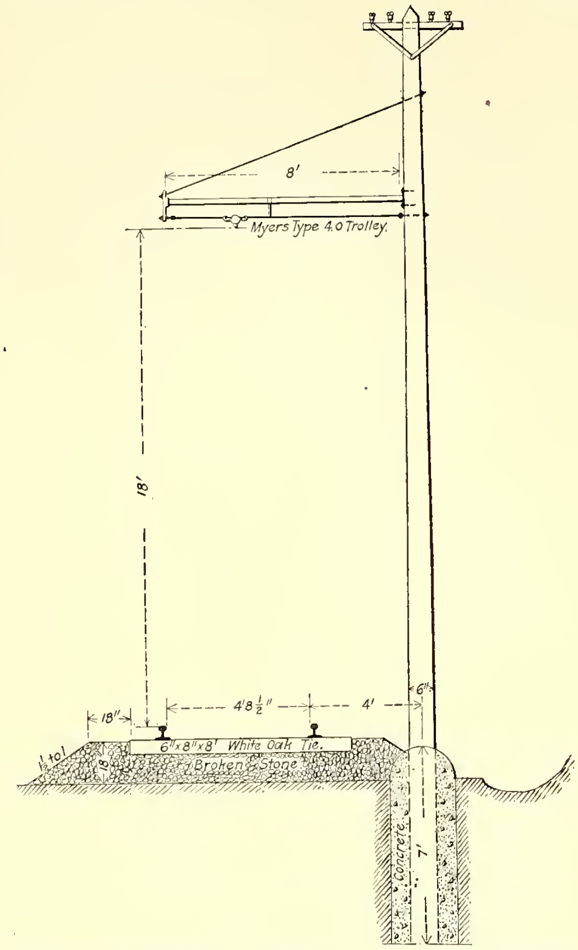
The trolley wire throughout the city is No. 0, except on the Washburn, Oakland and Vinewood lines, where it is Myers type No. 0000. The Myers type trolley wire is somewhat similar to the figure 8, except that the top is flat instead of rounded and the grooves on the sides are angular instead of rounded.

The trunk lines are double-bonded with No. 0000 concealed bonds made by the American Steel & Wire Company and the General Electric Company. The rails are cross-bonded every 500 ft. The same type of bond is used on the outlying lines.

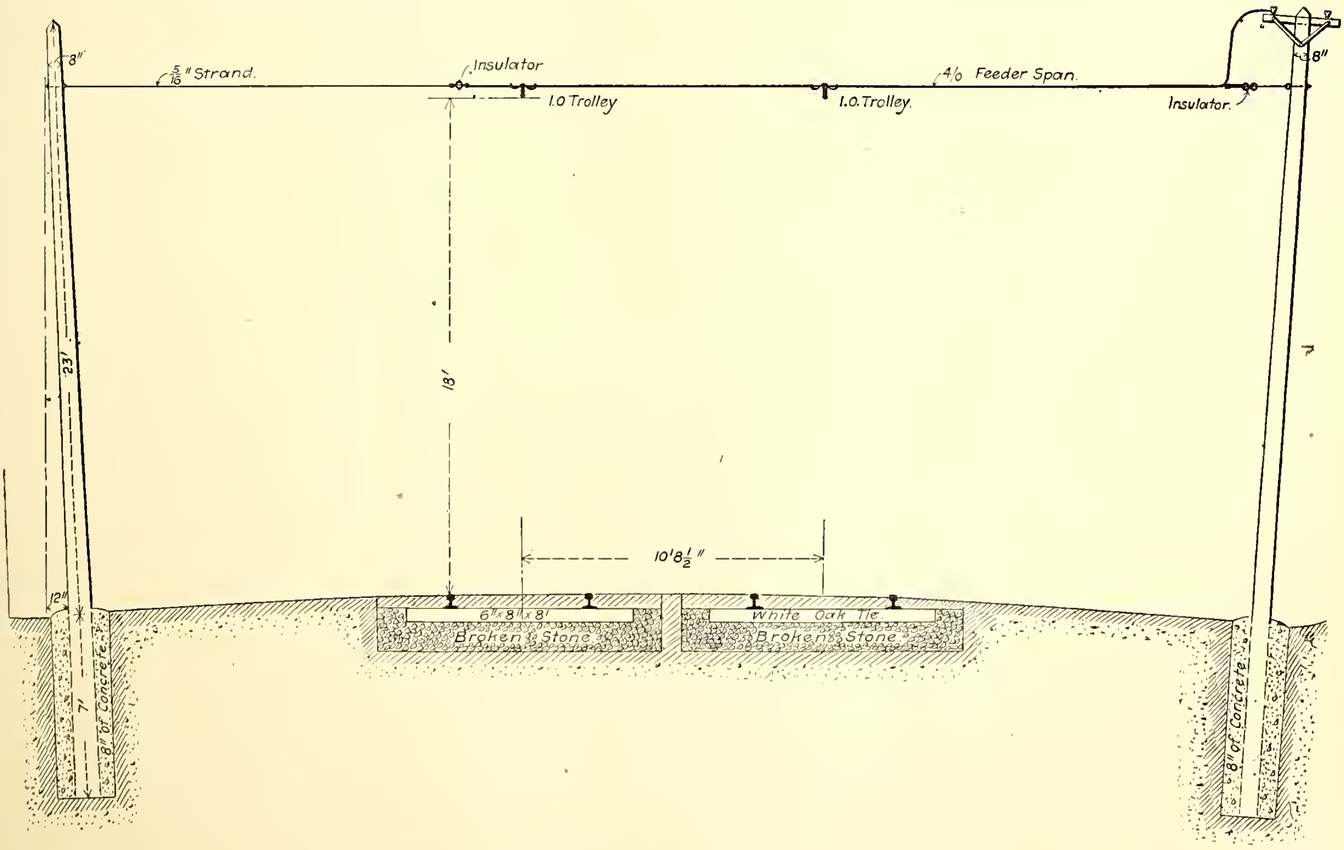


STANDARD DOUBLE-BRACKET POLE AND CITY TRACK CONSTRUCTION

Park, 6 miles distant, is 500,000 circ. mils as far as the heart of the city, and from there to the power station is 1,000,000 circ.



STANDARD SINGLE-BRACKET POLE AND SUBURBAN CONSTRUCTION



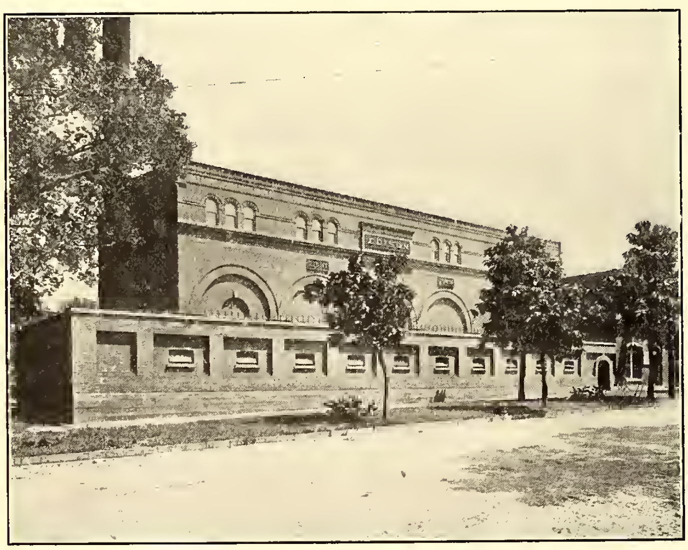
STANDARD SPAN-WIRE CONSTRUCTION ON PAVED STREETS

Besides the track bonding, there are three negative feeders running into the station. The one that starts at Vinewood mils. Another feeder ¼ mile long on Kansas Avenue to Fourth Street is of 500,000 circ. mils cross section. A crosstown feeder north and south on Clay Street taps into four lines 4200 ft. west of the power station, with a capacity of 300,000

CONCRETE-BLOCK CAR HOUSE AND BRICK-PAVED YARD

circ. mils. These negative feeders are connected to the rails every 500 ft. with No. 0000 copper wire. Copper wire of the same size is carried through all special work to supplement the bonding.

In downtown districts iron center poles set in concrete are



TOPEKA EDISON PLANT WITH 800 AMP.-HOUR RAILWAY BATTERY HOUSE IN FOREGROUND

used. In outlying districts Idaho cedar poles are used, and these also are set in concrete. The reasons for setting these wooden poles in concrete are interesting and may be of value to other companies. When the old poles were taken down during construction it was found that these poles, which were of Michigan cedar set in concrete, were in almost as good condition as when new.

It was thought that if such a good record as this could be made by setting poles in concrete it would be a good investment if all the wooden poles were set in this manner.

VINEWOOD TRAIN—STANDARD DOUBLE-TRUCK MOTOR CAR AND TRAIL CAR

ROLLING STOCK

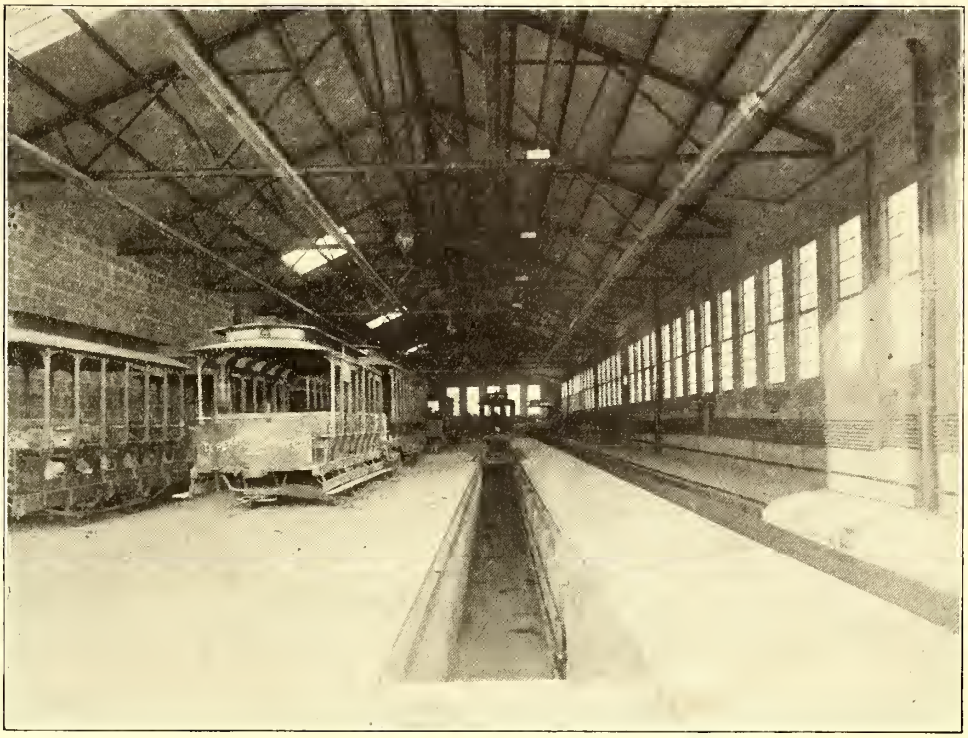
Most of the city rolling stock is single truck semi-convertible, with center aisles and cross seats, this being the best equipment for use in a city of this size. With such excellent track as exists in Topeka, these equipments ride as smoothly as any double-truck equipment. The double-truck cars are used mainly on the Vinewood line, over which the travel in summer is generally very heavy. There are thirty single-truck cars made by the American Car Company and by the Topeka Railway, mounted on Brill 21-E trucks with 26-in. wheel base and equipped with two GE 54, 25-hp motors and K-10 controllers. The single-truck cars have DuPont rear platforms and are designed to run single ended. The front vestibule is entirely closed and is carried on an extension of the main sills of the car. These cars are heated with Peter Smith hot-water heaters, with the heater and coal box in the front vestibule. The Minneapolis type of gate is used, which prevents passengers from boarding or leaving the car except when the gate is opened by the motorman. The cars have long side destination signs set in

STANDARD SINGLE-TRUCK CAR

an angle-iron frame. Illuminated signs in which wire glass is used are placed at the front and rear. All the single-truck cars are equipped with Eclipse fenders. There are five double-truck Jewett cars mounted on Peckham No. 36 M. C. B. trucks, equipped with four GE 67 motors, Christensen air brakes, Consolidated electric heaters and locomotive pilots. These cars are also of the semi-convertible type. For hauling freight, an electric locomotive is provided equipped with four GE 67 motors. The locomotive is in the form of a flat car, with a cab on one end. It is 30 ft. long by 8 ft. 6 ins. wide. It is mounted on American Car Company M. C. B. trucks. The company owns twelve flat freight cars, two McGuire snow sweepers, five snow plows and a Trenton trolley wagon.

BUILDINGS

The shops, car house and offices make a remarkably fine set of buildings, as seen from the engravings. The company was fortunate in being close to a good supply of cement for concrete and also to Kaw River sand, which is excellent for making concrete. The buildings, as seen from the accompanying engravings, are all constructed of concrete blocks. These blocks are 12 ins. x 12 ins. x 24 ins., made of one part Portland cement to three parts Kaw River sand. The mortar used in building construction was one part cement to two of sand. These concrete blocks make very handsome as well as very substantial buildings. A view of the property showing the car houses, shops and offices is given on page 879. The roofs of the buildings are of the Carey composition roofing laid on 1-in. sheeting and supported on steel trusses. The yard is paved with vitrified brick laid on a 6-in. concrete foundation

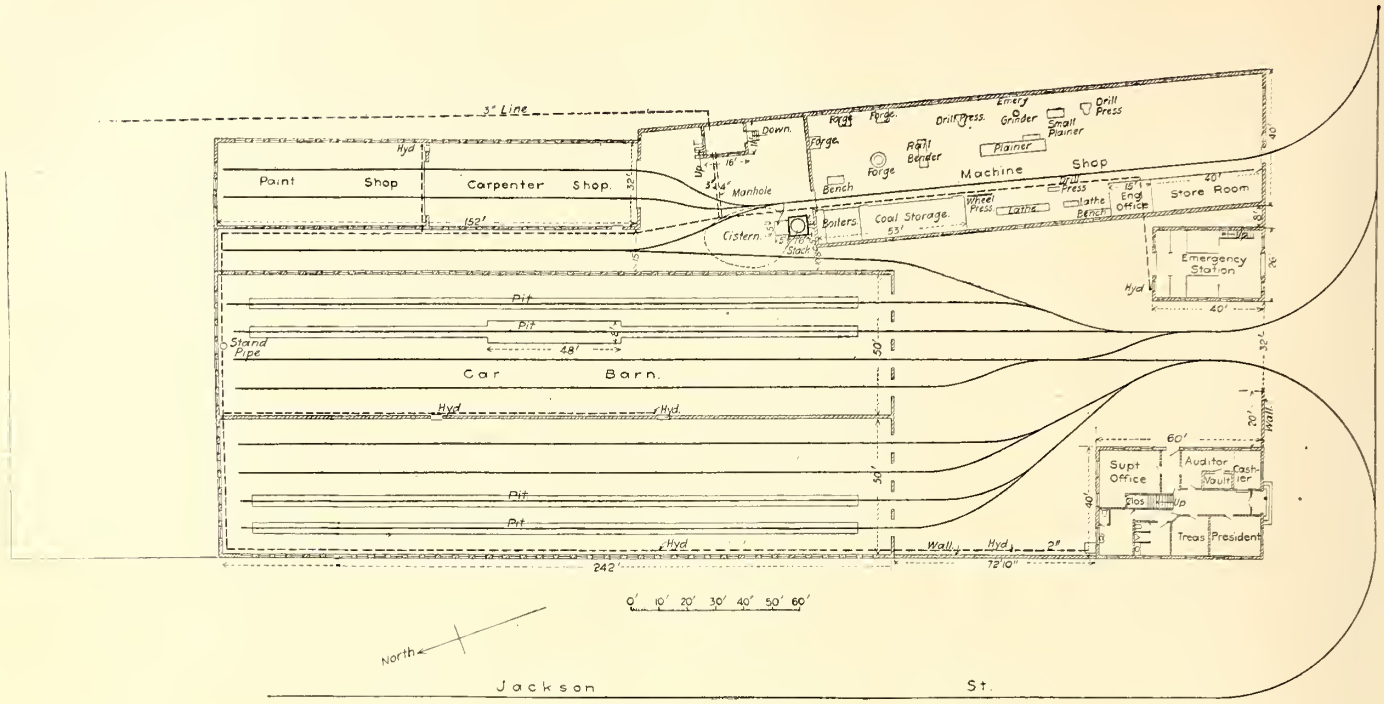


VIEW IN MAIN CAR HOUSE

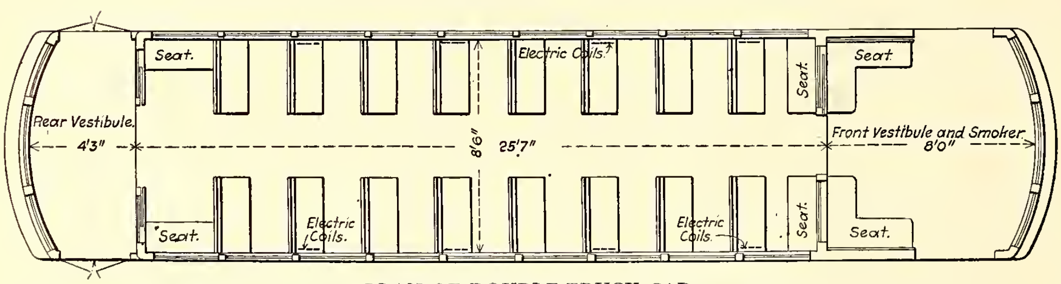
FREIGHT TRAIN AND ELECTRIC LOCOMOTIVE, TOPEKA

and grouted over the top with Portland cement. All large openings of car house and shop are provided with Wilson rolling steel doors. The small openings are closed with double standard fire doors.

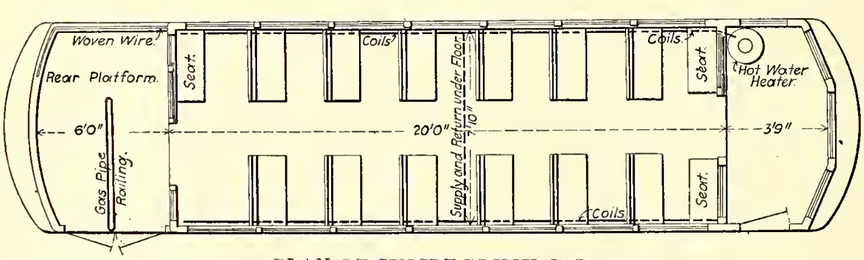
Between the machine shop and the carpenter shop in the yard is a 6000-barrel cistern, into which all the roofs on the property are drained. This cistern is covered with reinforced concrete of sufficient strength to support the weight of cars or any wagon that may be driven over it. At the rear of the car house is a standpipe 32 ft. high and 3 ft. in diameter. An automatic electric pump maintains the pressure in this standpipe at from 30 lbs. to 60 lbs. per square inch, an air cushion being maintained in the top of the standpipe to keep up the pressure when the pump stops. The standpipe is connected with nine fire plugs, located about the building and yards, each of which has 100 ft. of 2½-in. hose. These provisions, in connection with the fireproof construction of the buildings, secure



PLAN OF CAR HOUSE

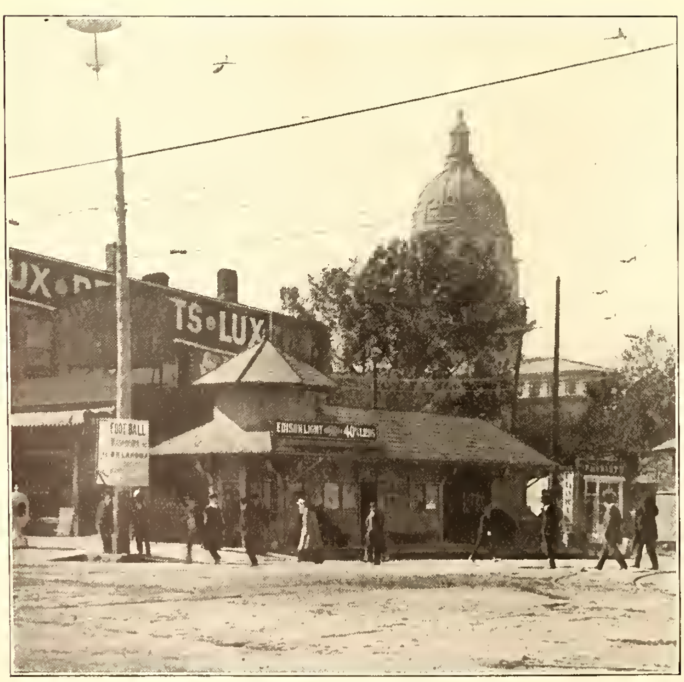


PLAN OF DOUBLE-TRUCK CAR

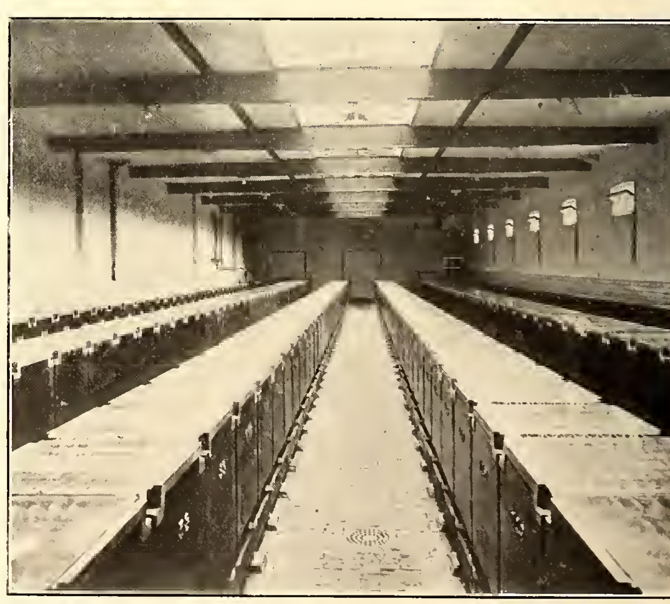


PLAN OF SINGLE-TRUCK CAR

a low insurance rate. The automatic electric pump is located in the basement of the oil house, and consists of a triplex Deming pump with a capacity of 300 gals. per minute, geared to a 25-hp G. E. motor. A home-made regulating device starts the pump automatically when the water pressure falls to 30 lbs., and shuts it off when it arrives at 60 lbs. The pump can maintain a fire pressure of 125 lbs. Above the pump room is the oil house, into the top floor of which oil is taken in barrels from a wagon driven up alongside the house. The barrels are hoisted with a block and tackle and run on a traveler into the house, where they are placed on racks and connected with pipes running to the floor below. The oil supply is obtained by the shop men from the faucets on the first floor, which practically does away with the waste which is usual with the



TRANSFER STATION AT STREET CORNER



RAILWAY BATTERY IN EDISON PLANT, TOPEKA, SHOWING GLASS COVERS AND NEAT TERMINAL-BAR ARRANGEMENT slip-shod methods of handling oil directly from the barrels.

A peculiar feature of street railway operation in Topeka is the transfer station at Eighth Street and Kansas Avenue, located between the sidewalk and the street. The company recently considered removing this transfer station, but so many protests were made against its removal, although it has no legal right on the street, that it was left. All the cars on the system, with the exception of one division, pass this point, and a large percentage of the transfers are made at this corner.

OPERATION

A headway of from 7 to 15 minutes is maintained on the nine city lines, which gives a headway of about 2 minutes on Kansas Avenue, the main thoroughfare. All cars are run on a time chart schedule, with regular meeting points on single track, except the cars on the Vinewood division, which are operated by the telephonic train despatching system, the despatcher being located in the assistant superintendent's office. The cars on this division are provided with portable telephones for receiving train orders.

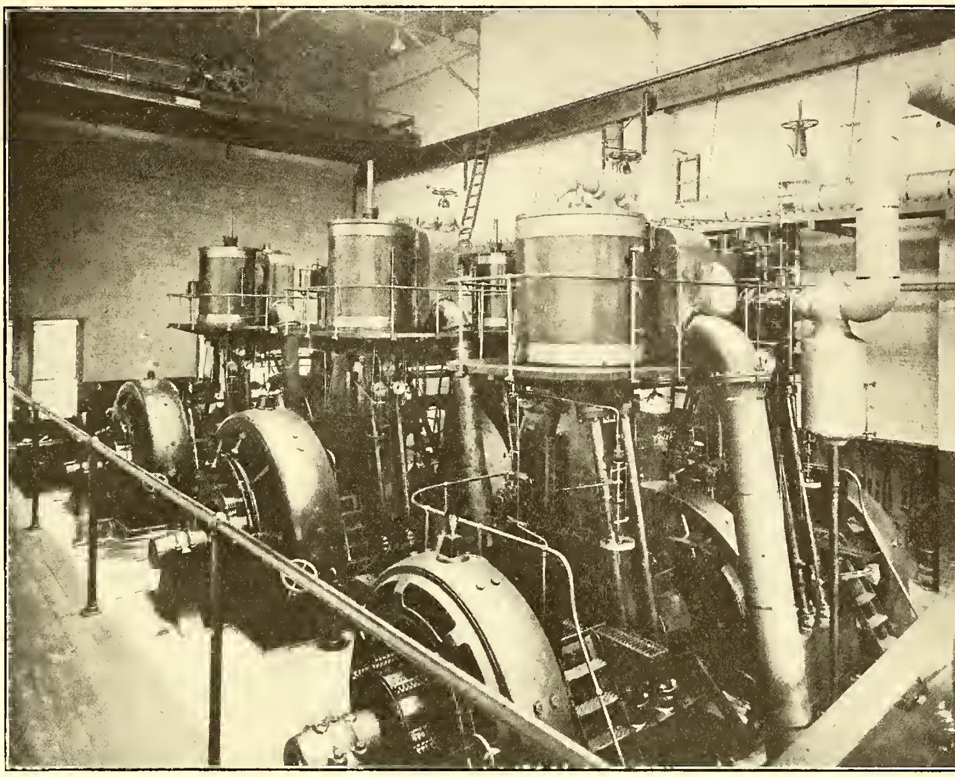
The company carries United States mail between the main postoffice and all of the sub-stations located in the city or suburbs, and also carries mail between Topeka and Oakland, a small town on a suburban line. Mail is carried on the regular

LOAD CURVE OF EDISON ELECTRIC ILLUMINATING COMPANY, TOPEKA, KAN., WITHOUT BATTERY ON RAILWAY LOAD

passenger cars, each pouch bearing a tag which shows when received and when given up by each conductor, so that any delays can be at once located. Each conductor handling a pouch punches on the tag where the mail was picked up and the point where delivered, together with the time of each transaction.

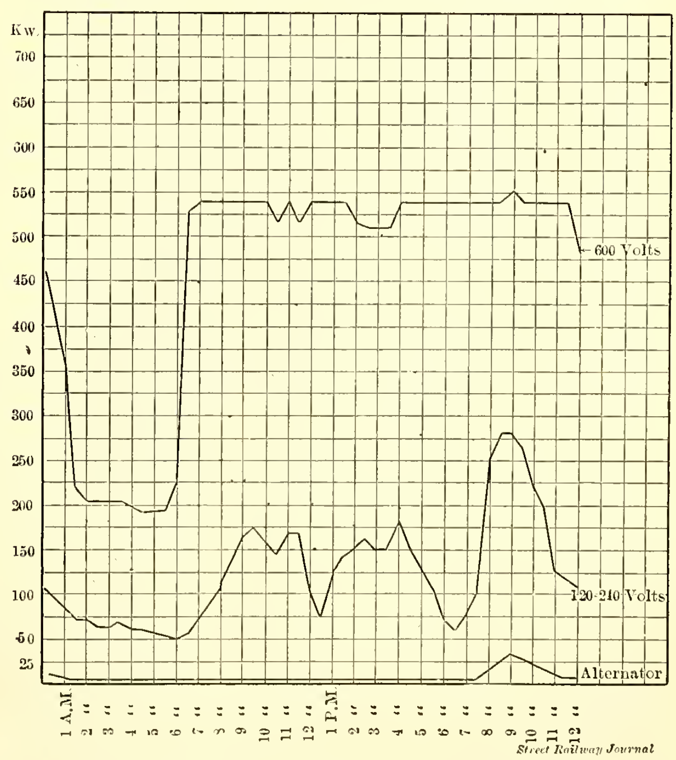
MUTUAL BENEFIT ASSOCIATION

The second floor of the company's office building is given to the club rooms of a Mutual Benefit Association, which is an



THREE 500-KW RAILWAY UNITS IN TOPEKA EDISON PLANT

unusual organization in a small city. The company bears the expense of maintaining these club rooms. They are provided with billiard and pool tables, reading tables, magazines, lockers,



LOAD CURVE OF EDISON ELECTRIC ILLUMINATING COMPANY, TOPEKA, KAN., WITH BATTERY ON RAILWAY LOAD

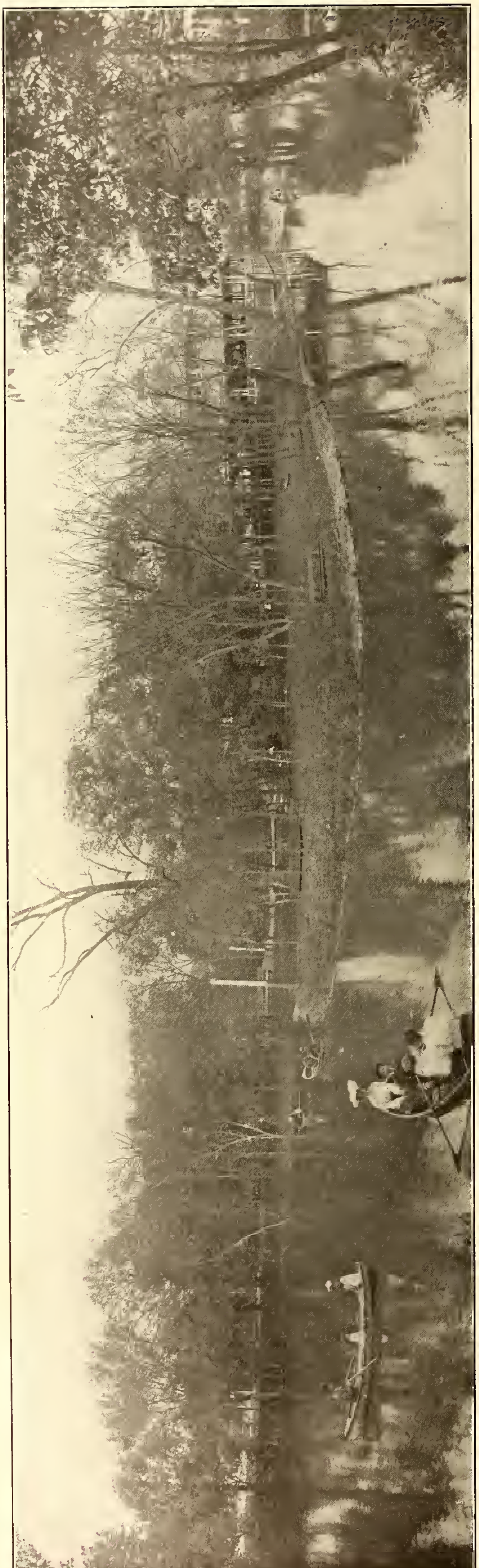
toilet rooms and shower baths. Only employees and officers of the company are eligible for membership in the association. In case of sickness, the association pays members $7 per week for fifteen weeks, or in case of injury from accident, $10 per week for ten weeks. In case of death, the member's beneficiary receives $50. The association maintains a reserve fund of

$200. Whenever this reserve fund is decreased by the payments of benefits, an assessment of 30 cents per month is levied on each member until the $200 reserve is reached, but for every

CHRISTMAS DINNER IN EMPLOYEES' CLUB ROOMS

EMPLOYEES' READING ROOM

EMPLOYEES' RECREATION ROOM

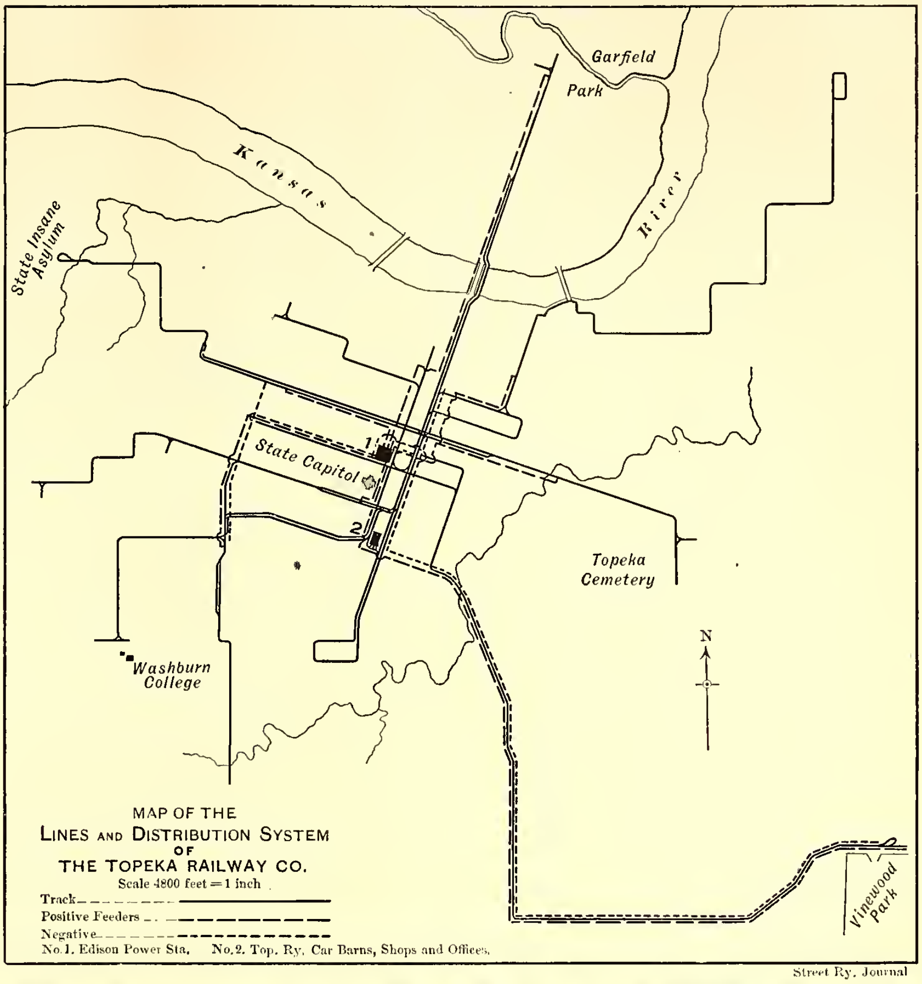


VIEW IN VINEWOOD PARK, TOPEKA

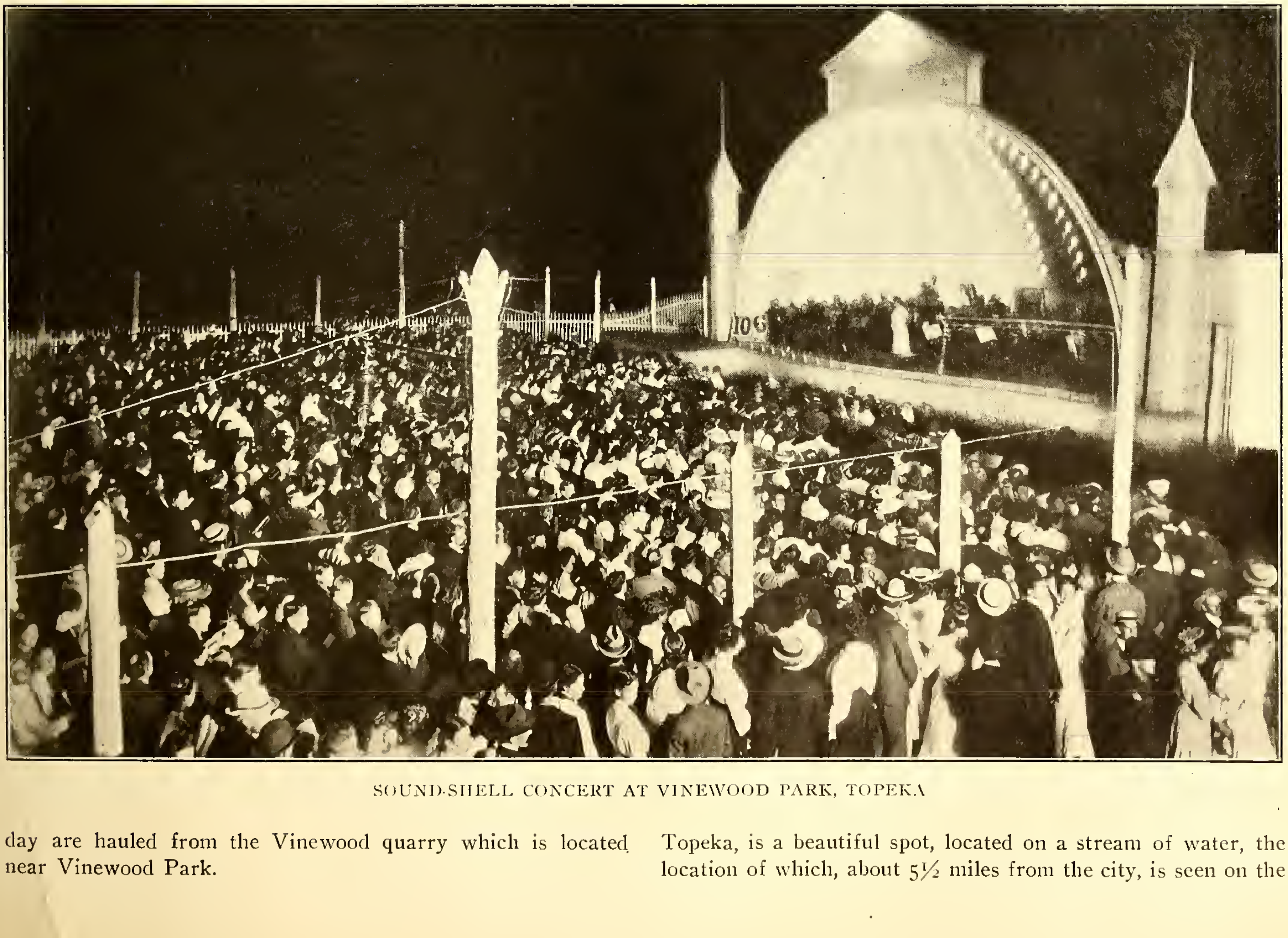
$1 paid by the members, the company contributes a like amount. There are ninety trainmen and thirty other employees, practically all of whom belong to the association. Five or six assessments a year take care of the payment of benefits. The president, vice-president, secretary and treasurer are chosen from the employees. The association is managed by a board of trustees, six of which are employees and three officers of the company. The members of the association are charged nominal fees for the use of billiard and pool tables and the use of bath rooms, and the money so collected goes into the fund of the benefit association. The association is a very desirable part of the company organization, not only on account of the insurance feature, but because of the opportunity it offers for employees and officers to become better acquainted. Entertainments are occasionally held at the club rooms for the members and their families, and the accompanying engraving shows a Christmas celebration held there.

FREIGHT TRAFFIC

By its franchise, the company is allowed to haul freight and delivers in carload lots from the steam roads to the factories and industries located on its street railway lines. It has a contract for hauling all the coal to the heating and lighting plant of the State Capitol Building. An average of ten cars of rock per day are hauled from the Vinewood quarry which is located near Vinewood Park.



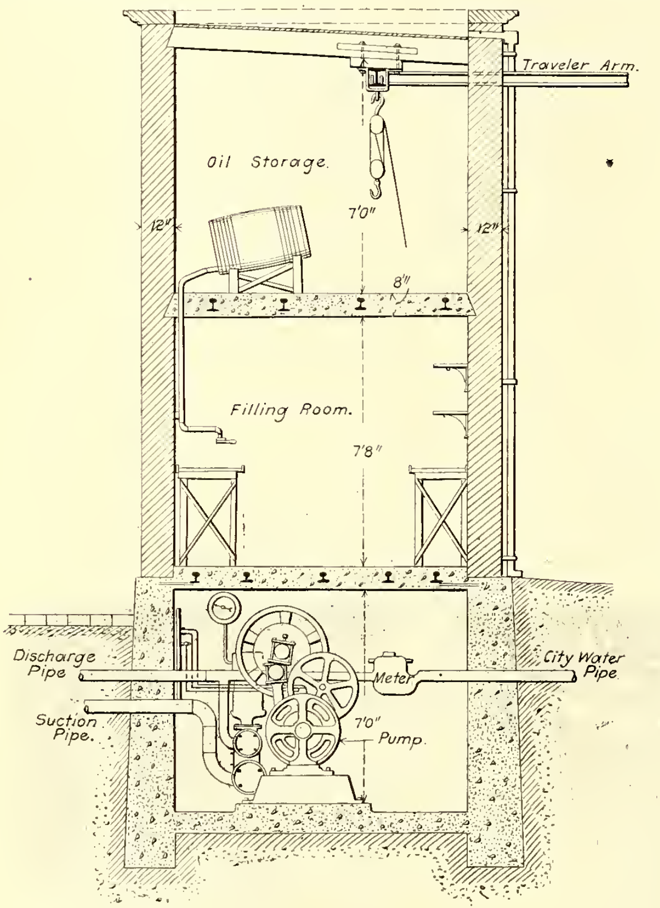
Street Ry. Journal



SOUND-SHELL CONCERT AT VINEWOOD PARK, TOPEKA

VINEWOOD PARK

Vinewood Park, the only pleasure resort in the vicinity of Topeka, is a beautiful spot, located on a stream of water, the location of which, about 5½ miles from the city, is seen on the map. There is a total of 375 acres in the property, 40 of which are improved for an amusement park. On the property is a quarry, which has a crushing plant with a capacity of 200 yds. of crushed rock per day. The park is not owned by the company, but by one of its officers. Admission to the park is free. The fare from the city is 10 cents one way. Among the artificial attractions forming the park equipment is a figure 8 toboggan and a large carousel made by the Philadelphia Toboggan Company. A very fine sound shell for use in giving open air concerts has been erected. The enclosure in front of this sound shell seats 1500 people. A summer theater built on the hillside seats 800 people. Besides this, there is a dance hall on the grounds, a café and an electric lighting plant driven by a gasoline engine. This plant supplies the incandescent lighting for interiors and decorative lighting, while the grounds are



SECTION OF OIL, LAMP AND PUMP HOUSE

lighted from sixty arc lamps off the trolley circuit. Two concrete dams in the stream flowing through the park make excellent lagoons for boating.

POWER SUPPLY

Power is purchased from the Topeka Edison Company, which is controlled by the same men as the railway. This company has a fine plant well equipped for taking care of both the commercial lighting and railway loads. There are three 500-kw G. E. 600-volt generators direct connected to compound vertical Buckeye engines for the railway service. A recent addition to the railway part of this plant is an 800-amp.-hour Gould storage battery with Gould booster arrangement, whereby the fluctuations of load are taken by the battery and a constant load is kept on the engines. A chart of the generator load "before and after taking" the battery is reproduced on page 885.

The battery room and arrangement of batteries is worthy of special attention. It is doubtful whether there is another battery room of this size in existence which is so free from fumes as this. Superintendent C. R. Maunsell, of the Topeka Edison Company, under whose direction the battery was installed, attributes this largely to the way in which each cell is thoroughly covered by a glass plate, as seen in the engraving of the interior of the battery room. The battery plate connecting bars are placed so low that the glass plate can cover the whole cell, with provisions for catching the drip from the corners of the plates. Each cell is insulated by porcelain insulators between it and supporting timbers. The supporting timbers are set on porcelain insulators mounted in turn on sulphur blocks. The floor is of vitrified brick.

ORGANIZATION

The Topeka Railway Company was organized in 1892, taking over the Topeka Rapid Transit Company and the Topeka City Railway Company. In 1903 the present management took hold and consolidated with it the Topeka & Vinewood Park Railway.

The reconstruction of this property was begun in August, 1903. The L. E. Myers Company, of Chicago, previous to that, had built under contract the Topeka & Vinewood Park Railway. Soon after the completion of this, Mr. Myers and associates bought control of the Topeka Railway and began its reconstruction. During the past summer the Topeka Edison Company was purchased by the same interests.

The officers of the Topeka Railway Company are: President, E. W. Wilson, Pekin, Ill.; vice-president and general manager, L. E. Myers, Chicago; secretary and treasurer, F. G. Kelley, Topeka; auditor, E. C. Flowers, Topeka; general superintendent, A. M. Patten, Topeka.

ELECTRIC LOCOMOTIVE TESTS IN SWITZERLAND

The following table gives the results of some tests on energy consumption recently conducted in Switzerland with the 45-ton single-phase converter electric locomotive built by the Oerlikon Machine Works and described on page 951 of the STREET RAILWAY JOURNAL for Nov. 26, 1904. The values given are the averages of a large number of readings which were taken at the terminals of the trolley line at the primary station:

Speed		Weight of Train, Including Locomotive, in Metric Tons	Grade in Per Cent.	Energy Consumption in Kw
Kw per Hour	Miles per Hour			
42	25.0	45	0	90
42	25.0	45	0.8	139
37	22.9	120	0	90
37	22.9	120	0.8	129
32	19.8	160	0	190
32	19.8	160	0.8	235
30	12.4	250	0.8	320

As will be remembered, this locomotive takes current from an overhead contact line at 15,000 volts, and is equipped with a single-phase synchronous motor, direct connected to a d. c. generator, which drives the d. c. motors on the axles. The locomotive which is being given a test run had made up to Oct. 1, 4850 km (3031 miles), corresponding to 486,000-ton-km. During these tests no difficulties have arisen either with the locomotive or with the overhead line, in spite of the high voltage used.

In a recent article in the STREET RAILWAY JOURNAL on the freight business of the Toledo & Western Railway, reference was made to the sugar beet industry along the line. This crop is now being moved and the company is delivering to the sugar beet plant at Blissfield, Mich., an average of 2000 tons a day. The finished product will soon give the company an increase over this business.

FROM A CONDUCTOR'S POINT OF VIEW

In the issue of the STREET RAILWAY JOURNAL for June 3, 1905, a number of suggestions received from a conductor on a large electric railway system were published. From the same source have been received the following suggestions, which may be of interest as showing how some of the operating details look from the conductor's point of view:

PAYING EMPLOYEES BY CHECKS

A number of roads pay all their employees by checks, but there is one serious objection to this method, inasmuch as many of the employees proceed at once to the nearest beer saloon to have the checks cashed. As a matter of fact, the saloon-keepers are always more accommodating than any other class of merchants about cashing checks, and the arrangement not only encourages employees to visit saloons, but also gives the saloon-keeper something of a hold upon the men. On roads that pay their employees by check, it might be well to permit each conductor to cash his own pay check as well as the checks of the motorman and other employees out of his day's receipts, and turn these checks into the car house in lieu of an equivalent amount of cash.

PROFESSIONAL MONEY LENDERS

Speaking of the matter of paying employees suggests the fact that in some localities the professional money lenders are coming to be detrimental alike to the interests of street railway companies and employees. These unscrupulous money lenders will take the last cent from a man, yet the various street railway managements unconsciously assist them in their nefarious dealings by posting orders that the company will not allow its employees to sign over their pay to professional money lenders. Every employee, even the best of the men, sometimes runs short of cash and is forced to go to the professional money lenders. These unscrupulous brokers are clever enough to know that the order acts as a boomerang, as the money lender can threaten to inform the company that the employee is dealing with them, in case he does not pay promptly the exorbitant interest demanded. Any company can break up the business of the professional lenders by permitting its employees, if they have a reasonable excuse, to draw a limited proportion of their pay from the company in advance.

COMPANY APARTMENTS FOR EMPLOYEES

Most electric railway companies have a certain amount of ground covered by car houses, and the suggestion is made that additional stories could be built over the car houses and utilized as apartments or flats for their employees. A company could afford to rent these apartments at reasonable cost to the men and at the same time pay an interest on the investment. It would be a good thing for the employees, and at the same time it would be advantageous to the company, to have its employees near their work where they could be easily reached in emergencies, as snow storms, etc.

CONTRACTS FOR EMPLOYEES

The question has been asked why would not it be good policy for electric railway companies to follow the practice of baseball managers and sign contracts for, say, two, five and ten-year periods with certain of their old and reliable employees. For instance, a company might make contracts of this kind with 10 per cent of its best men, binding them to give their services to that road for the given period, and in consideration of the contract the company might agree to pay a certain bonus to the contract men. This arrangement would give the new men something to work for, as they could be assured that after a certain period of service the company would make a contract with them, and they would therefore be sure of a good, steady place for several years to come. Of course, the advantage to the company would be that it would always have a certain proportion of its men under contract, and although perhaps all of the men would not feel under moral obligations to respect their contracts, a large percentage of them would respect their obligations and live up to the terms of their agreement.

EMPLOYEES AND THE CLAIM DEPARTMENT

An obviously important matter to the claim department is the names and addresses of the conductors and motormen. In case of an accident the claim department usually wishes to call the crew to the office and question them as to the details of the occurrence. On the other hand, it frequently happens that the claim department wishes to subpœna a crew that had an accident at some remote period, from one to five years back. The practice at present on many large roads is for the claim department when it wants the address of a crew to telephone the division superintendent, who looks in his address book (if he has one) and sends the desired name and address to the claim department. If the crew has left the employment of the company a lot of trouble ensues for the claim department if one of the crew has changed his address. When a man is hired in any capacity by an electric railway company, especially as a motorman or conductor, his name and address should be immediately sent to the claim department and kept on file, and if he is wanted at some future time he should be looked up from the claim office direct instead of advertising the fact throughout the division. In important cases, long pending and unsettled, the claim department could do a little follow-up work in this respect and keep track of the men it may require as witnesses by having an investigator every once in awhile visit the localities where the men reside and make cautious inquiries. By this means, if a certain former employee changes his address and is ever wanted as a witness, the claim department will be better able to locate him than it would if it waited until the last minute.

SUGGESTION TO DIVISION INSPECTORS

The inspector of an electric railway company who is detailed along a given route to help keep the cars running on their proper schedules can save himself considerable trouble if he will make out the schedules in the same form as is used in keeping a baseball percentage table, showing the relative positions of the various nines. He should have a book and use a separate leaf for each line, ruling the page with vertical and cross columns. At the top of the vertical columns should be written the run numbers, and down the left-hand side of the page should be written the numbers or names of the cross streets. Then, at the intersections of the columns, the time should be inserted at which each run is due at each of the cross streets. On a long line it may not be necessary to put in each cross street, but certain important points can be selected as timing points, and only these points indicated on the sheet. For the purpose of illustrating the idea, it might be assumed that the length of a given line is 120 blocks, requiring about 50 minutes to make a single trip. The timing point might be selected about every 30 blocks, and it would therefore take 12½ minutes to run 30 blocks, 25 minutes to run 60 blocks, 37½ minutes for 90 blocks and 50 minutes for the entire trip of 120 blocks. The inspector, located at one of the timing points, asks the motorman of each car as it approaches what his run number is, and the inspector, by running his eye down the column for the given run number to the point of intersection corresponding to the timing point at which he is standing, can tell whether the car is on time or not. This matter will also be expedited if each car carries the run number upon which it is operating, on a small tin or wooden tag hung on the dashboard or under the hood, and then the inspector does not have to ask the motorman what run he is working on. The practice of indicating the run number on the car is especially convenient if the regular motorman happens to be off and a new man is on the run.

CORRESPONDENCE

OVERHAULING BY MILEAGE

UNITED RAILWAYS COMPANY OF ST. LOUIS

St. Louis, Oct. 20, 1905.

EDITORS STREET RAILWAY JOURNAL:

Your request for information in regard to keeping records of mileage and the number of miles allowed for the different motor equipments, for the guidance of the repair shop, the system of repairs and inspection used in taking care of the car equipment of the United Railways Company of St. Louis, is received. Each type of equipment is allowed to make a certain mileage before being brought in for general overhauling. The following table shows the mileage allowed:

	Miles
Cars equipped with four G. E. 54s, in oil and grease	12,000
" " two G. E. 57s, in grease	5,000
" " two G. E. 57s, in oil	8,000
" " four G. E. 57s, in oil	12.000
" " two Westinghouse 56s, in oil	8,000
" " two Westinghouse 56s, in grease	6,000
" " four Westinghouse 56s, in oil	12,000
" " four Westinghouse 95s, in oil	35,000

Notices are sent to foremen when the mileage approaches the above limits. The mileage of each car for every day is taken from the daily car register report. This card shows the times at which the cars are put in and taken off service, and consequently hours run per day. As the miles per hour made on each particular line is known, the total mileage for car and day can easily be calculated. As it is necessary for the auditor to have the number of miles made by each car every day for his own records, there is no extra expense attached to this method in getting the mileage for use in overhauling cars.

On the mileage record card, Fig. 1, you will find that car No. 2572 has made 33,363 miles up to and including October 15. This record is made up from the daily register report in the way described. This card shows that the car was first overhauled in 1905, on May 24, which is indicated by the cross (drawn in red ink). This symbol means that the car was overhauled as to all four motors. The car ran 18,425 miles in 1904, since its previous overhauling, as shown in the upper left-hand corner by the word "forward," and as it had run 17,577 miles in 1905, making a total of 36,002 miles, the car had run its limiting number of miles. When only one motor is overhauled, on account of defective armature, etc., it is shown by using the figure 1-2-3 or 4 for whichever motor it happens to be.

Now, the mileage made by car No. 2572 up to May 24, during 1905, was 17,577, and as we allow this car to run 35,000 miles, as stated in the previous table, this car will not be due for overhauling on all four motors until it has run 52,577 miles, providing nothing happens to the armature, or some other trouble comes up which would necessitate the bearings being taken out of that particular motor.

J 55.

THE FOLLOWING CARS WILL BE DUE FOR BEARINGS, OR WERE OVERHAULED ON DATES AS GIVEN. X MEANS BOTH ENDS.

Car No.	Date	Ends	Car No.	Date	Ends

FIG. 2.—SHOWING FORM SENT TO THE SHOP FOREMAN WHEN CAR IS DUE FOR AN OVERHAULING

J 49. 35,000 miles — Oil

MILEAGE RECORD. Equipment 4-West'g 95 motors — 1905 — CAR NO. 2572

Ovrd 11, 4/05	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT.	OCT.	NOV.	DEC.
1		3179	6473	9945	15110	18343	21060	24834	28451	31682		
2	164	3254	6594		15292	18465	21225	24969	28573	31752		
3	287	3372	6683	9958	15417	18580	21333	25095	28673	31913		
4	466	3444	6852	9971	15516	18751	21504	25212	28725	32080		
5	555	3618		10008	15697	18800	21610	25338		32205		
6	598	3782	6942	10035	15764	18826	21658	25491	28851	32284		
7		3901	7007	10216	15919	18862	21738	25632	29003	32466		
8		4030	7065	10402	16039	18947	21934	25706	29076	32645		
9	665	4209	7242	10517	16174	19068	22082	25900	29160	32716		
10	709	4297	7380	10617	16256	19180	22233	25990	29218	32806		
11	769	4415	7559	10784	16428		22388	26116	29343	32933		
12	892		7664	10941	16527	19290	22584	26217	29455	33003		
13	1071	4527	7690	10954	16608	19415	22712	26288	29580	33114		
14	1240	4586	7814	10967	16794	19527	22908	26483	29732	33225		
15	1346	4703	7991	11148	16861	19653	23091	26559	29835	33363		
16	1469	4882	8168		16909	19734	23212	26712	30009			
17	1549	5046	8194	11185	17034	19798	23389	26784	30051			
18	1713	5225	8381	11291	17147	19931	23567	26871	30225			
19	1757			13381	17228	20043	23679	26918	30363			
20	1936	5394	8407	13548	17282	20149	23692	27043				
21	2009	5467	8559	13561	17439	20268	23817	27196	30530			
22		5566	8704	13714	17564	20307	23902	27322	30655			
23	2128	5704	8877	13900	17577	20432	24096	27448	30742			
24	2246	5855	8917	14081 X		20460	24122	27548	30931			
25	2304	5980	9089	14248	17591	20533	24235	27761	31001			
26	2483			14429	17654	20547	24307	27804	31139			
27	2601	6075	9196	14521	17775	20633	24378	27915	31250			
28	2694	6254	9374	14693	17861	20646	24436	28016	31412			
29	2800		9537	14818	17974	20771	24513	28072	31498			
30	2918		9700	14929	18099	20896	24611	28179	31556			
31	3006		9800		18221		24770	28313				

Total 1 52577

Due 2 "

3 "

4

FIG. 1.—MILEAGE RECORD CARD MADE UP FROM DAILY CAR REGISTER REPORT

You will note on the bottom of the mileage record card, in Fig. 1, spaces for four horizontal lines on which are shown when each motor is due for overhauling. Whenever a car reaches this mileage limit a notice is sent to the shop foreman on a printed form, Fig. 2. This blank is filled in with the car number, date when due and the ends to be overhauled. When this notice is received it is understood that the car should receive a general overhauling—that is, the car body should be raised up, the trucks run out, the motors opened up and cleaned, the fields tightened; the pinions, gears and all other electrical parts of the car as well as the trucks and car body receive a thorough inspection. In other words, when a shop foreman receives a notice from the office to overhaul a car on all motors, it means that the car shall not be defective in any way, shape or form when finished. This notice is also used by the shop foreman to notify the master mechanic's office whenever he puts new bearings on a car.

In addition, each car is run over the pit on an average of every four days and given a general inspection, when any defects are attended to at once. If the nature of the defects should prove to be such that repairs cannot be made in time for the car to go out on its regular run, the car is then marked on the board to be held in until all defects are remedied and the car is in proper shape to go on the road. Besides this general inspection every four days, we have repairmen who are specialists in their particular part of the work. For instance, the men going over the controllers carry a small book with all the car numbers of the division, and as they go over each controller its number is checked off. In this manner they can see at a glance which is the next car to work upon. Our plan is to do the work systematically, so that those parts that are subject to wear will receive attention in proper time. In the writer's opinion, there is a decided advantage from the repair shop standpoint in keeping the individual mileage record of each car. M. O'BRIEN, Master Mechanic.

A WORD IN REPLY

New York, Nov. 6, 1905.

EDITORS STREET RAILWAY JOURNAL:

I have noted with some interest the comments called forth by my communication in the STREET RAILWAY JOURNAL, issue of Oct. 21, on the subject of the New Haven road's decision to adopt alternating-current locomotives for equipment and operation on the New York and Stamford division.

One of my critics says that I don't know, another that the possible future benefits may warrant any present inconvenience, and a third has it that the New Haven road may "fly the coop" and abandon the Grand Central Station.

All very interesting, no doubt, but somewhat wide of the mark, and I recommend to those who disagree with my conclusions a second and more careful reading, keeping in mind the specific existing conditions, before retiring with too much modesty behind a curtain of reluctance to publicly discuss engineering questions of great public interest, or losing themselves in shadowy speculations of a coming electrical millenium.

With all due respect, I beg to say that I see no reason to change my expressed convictions as to the general character of the decision announced by the New Haven people, even if pleading guilty to being "unfamiliar with the up-to-date development of electric locomotives"—especially the unfulfilled promises—of which defect in my engineering equipment I am, of course, painfully aware.

Despite my critical attitude, which seems to have given some concern to a few people, and which time will show whether justified, I am beginning to believe that I am a better friend of rational a. c. development, applied in a rational way to railway operation, while maintaining that the limit of d. c. operation is by no means reached, than a majority of those who sing its praises on a single strident but oft-times unmusical note—even if I am unwilling to see its present injection into the densest section of the train movement of two great railway systems, with almost inevitable adverse consequences.

Nor is it fair to the alternating-current system itself.

A proverb says:

> "A prudent man seeth the evil, and hideth himself;
> But the simple pass on and suffer for it."

What a lot the future holds for some of us!

FRANK J. SPRAGUE.

A GOOD WORD FOR GREASE

ST. FRANCOIS COUNTY ELECTRIC RAILWAY COMPANY

Farmington, Mo., Oct. 30, 1905.

EDITORS STREET RAILWAY JOURNAL:

Apropos of the discussion on changing over motors built to lubricate with grease in the armature bearings, so that oil can be used, the writer wishes to put in a word in favor of grease. In the writer's opinion there are at least two serious objections to the use of oil in the older forms of motors. These objections are the difficulty of obtaining satisfactory feeding and the obstacles in the way of getting (in practice) shop men to give proper inspection and attention to bearings and motors.

Take, for instance, the GE 800 motor. We all know that this motor is not easily changed so that oil can be used in the armature bearings, because there are no oil wells under the bearings. With this motor, therefore, it is necessary to employ an oil cup which will fit into the old grease box. To avoid splashing of the oil over the top, especially on city lines, the cup should have a cap to screw on the top, as the grease box cover is not sufficient. With a closed oil cup of any kind it is practically impossible to obtain regular feeding, because the motion of the car and the consequent splashing of the oil will upset the best of regulators. If the feeding device feeds too slowly, dirt and dust will accumulate at the end of the bearing, forming a black, gummy paste that will in time stop the flow of oil. The outcome of this is "rewind the armature." If enough oil is allowed to pass to the bearing to remove the dirt and keep the bearing clean, then there is a waste of oil which will amount to more than it would cost to keep a good attentive man to put in grease.

The GE 57 and West. 56 motors are more easily changed for oil lubrication by using some form of felt oiler, or by placing one or two layers of felt in the bottom of the grease box and a small piece of felt in the grease slot. Some master mechanics use charcoal on top of the felt, but it is a question if this is safe. Others use wool waste on top of the felt and pour the oil on top of the waste. Then the questions arise, shall a light or a heavy oil, or a cheap grade or a costly grade be used? But no matter what oiling device or what grade of oil be selected, it is the writer's experience that the oil will work into the motors. It will be thrown onto the brush holders, causing the dirt and carbon dust to accumulate on the brushes and holders in the form of a gummy paste that will soon cause trouble. Then some oil is bound to work into the armature insulation and cause slight grounds and short-circuits, materially reducing the efficiency of the motor.

The statement is frequently heard, "We have used or are using oil in the older styles of motors and have greatly reduced the cost of lubrication." In these cases the writer is prone to question: "No, it may not cost so much for lubrication, but do you know it is not costing more power than it did owing to oil-impregnated armatures? Are you using more armature and field material? Are your brush holder springs burning off any more than they did when you used grease?" These questions must all be considered carefully. We may equip three or four cars with oiled bearings, run them a while and say, these cars are doing well, we will equip all of our 500 or 1000 cars, as the case may be, for oil lubrication. But the point is, can the same attention and inspection be given the entire equipment that were given the three or four cars under test? The same care can be given, but under ordinary everyday conditions will it be given?

It is the writer's experience that where oil lubrication is attempted on the older forms of motors more men will be required to keep the inside of these motors free from dirt, especially around the brush holders and commutators, than when grease was used.

It will also be said that the bearings run longer with oil, but will the entire electric equipment run longer? It costs more to rewind an armature or field than it does to put in a new bearing.

On interurban roads where better inspection is possible and where the conditions are entirely different, oil lubrication is probably the proper solution, but on the average city system the writer believes that the motor built for grease and run with grease will in the end be more economical than the motor built for grease and run with oil. J. L. SULLIVAN, Master Mechanic.

Questions submitted to the Indiana Railway Commissioner indicate that the next Legislature will be asked to enact a law requiring interlockers at all crossing of steam roads and electric lines in the State, also to secure legislation that will result in compelling steam railroads to turn over to electric railways loaded freight cars for transportation over electric lines.

MEETING OF THE OHIO INTERURBAN RAILWAY ASSOCIATION

The Ohio Interurban Railway Association opened its winter campaign with a meeting at Columbus, Oct. 26. About fifty members were present, roads in West Virginia, Michigan and Indiana, as well as Ohio, being represented. It was decided to hold the next monthly meeting at Youngstown, in order to increase the interest in the association among the roads of Northeastern Ohio and Western Pennsylvania.

President E. C. Spring reviewed the work of the previous campaign and stated that, although a great deal had been accomplished, he felt that the association had reached a critical stage. He thought that while many innovations of mutual benefit could be worked out under present methods, the aims of the association could best be subserved in following the example of the national association in the formation of a permanent organization with a salaried secretary, who could handle the increasing work of the interchangeable transportation committee, compile data and information, and work out plans for bringing before the public the advantages and possibilities of travel by electric roads. He thought that such a permanent organization could be made self-supporting, or practically so, by the publication of an official organ, together with time-tables, maps, guides, etc. He stated that the matter had been thoroughly discussed at the meeting of the executive committee the evening before and that it had been decided to send a circular letter to the various companies to ascertain how many would agree to support this movement until it could be made self-maintaining. It decided that each company should be asked to guarantee a maximum of $50 within a year, to be paid in instalments of $5 a month each. An effort will be made to induce Michigan and Indiana roads to co-operate in the plan, and it will be decided upon at another meeting.

The transportation committee reported that six companies had entered into the interchangeable coupon book agreement since the last meeting. Reference to these additions have been made from time to time in these columns, the Indianapolis & Eastern and the Lake Erie, Bowling Green & Napoleon being the latest acquisitions. The books are now good on 1816 miles of roads—1138 in Ohio, 571 in Indiana and 170 in Michigan. A number of additional roads in these States have signified their intention of signing the agreement after the first of the year. The chairman is in correspondence with the various roads, parties to a similar arrangement in Northern Illinois, and it is believed that these roads will readily agree to join hands with the stronger movement. There are now 3800 books in use in Ohio, 1900 in Indiana and 400 in Michigan. One company, the Springfield & Charleston Traction Company, has withdrawn from the agreement by order of the court, in whose hands it is, but aside from this, all the roads are pleased with the arrangement and find that it has increased their business. Steps have been taken to advertise the book in certain periodicals read by traveling men, and the Associated Press has agreed to make mention of new roads entering the agreement in its railway reports.

The chairman of the committee urged that the various roads, parties to the agreement, make their exchange reports to each other on or before the 5th of the month, as provided for in the contract; certain roads having failed to do this, causing some dissatisfaction and annoyance.

The treasurer reported all debts paid and a good balance on hand.

F. W. Coen, representative of the association at the Philadelphia convention of the American Street and Interurban Railway Association, reviewed briefly his impressions of the convention, which he stated was the most successful and most interesting gathering in recent years. He expressed the opinion that the greater prominence given to subjects of interest to interurban operators, together with the formation of a permanent organization, were responsible for this. He dwelt at some length upon the appointment of an insurance committee and the work already accomplished in the line of mutual insurance, and suggested that a committee be appointed to investigate this matter for the Ohio Association. The chair later appointed F. W. Coen, Theodore Stebbins and R. E. DeWeese to serve on this committee.

Henry N. Staats, secretary of the mutual insurance companies formed in Cleveland, and which have been referred to on a number of occasions in these columns, outlined their plans. As an example of the importance of this insurance proposition to all traction companies, he said that Henry J. Davies, secretary of the Cleveland Electric Railway, had recently corresponded with traction companies all over the country, inquiring the cost of insurance and the fire losses for a period of ten years. Some 420 roads replied giving tangible information, from which it was deduced that these roads had paid out $6,485,645 in premiums and had recovered $1,673,285 from fire losses in ten years, the per cent of recoveries to premiums being 27.66 per cent. "And yet," said Mr. Staats, "the old-line companies have had the temerity to tell you they have been insuring street railway properties at a loss." He said that 25 per cent of the premium went to the agent who carried the contract from his office to the street railway company's. The new mutual companies, he said, would issue policies at 1 per cent of the valuation, and he thought this would be reduced to half that amount after they were fully organized. Twenty-seven companies, some of them the most prominent in the country, have agreed to give all or part of their insurance to the traction mutual companies, and he said they expected soon to have sufficient guarantees to make the plans operative.

Judge E. P. Mathews, of Dayton, was appointed chairman of the legislative committee in place of the late Dr. J. E. Lowes, of Dayton.

Prof. E. P. Roberts, of Cleveland, invited members to visit the new club rooms of the Cleveland Electric Club, Schofield Building, that city, and to attend its monthly meetings and smokers while in that city. Prof. Roberts has just been elected president of the organization and has instituted an enthusiastic campaign for building up the club. Prof. Roberts also suggested that Ohio members investigate and inquire into the development and the merits of gasoline and oil engines for traction service. He predicted that there would be interesting and important developments in such lines in the not distant future.

A part of the noon intermission was devoted to inspection of certain new lines of material exhibited by supply men. W. P. Caspon, of the Garton-Daniels Company, showed the automotoneer and a number of specialties; W. E. Hinmon, of the Ohmer Fare Register Company, exhibited the Ohmergraph transfer issuing machine and the latest Ohmer register for interurban roads; while Murdock MacDonald, of the MacDonald Ticket & Ticket Box Company, Cleveland, showed an improvement on the MacDonald cash-fare receipt system which is in use on a number of Ohio interurbans.

AFTERNOON SESSION

The afternoon was to have been devoted to a discussion of the subjects: "What should be the proper width of interurban cars in order to give passengers the same comforts which they receive on steam roads?" "What should be the space between seats and width of aisles?" "What should be the width of devil strips between tracks on city and interurban lines?" "What is the best track construction on paved streets." But the session was cut very short in order to accept an invitation to inspect the line of the Scioto Valley Traction Company. The matter was put to a vote and passed by a small margin, but there was considerable dissatisfaction, especially from those who came from distant points, with the general proposition of breaking off the work of the association to take in what are frequently purely pleasure trips and social functions. In this case, however, the time was well spent, as the line in question is the only third-rail line in the State, and is considered to be one of the best built and best operated roads in the country.

E. P. Roberts opened the discussion on the subject of the width of cars. He said that while it was desirable to standardize car widths, there occurred to him three important points to be considered: First, the width permissible due to municipal restrictions; second, the methods of making use of the available space to provide for different kinds of service; third, the cost of grading on interurbans and the cost of paving on city streets.

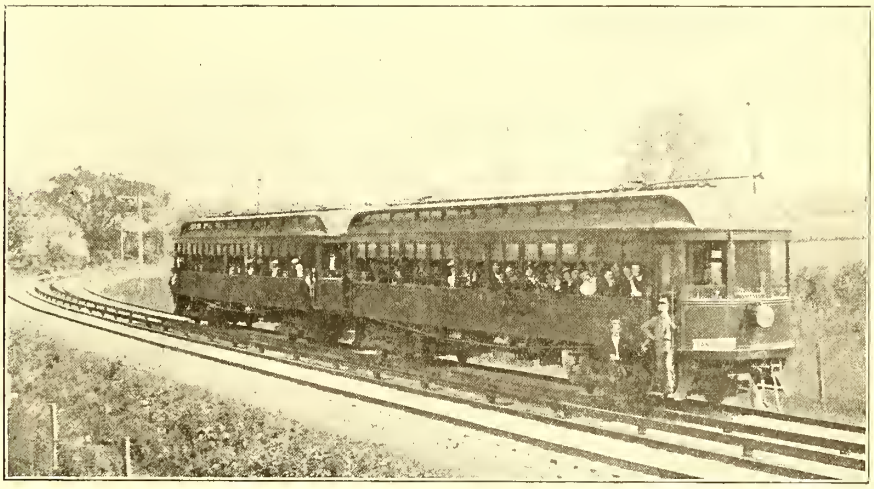
On the first point it was generally the rule to get as wide a strip as possible in the cities, although sometimes city companies declined to take all they could get on account of increased cost of paving. He thought interurbans might well help to pay for increased width of devil strips in cities. As interurban lines become longer and interline traffic greater, there is more and more complaint of uncomfortable and narrow seats. He thought interurban companies should design a different type of car for the long limited runs than for the local runs. He referred to the chair cars in use on some roads, but the objections to these is that they limit the seating capacity. The long-distance cars should have wide and deep seats, high roll backs and tilting cushions so that passengers will not tend to slide off from seats. Arm-rests he thought desirable, and for this class of travel he thought there was no objection to cutting down the aisle-space to the smallest possible degree in order to make the seats wider and more comfortable. There should be plenty of knee room and seats against partitions should have a slanting back as well as other seats; the space left by this slope could be used for storing card tables or other accessories. Seats should not be too high from the floor and there should be foot-rests. For local and short-haul traffic, he said the seats should be narrow and the aisles wide. Low back seats were more desirable than high back for such runs, as they afforded a maximum seating capacity. There should be no arm-rests and the backs should be hollowed out to afford free passage in the aisles. There should be longitudinal seats near the doors so that a number of passengers could stand there. This would also effect quick loading and unloading. He referred to a car which his company is designing for one of the most prominent high-speed roads in the country. This car will be 9 ft. wide over all and 8 ft. 6 ins. over sills. The seats will be 35 ins. center to center, 35 ins. from inside of panel to edge of arm-rest; cushions, 17 ins. x 35 ins.; corrugated backs, 26 ins. high; aisles, 19 ins. wide. The cars will have a smoking compartment, toilet room and washstand and a small baggage compartment, and will be 60 ft. long.

J. C. Gillette, master mechanic of the Columbus, Delaware & Marion Railway, said they had some cars which had 36-in. seats and very narrow aisles. On these the eaves and drip board had been dispensed with. The windows came down almost flush with the car seats, and the bodies are 4 ins. narrower at the sills than at the windows. These cars are 67 ft. long.

Further discussion was interrupted by the adjournment for the Scioto Valley trip.

THE SCIOTO VALLEY TRIP

General Superintendent S. S. Bradley, assisted by his master mechanic and his passenger agent, was in charge of the car. Each of these gentlemen took particular pains to point out the most interesting features of operation and construction, so that the trip was the source of a great deal of valuable information for many. This property was quite thoroughly described in the STREET RAILWAY JOURNAL of Dec. 3, 1904, and the large and well-equipped power station and the substantially built roadbed and third-rail construction, which were profusely illustrated in that number, were the subjects of many favorable comments. The line has recently been extended from Circleville to Chillicothe, and this work, which was done by the company under the supervision of Mr. Bradley, is even better than the old. The roadbed is graded 16 ft. wide, and from 20 ins. to 30 ins. of excellent gravel is placed under and around the ties, covering the ends. This piece of track, which has been in use less than sixty days, was in beautiful condition, and the managers all agreed that it was as fine as any they had ever seen on an electric line. The road has many long tangents and the cars equipped with four 125-hp motors make better time between terminals than the steam road which closely parallels the line. New station buildings have recently been erected in all important towns. They were designed for the



TWO-CAR TRAIN ON THE SCIOTO VALLEY TRACTION COMPANY, CARRYING MEMBERS OF THE OHIO INTERURBAN RAILWAY ASSOCIATION ON INSPECTION TRIP

future, the machinery rooms having space for two 400-kw rotaries and controlling apparatus, and there is a large passenger waiting room with ticket office, and an unusually large freight and express room with unloading platforms for cars and teams. The buildings are of natural colored brick with concrete foundations and floors and tile roofs. It was figured that it was economy to erect buildings of this character and carry no insurance on them rather than to build frame station buildings, making insurance necessary. The cost of third-rail maintenance as compared with overhead interested many, and Mr. Bradley stated that thus far it had cost less to maintain the entire third-rail and high-tension systems than the 1½ miles of trolley line in village streets. As to removal of snow and ice, he admitted that they had discovered no absolutely reliable method of keeping the third rail clear in certain kinds of weather, but the road was only tied up once for a period of 30 minutes last winter.

Motormen on this line are all old steam locomotive engineers, a number of them from the parallel steam road. They are paid 25 cents an hour, and conductors 20 cents. The plan of promotion by order of seniority has been dispensed with; in fact, all runs are equal, as they are changed regularly. A man starts early in the morning for one period of two weeks and then starts in the afternoon and works until late at night, and the men are shifted from one division to another at regular intervals. This eliminates all dissension and the men are all on the same footing. Mr. Bradley claims they are well pleased with this arrangement after they become accustomed to it. Steam rules are followed as closely as is practicable. Orders are issued in duplicate on tissue paper, and the orders are complete, no abbreviations being used.

It will be remembered that the road has two divisions which join 12 miles out of Columbus. Formerly the cars of the two divisions ran in and out of the city 5 minutes apart, but now they are brought into the city in trains, and frequently three cars are hooked together. The sight of three big 60-ft. cars running through the narrow streets and into the business district of the city was one which excited the admiration of the managers. The cars have type M controllers, with Westinghouse straight air brakes and VanDorn couplers with 9-ft. beams, so that they make the right angle curves in the city without difficulty. In increasing the service for summer traffic, Mr. Bradley believes it is much better to operate cars in trains than to give half-hour headway, and it was pretty generally agreed that the cars on the half-hour usually run light, while those on the hour are crowded. People do not become accustomed to the half-hour cars until they have been on for a number of months, and then when they are taken off in the fall there are complaints, so it is better not to put them on at all. With train operation, the labor cost is, of course, reduced, although Mr. Bradley makes it a practice to have a conductor on each car. This not only increases the safety of operation, but insures getting all the fares. Bell ropes are not carried through the trains, and while it takes a few seconds more to ring two or three bells, there is not the liability of accident.

The company is just preparing to take up the freight proposition and it is building a passenger and freight terminal in Columbus. It is located in the wholesale district, and it will have ample room for loading and unloading a number of cars. When this is completed the company will entirely abandon the use of the interurban loop which traverses the heart of the shopping district and which is responsible for a great loss of time and excessive wear and tear on equipment. For freight service it is the intention to install a number of box-car trailers, which will resemble the interurban cars by having windows and steam road roof.

The passenger business thus far has proven most gratifying, and it is believed the freight business will place the property on excellent paying basis. The company has never sold any of its bonds and will not do so until the property is more thoroughly developed.

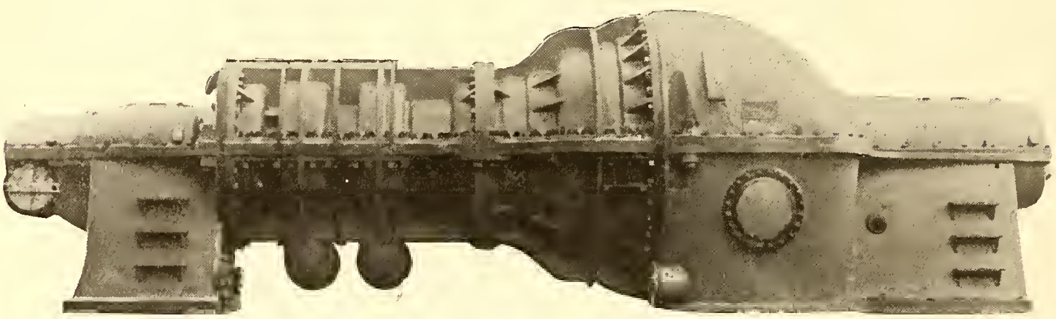
The Indiana Supreme Court has decided that a baseball park owned by an interurban traction company in connection with a pleasure resort, and communicating with it by gates, through a high board fence, used for playing baseball on Sunday, requiring persons to purchase tickets for the privilege of passing through said gates and sitting in the grand stand to watch the game, in preference to standing at the two sides of the park where there is no fence, and for the privilege of which no fee is charged, is a violation of the law prohibiting the playing of baseball on Sunday where an admission fee is charged.

9000-HP STEAM TURBINE FOR BROOKLYN

The sixth of the huge power plants to be constructed for the Brooklyn Rapid Transit Company will show, in some respects, a radical departure from the features usually found in stations where reciprocating engines are installed. Among the more important of these is the small floor space needed for the machinery. The engine room of the ordinary station requires 60 per cent of the total ground space, and the boiler section 40 per cent. In the new turbine plant, the turbine floor occupies but two-thirds the space required for the boilers.

The Brooklyn Rapid Transit Company's new Williamsburg station is designed to accommodate a total of nine steam turbine and generator units, three of which are now being installed. One of the most interesting of these is the Allis-Chalmers 9000-hp unit. A view of the body of the turbine, as it appeared when loaded on a 36-ft. flat car for shipment from the West Allis works of the Allis-Chalmers Company, is shown in the accompanying illustration.

The turbine is of the horizontal multiple-expansion, all-around parallel-flow type, generally known as the Parsons type, operating at 750 r. p. m. The generator is a Bullock alternating-current machine, built by the Allis-Chalmers Company at its Cincinnati works. It will carry 25 per cent overload continuously and 50 per cent overload for three hours with but small temperature rise.



9000-HP STEAM TURBINE FOR WILLIAMSBURG STATION OF BROOKLYN RAPID TRANSIT COMPANY

A noteworthy feature in the construction of the Allis-Chalmers turbine is the blading; the blades are made of a special alloy and of such form and dimensions as will secure the highest economy. The individual blades are mounted in groups, each group forming one-half of a circular row. The inner ends of the blades are swaged, firmly secured in accurately spaced slots in foundation rings and riveted in slots in their respective channel-shaped shrouds. The blade rings are secured by special calking strips in accurately machined grooves in the cylinder and rotor, thus absolutely insuring against throwing out due to centrifugal force. The channel-shaped shroud secures the blades in a substantial manner at the proper angle and spacing, and eliminates the danger of stripping, permitting the turbine to be safely operated with a minimum radial clearance. This special design of blading does away with hand work. The machine construction insures great strength, perfect alignment and uniformity in the spacing of the blades. Having adopted the proper working principle, the efficiency of a steam turbine depends on the accuracy of the angles, the spacing and the form of the blades. All of these factors are obtained in the construction of the Allis-Chalmers turbine.

The lubricating arrangement is free from complications, complete and efficient. It is equipped with a direct-acting steam pump for use on starting up the turbine. The turbine and generator rotors are direct connected by a flexible coupling, each being carried in two bearings of the ball and socket type. In the generator design especial attention has been given to thorough ventilation.

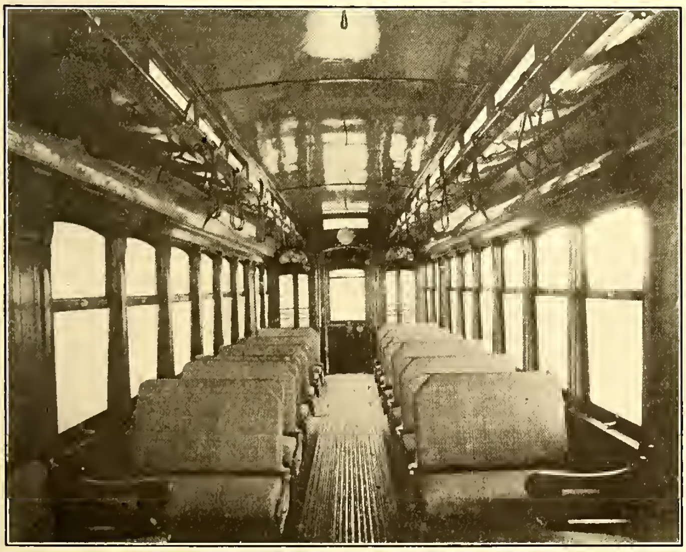
The turbo-generating unit measures approximately 47 ft. in length over all, 13 ft. 3 ins. in width and 11 ft. 6 ins. in height above the engine room floor. Its height above the foundation is scarcely more than that of the low-pressure cylinder of a reciprocating engine, of equal capacity, above the upper platform, and such cylinders are frequently more than 30 ft. above the engine foundations.

CLOSED VESTIBULE CARS FOR THE ELECTRIC RAILWAYS OF SEATTLE AND TACOMA

The Seattle Electric Company has recently received fifteen closed vestibuled cars, and the Tacoma Railway & Power Company three cars of the same type from the American Car Company, which were ordered through Stone & Webster, Boston. As the cars are identical in every respect, one description will suffice for both orders. The length over the end panels is 30 ft., and over the crown pieces, 40 ft.; the length of the platforms is 5 ft.; the width over the side sheathing is 8 ft. 4½ ins.; the distance between the centers of the posts is 2 ft. 8 ins. Double side sills are used, 3¾ ins. x 7¾ ins. and 2½ ins. x 7 ins., with 7-in. I-beams in place of sill plates. The corner posts are 3¾ ins., and the side posts, 2¾ ins. Only the lower sashes of the double sash windows are movable. These sashes drop into pockets in the side walls, which have hinged covers.

ONE OF THE NEW CLOSED VESTIBULE CARS FOR SEATTLE AND TACOMA

An interesting feature of the side construction noticeable in the view of the exterior of the car is a dead light between the second and third windows at each end. This construction is on account of the longitudinal corner seats, which are made to accommodate five passengers each, and the arms of which come in the center of the dead light. The transverse seats, which are of Brill manufacture, are upholstered in spring cane and have push-over backs and tilting cushions. Another feature, which is unusual, is the employment of double vestibule corner posts, with a light between. The vestibule entrances are without doors, and as the vestibule is brought well around to the sides, the light is placed between the double posts to extend the range of the motorman's vision. The platform timbers are reinforced with angle iron, and angle iron center knees extend 4 ft. 9 ins. back of the body bolsters. The height from the track to the platform step is 16⅝ ins.; from the step to the platform, 14½ ins., and from the platform to


SEATING ARRANGEMENT OF NEW CLOSED VESTIBULE CARS FOR THE SEATTLE AND TACOMA ELECTRIC RAILWAYS SHOWING THE LONGITUDINAL CORNER SEATS

the car floor, 8 ins. The trucks are the Brill No. 27 G-E-1 type, having solid forged side frames. The wheel base is 4 ft., and wheel diameter, 33 ins. Four motors of 40-hp each are used per car.

The Rio de Janeiro Tramway, Light & Power Company, incorporated under the laws of New Jersey, has filed a certificate changing its name to the Villa Isabel Tramway Company.

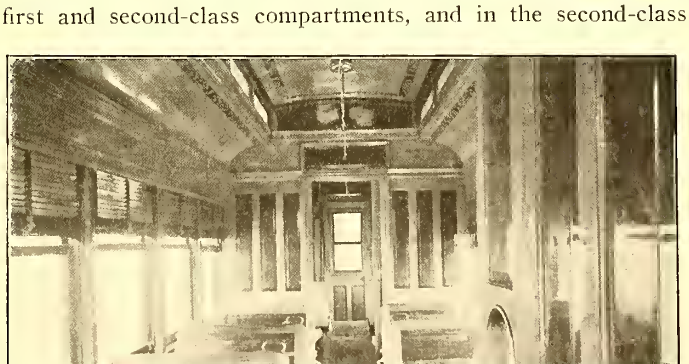
NEW EQUIPMENT FOR RAILWAY IN COLOMBIA

The J. G. Brill Company is shipping in sections the type of car illustrated to the Ferro Carril de Antioquia, a 42-mile line between Puerto Barrio and Caracoli, in the department of Antioquia, Colombia. The first-named city is on the Magdalena River, the chief navigable waterway of the country, and is at the point where navigation stops, owing to rapids. It is therefore an important commercial center, through which most of

EXTERIOR VIEW OF CAR FOR ANTIOQUIA, COLOMBIA, FITTED WITH FIRST AND SECOND-CLASS COMPARTMENTS

the business, from the capital, Bogota, to the south, and Medellin to the west, is transported. An extension of the railroad will shortly be completed to Medellin, which is 118 miles from the present terminus. The railway is a government line, administered by the Antioquia Department, and most of its equipment has been supplied by the J. G. Brill Company.

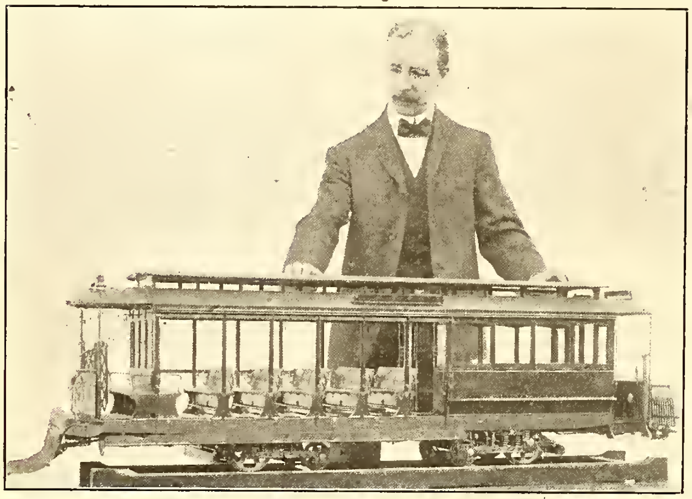
An interesting feature of the cars is in the fact that, although but 21 ft. long over the bodies, they are divided into first and second-class compartments, and in the second-class


INTERIOR VIEW OF ANTIOQUIA CAR, SHOWING SLAT SEATS IN SECOND-CLASS COMPARTMENT AND CANE SEATS IN THE FIRST-CLASS COMPARTMENT

compartment have a saloon of standard character. The cars are handsomely finished in cherry and ash, and have decorated birch ceilings. The seats in the first-class compartment are of spring cane, while those in the second-class have cherry slats. The seats have reversible backs and are manufactured by the builder. The trucks are the standard type used on the line, and are also built by the Brill Company. The wheel base is 4 ft., and the diameter of the wheels, 24 ins.

AN INTERESTING MODEL OF THE METROPOLITAN COMBINATION CAR

The model shown in the illustration was recently presented to H. H. Vreeland, president of the New York City Railway Company, by the J. G. Brill Company. It is a perfect working model of the type of car known as the "Metropolitan Combination," and was built to the scale of one-eighth of the full sized car. The type is a familiar one to New Yorkers and



MODEL OF NEW YORK CITY RAILROAD COMPANY'S "METROPOLITAN COMBINATION" CAR

very popular with them. It was first introduced in New York early in the fall of 1898 to meet a decree of the Board of Health, that every fourth car in summer be closed. Smoking was allowed in the open part, and when cold weather came along, the requests to continue the combination cars in service were so numerous that they became a regular part of winter as well as summer equipment. The car is a modification of the "California" type, and was planned by John A. Brill, vice-president of the J. G. Brill Company.

The model was made entirely at the works of the J. G. Brill Company, and both the body and trucks are completely operative. The window sashes may be raised and lowered, the seat backs reversed, each section of the twin-doors open simultaneously, the brakes are operated by ratchet-brake handles, and every other part is reproduced exactly in miniature. The model was exhibited in the Brill parlors at the Bellevue-Stratford Hotel, Philadelphia, during the recent American Street Railway Association convention, and was examined with interest by a large number of the delegates.

TORONTO ELECTRIC MILEAGE DATA

The following table shows the mileage of the Toronto Railway Company and the number of passengers carried from 1892, when the system was converted into an electric railway, up to the end of 1904:

	Mileage of Tracks	Passengers Carried	Population
1904......	92.93	60,127,460	293,395
1903......	92.78	53,055,322	250,757
1902......	90.09	44,437,678	237,144
1901......	88.91	39,848,087	221,583
1900......	85.06	36,061,867	214,967
1899......	85.00	31,826,940	208,340
1898......	84.83	28,710,388	201,439
1897......	86.14	25,271,314	197,826
1896......	85.28	23,537,911	192,440
1895......	85.22	23,353,228	191,007
1894......	81.43	22,609,338	188,914
1893......	78.84	21,215,010	188,914
1892......	70.42	19,122,022	188,914

THE NEW YORK CENTRAL-NEW HAVEN SITUATION

In a recent interview in the New Haven "Register," E. H. McHenry, fourth vice-president of the New York, New Haven & Hartford Railroad Company, discussed the letter by Frank J. Sprague on the New York-New Haven situation published in the STREET RAILWAY JOURNAL for Oct. 21. Among other things, Mr. McHenry said:

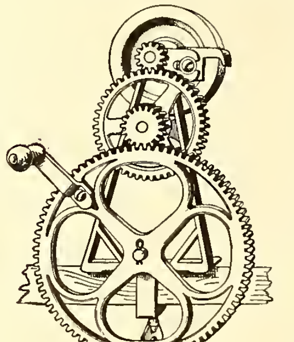
The new electric engines of the New York, New Haven & Hartford Railroad, now under construction by the Westinghouse Electric & Manufacturing Company, are of the interchangeable type. They are expressly designed to operate under all practical conditions within wide limits. They will be able to use both alternating current and direct current, high tension or low-tension alternating current, to take current from the "deadly third rail" or from overhead conductors, from high conductors or low conductors at varying heights between 14 ft. and 22 ft., and to operate with equal facility on either or both of the two track levels of the Grand Central Station. On sections equipped for direct current, they will operate in every respect as direct-current engines of high commercial efficiency, and on sections equipped for alternating current, with still higher efficiency.

The adoption of this most flexible type of engine by the New Haven company introduces no new features or difficulties in the track equipment, or operation of the Grand Central terminal, and will not entail upon the New York Central the necessity of an additional dollar nor the transposition of a wire. It would certainly seem, therefore, that no departure from the standards established by the Electric Traction Commission of the New York Central Railroad could be less objectionable from any point of view. The public is informed that its interests are imperilled by the action of the New Haven company, but so long as travelers resist all temptations to sit on the third rail or to "skin the cat" on the trolley they can safely ignore the harrowing technicalities elaborated by Mr. Sprague.

Regarding the multiple-unit system, the New Haven company has been lately assured by competent authority of the perfect feasibility of adapting interchangeable alternating and direct-current motors to such service, subject to disabilities of increased weight and cost, and the New Haven company is, accordingly, not estopped from the use of this kind of equipment should it prove desirable. The adoption of this equipment is, however, subject to other considerations quite independent of motor design and control, and is still under consideration.

HIGH-SPEED CARBORUNDUM GRINDER

The carborundum grinder shown herewith is a compact and durable portable machine which the Royal Manufacturing Company, of Lancashire, Pa., has in successful use on a number of electric and steam railways for maintenance of way work, rail bonding and bridge building. Where this machine is in use it is necessary to carry only two or three drills to avoid delays due to cases of breakage. The grinder, which is known as the "Practical," is geared for high speed, and presents the advantages of a high-cutting abrasive tool easily installed and operated in any position along the track where work is going on or in the shop or tool room. It is claimed for this grinder that it will not glaze nor require much pressure in carrying on its work, thereby increasing the life of the wheel. The grinder and frame are made of gray iron and the spindle of steel. All of the parts are interchangeable. A wheel can be taken off and any desired wheel of any shape fitting the same size hole put in its place. The dimensions of this grinder are 12½ ins. high over all and 7½ ins. wide. The wheel is 4-in. x 1-in. x ⅝-in. hole. Total weight of machine, 6 lbs.



CARBORUNDUM GRINDER

FINANCIAL INTELLIGENCE

Wall Street, Nov. 8, 1905.

The Money Market

Considerable firmness developed in the local money market during the week, rates for all classes of accommodations rising sharply, as a result of a more active speculation in stocks, and the unusually heavy demand for funds at Western and Southern points for crop moving and other purposes. During the week ending Nov. 4, the net cash loss sustained by the New York banks was the largest, with two exceptions, since the beginning of the outward movement of funds last August, and at the present time indications point to a continuance of the outflow of money for some time to come. Prevailing rates of exchange at the principal interior points show that the demand from this source is still urgent, which, together with the extremely low bank reserve, is likely to result in a continued firm market. The European markets have also ruled firm, largely on account of the disturbance throughout Russia, but apart from an advance in the discount rate to 5½ per cent by the Imperial Bank of Germany, rates show no decided change from those ruling at the close of last week. The demand for gold at European centers has been urgent, especially at Paris, and shipments of the precious metal from this side have been averted only by the high rates prevailing in the local money market. Quotations for foreign exchange, however, are still near the gold export point, but the general opinion is that shipments of gold have been arrested, at least for the present. The bank statement published on last Saturday was a decidedly unfavorable document. Loans increased $16,453,000, due largely to the activity in the securities market. Cash decreased $7,405,100, which was somewhat larger than had been expected. Deposits increased $10,686,200. The reserve required was $2,671,550 larger than in the preceding week, which added to the $7,405,100 decrease in cash reduced the surplus reserve by $10,076,650. The surplus now stands at $2,354,275, as against $10,112,400 in 1904, $5,394,225 in 1903, $17,852,350 in 1902, $8,689,925 in 1901, and $4,606,050 in 1900.

Money on call loaned at 4½ and 10 per cent, the highest since July, 1903, the average for the week being about 6 per cent as against 5 per cent in the preceding week. Short time loans were placed at 5 and 5¼ per cent, as against 4¾ and 5 per cent a week ago, while six months' funds held firm at 4¾ per cent. Commercial paper has ruled quiet and firm at 5 to 5¼ for the very best indorsement.

The Stock Market

A notable feature of the stock market during the past week has been the unusually heavy selling for London account, based in very large measure upon the greatly disturbed condition of affairs in Russia, which lead to a temporary suspension of the proposed big loan by that government, though the further advance in the Bank of Germany's discount rate and talk of another increase in that of the Bank of England likewise served as more or less disturbing factors. Added to the above were still higher rates for call loans in the local money market, the highest in fact for years past, and the doubts which prevailed with reference to the outcome of the election in New York. These unsettling elements led to a good deal of selling for home account, which, coupled with that by the foreigners already noted, created considerable irregularity at times, and at the close, when the money rate reached its highest level, some weakness was apparent. On the whole, however, the market may be said to have acted exceedingly well under the circumstances, and to have given every evidence of a maintenance of that remarkable power of absorbtion which has characterized it for so long a time. Many stocks not only made decided advances, but also sold at the highest figures on record, the most notable cases in point being American Smelters and Reading. Fears were again revived of a corner in the last named, and because of this the general market did not sympathize at all times with the decided buoyancy in that stock. Assurances were forthcoming, however, that no corner was being worked in Reading, although it was admitted that a good deal of the upward movement was due to a squeeze of the extensive short interest in the shares. Respecting general business conditions everything continues decidedly healthful, and the existing heavy demand for funds from the interior, and particularly from the West and South, is indicative of unusual commercial activity in those sections. In the iron and steel trade the situation is brighter than ever, as shown by the fact that October was a record breaking month in the matter of output, the railroads, especially in the West, continuing to report an unprecedented volume of traffic moving, and earnings of the transportation companies are in practically all cases thoroughly satisfactory. All these matters go to explain the comparative steadiness of the general share speculation in the face of the unsettling conditions above set forth.

Very naturally a great deal of interest centered in the local traction stocks during the week on account of the election, with its attendant active agitation of the question of municipal ownership. In consequence the shares of these companies displayed more or less feverishness, and even though the head of the municipal ownership ticket suffered defeat at the polls, these stocks failed to show any resiliency at the close, but on the contrary were weak, in sympathy with the decline in the general list resulting from the higher money rates. Despite this reactionary tendency there was good buying of some of these issues, this being especially true of Brooklyn Rapid Transit, which was purchased on the excellent showing which the earnings of the company made for the September quarter.

Philadelphia

Increased activity developed in the local traction issues this week, and prices generally have displayed a decided firmer tendency. Interest centered almost entirely in Philadelphia Company common. Dealings were upon an enormous scale, upwards of 56,000 shares changed at prices ranging from 48⅞ to 53⅞, the highest price attained in several years. At the high figure some profit taking developed, which carried the price off to 58⅛ at the close. The activity and strength in this stock was attributed to an announcement that an offer has, or will, shortly be made for the entire capital stock of the company, and it is understood that the local interests in the company have agreed to go into the syndicate. The price at which the stock is to be acquired has not as yet been fully agreed upon, but it is said to be between 60 and 65. It is also stated that the company has sold 20,000 shares of treasury stock, the proceeds of which will be used for betterments, additions and other corporate purposes. The preferred stock ruled extremely quiet and without material improvement in prices, about 600 shares selling at from 49 to 50. Philadelphia Rapid Transit displayed moderate activity, about 2500 shares changing hands at from 27⅝ to 28¼. Other transactions included 447 Union Traction at 62⅝ and 62¾, 280 Consolidated Traction of New Jersey at 81¾ and 81⅜, Railways general at 4¼ and 4½, American Railways at 52¾ to 53¼, Rochester Railway at 104½, Union Traction of Pittsburg at 31, and Philadelphia Traction at 100¼ and 100½.

Baltimore

There has been a general improvement in tractions at Baltimore. The demand for these issues has increased materially, and as a result prices in many instances show substantial net gains over those ruling at the close of last week. United Railway issues constituted the leading feature, trading in them being stimulated by renewed reports of refinancing the company. The income bonds were heavily bought, upwards of $186,000 changing hands at from 65½ to 66¾. The 4 per cents ruled firm at 92⅝ and 92¾, about $65,000 being traded in. More than 2000 shares of deposited stock sold at 16 and 16½, while $4,000 deposited incomes brought 66¼. City & Suburban 5s sold at 114⅞ for $5,000, and $2,000 Washington City & Suburban 5s brought 106½. Other sales were: $1,000 Baltimore City Passenger 4½s at 101, $1,000 Newport News Railway at 96, $5,000 Virginia Railway & Development 5s at 99¾, $6,000 Macon Railway and Light 5s at 100, $2,000 Knoxville Traction 5s at 106½, $1,000 Philadelphia Companys 5s at 110¼, and $2,000 Pittsburg Union Traction 5s at 115¼.

Chicago

Trading in the Chicago market was dull and devoid of special feature. Chicago Union Traction was stationary at 12½, 700 shares changing hands at that price, and 10 shares of West Chicago brought 60. South Side Elevated held firm, 227 shares of the common selling at 97 and 97½, while small lots of the preferred stock brought 105 and 105½. Chicago & Oak Park common brought 6¼ and 6 for 210 shares, and odd lots of the preferred sold at 20½ and 20, the closing transactions being 20¼. Other sales were: 115 Metropolitan Elevated common at 27⅞ and 28, 100 preferred at 72 and Northwestern Elevated at 23 and 23¼

Other Traction Securities

The Boston market was irregular. Boston & Suburban, after selling at 19 at the opening, broke to 15, and later rallied to 18, while the preferred rose from 62 to 64, and closed the week at 63. Boston Elevated ruled firm, sales of 150 shares being reported at from 154 to 153 and back again to 153⅞. Massachusetts Electric common was steady, 800 shares selling at 13, while the preferred fluctuated between 56½ and 55, closing at the lowest. Boston & Worcester preferred rose from 72 to 74, and closed at 73½. West End common brought 99½, and the preferred brought 114½. On the New York curb, Interborough Rapid Transit has ruled weak, about 2200 shares changing hands at from 211½ to 206½. Later, however, the stock rose sharply to 212¼, on the defeat of the Municipal Ownership candidate at Tuesday's election, but near the close the price reacted 2 points in sympathy with the decline in the general stock market, the final sale taking place at 207. New Orleans Railway common sold at 38¼ for 100 shares, and 200 preferred sold at 83⅝. The 4½ per cent bonds held firm, $33,000 selling at 91. Washington Railway common sold at 43 for 90 shares.

A week of comparative inactivity in Cleveland with declining values for a number of issues heretofore very active. Cleveland & Southwestern common dropped from 19 to 16, and Lake Shore Electric from 17 to 15¼. Western Ohio receipts declined a point to 18; Aurora, Elgin & Chicago preferred sold at 93, a slight decline, and the common at 32½ to 33½ as compared with 35 the week before. Northern Ohio Traction made a factional advance to 27¼ on reports of prospective dividends. Cleveland Electric was a trifle weaker at 83¾.

Cincinnati, Newport & Covington common had a boom at Cincinnati on a statement that it will soon pay a dividend. Some 3800 shares changed hands with an advance from 46 to 47¾. The preferred sold at 95 and 95¼. Detroit United sold at 90¾ and 91, a decline from recent prices. Cincinnati, Dayton & Toledo issues were in good demand and about a thousand shares of the common came out at 26¼ to 26½. The 5 per cent bonds sold to the extent of more than $100,000 worth, the price advancing to 99, the best on record. A small lot of Toledo Railways sold at 40, an advance of several points from last sale.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Nov. 1	Nov. 8
American Railways	52	52
Boston Elevated	153	153
Brooklyn Rapid Transit	75⅝	75⅜
Chicago City	200	200
Chicago Union Traction (common)	11	11¼
Chicago Union Traction (preferred)	—	—
Cleveland Electric	—	—
Consolidated Traction of New Jersey	82	82
Consolidated Traction of New Jersey 5s	108½	108½
Detroit United	91½	92
Interborough Rapid Transit	210	210
International Traction (common)	36½	36½
International Traction (preferred) 4s	74	76½
Manhattan Railway	165½	165
Massachusetts Electric Cos. (common)	13	13
Massachusetts Electric Cos. (preferred)	56	55½
Metropolitan Elevated, Chicago (common)	27	28
Metropolitan Elevated, Chicago (preferred)	71	71
Metropolitan Street	119⅝	121
Metropolitan Securities	77⅝	77
New Orleans Railways (common), W. I	38	37
New Orleans Railways (preferred), W. I	83⅝	83⅞
New Orleans Railways, 4½s	90⅝	91½
North American	97½	96½
North Jersey Street Railway	28	28
Philadelphia Company (common)	50¼	52⅞
Philadelphia Rapid Transit	27½	27⅝
Philadelphia Traction	100	100
Public Service Corporation 5 per cent notes	96	96
Public Service Corporation certificates	64	64
South Side Elevated (Chicago)	96	97¼
Third Avenue	122	123½
Twin City, Minneapolis (common)	116½	115½
Union Traction (Philadelphia)	62½	63
West End (common)	99½	99½
West End (preferred)	114	114

W. I., when issued.

Iron and Steel

The "Iron Age" says October will go down in the history of the iron industry for record breaking. The monthly statistics show that there were produced by the anthracite and coke furnaces of the United States 2,053,127 tons of pig iron, which compares with the previous achievement of 1,963,717 tons in May. Both figures do not include the output of charcoal pig, which may be estimated at about 30,000 tons a month. The steel companies produced 1,370,960 tons in October, as compared with 1,287,438 tons in May. Of this October product the United States Steel Corporation has 950,752 tons. The Carnegie Steel Company in October broke seventy-eight past records of production at its furnaces and mills, not counting turn and day records, which would greatly add to the number. The Edgar Thomson rail mill made in October 83,568 tons of steel rails. The plants of the United States Steel Corporation produced 1,172,951 gross tons of ingots in October. The pig iron markets throughout the country are exceedingly firm, and the conviction seems to be gaining ground that further advances are inevitable. Production, however, is at an enormous rate. Southern furnaces are now squarely on the basis of $14 for No. 2 foundry at Birmingham, but have made only moderate sales lately, being heavily booked. Moderate sales of steel rails are reported, with further heavy contracting in sight.

NEW TRAFFIC ARRANGEMENTS IN OHIO

The Dayton & Troy Electric Railway and the Western Ohio Railway, which heretofore have operated limited cars through from Dayton to Lima, have arranged for all local passenger and express cars as well as limiteds to operate through without change. General Manager F. D. Carpenter, of the Western Ohio Railway, has also completed arrangements with the Toledo, Bowling Green & Southern Traction Company whereby, as soon as the Western Ohio extension from Lima to Findlay is completed, limited parlor cars will be operated through from Dayton to Toledo, a distance of 162 miles. On the basis of present limited schedules on these roads, this trip will be covered in 5 hours, which is only 30 minutes slower than the trains on the parallel steam road.

ANNUAL REPORT OF MONTREAL STREET RAILWAY COMPANY

The Montreal Street Railway Company has issued its annual report for the year ended Sept. 30, 1905. The income account compares as follows:

	1905	1904
Gross receipts	$2,707,474	$2,463,825
Operating expenses	1,650,566	1,510,998
Earnings from operation	$1,056,908	$952,827
Charges, etc.	363,739	309,485
Net earnings	*$693,169	$643,342
Dividends	691,667	642,520
Surplus	$1,502	$822
Passengers carried	66,631,206	60,281,8[illegible]4

* Equal to 9.90 per cent earned on the $7,000,000 capital stock.

The general balance sheet as of Sept. 30, 1905, compares as follows:

Assets—	1905	1904
Road construction and equipment	$7,971,544	$7,461,586
Stores	187,470	187,548
Real estate and buildings	1,810,721	1,665,876
Accounts received	82,544	90,570
Park & Island Railway advertising	229,755	163,241
Cash	56,411	25,289
Fire insurance fund	266,000	206,000
Stocks and bonds other companies	1,223,265	1,215,265
Total	$11,827,709	$11,015,376
Liabilities—		
Capital stock	$7,000,000	$6,600,000
Bonds	2,509,368	2,479,368
Bank of Montreal loan	650,000	318,166
Accounts and wages paid	232,222	199,546
Accrued interest	34,568	33,351
Accrued tax	156,551	135,788
Employment section	14,389	12,984
Unclaimed dividends	1,957	1,957
Unredeemed tickets	30,728	26,766
Suspended accumulations	115,302	125,750
Dividends payable Nov. 1	175,000	165,000
Fire insurance fund	304,930	267,905
Contingent account	81,626	129,231
Surplus	521,067	519,565
Total	$11,827,709	$11,015,376

SCARCITY OF HELP IN NEW ENGLAND

Several companies in New England are reported as experiencing considerable difficulty in securing conductors and motormen for winter service. The statement is made that the work is attractive in summer to a certain class of efficient but itinerant help that seeks indoor employment for the winter at whatever it can turn its hand. That men in New England are able to shift so easily from one place to another at wages fairly remunerative is due to peculiar industrial conditions that obtain there. The industries of the East are all booming, and the demand for help is greater than the supply. Consequently men are changing from one position to another, with the thought uppermost in their minds only of their present convenience. One of the companies seeking new men is the Connecticut Railway & Lighting Company. At Bridgeport the company has posted notices of its desire for more help, and promises steady employment during the period of satisfactory service.

EARNINGS OF CONNECTICUT COMPANIES FOR YEAR

The reports of the street railway companies operating in Connecticut, filed with the Railroad Commissioners at Hartford, are very gratifying. A summary of the figures available for publication at this time shows results as follows:

The Consolidated Railway Company: The net earnings for the year were $855,328, the gross income $943,285, and taxes paid to State $123,786. This company has a capital stock outstanding of $10,000,000, with bonds of $17,024,400. The capital stock a mile of road owned is $49,476. This is low, compared with the capital a mile of the Connecticut Railway & Lighting Company, which is $72,075. For the Consolidated company the report shows a total cost of construction and equipment of $16,462,969; gross earnings from operation, $2,024,502; operating expenses, $1,169,174. The company carried 38,778,053 passengers in the year on its various lines; the number of accidents was 226, of which eleven were fatal. The company owns 548 passenger cars of all kinds, and a total of 616, including mail, express and freight.

The Connecticut Railway & Lighting Company, which is owned by the United Gas Illuminating Company, of Philadelphia: Capital stock, $15,000,000, and bonds outstanding of $12,776,192. The total cost of construction and equipment is $29,526,719; the cost of construction and equipment a mile of road owned and operated is $166,571; gross earnings from operation were $1,420,093; operating expenses, $837,615; net earnings, $582,477. The company now owns 177 miles of track, and carried 28,351,395 passengers last year.

A large number of reports of smaller companies have been filed in Hartford. The Hartford Street Railway Company shows an increase in gross earnings from operation of $64,638, the total being $961,760. The operating expenses increased by $32,000, and were $672,565. The gross income, less operating expenses, was $289,897, or $32,839 more than the previous year. The surplus for the year was $282,280, or $60,000 more than in 1904. The total number of accidents was sixty-five, of which four were fatal.

The Hartford & Springfield Street Railway shows gross earnings of $128,168, operating expenses of $74,969, and net earnings from operation of $53,198. The net income was $3,248, and surplus for the year $3,020. As there was a deficit of $18,797 at the close of last year, this road shows now a deficit of $15,387. Two persons were killed and two injured in the year.

The Hartford, Manchester & Rockville Tramway Company shows gross earnings of $147,794; operating expenses, $113,687; net earnings from operation, $34,107; net income, $18,648; surplus, $106,218.

The net earnings of the Farmington Street Railway Company were $2,346, and surplus $5,010; the Suffield Street Railway, net earnings, $5,640; surplus, $2,261; the Bristol & Plainville Tramway Company, net earnings, $22,900; surplus, $75,681; the Meriden, Southington & Compounce, net earnings, $12,902; surplus, $14,644; the Cheshire Street Railway, net earnings, $1,177; surplus, $1,994; the Providence & Danielson Railway Company, net earnings, $14,375; surplus, $59,590; the Torrington & Winchester Street Railway, net earnings, $19,647; surplus, $39,218; the Willimantic Traction Company, net earnings, $10,693; deficit, $4,330; Stamford Street Railway, net earnings, $31,755; surplus, $37,340; Groton & Stonington Street Railway, net income, $17,112; surplus, $7,737; Danbury & Bethel Street Railway, net earnings, $24,950; surplus, $33,147; Branford Lighting & Water Company, net earnings, $28,905; surplus, $37,735; Manufacturers' Railroad of New Haven, net earnings, $3,833; surplus, $13,733.

STEAM TURBINES IN WASHINGTON TERMINAL STATOIN

When the large Union station at the Washington terminal of the Pennsylvania Railroad is completed, it will be one of the finest and best equipped railroad stations in the world, serving all incoming and outgoing trains of Washington. In conformity with the rest of the station the power plant will be equipped with the most up-to-date and best machinery obtainable, steam turbines being selected as prime movers, partially on account of the limited amount of space devoted to that purpose. Four 500-kw steam turbines have been ordered from the Westinghouse Machine Company, of East Pittsburg, Pa., adapted for driving alternating-current 60-cycle generators, running at 3600 r. p. m. Dry, saturated steam will be used at 150 lbs. pressure and 25-in. vacuum, and the turbines will be capable of developing 670 e. h. p. each. The alternating-current generators will be of the turbo-rotating field type, with two poles and a frequency of 7200 alternations at a normal speed of 3600 r. p. m. They will deliver three-phase current at 2300 volts, and, being of the enclosed type, will operate practically without noise.

ONE OF THE NEW COMPANIES IN JERSEY SECURES LARGE LAND GRANTS THERE

The Hudson Street Railroad Company, allied with the Belmont interests, and organized to operate street railways by electricity in New Jersey and become a competitor of the Public Service Corporation, has taken over the interests of the Hackensack Meadow Company, formed to reclaim the big area of marsh in Hudson County.

The new company, which will fill in or drain the meadows, is the New Jersey Terminal Dock & Improvement Company, with a capital of $3,000,000. Its close connection with the proposed trolley corporation is manifest in the directory selected, as Pliny Fisk, W. M. Barnum, W. L. Laud, Andrew Freedman and W. C. Kinney are on the boards of the two corporations, and Walter G. Oakman, who has been elected president of the New Jersey Terminal Dock & Improvement Company, and Anson M. Bangs, the vice-president, are also prominent in the Hudson Street Railroad Company.

It was also announced that the trolley and tunnel companies in the syndicate have architects at work preparing plans for two buildings to be erected in Church Street, one to occupy the block between Cortlandt and Dey Streets, and the other the block between Dey and Fulton Streets. These will be office buildings, will cost $7,000,000, and will have the trolley terminals in the basement and connect with the subways and the "L" roads.

OCEAN SHORE COMPANY AWARDS CONTRACTS

The Ocean Shore Railway Company, which is constructing a double track electric railway from San Francisco to Santa Cruz, has closed contracts for its electric equipment and power house plant. The power house will be erected at Balboa, on Half Moon Bay, by Chas. C. Moore & Company, who have the contract to supply and erect everything except the electric equipment, which will be furnished by the General Electric Company. Two 2000-kw, 2300-volt, 25-cycle fly-wheel-type generators will be direct connected to two McIntosh & Seymour vertical cross-compound engines, making 107 r. p. m. Of the two 125-kw exciters, one will be driven by a Harrisburg engine and the other by an electric motor. Seven 1000-kw oil-cooled transformers will raise the voltage from 2300 to 30,000 volts. Thirty 250-kw lowering transformers will reduce the current to 440 volts at the sub-stations, where ten six-phase rotary converters will furnish direct current at 500 volts to the trolley wires. Eight sub-stations will be located at intervals of about 10 miles, and two will be mounted on cars so as to be portable. Forty four-motor car equipments, each motor of 125 hp, have been ordered, arranged for multiple control, although, as a rule, cars will be operated singly except when there is a rush of traffic. The overhead work will be of catenary construction, insulated for 6000 volts, so that whenever it becomes advisable the line can easily be changed over for operating by the alternating-current system. The boiler plant will include five 600-hp Babcock & Wilcox wrought steel boilers carrying 200 lbs. pressure and equipped with superheaters. Wheeler condensing apparatus will be installed and all auxiliaries will be steam driven. A salt water pumping system will supply circulating water from the Bay. Crank and fly-wheel air pumps of the Edwards type will be used and centrifugal circulating pumps. Improved oil-burning apparatus will supply the furnaces. There will be a Weber concrete steel stack, 8 ft. in diameter and 125 ft. high.

CHICAGO TRACTION MATTERS

Negotiations between the Chicago traction companies and the local transportation committee of the Council have reached a much more businesslike stage than ever before. The Council, by two-thirds majority, has a fourth time rejected Mayor Dunne's recommendation to cease negotiations with the traction companies and take other steps for immediately acquiring the lines. In drafting the ordinances the local transporation committee has called upon Bion J. Arnold for expert estimates on earnings on which to base compensation to the city for the franchise and also to plan routes for the cars through the business district. Mr. Arnold has already reported to the committee on routes, enumerating twelve such, many of them to extend across the city.

THE QUESTION OF RELIEVING CONGESTION IN CLEVELAND

In line with the proposed plan for eliminating congestion in the Public Square by placing loops around all four corners of the square and having all lines start from the square instead of running across the city, as at present, Walter Warner, president of the Chamber of Commerce, which is investigating the proposition, recently suggested that the company experiment with reduced fares and make a charge of 1 to 2 cents for transfers. The company agreed to prepare statistics as to the number of transfers at the square and the percentage of through traffic, and the matter will be further discussed at a joint meeting of the Chamber, the city officials and the street railway company. President Horace Andrews, of the street railway company, still adheres to the idea that subway loops is the only real solution of the problem, and he claims that the plan of surface loops would serve only for a short time and would be unsatisfactory to the public on account of transfers.

THE WINTERS-CLEGG SYNDICATE DISSOLVES

The so-called Winters-Clegg syndicate, which controls the Oakwood Street Railway and the Citizen's Railway Company, of Dayton, together with the Dayton & Troy Electric Railway and the Dayton & Western Traction Company, has dissolved partnership so far as the two interurban lines last mentioned are concerned. The two lines have been peculiarly situated and handled. The first mentioned runs due north from Dayton, forming part of the through system to Toledo, while the other runs due west, forming part of the system to Indianapolis. Both roads have about the same mileage and their earnings have been practically the same, being among the most prosperous in the Central West. Neither road has any bonded or floating indebtedness, and the securities are owned practically outright by the interests mentioned. Mr. Valentine Winters has been president of both roads, but has devoted his time entirely to the Dayton & Western, while Harrie C. Clegg has been vice-president of both roads and general manager of the Dayton & Troy. Recently, by an exchange of securities, the Dayton & Western passed into the absolute control of the Winters family, while the Dayton & Troy passed into the hands of H. P. and C. B. Clegg. For some time past the so-called Widener-Elkins syndicate has been desirous of acquiring these properties, but the interests mentioned have been unwilling to dispose of them at the prices offered. Now that the two interests have been dissolved, it is thought that negotiations for the control of these properties may be successful.

PROSPECTS FOR DEVELOPING FREIGHT TRAFFIC IN MASSACHUSETTS

Documents filed recently with the Railroad Commissioners of Massachusetts and reports from town authorities seem to warrant the statement that the movement to extend the carrying of freight by the electric railways within the State has attained impetus enough to insure important developments along this line.

As a rule, Massachusetts roads have been slow to develop the business of carrying parcels, to say nothing of anything heavier. There has been a little business of this sort over the Shaws' line to Plum Island, from Newburyport; and a little on two or three of the lines in the Western part of the State. The Dartmouth & Westport, joining the important manufacturing cities of Fall River and New Bedford, has been about the only line that has profited by carrying freight. It has only two box cars for freight. The Middleboro, Wareham & Buzzard's Bay has for some time done a small freight business, but has only one box car for freight with two platform cars not equipped.

The Boston & Worcester line was equipped at the start with box freight cars, and it turns out that Mr. Shaw has been busy practically ever since the opening of the road in developing a system that would enable him to operate these cars with profit. Rumors pretty well substantiated in Boston within the last week or two were to the effect that those in control of the Boston & Worcester company had at length obtained control of a Boston & Suburban Express Company, operating a wagon service, and that thirty new wagons were being made ready to be placed in commission as distributors and gatherers of freight and express matter carried in and out of the city by the Boston & Worcester line. Mr. Shaw, the principal owner, is known to contemplate an extension of this proposed freight and express service over the projected Hartford & Worcester Street Railway.

While this Boston & Worcester development is in a way an old story, there are other recent developments which are new. One is the activity of the Old Colony Street Railway to secure freight and express privileges from the cities and towns in Southeastern Massachusetts. The company is actively at work with the local authorities at the present time, and it can be stated on the authority of the first vice-president of the company that its principal aim is to establish an express and parcel service from Fall River and New Bedford up through its entire territory to Boston.

While the through business is mentioned as the company's main object, the general impression prevails that the recent activity of the Taunton & Pawtucket Street Railway, as now controlled by Choate, Hall & Stewart, the firm which has taken over a number of formerly unprofitable trolley roads in Massachusetts, has spurred the Old Colony Company into a show of competition. The Taunton & Pawtucket has recently received the Railroad Commission's approval of local permits that will enable it to carry freight and express matter such as may be included in a special list; and this road with the old Middleboro, Wareham & Buzzard's Bay line, which is now in the same control, will give a through service from the neighborhood of Monument Beach through Taunton and, by means of connecting roads in Rhode Island, into the cities of Pawtucket and Providence. This territory is reached to some extent by lines of the Old Colony Company, and the local express opportunities may be a factor in that company's new activity in securing privileges.

Another feature of the mid-State situation that has aroused interest is the petition recently made to the Railroad Commission for approval of freight and express privileges for the Springfield Street Railway. This is the line which has just had its lease of the Springfield & Eastern approved. It is owned by the New York, New Haven & Hartford Railroad, and is in territory which is expected to bring it into competition with the Shaw lines. It seeks the new freight rights in the district around West Springfield and Agawam.

James F. Shaw's father, Hon. E. P. Shaw, former State Treasurer, is president of the Boston Company, operating wagons in a suburban express service. The company has been in operation about a year, and its wagons will be used to and from the terminal station to be established in Boston for the trolley express cars.

SOME RECENT WESTINGHOUSE-PARSONS TURBINE ORDERS

The Westinghouse Machine Company, of East Pittsburg, Pa., manufacturers of the Westinghouse-Parsons steam turbine, has within the last few weeks received numerous orders for its turbines, among them being one from the Lumberton Cotton Mills, Lumberton, N. C., for one 300-kw turbine; from the Waltham Gas Light Company, Waltham, Mass., for four 500-kw turbines; from the Gulfport & Mississippi Coast Traction Company, Gulfport, Miss., for two 500-kw turbines; from the Suburban Electric Company, Scranton, Pa., for one 500-kw turbine; from the Pennsylvania Light & Power Company, Pittsburg, Pa., for one 500-kw turbine; from the Water, Light & Gas Company, Hutchinson, Kan., for one 500-kw turbine, and from the Winston-Salem Power Company, Winston-Salem, N. C., for one 750-kw turbine.

The turbine ordered by the Lumberton Cotton Mills will be of the well-known multiple expansion parallel flow type, driving a 60-cycle direct-connected generator, running at 3600 r. p. m. It will operate at 150 lbs. steam pressure and 26-in. vacuum, and deliver three-phase current at 440 volts. The turbines for the Waltham Gas Light Company will be of the same type and frequency, operating at 3600 r. p. m., with dry, saturated steam at 175 lbs. gage pressure and 28-inch vacuum. The alternating-current generators will be of the rotating field turbo type, delivering three-phase current at 2300 volts. The Suburban Electric Company's turbine, with characteristics similar to the above, will operate with dry, saturated steam at the throttle of 150 lbs. gage pressure and with atmospheric pressure in exhaust pipe, and will be capable of developing 750 e. h. p. The turbines for the Gulfport & Mississippi Coast Traction Company will operate under 150 lbs. pressure, 28-inch vacuum and 100 degs. F. superheat, and will be direct connected to 60-cycle turbo-generators running at 3600 r. p. m.

CHANGE IN SCHEDULE OF LONG ISLAND TRAINS—REDUCTIONS IN RUNNING TIME RESULT OF ELECTRIC OPERATION

Under the winter time-table of the Long Island Railroad Company, which went into effect Sunday, Nov. 5, the electric service, heretofore confined to the suburban trains, was extended to the through or express trains, and the running time of these trains was cut down from 25 minutes to 17 minutes. Under the new schedule trains leave Flatbush Avenue, Brooklyn, for points on Long Island from 1 to 3 minutes earlier than the trains with which they connect at Jamaica leave Long Island City. This little difference is made only in order to give passengers from Brooklyn time to get out of the cars at Jamaica before the trains from Long Island City arrive.

There are seventy-five electric passenger trains each way daily between Flatbush Avenue, Brooklyn, and Jamaica, and twenty-five of these are local trains that go through to Queens and Belmont Park, extending the suburban service 5 miles beyond the village of Jamaica, and fare on these trains is only 10 cents from Flatbush Avenue to Jamaica, and 20 cents to Queens. Sixteen electric trains run each way daily.

The steam trains from Long Island City will make close connection with the local electric train from Brooklyn at the platform of the station at Ozone Park, where passengers will transfer from one train to the other and the steam train will then run from there as express across Jamaica Bay, making no stops between Ozone Park and Hammils, and all intervening stops will be made by the local electric trains from Brooklyn.

TECHNICAL PUBLICITY ASSOCIATION

At a meeting and banquet of the Technical Publicity Association, held at the Aldine Club, New York, Friday evening, Nov. 3, the following officers were elected: President, C. B. Morse, Ingersoll-Rand Drill Company; first vice-president, H. M. Cleaver, Niles-Bement-Pond Company; second vice-president, Frank H. Gale, General Electric Company; secretary, Rodman Gilder, Crocker-Wheeler Company; treasurer, H. M. Davis, Sprague Electric Company; members of executive committee, Graham Smith, and Charles M. Manfred, Johns Manville Company.

H. M. Davis addressed the association on "The Advertising Appropriation." An informal discussion followed, in which the members exchanged views on the disposition of advertising appropriations, the relative amount that should be spent in magazine and circular advertising, the relation between the advertising appropriation and the volume of business, etc.

MEETING OF THE BRITISH IRON AND STEEL INSTITUTE

On the occasion of the autumnal meeting of the British Iron and Steel Institute, of which R. A. Hadfield, the well-known manufacturer of special work, is this year the president, the members of the institute and other guests were invited to luncheon at Hadfield's Steel Foundry Works at Tinsley, after which an inspection of the extremely extensive works was made. For the convenience of those coming direct from London a special train was run from London to the works, and after the inspection the same train returned to London in the evening. The prominent guests present included the Spanish ambassador, the Japanese minister, Gen. A. Chaffee, etc. After luncheon the party was conducted over the East Hecla works. It would be impossible in this article to enumerate all the interesting things that were seen, but as regards tramway work there might be mentioned steel rail and joint grinding machines for petrol and electric driving, the Parr patent automatic electrical point controller, and the layout ground on which there were track and other special work for railways and tramways, including overhead and conduit electrical track work for the London County Council and other tramways. A number of Hadfield's special steel-tired electric car wheels were also inspected. These wheels have been in service on the Sheffield Corporation Electric Tramways for the past two and a half years, in which period they had run 79,860 miles before being taken out of service. The steel foundry also proved of vast interest to the various visitors, covering, as it does, 6 acres, and being probably the largest foundry in the world. The central power station, which supplies power to the whole of the works, was also visited, after which visits were paid to the annealing shop, pattern shop and machine shops, in which all kinds of machinery were shown in various processes. Altogether a most interesting and profitable day was spent.

AMERICAN OPERATIONS IN BRAZIL

The United States Consul at Rio de Janeiro, Brazil, gives, in a recent report to the Department of Labor and Commerce, a brief review of the operations of Americans in Brazil as exemplified in the work of the Rio de Janeiro Tramway, Light & Power Company. He tells about the organization of the company, the development of power by it, the taking over of the existing street railway properties, its plans for unifying its interests, and the managing personnel. In regard to the plans of the company he says: "The concessions of the constituent companies vary from thirty to fifty years, with monopoly of zone. The new company is applying for a new concession unifying all the existing ones. The company has also acquired the "Société Anonyme du Gaz de Rio de Janeiro," which, under its concession from the Federal Government, controls the illumination of the city until the year 1945. At present there is a small amount of electric lighting from steam plants operated by the company. The new company is applying for various modifications in the existing concession. The company has also a concession from the municipality of Rio de Janeiro, which included a monopoly for the distribution of electric energy for power purposes until the year 1915, after which date the concession continues for a long period without monopoly. The company has also recently acquired the property of the Rio Telephone Company, the business of which has heretofore been conducted by Siemens & Halske. The telephone concession includes a monopoly for a period of thirty years."

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED OCT. 24, 1905

802,498. Retaining Clip for Third-Rail Insulators; William Courtney, New York, N. Y. App. filed Dec. 6, 1904. Transverse holes through the insulating base or support and a pair of opposite hooks for clamping the rail.

802,518. Pin of Brake-Rod Jaws or the Like; Arthur Lipschutz, St. Louis, Mo. App. filed March 15, 1905. Recesses cut in the pin to economize material.

802,519. Car Seat; Richard D. Long, Iola, Kan. App. filed Jan. 26, 1905. A pair of corresponding members which are reversible to form either a seat or back. The legs are constructed to brace and lock in either position.

802,538. Switch Operating Device for Street Railways; Richard M. Van Eaton and Julia M. Van Eaton, Pueblo, Col. App. filed June 19, 1905. Two cams in the roadbed, one to throw the switch in either direction, are adapted to be engaged by a cam on an approaching car.

802,539. Trolley for Electric Cars; George F. Warburton, Denver, Col. App. filed Aug. 6, 1904. Two tandem trolley wheels and harps yieldingly mounted upon the trolley pole.

802,716. Protected Rail; Louis Steinberger, New York, N. Y. App. filed Nov. 2, 1904. The third rail consists of a U-shaped metal strip having a web set into a slot in an insulating support, and a hood of insulating material.

802,723. Brake Head; George A. Woodman, Chicago, Ill. App. filed March 9, 1905. A brake beam and brake head mounted thereon, one of which has an odd number and the other an even number of locking faces, any two of which are adapted to engage and form a locking connection between the beam and head.

UNITED STATES PATENTS ISSUED OCT. 31, 1905

802,993. Trolley Wheel Bearing; Robert Kissinger, Columbus, Ohio. App. filed March 27, 1905. The trolley-wheel axle is provided with a spring-pressed, two-part bushing, thereby obtaining efficient contact with the trolley wheel at all times.

803,020. Controller for Electric Cars; Francis A. Roche and Francis J. Roche, Somerville, Mass. App. filed March 15, 1905. A construction of controller which compels an intermittent step by step movement of the controller. Steel balls are contained in an annular recess which co-operates with lugs to produce the desired effect.

803,208. Trolley Catcher; Warren W. Annable, Grand Rapids, Mich. App. filed March 31, 1905. A sliding carriage mounted at the base of the trolley pole, the trolley cord leading downward around the carriage, thence back through a pulley at the upper end of the pole and thence to the car platform, and means whereby when the pole leaves the wire the carriage will grip the pole and prevent the same from flying upward.

803,210. Trolley Retrieving Device; Henry B. Clarke, Chicago, Ill. App. filed Jan. 16, 1905: A sudden movement of the trolley cord opens an air valve which operates to release a spring drum to retrieve the cord.

803,215. Overhead Structure for Electric Railways; Harry P. Davis and Theodore Varney, Pittsburg, Pa. App. filed Oct. 19, 1904. Means for connecting insulated trolley wire sections of different voltage, consisting of a wooden strip or bar with fixtures secured to each end for the attachment of the wires. The bar is suspended at both ends from insulators.

803,216. Suspension Device for Trolley Conductors; Harry P. Davis and Theodore Varney, Pittsburg, Pa. App. filed Jan. 17, 1905. The trolley is suspended from two messenger cables by means of V-shaped fixtures depending from the messenger cables and clamping the trolley wire at their apexes.

803,240. Belt Casing for Axle-Driven Dynamos; Roger M. Newbold, Birmingham, Ala. App. filed March 8, 1904. A novel casing for the protection of a belt from the car axle to a dynamo for lighting purposes.

803,241. Gravity Roller Side Bearing; John F. O'Connor, Chicago, Ill. App. filed July 6, 1905. The lower bearing plate is furnished with reversely inclined or gravity tracks for rollers, the tracks for the rollers in the upper and lower bearing plates being preferably curved about the king-bolt as a center.

803,252. Trolley for Electrically-Propelled Vehicles; Norman W. Storer, Pittsburg, Pa. App. filed Feb. 15, 1905. A trolley bow having a contact member provided with a wide, flat contact surface and with one or more lubricant-containing grooves.

803,258. Track Sander; John H. Watters, Augusta, Ga. App. filed June 24, 1905. An air jet is directed into the sand-box immediately above the discharge opening, said air-jet having a passage of contracted diameter in advance of its discharge end, to thereby prevent the destructive sand blast.

803,313. Brake Beam and Method of Making the Same; John F. Streib, Avalon, Pa. App. filed Oct. 29, 1904. A beam made from a sheet of metal having a hole in its bolt and cuts extending from said hole, the beam having pressed flanges on both inner and outer margins.

803,382. Switch-Tongue Throwing Mechanism; John C. Wilson, Nespelem, Wash. App. filed April 14, 1905. A switch-tongue throwing mechanism comprising a pair of pulling arms, each provided with a beveled portion and a tooth, the beveled portion of one arm adapted to shift the other arm out of the path of the first-mentioned arm, means for suitably connecting the arms with the switch-tongue, and means for operating the said arm, causing the shifting of the switch-tongue.

803,399. Switch Operating Mechanism; Claude G. Colwell, Clyde, Kan. App. filed Aug. 2, 1905. Details of construction of a lever on the car for engaging a switch-throwing trip-lever in the roadbed.

12,394. Controller (reissue). John P. Durkin, Philadelphia, Pa. App. filed Dec. 27, 1904. The controller arm has a pawl which may be thrown outward by centrifugal force. If the motion of the controller arm is too rapid, the pawl catches on notches, but immediately drops back so as to permit further movement of the arm.

PERSONAL MENTION

MR. J. T. ROSS, of Cleveland, for a number of years construction expert for the Everett-Moore syndicate, has become chief engineer for the Toledo Railways & Light Company, of Toledo.

MR. D. H. KIMBEREY, a prominent citizen of Cleveland, Ohio, and president and promoter of the Kansas City & Leavenworth Railway Company, died at his home in Cleveland a few a days ago.

MR. WILLIAM P. GRAVES, formerly secretary to the president of the Cook County Board, Chicago, has been made secretary to President T. E. Mitten, of the Chicago City Railway Company.

MR. HOWARD E. ARNOLD, formerly auditor of the Dayton & Northern Traction Company, of Dayton, has gone into the supply business at Dayton, acting as sales agent for Shelby trolley poles, Barret jacks, Lyon sheet steel gear cases and other specialties.

MR. ISAAC McQUILKIN, comptroller of the Indiana Union Traction Company, of Anderson, Ind., has resigned from the company, to become auditor of the Clinchfield Corporation, owning large coal interests in Virginia and building a 300-mile coal road in its territory. Mr. McQuilkin was formerly auditor of the Lehigh Valley Railroad.

MR. LEWIS P. STILLWELL has been appointed consulting electrical engineer, and Mr. H. S. Putnam electrical engineer, of the New York, Westchester & Boston Railway Company, which is building a high-speed interurban electric line between New York and Port Chester, N. Y. Mr. Stillwell will advise Chief Engineer William A. Pratt upon all matters relating to the electrical and mechanical equipment, while Mr. Putnam will have direct charge of the work, and see that it is carried out along the lines suggested by the consulting engineer. Mr. Putnam has been associated with Mr. Stillwell since 1902 in the Interborough and other railway undertakings.

MR. BYRON CLINGERMAN, of New York, formerly with J. G. White & Company, has been appointed electrical engineer and assistant to the manager of the Appleyard lines in Ohio. He succeeded Mr. Howard Oskamp, who resigned Nov. 1, to take a position with the Bullock Electric Manufacturing Company, of Cincinnati.

DR. KARL GOLDSCHMIDT, of Essen, Germany, sailed for Europe from New York on Nov. 7. Dr. Goldschmidt has been spending about five weeks in this country investigating the progress of the thermit welding process and other business affairs which he has in this country. On the eve of his departure he gave a delightful dinner at the Waldorf to his associates and a few other gentlemen whom he had met on his trip.

MR. EDGAR JAY RAUCH, of Toledo, has resigned as general superintendent of the Canton-Akron Railway Company, the Canton-New Philadelphia Railway Company and the Tuscarawas Traction Company, the Tucker-Anthony properties in Ohio. Before going with these companies Mr. Rauch was superintendent of rolling stock for the Old Colony Street Railway. He has had wide experience in all branches of city and interurban railway operation.

MR. BENJAMIN H. GLOVER has been appointed to fill the newly created office of superintendent of motive power and way on the Metropolitan West Side Elevated Railway, of Chicago. Mr. Glover was for a number of years in charge of the underwriters' national testing laboratories in Chicago, under Secretary W. H. Merrill, Jr. He left this position to go with the General Railway Signal Company, at Buffalo, and recently has been with the Westinghouse interests.

MR. W. S. MENDEN, whose appointment as general superintendent of the Metropolitan West Side Elevated Railway Company, of Chicago, was recently announced, has resigned to become chief engineer of the Brooklyn Rapid Transit Company, succeeding Mr. Eugene Clapp. The office of general superintendent of the Metropolitan company has been abolished. Mr. M. J. Feron has been appointed superintendent in charge of train and station service of the Metropolitan Company.

MR. M. C. DRAPER, of Cleveland, Ohio, has been elected second vice-president and general manager of the Eastern Wisconsin Railway & Light Company, to succeed Mr. T. F. Grover. Mr. Frank B. Huntington has been named first vice-president and secretary. Mr. Draper has been connected with the Westinghouse Company as its Ohio representative. Mr. Huntington came to Fond du Lac from Milwaukee, where he was freight train agent of the Wisconsin Central Company, in 1903, to assume charge of the accounting department of the Railway & Light Company.

DR. H. B. ROCKWELL has recently been made general superintendent of the Mobile Light & Railroad Company, of Mobile, Ala., and in addition to handling operating details is to have entire charge of the claim department. Mr. Rockwell is a graduate physician, and has been identified for a number of years with street railway claim adjusting work, particularly in New England. For several years he was manager of the Electric Railway Pool, with headquarters in Boston. The "Pool" consisted of some thirty or forty suburban electric roads in New England and the Middle West, which were associated for the purpose of securing mutual accident insurance and protection against loss by improper damage claims. As a claim adjuster, Dr. Rockwell has met with pronounced success, and his experience in this line has well fitted him to take up general operating work.

MR. C. P. ORTH has resigned as master mechanic of the New York & Long Island Traction Company, of Hempstead, L. I., to take a vacation before taking up work in the Middle West. Mr. Orth started with the Short electric railway department of the Brush Electric Company, of Cleveland, in 1890. In 1892 he was appointed electrician with the Broadway & Newburgh Street Railway Company, of Newburgh, N. Y., with which company he remained until 1896, when he became master mechanic of the Lorain Street Railway Company, of Lorain, Ohio, then controlled by the Lorain Steel Company. In 1901 he entered the employ of the Cleveland Construction Company, which built the New York & Long Island Company's line. Here he remained during construction, and later entered the operating department of the New York & Long Island Company as master mechanic. Mr. Orth will be succeeded in the company by Mr. J. C. Hayes, of the engineering staff of the Interborough Rapid Transit Company, of New York.

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NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

Of this issue of the Street Railway Journal 8000 copies are printed. Total circulation for 1905 to date, 376,150 copies, an average of 8177 copies per week.

The Life of Ties

Among the subjects which could profitably be discussed at future convention sessions devoted to track matters is that of the life of various kinds of ties in different soil. This is something upon which there is very little more than a hearsay knowledge at present. We have in mind the experience of one manager who was religiously insisting that nothing but white oak ties be laid on his road. After he had gone for a number of years on this principle, he happened one day to take up some old track that had been laid on hemlock ties, the very kind that he and many others had been condemning as unfit to lay under any permanent track. Had anyone proposed laying them on this road he would not have listened to the proposition. Yet these hemlock ties were in better condition than the white oak or any other kind of ties laid in the same stretch of track at the same time. The manager referred to began to get interested and inquired among his friends as to the life of ties, but found their experiences very different. The hemlock ties which lasted so well were laid in blue clay and sand, and other roads which had tried them in black loam found them next to worthless. It would seem that certainly there should be a special investigation of the life of ties when they are completely buried, as they are in city streets, and in view of the amount of money that is spent in tie renewals each year by American electric railways, it is certainly worth attempting.

Telephones in Employees' Homes

The telephone is now such a valuable adjunct in the operation of a street railway that it is next to impossible to name a road which does not make use of it. Aside from its importance in the administrative departments and its usefulness in tying a system together for routine work, the telephone is a powerful factor in the relief of congestion and raising of blockades, and the practice of installing private instruments in suitable boxes or stores at important centers of traffic has resulted in great convenience when it has been necessary to summon emergency crews and divert cars to alternative routes in times of accident.

On the smaller roads the telephone is principally used for despatching cars, and its importance in the general transaction of business is naturally less apparent than in the case of the large city systems. As a road extends its territory, however, it becomes more and more essential that some means shall be available for immediately reaching the department heads in case of emergency, and there is no doubt that the installation of a telephone in the home of each important official solves the problem. Distances on a rural system are seldom short when a break-down occurs, and the ability to immediately get in touch with the officials needed in times of emergency far outweighs the $25 or $30 per year which the rental of a telephone requires. In many cases an employee's telephone can be purchased and installed on the company's own line for less than $15. Under the exacting conditions of operation common upon small roads, it is difficult for some of the more responsible employees to enjoy the privileges of home life to anything like the extent which obtains in urban work. The master mechanic, for example, is closely tied to the car house, and often cannot select an attractive home site simply because he must always be within immediate call of the shops and power house. Given a company telephone in the home of such an official, his work becomes much lightened; he can be reached at any hour of the night with ease, and can often prescribe remedies for troubles without a personal journey to the car house or station. In times of extreme emergency, the telephone-equipped officer can generally be reached instantly, and the delays due to the sending of foot messengers or the "harnessing up" of some old white horse across the road from the shop are eliminated,

The Mantle of Ananias

When the suburbanite or the cliff dweller of the metropolis gets out pencil and paper and begins solemnly to figure out how much he can save in car fares by purchasing an automobile, the end of that man is plainly to be seen. The microbe is getting in its work, and unless prompt remedies are applied, the victim will be wearing goggles to breakfast within thirty days. And if he picks up his morning paper and reads therein the fanciful tale of the alleged economy contest which has just been completed by a group of automobiles in New York State, he is surely doomed. Nothing short of trepanning can extract the wheels from his head. The contest has been a notable one, resulting in as fine a line of statistics as ever figured in a discussion of the tariff. To summarize it briefly, seven or eight cars, in magnitude varying from an omnibus to a runabout, have been scratching up the dust in various directions about the metropolis for four or five days, and up to a point near the end of the contest, had reported a running cost per passenger of about ½ cent per mile. This is altogether delightful, and it hardly needs the scare headlines to inform the reader that railroad fares are not in the game for a moment. We have no doubt that the report gave the presidents of most of our trunk lines cold chills, and we looked over the stock reports next day with the fond expectation of picking up some Pennsylvania or Central at about 30 cents per share, to meet, alas, with disappointment, as usual. The ferocious bulls that paw the pavement of the Street had evidently seen statistics before and remained unterrified.

The statistics in this case have a strangely familiar smell. We have caught the flavor time and again in Socialistic attacks on street railways, based on imaginary costs of operation, and a faint whiff of it rises above the other stenches from the Chicago municipal ownership platform. We have time and again roasted friends and enemies alike for putting out alleged costs bereft of maintenance and depreciation, and even of general expense. They may be on their face interesting to the bookkeeper, but they deceive the public and pave the way to insolvency. In this facetious economy run, the really deadly items of expense find no place. At the present prices of tires, the mere tire depreciation equals the entire costs reported, if any credence is to be given to the melancholy tales of the initiated. What maker will guarantee a set of tires on a touring car for an average of 5000 miles over country roads? And what is the practical life of the car as a whole? Where are now the cars of three or four years ago, unless they have gone to the land of lost needles and pins? Now and then one sees a scarred veteran of Model 1900 creaking along in the environs of Lonesomehurst, but its comrades have gone to that scrap heap from which no car returns, or, like the discarded horse cars, are stored in the back yard of nowhere. They are not even utilized for owl lunch carts. We believe in the future of the automobile as a useful permanent addition to the world's facilities for getting about, but to count on its economy as against railways, steam or electric, is mere badinage. What it does it may do well, and we appreciate its advantages, although deprecating the absurdity of these claims of economy. As a pleasure vehicle it is coming to be a distinguished success, and as a business vehicle it is making a good record. Why try to force it then into hopeless competition? As well try to exploit street cars as airships. The economy test which we would wish to see is a year's record of a much used car, owned by a private individual, with the total cyclometer record set against the total bills paid in its behalf, plus a proper proportion of the cost charged off against depreciation. As a matter of convenience, the record might be most admirable, but the actual expense per car-mile or passenger-mile would certainly not be a source of anxiety to railroad stockholders.

Hanging Apparatus Under the Car

As a general statement, we believe that resulting benefits would warrant more consideration being given to the disposition of the brake and other apparatus under the car. A car will, of course, operate no matter what the relative position of these parts may be, but the proper distribution of weight, accessibility of apparatus and neatness of appearance can often be improved upon with a little attention to this detail of car design.

So far as weight is concerned, the pump and brake cylinder under the car and the hot-water heater and controller, if the car has but one, are to be taken into account. When the heater and a heavy controller are on the same side, the pump and the brake cylinder must usually be placed on the opposite side to give the proper balance. Should the old type of panel rheostats be employed, their weight must also be taken into account in determining their location. The newly-adopted grid type of resistance, however, weighs only about 50 lbs. apiece, and its weight is consequently not such an important item.

To eliminate all guess work, it is a good plan to obtain the exact weight of each of the pieces of apparatus not located symmetrically on each side of the car, and then to do some preliminary locating on paper until an even distribution on each side of the center is obtained. Some may regard this as reducing the problem to an unnecessary nicety, but we believe it better to err on the right side rather than run the risk of having the springs settle unevenly, with the consequent listing of the car body to one side.

Two other considerations involving weight should be taken into account in addition to that of securing a balance. The nearer to the middle of the car the heavy parts are hung, the greater is the stress on the truss rods, and consequently the greater the tendency of the car body to sag down in the middle. To lessen this liability, the apparatus should be hung as near the trucks as clearance will permit. Again, a cross strain may be induced if the weighty parts are not placed directly opposite each other. This, however, is of minor importance.

The question of weight is the all-important one, but some consideration should be given the placing of the parts so they can be gotten at for inspection and when repairs are necessary. Periodic inspection of apparatus is a rather monotonous task, to say the least, and one may feel sure that the fewer facilities there are for inspecting the different parts the more likely is this very important work to be neglected. The pieces of apparatus should consequently be placed far enough apart to permit of access to those parts requiring inspection.

Much can be added to the appearance of the car by distributing the apparatus with this end in view. The consideration of appearance, however, is of minor importance as compared with those of distribution of weight and of accessibility of apparatus. So far as appearance alone is concerned, a good rule to follow is to place those parts which hang low—the pump, for example—as far from the sides as possible. The air tanks and resistances may be placed nearer the side sills. Increased ventilation for the resistances, moreover, is usually obtained by placing them under the side sills.

Emergency Brakes

What has become of the long list of emergency brakes which has accumulated ever since horse-car days? There is, happily, small need of such on many roads, but the inspired idiots who greased a steep grade on Halloween, in a neighboring city, and thereby nearly wrecked a carload of passengers, call to mind that there are occasions when drastic braking measures become very necessary. The point which we wish to bring to mind is the need of considering the factor of safety upon grades. In the very early days of electric railroading one of the chief "talking points" in favor of electric cars was their supposed ability to go up any kind of a grade. It was almost universally believed at one time that the passage of current between wheel and rail somehow gave the former a better grip upon the latter. While this idea was soon disproved, electric roads were still built upon the most break-neck grades, and even now are laid out frequently with reckless disregard of gravitation. An electric car with its entire weight upon the driven axles will undoubtedly climb terrific grades, limited only by the gearing of the motors and their grip upon the rails. Practically the attainable grade depends on the texture of wheels and rails and the sand available. Rails and wheels may vary in adhesive capacity from the friction determined by two smooth and somewhat lubricated surfaces to that of a gear and rack rail. On common track, as is well known, cars will take grades of 10 per cent comfortably, and so on up to 14 per cent or 15 per cent. With wheels not too smooth and over new and dry rails, the car can probably manage 2 per cent or 3 per cent more even than this, but it is close to the skidding point.

Now, one thing which should be determined for modern track and rolling stock is the variation in adhesion under different conditions of the track. Precious little numerically is known about this, though the facts are familiar in a very general way. The thing to be measured is the pull required to just skid the wheels under different conditions of track upon actual grades, and it could be found out without great labor by towing with a dynamometer. In the same way the capacity of the brakes could be tested, but as a matter of fact, if the brakes are in proper order, they will hold the wheels under almost any conditions. On some roads it would certainly be found that with a track in bad condition, skidding on grades is a contingency to be looked out for; in other words, the grades are such that there is an insufficient factor of safety, and it would then be the part of wisdom either to modify the grades or to try the virtue of track or roadway brakes. Of these, many forms have been devised, most of which have passed into innocuous desuetude. Nevertheless, there are times and places in which they would be useful. This matter of slippery track is important aside from grades. Every car carries in front a dangerous space—the distance within which the brakes will not bring it to rest—and the effect of a slippery track is considerably to lengthen this space. A knowledge of the real length of this dangerous space under different conditions of track and at various speeds is highly important in averting accidents, many of which have been caused by inadvertently trespassing upon the limit, particularly with high-speed cars. If on good track the brakes at a certain speed will stop the car in 50 yds., everything beyond that distance is safe so long as track and brakes are in normal condition, and no longer. It would be wise policy for operating companies to get a pretty clear idea of the dangerous space for each type of car used with various conditions of track. If the service is of a character to require running pretty close to the limits, from grades or any other cause, then emergency brakes are well worth consideration. They are certainly capable of getting a grip on the rails sufficient to stop the car even in situations of the most trying character.

Life of Brake-Shoes

The brake-shoe that has generally been considered most desirable for use in street railway service is the one which will give the longest life, irrespective of its other qualifications. Where light weight cars are used and there is an excess of braking power available, this opinion is undoubtedly correct, yet in considering the effect of the service upon the life of the shoe, there are many conditions which have an important bearing and should be carefully studied. For instance, the shoes which will unquestionably give the most satisfactory results in rapid retardation of cars are those of soft cast-iron body, while the harder and more durable shoes are much less effective in braking. Owing to the notoriously poor wearing qualities of the plain cast-iron shoes, the tendency in light electric railway service has been unmistakably toward the hard metal shoes or the soft cast-iron shoes with hard metal inserts.

There is, no doubt, much to be said in favor of the hard iron insert for service upon the average street railway system. While the highest efficiency of braking is not attained, there is still an ample margin in frictional qualities provided to enable quick stops to be made when desired, while the greatly increased life of the shoes is a matter of no small importance. With brake riggings proportioned properly for the insert shoes, no difficulty is experienced in making stops that are entirely satisfactory for the ordinary service. It is, in fact, often argued that there is advantage in having a tough, wear-resisting shoe, inasmuch as careless motormen often operate their cars through busy, crowded sections with their brakes partially set—to avoid the labor involved of continually setting and releasing the brakes. In such service a soft shoe will wear rapidly and prove uneconomical.

The character of the country operated through also has a marked effect upon the life of shoes, inasmuch as the dirt and dust disturbed by the car in its passage will inevitably get between the shoe and the wheel. Where sand or a pronounced grit is liable to be encountered, as in interurban service, a harder shoe, preferably a soft iron body with hard iron inserts, must be used in order to prevent excessive wear. Under the average conditions of city operation, however, this difficulty is rarely experienced, as the dirt usually encountered is of a nature conducive to slippage rather than productive of frictional qualities.

Much difficulty has been experienced in breakages of shoes when worn down rather thin, yet still thick enough to warrant their being retained in service. This may be effectually provided for by the use of one form of reinforcement or another, such as the inserted bundle of steel strips or the reinforcing steel back, which are now incorporated in standard makes of shoes now on the market. These systems add greatly to the life, giving full strength until the shoes are worn out and the reinforcing structure exposed. The strengthening features involved prevent the dangerous breakages due to shock, unequal heating, or other causes, with attendant danger of derailment which occur frequently in service with the old-style shoes. The importance of this innovation is being recognized by the largest systems and reinforced shoes are being adopted for standards.

THE STANDARD SURFACE CAR OF THE BROOKLYN RAPID TRANSIT COMPANY

The car recently adopted by the Brooklyn Rapid Transit Company as its standard for service on surface lines is a radical departure from the customary types of semi-convertible cars.

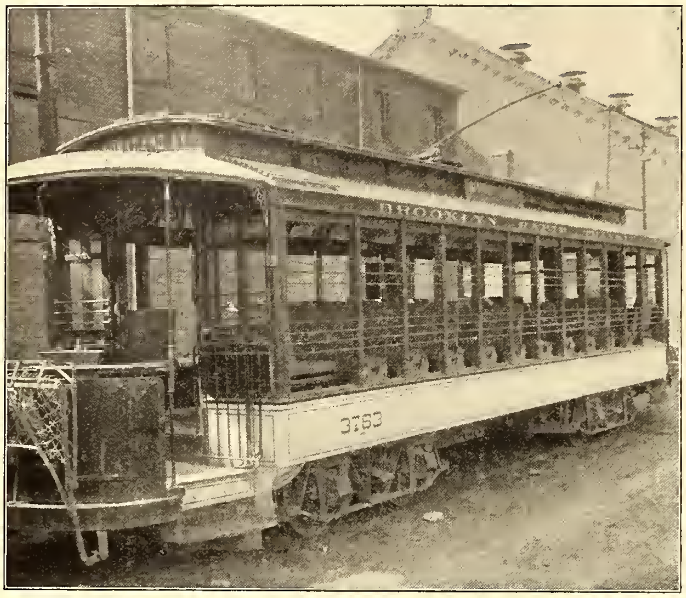


FIG. 1.—CAR OPEN FOR SUMMER SERVICE

When closed for winter service, in exterior appearance and in interior arrangement it differs very little from the usual closed car with cross seats. As an open car, on the other hand, it presents more the appearance of the usual type of open car than the ordinary semi-convertible type.

The change from a closed to an open car is accomplished by removing from between the side posts sash, containing the glass, and a panel, which corresponds in position to the con-

FIG. 3.—INTERIOR VIEW OF CAR

vex panel of the ordinary type of closed car. With these frames removed, the side of the car is completely open from the letter board to within 12 ins. of the floor.

A short description of the car was given in the issue of March 11, 1905, of the STREET RAILWAY JOURNAL, at which time the first order for 200 was sent in. The cars received in the early part of the summer have been in operation during the past few months, and their adaptability to the service has been such that the company has just given a duplicate order for 150 additional cars. It is expected that in time this type will entirely supersede the ordinary side-entrance summer car on all the surface tracks of the company.

While the method of converting is its most prominent feature, the car is worthy of an extended description for an entirely different reason. It represents the most advanced ideas in surface car construction of one of the largest operating companies in the country. The construction of the car in general, the method of wiring and many other features are also peculiar to the practice of the Brooklyn Rapid Transit Company.

The general dimensions of the car are: Length of car body over corner posts, 31 ft. 5¼ ins.; length over bumpers, 42 ft.

FIG. 2.—A CAR BEING CHANGED OVER

6 ins.; extreme width, which is over water-drip rails, 8 ft. 2½ ins.; width over side sills, 8 ft.; height from under side of sill to top of trolley board, 8 ft. 11 ins.; height from floor to under side of upper deck headlining, 7 ft. 9¼ ins.; truck centers, 20 ft.

Probably the most noteworthy feature of the bottom framing

FIG. 4.—NEAR VIEW OF SIDE OF CAR, SHOWING RETAINER CASTINGS AND SASH

is the use of a steel plate, which is bolted to the outside of the side sill and extends around the corners of the car to the door posts at each end. The plate, which measures ⅜ in. x 17 ins., serves several purposes. In the first place, it ties the bottom framing firmly together and secures the side posts, to which it is bolted, to the side sill. Again, it trusses up the car body.

This latter is its chief purpose, and no other truss, either inside or under the car, is provided. Five cross sills, the bolsters and diagonal braces at the middle and across the corners of the framing, together with the strengthening effect of the double floor, insure the bottom framing against weakness at any point. The platform drops 9⅛ ins., and is supported entirely by two angle and two T-irons. All exposed wood surfaces of the bottom framing are covered with ¼-in. transite, as a protection against fire.

The reproductions from photographs and the drawings show the construction of the removable sash and the window guards, as well as the method of fitting them in place. In the cross section of the posts, and shown in Fig. 8, may be seen the rabbets at the edge of the post into which the sash fit. When in position they are flush with the outside of the post proper, being held in place by retainer castings screwed to the the posts and extending the full distance between the belt and water-drip rails. The method of attaching these retainer castings may be observed in Fig. 7. Four round-head cap screws at intervals of 17 ins. extend through the posts from the inside and engage in threaded lugs in the retainer castings. These lugs in turn fit snugly in recesses in the posts, so that the castings always occupy the same position.

To prevent rattling, it is essential that the frames make a snug fit between the posts. This is facilitated by stamping them with the car number and the position to which they are fitted, so that they can be put back in the same place year after year.

The driving rains encountered in Brooklyn and the vicinity during the summer necessitate a curtain that will fit close against the posts and not be blown out of the groove intended for it. For this reason a special curtain fixture, which is of the pinch-handle type manufactured by the Curtain Supply Company, is used. A metal strip is screwed to the post, partly covering the curtain groove. A shoulder on the slide of the curtain fixture retains the fixture behind this strip, and the slide can only be removed when the curtain is completely raised. Stiffening rods placed at close intervals insure the upper portion of the pantasote curtain remaining in place.

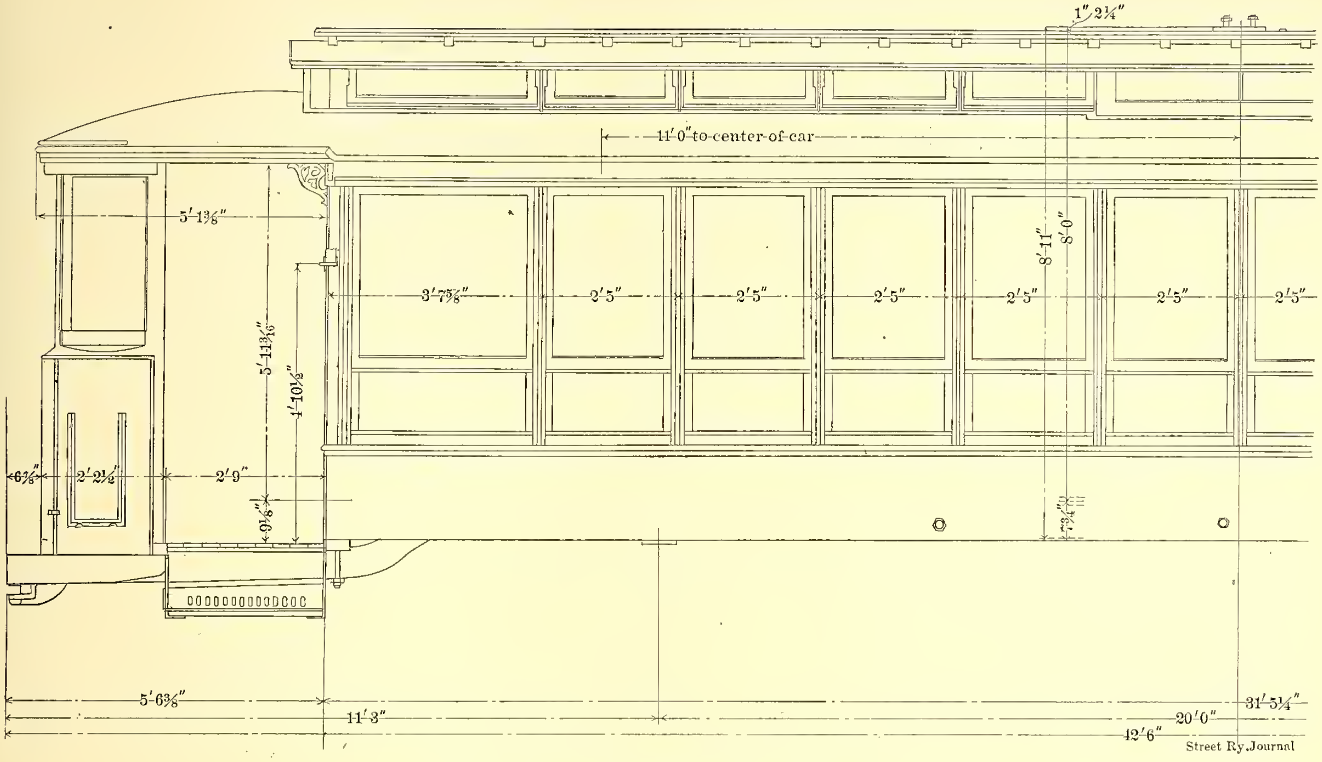


FIG. 5.—HALF SIDE ELEVATION OF CAR

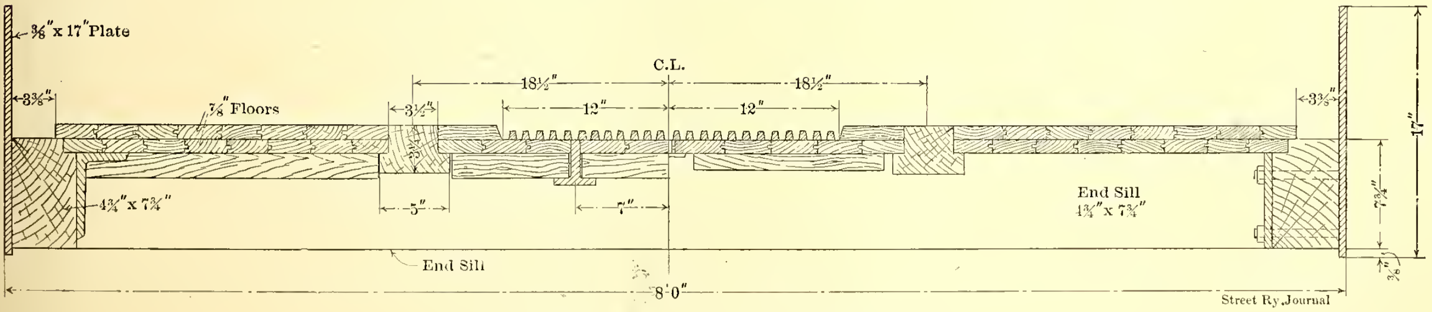


FIG. 6.—SECTION THROUGH UNDERFRAME

The roof is the usual design of monitor deck. Wood carlines are placed at intervals of about 9½ ins. Those over each side post are reinforced by carlines of 5-16-in. steel, the two carlines being bolted together at intervals of 11 ins. Roof mats are supplied at diagonal corners, and trolley boards extend the full length of the monitor deck. A novel method is employed in securing the trolley base block to the running boards. This is well shown in Fig. 10, showing the Milloy trolley stand in position. The advantage gained over the usual construction is the reduced height obtained.

A minor feature, yet one worthy of attention, is the design

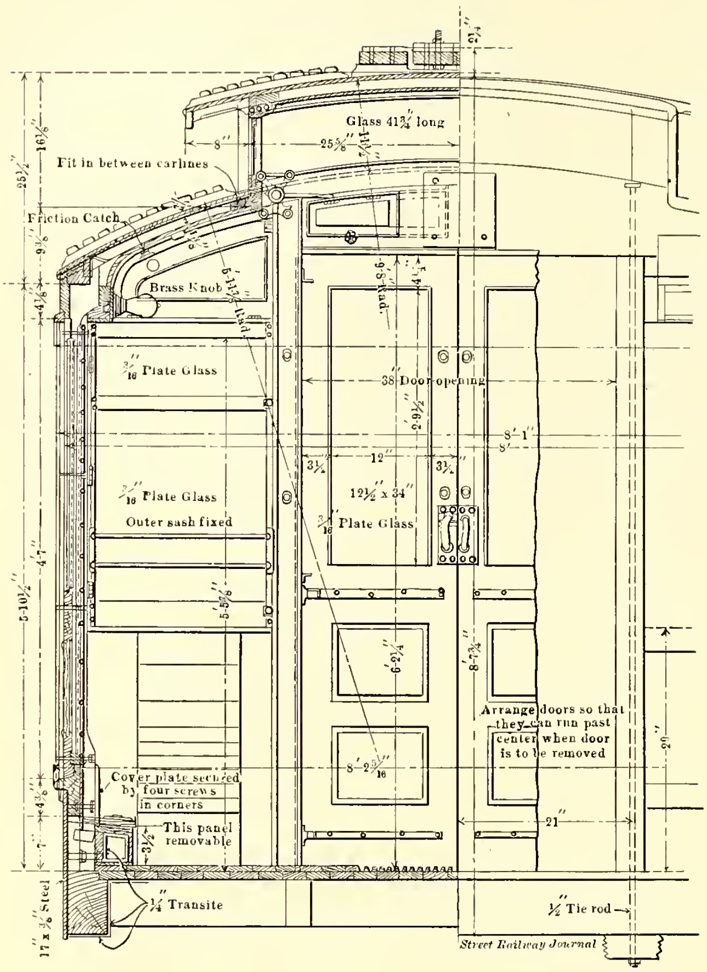


FIG. 7.—CROSS SECTION OF CAR BODY

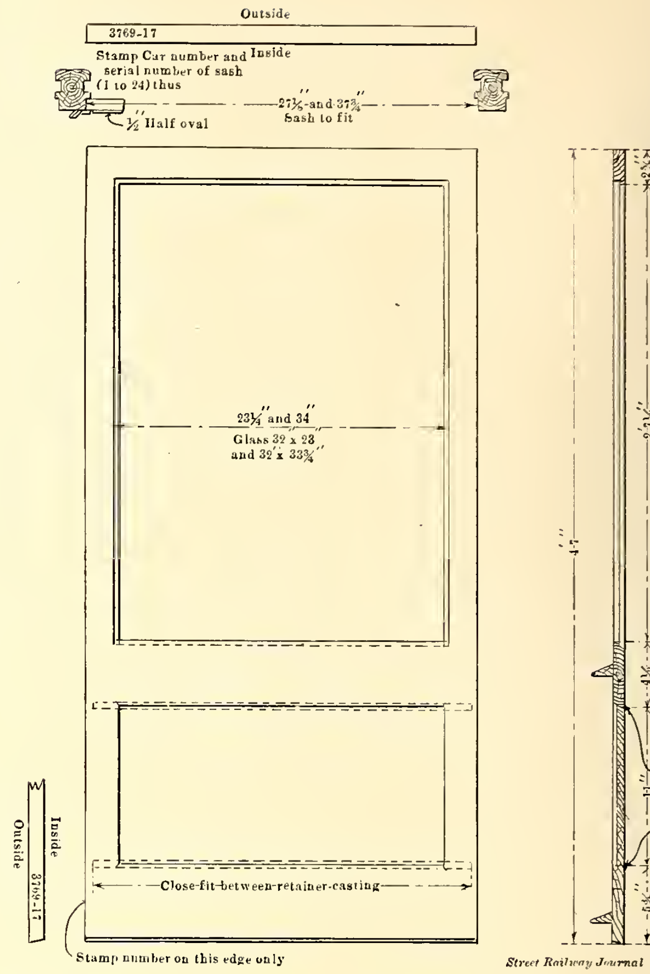


FIG. 8.—REMOVABLE SASH

of the corner post steps, which are used when ascending to the roof of the car. These steps serve as grab handles as well, as may be observed in Fig. 15.

The distinguishing features of the car wiring are the centralization of the several switches and the fact that as little as possible of the wiring is placed underneath the car. The under side of the framing between bolsters is practically clear of wiring. With the exception of the light wiring, all the wires which run the length of the car are carried in two cable ducts.

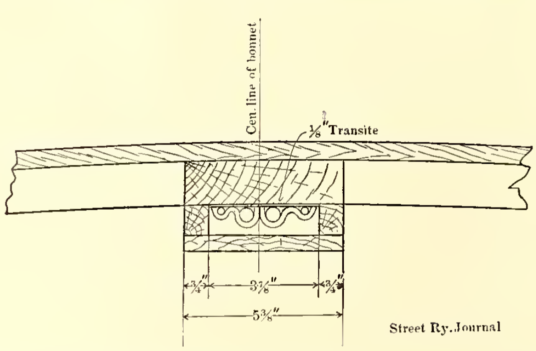


FIG. 9.—SECTION THROUGH BOX IN BONNET FOR WIRES TO CIRCUIT BREAKER AND BONNET SIGN

These ducts are built of wood and are lined with ¼-in. transite, and, as may be observed by reference to Fig. 7, they occupy the same position as do the radiating pipes in a car heated by hot water. To protect the ducts, cast-iron foot rests are screwed to the cover over the spaces between the seats. At the ends of the car the ducts terminate and the control wiring passes into similar cable boxes underneath the end sills where the boxes from the two sides of the car unite, and a single duct carries all the cables to the base of the controllers. All wires, with the exception of those in the cable duct, are carried either in loricated conduit or in electrobestos molding.

At each end of the car the trolley lead is carried down an upper deck corner post, and through the bulkhead into a wire box, to be described later, in loricated conduit. The conduit terminates here, the cable being carried in electrobestos molding, enclosed in a wooden box, along the under side of the hood to the automatic circuit breaker, placed immediately over the motorman's head. Returning from the circuit breaker, the cable passes back into the wire box, where iron conduit again receives it, then through the bulkhead and down a corner post to a fuse box underneath the car. Then it goes direct to the

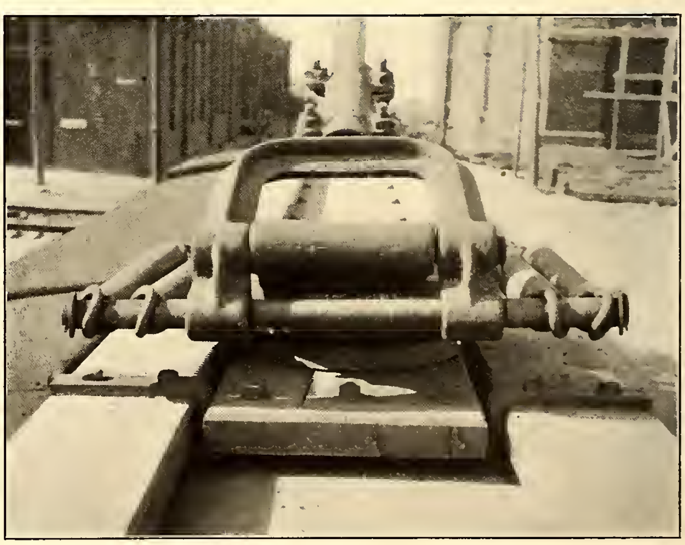


FIG. 10.—ROOF OF CAR, SHOWING METHOD OF SECURING TROLLEY BASE BLOCK TO RUNNING BOARDS

controller. The lead to the lightning arrester, which is tapped off the main cable in the wire box at the No. 1 end of the car, passes down a corner post to the arrester near the end sill.

With the exception of wires E_1, E_2 and R_5, all the motor and resistance leads are of No. 4 wire. The three wires mentioned are, for evident reasons, of larger size, No. 3 being used.

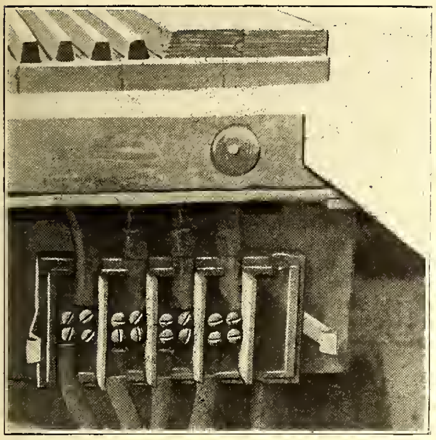


FIG. 11.—JUNCTION BOX FOR MOTOR LEADS

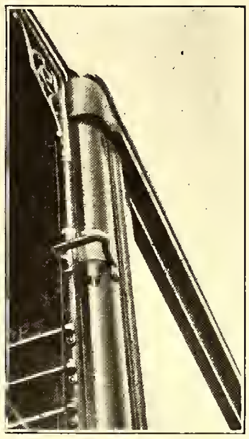


FIG. 15.—SHOWING STEP ON CAR POST

The manner in which the control leads are divided between the two cable ducts may be observed in Fig. 12. Electrobestos molding covers the resistance leads after they leave the cable ducts. Similar molding is used on the cable leads to the motors as they cross from the cable duct to the junction boxes of the

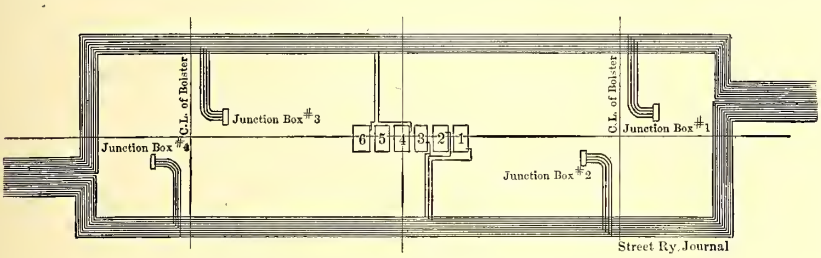


FIG. 12.—DIAGRAM OF WIRE IN CONTROL CABLE

motors. As these leads cross over alongside the bolsters, where dirt and water from the wheels might injure them, the electrobestos molding is protected by a cover of No. 22 galvanized iron. Fig. 13 shows this arrangement.

The junction box used solves in a very effective manner the

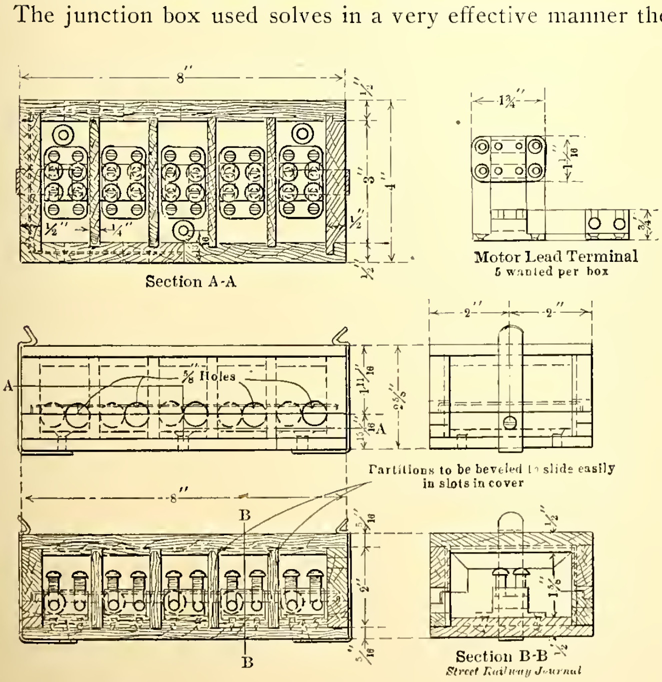


FIG. 14.—SECTIONS OF JUNCTION BOX FOR MOTOR LEADS

troublesome question of how leads from the cable and motor leads shall be connected. The design of this box may be understood from Fig. 14, while Fig. 11 shows it with cover removed in position under the car. The box, which is made of ash, measures 8 ins. long, 4 ins. broad and 2⅝ ins. deep. The removable cover is secured in place by spring clips. Wood separators divide the box into five compartments, each of which

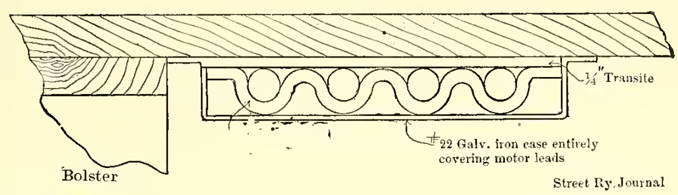


FIG. 13.—SECTION THROUGH CAR FLOOR, SHOWING METHOD OF CARRYING MOTOR WIRES TO JUNCTION BOX

contains a double terminal block. Leads from the cable pass through the top of the box, while the motor leads enter at the bottom. Some of the advantages to be derived from such a box are very evident. Where the ordinary two-way connector is employed instead, the tape used in a short time would go far toward paying the cost of constructing such a box. Moreover, the convenience and the rapidity with which motors may be connected and disconnected when the box is employed should not be overlooked.

A schematic diagram of the light, heater, pump and headlight circuits is shown in Fig. 16. With the exception of those for the headlight, the switches and fuses for all these circuits are on a slate board in a box, placed over the entrance door at the No. 1 end of the car. The box is lined with ¼-in. transite and is provided with a hinged cover. Its position and the relative location of the switches and fuses are shown in Figs. 17 and 18. In the former it may be observed that all the switches and fuses are lettered in such a manner that they may be recognized without first trying them.

The grouping of all the auxiliary switches of the car in one protecting box is a point worthy of special attention. It was the custom a few years ago to locate the switches and fuses for the lights, heaters and pumps at any convenient point on the car. When a fuse blows on such a car a new man is at a loss to know where to find the defect. Moreover, when scattered, the switches are usually unpro-

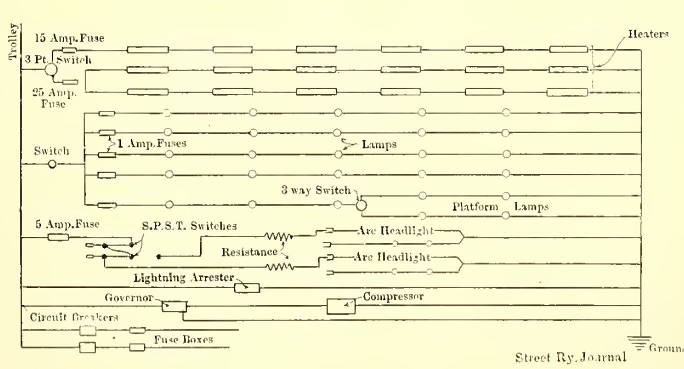


FIG. 16.—SCHEMATIC DIAGRAM OF CAR WIRING

tected and the repair bill is increased considerably over what it would be were the switches centralized and covered.

Immediately behind the switchboard on the No. 1 end, and in the corresponding position on the opposite end, are the wire boxes, to which reference has already been made. These project out from the bulkhead just underneath the hood, extending the full distance between the side plates, and contain all of the wires of the upper portion that pass across the car.

The wires in the box are all carried in electrobestos conduit. By reference to Fig. 18, the position of the boxes and the arrangement of the wiring in the one on the No. 1 end may be

FIG. 17.—SWITCH BOX OVER DOOR

observed. Each of the five lighting circuits employed contain a separate fuse, but all are controlled by one switch.

of these may be observed in the several photographs. A sign at the center of the car and the position of the lights behind it is well shown in Fig. 20.

The three-point heater switch controls two circuits, each protected by a separate fuse. One of these circuits further divides between two sets of heaters, as may be seen by reference to Figs. 16 and 21. The first point of the switch throws in the single circuit, which includes three heaters on each side of the car. On the second point current passes through six heaters on each side of the car, while the third point throws all the heaters in circuit. The heater leads are carried in the cable ducts with the motor and resistance leads. Through outlet castings in the top of the duct, the leads pass directly to the heaters under the seats. The outlets from the cable duct are but a fraction of an inch from the heater terminals, necessitating very short connecting wires.

At first thought it might be supposed that the car would require more heat than it would if permanently closed. It is believed, however, though no careful tests have been made, that by reason of the close fit of the removable sash, the car will be kept as warm with a given current consumption as would a closed car of equal size.

On No. 2 end of the car, in a position corresponding to that

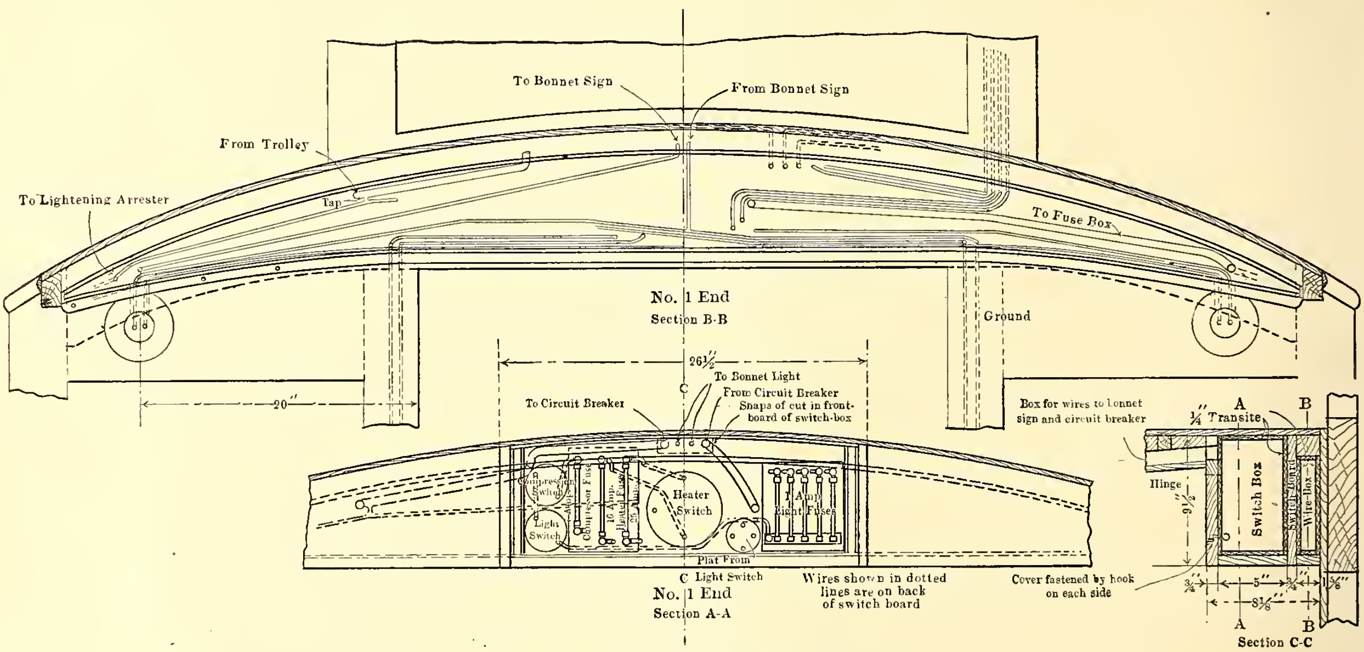


FIG. 18.—SECTIONS AT NO. 1 END OF CAR, SHOWING WIRING, SWITCH AND WIRE BOXES

Four of these circuits are straight five-light circuits. The remaining one, after passing through three of the lamps in the upper deck ceiling, returns to a three-point switch controlling

of the switch box on the No. 1 end, are located the two headlight switches. One of these controls the main circuit, while the other—a double-throw switch—shifts the current to either

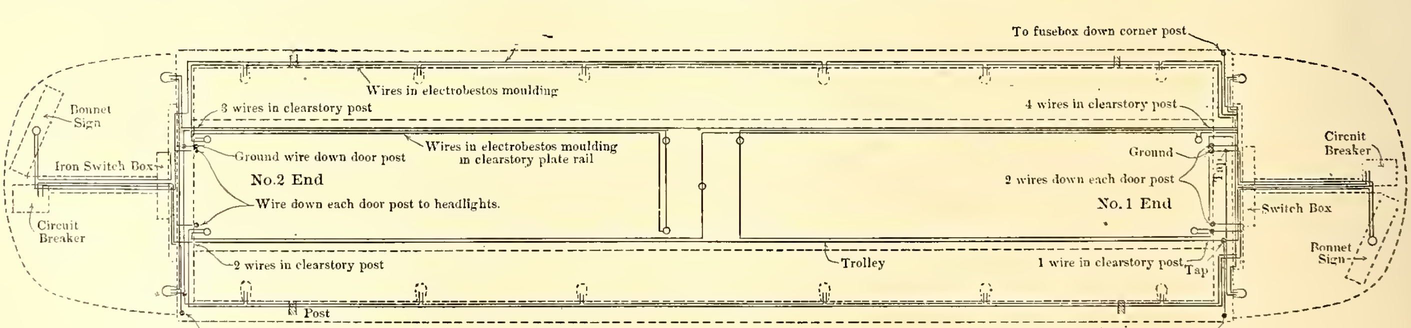


FIG. 19.—PLAN OF LIGHT WIRING

two platform lights on each bulkhead. The location of the lights and arrangements of the circuits are shown in Fig. 19. The nine lights in the upper deck are so placed as to best illuminate the signs under the monitor deck eaves. The position

end of the car. From the double-throw switch the current passes to one of the two headlight resistances under the car, and thence to the headlight. This is of the Rex combination arc and incandescent type manufactured by the United States

Headlight Company. A combination headlight is necessitated by the fact that the cars operate both on city lines and long suburban runs, such as that to Coney Island. The two-way switch leading to the two 32-cp 250-volt incandescent lamps in

FIG. 20.—SIGN, SHOWING POSITION OF LAMPS BEHIND IT

series or to the arc is located in the base of the headlight.

Of the 150 new cars of this type ordered, the John Stephenson Company will build 100 and the Laconia Car Company the remainder. Besides several other minor changes, the new cars will have vestibules on each end, as shown in the drawing. Vestibules are now being built on the cars in service, which

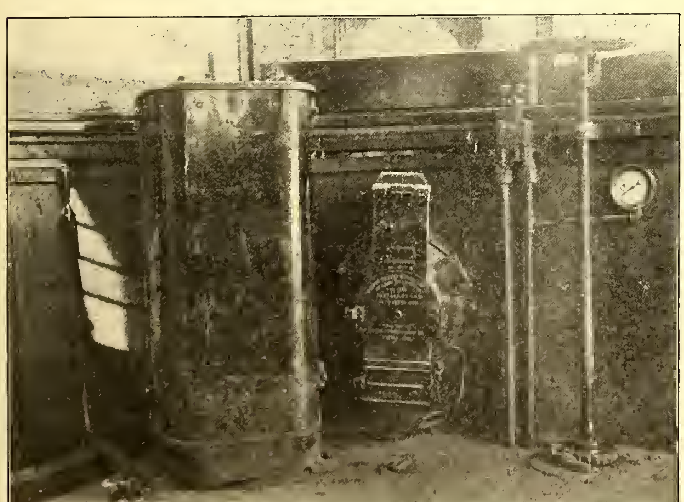


FIG. 22.—ARRANGEMENT OF CONTROLLER AND OTHER APPARATUS IN VESTIBULE

originally were constructed with open platforms, as may be seen in the half-tone reproductions.

The end sash in the new cars will be made stationary, those of the old car being arranged to drop. Close-fitting curtains will be provided for the end sash and doors, for the convenience of the motorman. It is as yet undecided what type of motors, controllers, brakes and heaters will be used on the cars of the new order. Trucks of a special type, made by the Baldwin Locomotive Works after designs furnished by the company, will be used under the new cars.

The car contains twenty-four rattan seats of the Wheeler type. Ten on each side are placed opposite windows, 30 ins. apart. To give desired aisle room near the doors, the remaining four are set in the corners lengthwise of the car. No attempts have been made to ornament the interior of the car with moldings and panels. The inside finish, which is cherry, is comparatively plain. The dash and all that portion of the car body below the belt rail is painted a citron yellow. The panels, posts, letter board and trimmings are scarlet lake.

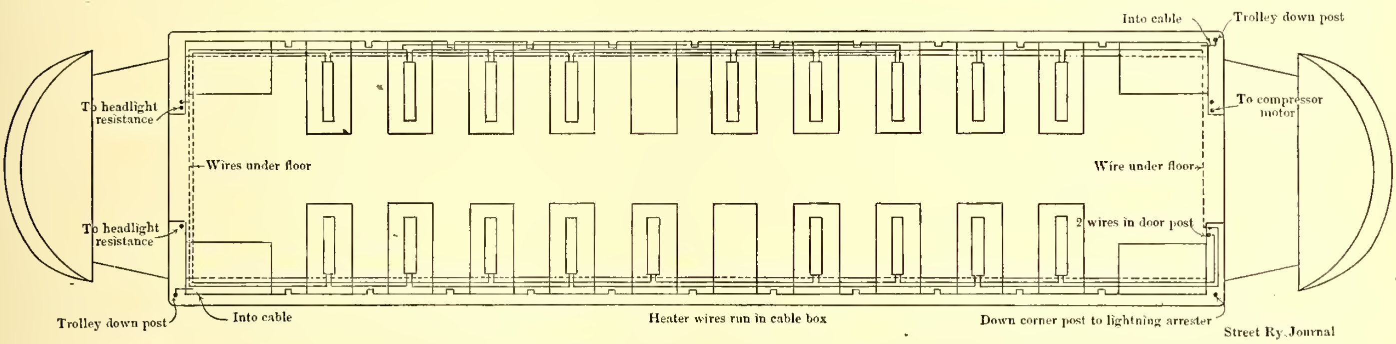


FIG. 21.—PLAN OF HEATER WIRING

A BOLD CAR HOUSE ROBBERY IN SEATTLE

Two bandits held up the Madison Street cable house of the Seattle Electric Company at 3:30 o'clock Oct. 22, overpowered a night watchman and fireman, and, after breaking into the company's strong box, made off with over $500, mostly in small change. The men forced an entrance to the car house two hours after the last car had turned in and everybody but the watchman and a fireman was gone. The watchman was busy cleaning the lamps when the bandits found him. They overpowered and tied him to a street car. The fireman came out to investigate the noise and was immediately made fast to another car. With the only men at the car house out of the way, the bandits broke into the engineer's tool chest and then robbed the sheet-iron box, into which the money collected by the various conductors is dropped.

THREE-WIRE SYSTEM TO BE TESTED ON THE VIENNA STADTBAHN

A test is to be made of the Krizik d. c. three-wire system on the Vienna Stadtbahn, which is at present operated by steam. This system was described in the Street Railway Journal for Dec. 10, 1904, and a voltage of 2 $\times$ 1500 volts, or 3000 volts, between the outer wires will be used. The locomotive will contain four 200-hp motors, and the section to be equipped is that between Praterstern and Hauptzollamt, a distance of 1.4 km, or a little over 1 mile.

The Great Berlin Street Railway Company, owner of most of the surface lines in Berlin, Germany, has decided to increase its capital by $15,000,000 and construct underground lines under Potsdam, Leipsic and Unter den Linden Streets, provided, as seems probable, that a ninety-year concession can be obtained. Several minor street railways will unite with the Great Berlin Company in the project, the cost of which is likely to be two or three times $15,000,000.

BRAKE-SHOES AT ROCHESTER

Through the courtesy of R. E. Danforth, general manager of the Rochester Railway Company, the following statistics are published concerning the cost of brake-shoes on its city and suburban lines.

The company is now using a gray iron shoe having a slightly chilled face, and it is the practice, in so far as possible, to wear the shoes to about ½-in. thickness before they are removed. Some little difficulty has been experienced through uneven wear—that is, one end would wear almost through while there would be considerable metal left in the other end. This has now been remedied by a slight change in the brake rigging, and more nearly uniform results are being secured. The company is getting about 19,000 car-miles from the chilled iron shoes.

During a recent test a set of chilled iron shoes were put on an 8-wheeled car in comparison with a set of special shoes, and the car was kept in continuous service from May 7 to June 22, when the shoes were removed and weighed. The four special shoes weighed 92 lbs. when put in service and 50 lbs. when removed, the metal used amounting to 42 lbs., or a total cost of $1.36. This gave the following comparison with the iron shoe: The special shoe made 133 1-7 miles per lb. of metal, or 41 4-9 per $.01 of cost. The chilled iron shoe made 161 3-26 miles per lb., or 48 13-84 miles per $.01 of cost.

The following table gives data for seven months of 1905:

Month	Total Cost of Brake-Shoes	Cost of Brake-Shoes per 1000 Car-Miles
March	$321	.586
April	297	.575
May	253	.442
June	249	.420
July	205	.314
August	235	.362
September	233	.388

NEW TERMINAL DEPOT AND OFFICE BUILDING IN KALAMAZOO, MICH.

On account of the growth of interurban business, and the need of better facilities for handling the same, the old waiting room of the Michigan Traction Company in Kalamazoo, Mich., had become too small and cramped. The officials of the company therefore decided to build a new depot and office building. With this object in view, a large plot of ground was purchased on Portage Street, near Main Street, in the center of the business section of the city. The old buildings on the ground were razed and plans were drawn for the present building, which is built of red brick with red sandstone trimmings and steel girders.

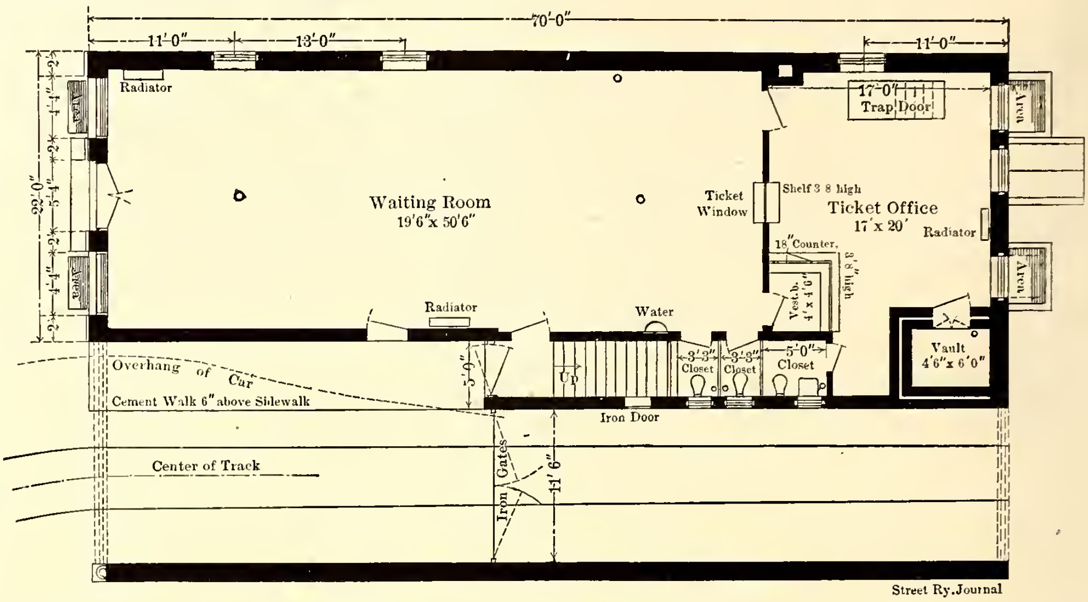


FIG. 1.—FIRST-FLOOR PLAN OF TERMINAL BUILDING, SHOWING WAITING ROOM, LOCATION OF TICKET OFFICE, ETC.

FIG. 3.—KALAMAZOO TERMINAL OF MICHIGAN TRACTION COMPANY

FIG. 4.—WAITING ROOM IN THE KALAMAZOO TERMINAL

The first floor plan, which is reproduced herewith in Fig. 1, shows the arrangement of the waiting room and the ticket offices, with a track for loading and unloading cars. The track also leads to the freight house in the rear, and, as it is paved, is also used by wagons for a driveway to the freight house. The second floor plan (Fig. 2) shows the arrangement of the operating offices, also the employees' room.

The whole third floor is one large room, used for a hall and rented out for entertainments and receptions.

Fig. 3 shows the exterior of the terminal, with a car in the train shed, and Fig. 4 the interior of the waiting room looking toward the front entrance.

This building was used for the first time on Sept. 15, 1905, and received high praise from the daily press and patrons of the road. The building was built under contract by local contractors, under the direct supervision of R. W. Harris, superintendent of the Michigan Traction Company, and D. A. Hegarty, general superintendent of the Railways Company General, which company owns and operates this property. At the rear of this building, at a distance of 40 ft., allowing space for teams to turn and back up to platform, is located the freight house, a substantial brick and steel structure.

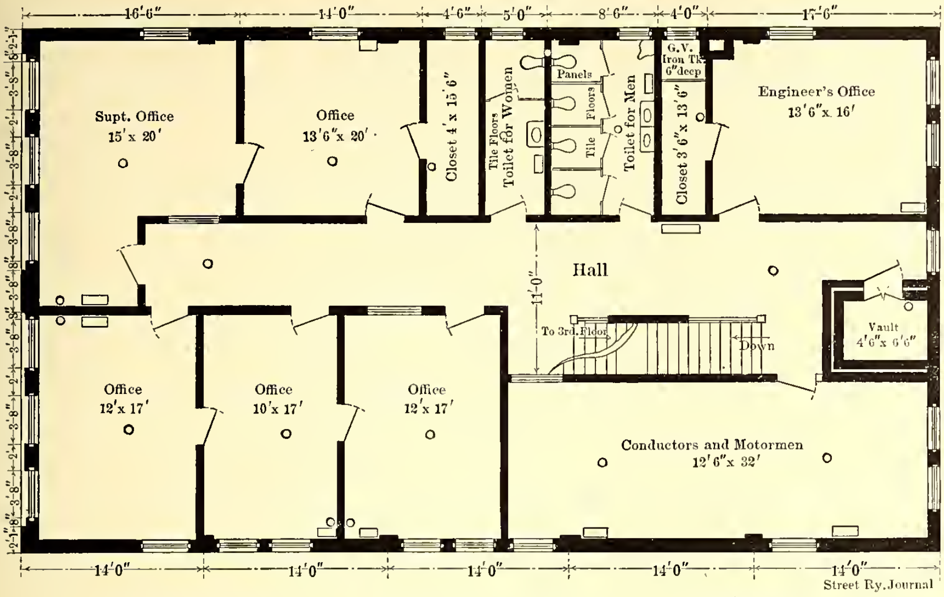


FIG. 2.—SECOND-FLOOR PLAN OF MICHIGAN TRACTION COMPANY'S KALAMAZOO TERMINAL BUILDING

BUILDING UP THEATER TRAFFIC ON INTERURBAN ROADS

During the past summer the Rochester & Eastern Rapid Railway Company, which operates a high-speed interurban electric railway between Geneva and Rochester, N. Y., has instituted a number of ways and means of increasing travel over its line, and several of these have been described in the columns of the Street Railway Journal. J. H. Pardee, general manager of the property, is planning to continue through the fall and winter months the same policy of offering every possible inducement to residents along the line to use the electric road. As a single instance of what can be done in this direction, the company undertakes to secure reservations of seats in any of the Rochester theaters. Many people living along the interurban line some distance out from Rochester would frequently like to go into the city to attend the theater, but have been restrained from doing so owing to the inconvenience and expense of reserving seats in advance in person or by telephone, and the uncertainty as to whether the seats would be held until the parties reached the theater.

Under the arrangement devised by Mr. Pardee, people living anywhere within the district served by the electric road can now go to any of the company's station agents along the route and by leaving the amount of money equivalent to the price of the seats desired can receive an order for their seats. By special arrangement with the theaters, these orders will be exchanged at the theater box office for the seat coupons at any time. This insures that, although the parties may be delayed in reaching the theater for the desired performance, they can depend upon finding the seats ordered waiting for them.

This works out in practice as follows: When the company's agent receives a request to obtain theater tickets for a given performance, he first ascertains the price and location preferred and then telephones the order to the company's station agent at Rochester, using for the purpose the company's private telephone line. The Rochester agent then telephones the theater and reserves seats as near the desired location as possible and telephones the numbers of the seats back to the local agent. This agent then makes out an order and delivers it to the parties desiring the seats. The blank form used in the operation is reproduced in this connection. It consists of three perforated coupons. The long coupon at the right-hand end is the order and receipt which the local agent delivers to the party ordering the seats. The middle coupon or auditor's check is sent to the company's auditor for checking against the seat orders issued by the local agent when these are returned by the theaters. The left-hand coupon is the stub which remains in the local agent's book. The railway company has secured agreements from all the theaters in Rochester to enter into this arrangement, the only obligation being that the railway company agrees to hold itself liable for the price of all seats ordered by its agents whether the seats are used or not.

FORM O 6-2-05-1M-1M

ROCHESTER & EASTERN RAPID RY. CO.
THEATRE CHECK.

Date
Theatre
Seats
Performance EVENING / MATINEE 190
Name
Amount $

No. 1099

ROCHESTER & EASTERN RAPID RY. CO.
THEATRE AUDITOR'S CHECK.

Date
Theatre
Seats
Performance EVENING / MATINEE 190
Name
Amount $

No. 1099

ROCHESTER & EASTERN RAPID RY. CO.
INTERURBAN LINE.

Date 190
Good for *Seats Nos.*
at the *, Rochester, N. Y.,*
for EVENING / MATINEE *performance* *, 190*
Issued to
Paid $

No. 1099 *Agent.*

FORM USED IN HANDLING SALE OF SEATS FOR CITY THEATERS

The conveniences offered to the public by this system have resulted in building up the theater traffic into Rochester over the electric road from almost nothing to very satisfactory proportions, and it is now necessary to run regular theater cars every evening from as far away as Geneva, a distance of 40 miles, into Rochester, in order to accommodate this travel. Undoubtedly the progressive spirit exhibited in this connection by this company will be followed by other electric interurbans.

CORRESPONDENCE

LOCATION OF TOILET AND SMOKING COMPARTMENTS ON INTERURBAN CARS

SHEBOYGAN LIGHT, POWER & RAILWAY COMPANY

Sheboygan, Wis., Oct. 31, 1905.

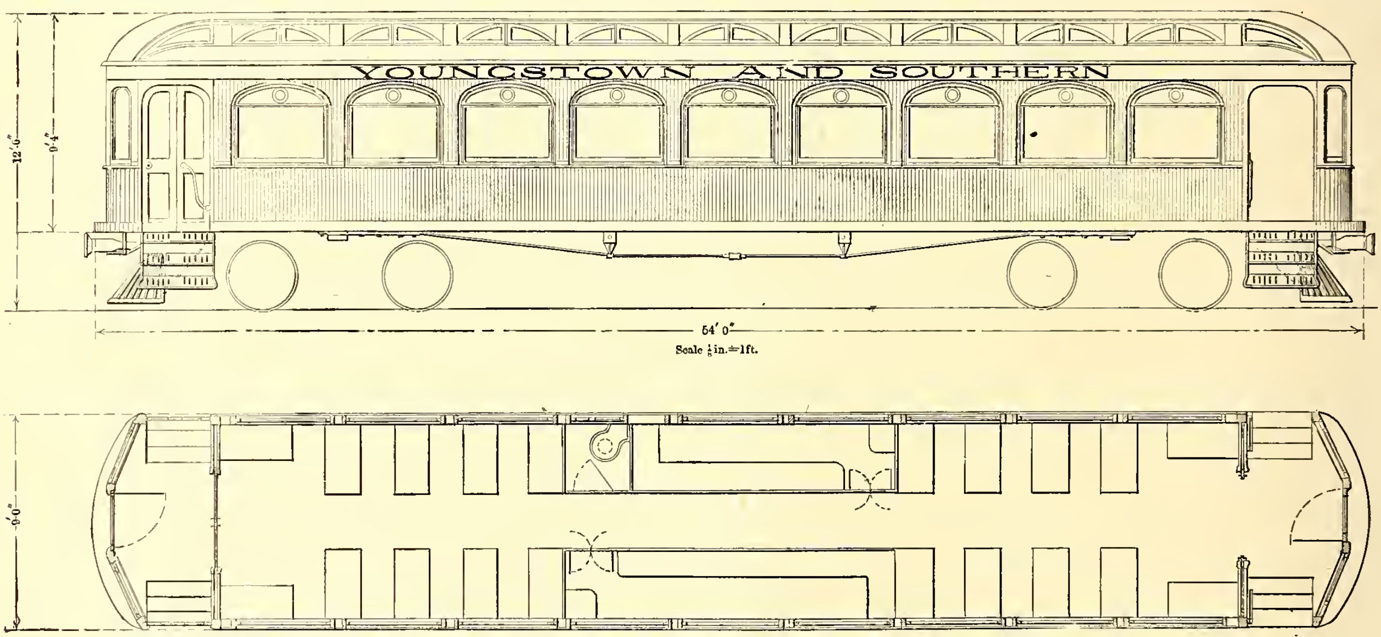
EDITORS STREET RAILWAY JOURNAL:

Your editorial in the current issue of the JOURNAL on the location of heaters and toilet rooms on interurban cars has proved very interesting to me. The problem which you mention is one which confronts all engineers who have to do with designing of rolling stock. You might with perfect propriety have included a few remarks on the location of smoking compartments of interurban cars. The major portion of your editorial refers to cars operated in one direction only. In the writer's experience this form of car has been the easiest type to design. There is no question whatever about the location of the smoking room, and on such a car the toilet room is, for obvious reasons, best located in the rear, with the heater opposite it. The only disadvantage to such an arrangement is, as you point out, that it reduces the available space at the door.

Whenever the designer undertakes to produce a car suitable for a modern interurban railway to be operated on the multiple-unit system, he has a more difficult problem to solve. The accompanying engraving shows a car which the writer designed for a proposed interurban railway in the State of Ohio. Owing to the fact that the road was completed and is operated as a steam railroad, the car shown here was never actually built, but it is possible that it may be constructed in the near future. On a railroad operated on the multiple-unit train control system, it is out of the question to have cars arranged for operation in one direction only. Cars must be so designed that they can be operated in any direction or sandwiched in among other cars in a train. The car here shown is, therefore, designed with end doors, so as to give connection the entire length of the train. It is designed with a steel frame running from end to end, with the platform an integral part of the floor framing. This construction necessitates one more step than is ordinarily provided, but such construction does not present any particular difficulties, nor work any hardship on passengers. No motormen's cabs are provided in any way, and the car is intended to have master controller and air-brake apparatus in the forward right-hand corner of each platform. The pilot or cow-catcher is hung from under the platform sufficiently far back to allow cars to be coupled together without interference from pilots. The body doors of cars are double sliding and the two end seats are placed longitudinally to give plenty of room near the doors.

The most unique feature of the cars is the location of the smoking room. Smoking rooms located at the end of the car have been a source of annoyance to passengers for a long time. Cars operated in either direction must on each alternate trip have the smoking room at the rear end, which makes it almost compulsory for passengers, including ladies and children, to pass through the smoker, with its usual collection of tobacco spitting humanity, puffing like volcanoes. How many fares interurban roads lose on this account it is, of course, impossible to estimate. It seems worth some effort to do away with these annoyances. Accordingly, the smoking compartment is placed in the middle of the car. In reality, there are two smoking rooms, partitioned off from the main body of the car with panel and glass partitions. The aisle is continuous throughout the length of the car, and the smoking rooms are one on each side of the aisle. The seats in these smoking rooms were arranged longitudinally with their backs toward the aisle, thus enabling the passengers to sit facing the window, which accomplishes two objects: one, that the occupants of the smoking rooms are so placed that they cannot stare and ogle at people passing through the aisle, and the other, that they can enjoy a view of the scenery along the route with the maximum of comfort. Each smoking room is provided with two independent ventilators. The toilet room is partitioned off, as shown, and is in an exceedingly convenient location. On account of the fact that the road on which these cars were to be operated is in a locality where coal could be obtained at about 75 cents per ton in the boiler room, it was intended to heat the cars electrically, but a smaller partition could very readily be arranged for a hot-water heater directly opposite the toilet room. The problem of carrying ashes through the car, it seems to me, you make too much of in your editorial. I wonder if it has ever occurred to the men who complain about ashes littering up the floor that there is only about 2 ins. of wood between the heater and all outdoors, and that by boring a hole in the floor immediately under or adjacent to the heater, the whole problem of ash disposal is solved.

I hope that you will find the design of this car of some interest, and beg to assure you that criticisms of it will not be resented. ERNEST GONZENBACH.



PLAN AND SIDE ELEVATION OF CAR DESIGNED FOR USE ON ELECTRIC INTERURBAN RAILWAYS AND FOR OPERATION IN EITHER DIRECTION

COST OF OILING CARS

THE RHODE ISLAND COMPANY

Providence, R. I., Nov. 10, 1905.

EDITORS STREET RAILWAY JOURNAL:

In relation to your editorial in the issue of Oct. 24 on the "Cost of Oiling Cars," and more particularly to that part which reads as follows: "The main thing with them is to get a cup which will feed no more than the necessary amount, and will, as far as possible, stop feeding when the car is standing still," I would like to add a few facts which have been proved conclusively on the various lines operated by the Rhode Island Company, of Providence, R. I., with oil cups of our own design.

The amount of oil necessary for proper lubrication is dependent upon the size of the bearing and the operating conditions under which the motor works. The cup is so designed that dust and dirt is prevented from reaching either the oil or the bearing. Some of our GE 57 motors have been running, and are still running, with an average of 2 ozs. of oil per bearing per 1000 miles. Similar tests show that the smaller bearings, such as are found on the GE 800 motors, require from 3 ozs. to 4 ozs. of oil per bearing per 1000 miles.

A good grade of oil for this work weighs about 116 ozs. per gallon. This cup is easily adjusted, so that more oil can be used if desired, but if a good grade is used, from 2 ozs. to 5 ozs. seems to be ample to meet any condition, which makes a very cheap and reliable lubrication. It also positively stops feeding when the car is not in motion, thus preventing all waste. If these features did not exist, the amount of oil necessary to be used could not be brought down to the figures above mentioned.

There is no felt or wicking used in connection with the feeding apparatus, and the construction is so plain that there is no possibility of clogging on account of dust or dirt.

W. D. WRIGHT, Superintendent of Equipment.

HIGH FREQUENCY FOR SINGLE-PHASE RAILWAYS

ALLGEMEINE ELEKTRICITATS-GESELLSCHAFT

Berlin, Oct. 31, 1905.

EDITORS STREET RAILWAY JOURNAL:

Referring to the paper by C. F. Scott on "The Single-Phase Railway System," presented before the Philadelphia convention of the American Street and Interurban Railway Association, and published in the STREET RAILWAY JOURNAL of Sept. 30, 1905, we note that on page 606, under the heading "Source of Power," the assertion is made that "The standard frequency for the single-phase motor is 25 cycles. * * * If power is to be taken from a power house which generates a higher frequency, it cannot be applied directly, but must be changed to 25 cycles. This may be effected by a motor-generator set."

It may be of general interest to know that this limiting condition does not apply to the Winter-Eichberg motor, for without any changes in construction this motor is capable of operating up to 50 cycles. This company has already installed two large systems, namely, the Stubaitalbahn in Innsbruck, Austria, and the Borinage in Belgium, the first of which uses 42-cycle motors and the second 40-cycle motors. Despite the difficulties presented by the peculiar local conditions, the motors have been operating very satisfactorily.

The direct use of high-frequency single-phase current naturally brings with it the great advantage that the same power station generators can be employed for supplying both the lighting and the railway circuits. This makes it possible either to divide the normal lighting and railway circuits, in which case the reserve machinery is equally good for both branches of the business (as is the case in the Borinage), or one and the same machine can be used simultaneously for lighting and railway work (as is the case on the Stubaitalbahn). The latter arrangement is particularly valuable for small installations whose power requirements form a relatively small part of the total capacity of the power station.

In the above-mentioned paper by Mr. Scott a list is given of the railway installations which the Westinghouse Company had in hand at that time. In connection with this it may be of especial interest to note the following work which has been carried out or is being carried out by this company:

Spindlersfeld, five 110-hp motors, total 550 hp; Swedish State Railways, five 110-hp motors, total 550 hp; Hamburg City & Interurban Railway, 161 115-hp motors, total 18,515 hp; compressor motors for the foregoing installations, fifty-seven 3-hp motors, total 171 hp; Stubaitalbahn, twenty 40-hp motors, total 800 hp; Borinage, forty 40-hp motors, total 1600 hp; mining locomotives for the Menzel shaft, three 40-hp motors, total 120 hp; making a grand total of 22,306 hp in single-phase motors.

ALLGEMEINE ELEKTRICITATS-GESELLSCHAFT.

THE NEW YORK CENTRAL-NEW HAVEN SITUATION

In view of the attention which is being given to the proposed electrification of the New Haven road, and the communications which have appeared in previous issues on this subject, the following statement from Wm. S. Murray, electrical engineer for the New York, New Haven & Hartford Railroad, is of interest:

Concerning the proposed method of electrification it is interesting to note the unsolicited general concordance of opinion on the part of certain engineers, and gratifying in the main to note a temerity in expressing a concrete opinion of our decision.

Without a full appreciation of the relevant factors in the case one could hardly view with a more kindly eye a hearty endorsement of our conclusion than a condemnation of it. Certainly the first indication of a real engineer is his reservation of an opinion until all these relevant factors have, in the full knowledge of their true bearing, been assembled. To-day a conclusion is worth nothing that is not a compromise. A compromise is the true algebraic sum of all the relevant factors.

After six months' careful study of the possible methods of electrification a conclusion has been reached. The work has been too initiative, the ground too new and the opportunity too exceptional not to have kept an accurate log upon the method of procedure. Were it possible to devote time to things other than an expeditious and careful continuance of the work begun we would gladly segregate this conclusion into its relevant factors and discuss it with those engineers who, by the reservation of their concrete opinion, have shown a silent wish to later agree or disagree with its plans.

To the two great electrical manufacturing companies who have placed the genius of their engineering in our hands for consideration we have nothing but the highest tribute to pay. It has been no mean privilege to make a minute study of their individual viewpoint of the problem. It is true their analysis of the situation has dictated widely separated conclusions, and those engineers who appreciate the trust imposed in this decision for the New Haven road can readily understand that the divergence of opinion has served only to double the responsibility of the conclusion, but by which the engineers for the New Haven road are in no way disturbed.

To those minds prone to a conclusion without the assistance of the relevant factors it may be a helping thought to say that throughout the study of the New Haven's electrification the Central's plans have been a constant and most relevant factor. The conditions of the New Haven problem, however, are widely different. It has been deemed that alternating current is pertinent to their proper fulfillment. Because the New Haven locomotives will be operative either on direct or alternating current in no way emphasizes the importance of their interchangeability. The condition imposed in effect makes valuable the double characteristic. A criticism of the Central's plans is irrelevant and unnecessary; direct-current propulsion is the judgment of their engineers. Our concern is its effect upon us, and it is read in the direct-current characteristic of our locomotive.

The officers of the East St. Louis & Suburban Electric Railway Company, accompanied by section foremen of all divisions, inspected the road Nov. 2. Two prizes of $50 each will be awarded to the foremen whose sections have been kept in the best condition at the least cost.

NEW YORK CENTRAL ELECTRIFICATION

An extended description of the new electric power stations now being built by the New York Central & Hudson River Railway Company for its electric zone in New York City was published in the last issue of the Street Railway Journal, and in the previous issue an account was given of the new steel cars of the company. It is proposed in this issue to describe the improvements which are being carried on in the Forty-Second Street terminal to accommodate electric trains, and also to describe the transmission system and sub-stations.

PART OF THE EXCAVATION FOR NEW GRAND CENTRAL STATION, LOOKING NORTH FROM FORTY-FIFTH STREET

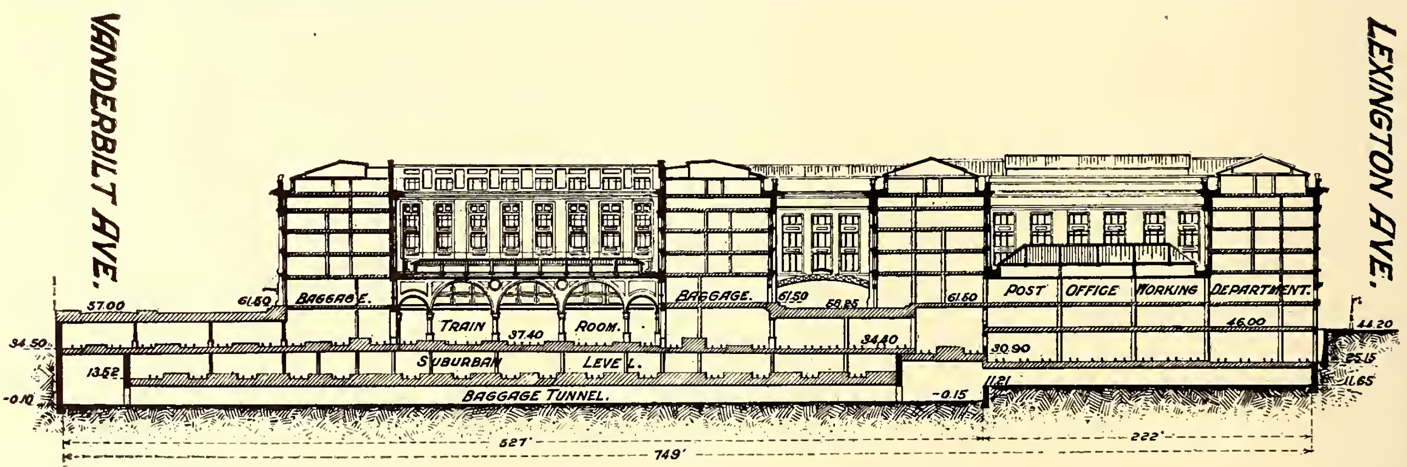
The changes to be made at the Grand Central Station involve a demolition of the present building and the construction of a new terminal station which will undoubtedly be the largest and most complete in its appointment of any railroad terminal in the world. It will be unique in a great many ways, but notably in the fact that it will be designed entirely for electric railway operation. This permits the use of two train levels, both below the level of the street, while the ticket offices, waiting room, baggage rooms, etc., are on a third level, accessible directly from the streets on either side. This arrangement would not have been possible except in a station devoted entirely to electric trains, hence this station establishes a new standard in terminal station design. The advantage of employing several tiers in terminal station construction in a city and district in which real estate is so expensive as it is in New York are obvious. Instead of being obliged to secure additional track accommodation by spreading out laterally, the additional space is gained by expanding vertically. The new station and switch yard will occupy considerably more space than the old station and switch yard, and by the use of different tiers the company has been able to reclaim for railroad purposes about 40 acres of land which would not have been available with the use of steam locomotives. It is not the intention in this article to describe the architectural features of the new station, but to confine the description to the arrangement of the tracks and its effect on the capacity of the station.

The lower deck, or the suburban track level, is on practically the same grade as the New York Subway. The arrangement of tracks in this terminal is shown on the opposite page. All trains running into this station will be multiple-unit trains, and, as will be seen, separate platforms are used for inbound and outbound passengers. Each passenger track extends between two platforms. In this way trains can discharge passengers on one platform and immediately receive passengers from the platform on the opposite side of the train. The station can be used as a stub-track terminal and the trains can be immediately despatched out of the station; or if preferred, the train, after discharging the passengers, can continue around the loop and receive passengers from any one of the outbound platforms on the other side of the station. This level, as shown in the plan herewith, is designed to have a physical connection with the subway, although the actual construction of this connection has not been definitely decided upon. Underneath the station is a baggage tunnel through which baggage can be conveyed from Lexington Avenue to Vanderbilt Avenue.

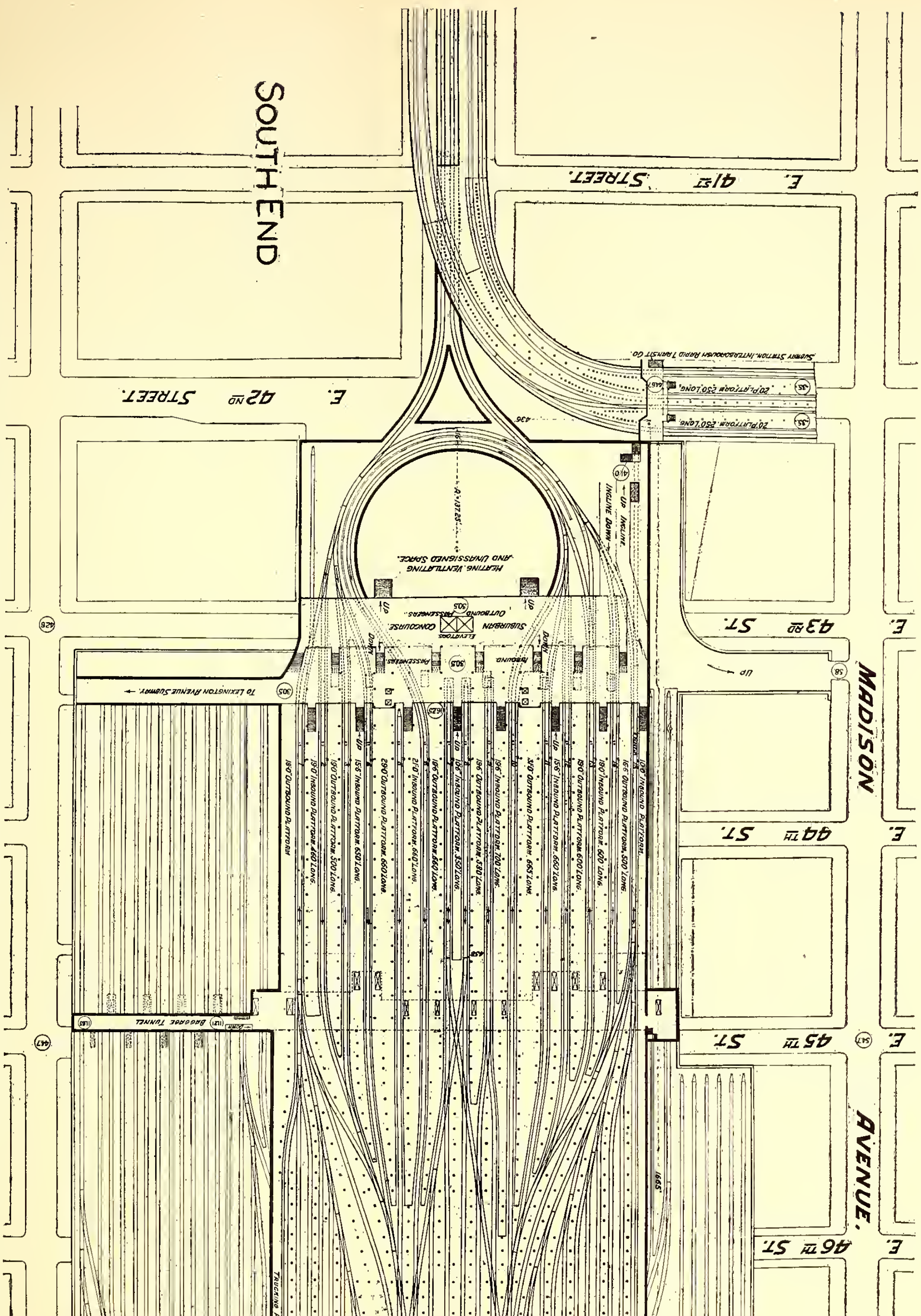
The express level, which is at a height of 20.98 ft. above the suburban level, is designed for through trains and electric locomotive operation. As will be seen, there are forty-seven stub-tracks on this level, with special platforms for United States mail, Adams Express and American Express.

The ticket office, waiting rooms and baggage rooms are practically on the Vanderbilt Avenue and Forty-Second Street street level, and are 27 ft. above the express level. Adjoining the new station on the Lexington Avenue side will be the Post-office Building, which will be connected with the station by an underground passage.

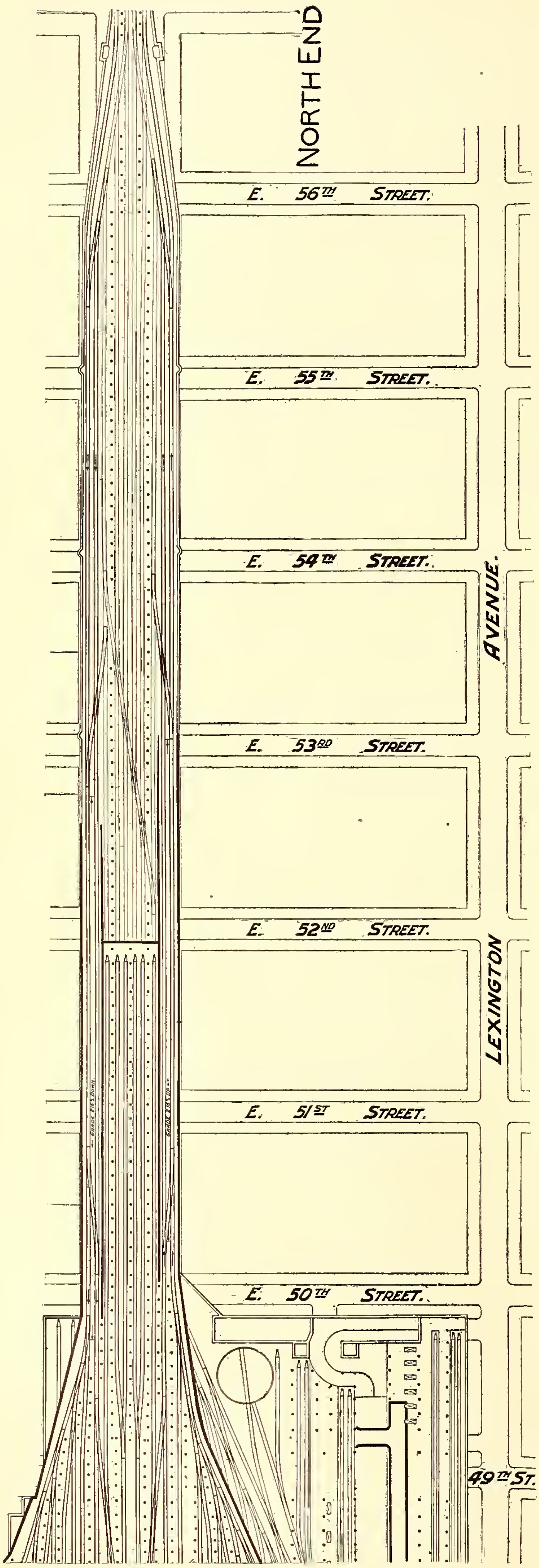
Before the commencement of the terminal improvements all trains entered the Grand Central Station at Forty-Second Street, New York, through the four-track masonry tunnel in Park Avenue, which terminated at Fifty-Sixth Street. Thence to Forty-Ninth Street the tracks ascended 17 ft. in an open cut and entered an open yard, descending 3 ft. to street level at the station. The yard had an irregular area about two blocks in width and seven blocks in length, and covered 23 acres with its 11.3 miles of tracks and several buildings for freight, express operations and storage purposes. North of Forty-Ninth Street vehicular traffic was maintained on both sides of Park Avenue, the tracks occupying the center of the street only; between Forty-Ninth and Forty-Second Streets



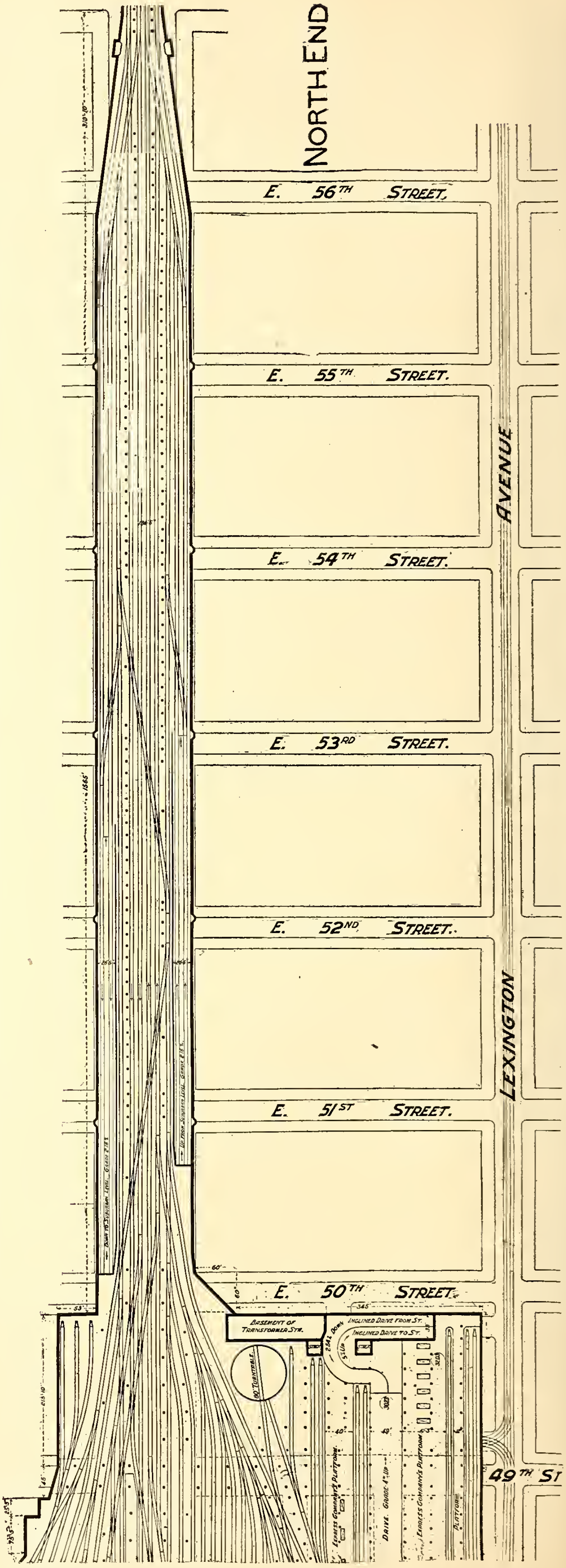
SECTION OF NEW GRAND CENTRAL STATION THROUGH TRAIN ROOM



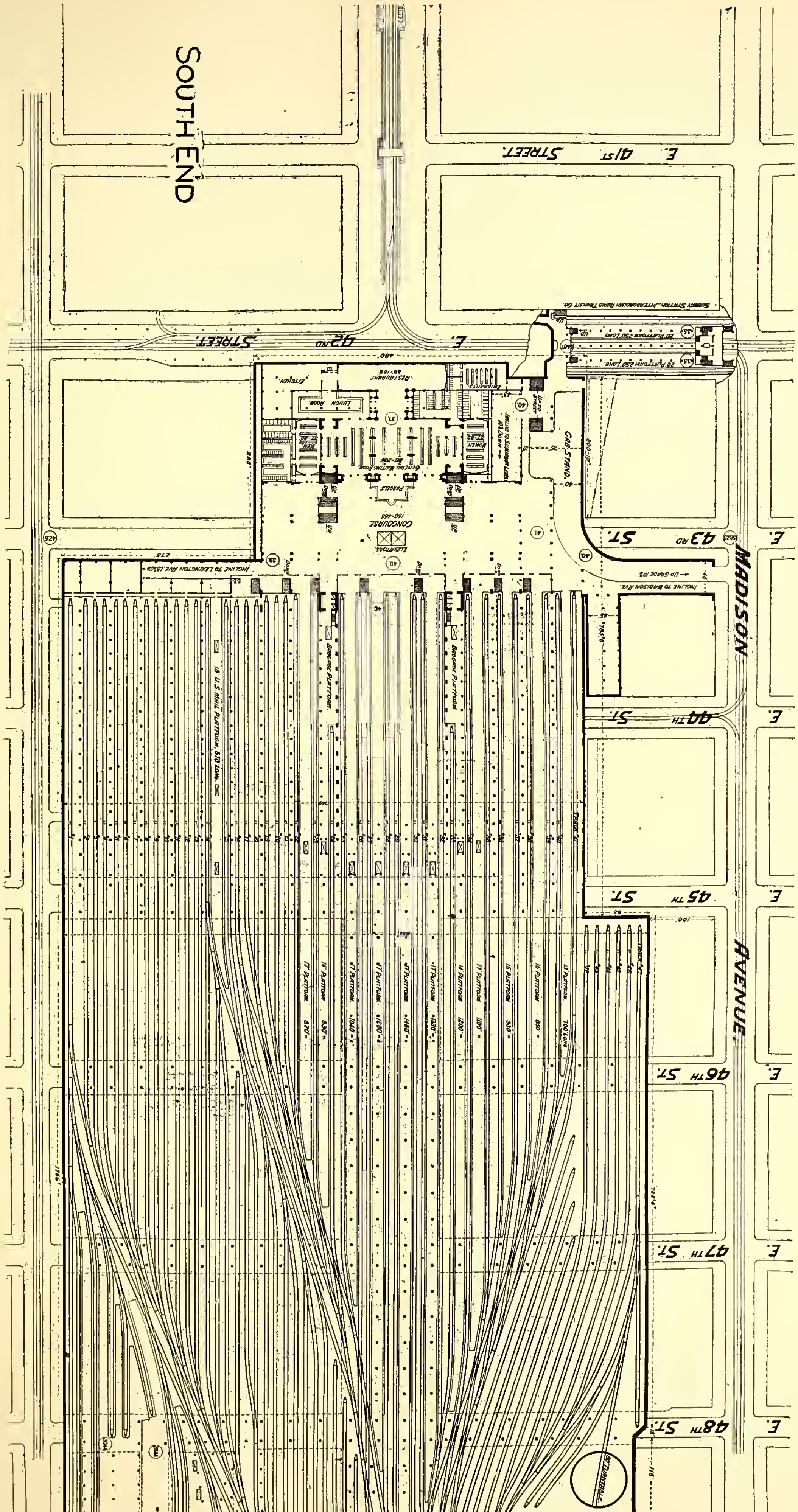
PLAN OF TRACKS ON SUBURBAN LEVEL, NEW GRAND CENTRAL STATION, NEW YORK, OF THE NEW YORK CENTRAL & HUDSON RIVER RAILWAY COMPANY, SHOWING INBOUND AND OUTBOUND PLATFORMS FOR MULTIPLE-UNIT ELECTRIC TRAINS, LOOP, POSSIBLE CONNECTION WITH THE SUBWAY AND STEPS AND ELEVATORS LEADING TO EXPRESS LEVEL ABOVE



PLAN OF SUBURBAN LEVEL OF THE NEW GRAND CENTRAL STATION FROM FORTY-NINTH STREET TO FIFTY-SEVENTH STREET



PLAN OF EXPRESS LEVEL, NEW GRAND CENTRAL STATION FROM FORTY-NINTH STREET TO FIFTY-SEVENTH STREET



PLAN OF TRACKS ON EXPRESS LEVEL, NEW GRAND CENTRAL STATION, NEW YORK, OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD COMPANY, SHOWING STUB-END TRACKS, CONCOURSE, RESTAURANT, ETC., AND STEPS LEADING DOWN FROM TICKET OFFICE ON STREET LEVEL ABOVE the tracks occupied the full width of the roadway, so that no portion of it was available for traffic. Street traffic was carried across the yard by inclines with a long-span truss bridge on the center line of Forty-Eighth Street and by a girder bridge over the cut in Park Avenue, between Fifty-First and Fifty-Second Streets. Foot bridges crossed the yard at Forty-Seventh and Forty-Ninth Streets, and crossed the cut at Fiftieth, Fifty-Third, Fifty-Fourth and Fifty-Fifth Streets. These were elevated above the street level and approached by stairs and, at the east end of Forty-Seventh Street, by an incline.

The improvements now in progress will keep the entrance of the tunnel as before at Fifty-Sixth Street, but will depress the tracks at that point and provide for ten tracks instead of four, as formerly; the yard will be depressed to a level about 15 ft. lower than before, and will be extended to a maximum width of about 135 ft. on both sides for a length of 3400 ft. from the end of the tunnel to the new terminal building. About 17.5 miles of new and rearranged old tracks will be laid in the 43-acre yard; a yard 300 ft. wide and 6.2 miles of track will be constructed about 22 ft. below the main yard on the center line of Park Avenue, and will extend from Fifty-Third Street to and through the new station. A steel plate girder viaduct extending longitudinally through the center of the yard will carry the full width of Park Avenue from Fifty-Sixth Street to the new station at Forty-Fifth Street, and thirteen plate girder viaducts from about 45 ft. to 63 ft. wide and 50 ft. to 950 ft. long will carry all intersecting transverse streets across the yards. The cross streets will be graded up to the ends of these viaducts. A new terminal station will be constructed with connections to the Rapid Transit Subway at the level of the suburban train platform, and uninterrupted and increased train service during the execution of these improvements will be facilitated by the construction of a large temporary passenger station on the east side of the new yard and by the transfer of the engineering and other offices to a new building at Madison Avenue and Forty-Fourth Street. The important results attained by these improvements are given in the accompanying table.

TABLE SHOWING FACILITIES AT GRAND CENTRAL TERMINAL BEFORE AND AFTER IMPROVEMENTS.

Subject	Present Amount			Proposed Amount				Increase Per Cent.
	Mott Haven	Grand Central Station	Total	Suburban Level	Express Level	Street Level and Above	Total	
Terminal area, acres	......	23.24	23.24	24.22	40.32	......	64.54	178
Tracks, platform, miles	......	2.91	2.91	2.07	3.70	......	5.77	98
Storage, miles	......	1.54	1.54	2.94	5.57	......	8.51	453
Express, miles	......	0.35	0.35	......	0.86	......	0.86	146
Mail, miles	......	0.16	0.16	......	0.20	......	0.20	25
Other, miles	......	5.88	5.88	5.58	6.25	......	11.83	101
Total, miles	......	10.84	10.84	10.59	16.58	......	27.17	151
Tracks, car capacity (*a*).								
Platform	......	214	214	177	273	......	450	110
Storage	525	115	640	249	394	......	643	0.5 (*b*)
Express	......	26	26	......	61	......	61	135
Mail	......	11	11	......	15	......	15	36
Total	525	366	891	426	743	......	1,169	31
Tracks, platform, number	......	19	19	15	20	......	35	84
Ground area, building, acres	......	5.90	5.90	......	......	8.10	8.10	37
Offices, sq. ft	......	129,500	129,500	......	......	426,694	426,694	229
Post Office, sq. ft	......	33,000	33,000	......	......	104,577	104,577	217
Waiting rooms, sq. ft	......	12,443	12,443	......	24,697	......	24,697	98
Retiring rooms and toilet, sq. ft	......	1,391	1,391	......	9,080	......	9,080	553
Restaurant and accessories, sq. ft	......	2,647	2,647	......	16,454	......	16,454	522
Ticket offices, sq. ft	......	1,444	1,444	......	2,295	......	2,295	58
Parcel stand, sq. ft	......	507	507	......	1,320	......	1,320	161
Baggage rooms, sq. ft	......	33,315	33,315	......	60,800	......	62,940	88
Concourses, sq. ft	......	14,814	14,814	53,750	67,200	......	120,950	717
Ticket lobby, sq. ft	......	1,490	1,490	......	......	18,298	18,298	1,128
Cab stands, sq. ft	......	2,952	2,952	......	11,535	28,105	39,640	1,243
Cab curbs, lin. ft	......	125	125	......	275	580	855	584 (*c*)
Office corridors, sq. ft	......	18,210	18,210	......	......	120,222	120,222	560
Office toilets, sq. ft	......	2,482	2,482	......	......	15,920	15,920	541
Steel viaducts, sq. ft	......	......	......	......	......	569,780	569,780	0

(*a*) In measuring the car capacity of the tracks, 60 ft. is allowed in the suburban station and 70 ft. in the express station. (*b*) Considering the storage tracks at the Grand Central Station only, there has been an increase of 528 cars or 459 per cent. (*c*) These figures are independent of public street curb.

The design and execution of the terminal improvement work described above is under the direction of a special engineering corps of the New York Central & Hudson River Railroad Company, under W. J. Wilgus, vice-president. A. B. Corthell is terminal engineer; G. A. Harwood, designing engineer; W. F. Jordan, resident engineer in charge of general field work and supervisor of details; and W. L. Morse, assistant engineer in charge of the execution of plans and structural engineering.

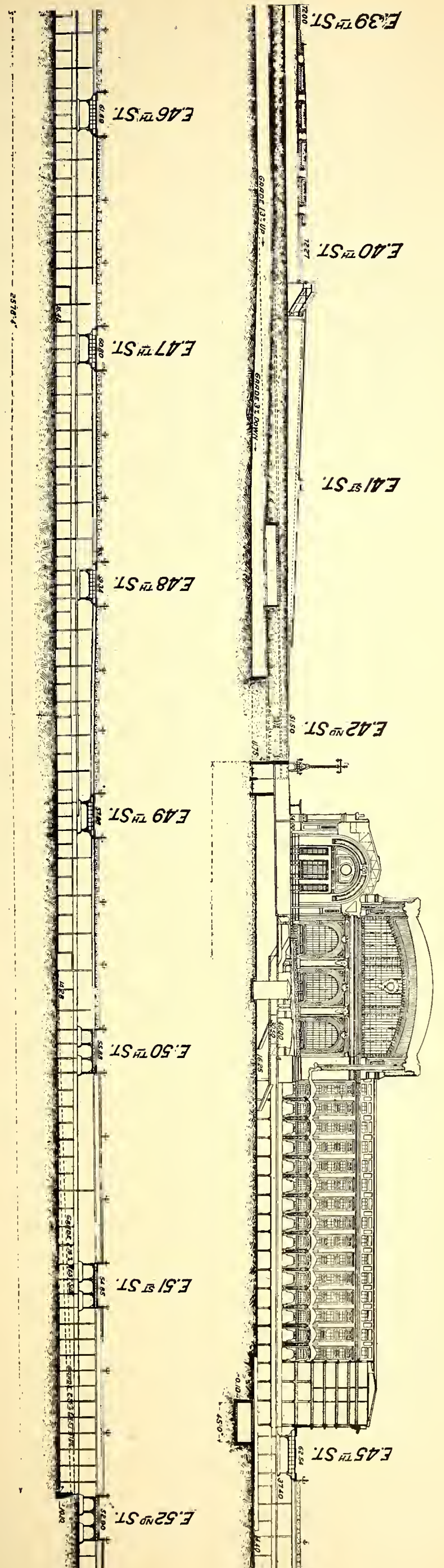
THE TRANSMISSION LINES AND SUB-STATIONS OF THE NEW YORK SUBURBAN DISTRICT OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD COMPANY

In the Nov. 11 issue of the STREET RAILWAY JOURNAL an account was published of the two main power stations of the New York Central & Hudson River Railroad Company at Port Morris and Yonkers. In that same issue a cross section of a typical sub-station was published. The current generated at these two power stations is transmitted as three-phase, 25-cycle, 11,000-volt alternating current to eight sub-stations located as follows: No. 1, Fiftieth Street and Lexington Avenue, Grand Central terminal, New York; No. 2, Mott Haven; No. 3, Kingsbridge; No. 4, Yonkers; No. 5, Irvington; No. 6, Ossining; No. 7, Bronx Park; No. 8, Scarsdale.

TRANSMISSION LINES

The transmission lines are partly overhead and partly underground. The system is designed to give the greatest protection against interruptions of all kinds. Each sub-station may be fed from either power station, and the lines are so disposed that no ordinary accident could cut off a sub-station from its power supply.

All overhead transmission lines are supported by latticed steel poles set in concrete foundations. Conductors will be of



LONGITUDINAL SECTION ON PARK AVENUE, FROM THIRTY-NINTH STREET TO FIFTY-SECOND STREET, OF NEW GRAND CENTRAL STATION

either 0000 bare stranded wire cable or of aluminum stranded cable, spaced 36 ins. apart on the cross-arms. Cross-arms will be of yellow pine. The insulators will be supported by steel pins. Poles will be spaced 150 ft. apart on tangent and closer on curves as existing conditions demand. An experimental line has been erected by the company so that its engineers may develop the installation to the fullest degree. A plan and elevation of the standard pole adopted by the company is shown on page 922.

All overhead lines are protected by the latest form of lightning arresters, and details of the overhead construction have been considered so minutely that the success of the system is assured.

Underground cables have three conductors of 0000 stranded copper, with paper insulation and lead sheathing. Duct lines are of vitrified tile covered with waterproofing and laid in concrete. The manholes placed at stated intervals on the lines are designed for arrangement of cables with regard to the best manner of handling and supporting them when they are installed. Each cable lies on a shelving of concrete supported on iron pins. These shelves can be removed when necessary, and are designed to facilitate the easy handling of cables as well as protection to sheathing and splicing. Manholes are roomy and are laid out to permit the bending of cables in easy curves. Much ingenuity has been used in the construction of these underground lines and manholes, and many of the ideas developed are novel.

Through the Park Avenue tunnel and along the viaduct, and also through the Harlem division depression, the conductors will be carried in 3½-in. steel pipes supported by brackets, and in crossing the Harlem River the conductors will be in a submarine cable laid in a dredged trench in the bed of the river, back-filled with gravel.

At points where the lines change from overhead to underground construction, cable towers of attractive architectural design will enclose the connections, together with lightning arresters and disconnecting switches.

SUB-STATIONS

At the sub-stations the high-tension current is stepped down to direct current at 666 volts for delivery to the third rail. The main equipment of each sub-station consists of three rotary converters and their accompanying transformers and subsidiary apparatus. The arrangements provide for a future installation of five rotary converters. The relative locations and capacity of the sub-stations are as shown in the following table:

Sub-Sta. No.	Location	Area or Main Floor, sq. ft.	Miles from Grand Central Station	Present Installation of Rotary Converters	Future Installation of Rotary Converters
1	Grand Central terminal.	4,796.6	.36	3 of 1500 kw	5 of 1500 kw
2	Mott Haven	3,845.27	*5.47 †5.49	3 of 1500 kw	5 of 1500 kw
3	Kingsbridge	3,845.27	9.44	3 of 1000 kw	5 of 1000 kw
4	Yonkers	3,639.33	15.64	3 of 1000 kw	3 of 1500 kw
5	Irvington	3,845.27	22.11	3 of 1000 kw	5 of 1000 kw
6	Ossining	3,845.26	30.31	3 of 1000 kw	5 of 1000 kw
7	Bronx Park	3,845.27	9.30	3 of 1000 kw	5 of 1000 kw
8	Scarsdale	3,845.27	19.02	3 of 1000 kw	5 of 1000 kw

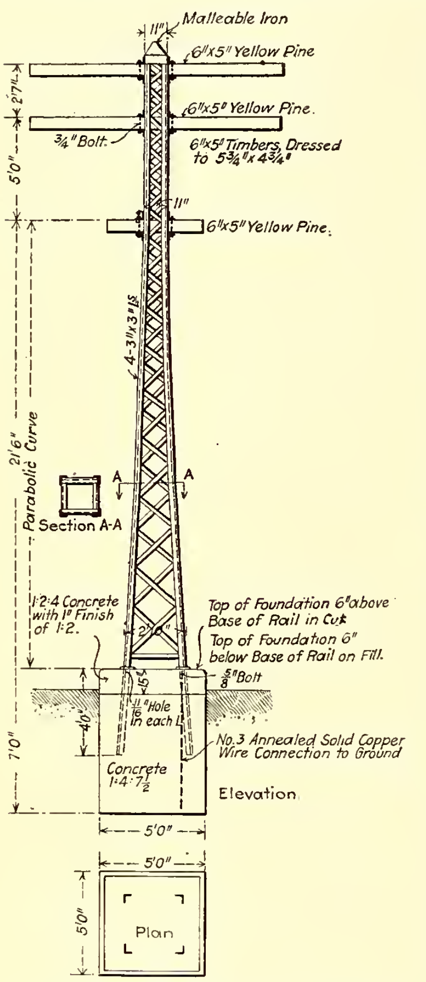
* Hudson division.
† Harlem division.

Each sub-station is provided with a battery equipment, described below, and provision is made for any extensions that may be expected from increase of traffic.

DESIGN OF SUB-STATIONS

The following general principles were adopted in the design of the sub-stations: (1) The path of the energy to be as direct and as short as possible from the high-tension transmission lines to the d. c. feeders; (2) the wiring to be as little exposed as possible, and yet to be readily accessible; (3) all machinery to be on the same floor as the operating boards; (4) the principal apparatus to be under the direct control of the operator while standing at the operating boards; (5) all apparatus and machinery to be so arranged that the effects of an accident will be confined to the place where it occurs; (6) the risk of accident to the operator to be as slight as possible; and (7) stations to be fireproof.

In pursuance of the first idea, the apparatus is arranged in the following order across the station: Entrance of high-tension lines, high-tension switching apparatus, transformers, rotary converters, direct-current switching apparatus. Along the station there is a succession of complete units, such as that described above, the controlling apparatus being located at the center. The second requirement necessitated the use of wall chases for the high - tension lines, and determined the use of transformers having both high-tension and low-tension terminals underneath the main floor. The third requirement determined the omission of galleries except for lightning arresters. The fourth requirement introduced the use of electrically-operated switches and circuit breakers for both the high-tension alternating current and the low-tension direct current. All of these switches and circuit breakers are operated from the control boards. The fifth requirement settled the ample spacing of the machinery and introduced a very complete system of barriers for the protection of live conductors, an arrangement which is of great service in protecting the operators from danger.



PLAN, ELEVATION AND SECTIONS OF STANDARD POLE FOR TRANSMISSION LINES

ENTRANCE OF HIGH-TENSION LINES

The underground lines enter the basement through ducts and are terminated at end bells, where they divide into three separate conductors running to three series transformers which supply current to the measuring instruments. The scheme adopted for the entrance of overhead lines was settled after a careful examination of all systems in use, and is believed to afford the best possible protection against rain and snow, not only to the incoming line, but also to the apparatus in the building.

LIGHTNING ARRESTERS

The design of the lightning arresters was made with the view of separating the phases as much as possible and to make all parts accessible. The groups of arresters are mounted in such a way that a complete set may be taken out and replaced with the greatest facility, a feature which is believed to be original with this installation.

All overhead lines are provided with knife switches to disconnect them from the sub-station apparatus.

HIGH-TENSION WIRING AND OIL SWITCHES

The high-tension bus compartment is of concrete, and is provided with concrete barriers to separate the lines connected to the busses. The series transformers for the measuring instruments pertaining to lines and machines are suspended from the ceiling in a row near the bus compartment, and are separated by barriers. In order to obtain this uniform arrangement, and yet leave the front terminals of the oil switch dead when not in use, the high-tension lines between the series transformers and the power transformers are looped under the bus compartment, an arrangement which affords a very neat and practical way of combining two advantages which hitherto have not been jointly obtained.

The wiring where bare is of copper tubing, which gives an excellent mechanical construction, a feature of special importance for the delta arrangement of the power transformers. The high-tension bus-bars are supported rigidly, but nevertheless in such a way as to take care of expansion and contraction. All openings in the bus compartment are protected by fireproof doors.

The oil switches are electrically operated, and are designed to carry a substantial overload. They are provided with pilot lamps to indicate at the control board whether they are open or closed, and the lamp circuits are so arranged that there is no indication unless the plungers complete their stroke without rebounding. The compartments are of brick, which matches the interior of the sub-stations, the barriers between phases being soapstone.

TRANSFORMERS AND ROTARY CONVERTERS

Two sub-stations are equipped with single-phase 550-kw transformers to supply the 1500-kw converters, whereas the stations with 1000-kw converters have 375-kw transformers. These have a normal ratio of 11,000 volts to 460 volts, and are provided with extra taps for varying the voltage according to the drop in the transmission lines, or according to the distribution of load among the sub-stations. They are of the air-cooled type, with terminals underneath. The air is supplied by two induction-motor-driven blowers, one of which suffices to supply the station.

The rotary converters are of the sextuple connection three-phase type, which combines the advantages of the ordinary three-phase and six-phase type. They convert the alternating current at 460 volts into direct current at 666 volts.

DIRECT-CURRENT SWITCHBOARDS

These will have motor-operated switches and circuit breakers, controlled from the boards at the center of the station. The design of these switches and breakers insures a certainty, rapidity and safety of action hitherto unknown with this type of apparatus. A spare panel and auxiliary bus are provided, to which any feeder or machine may be connected pending repairs on its proper panel. All connections are made with copper bars, thereby insuring a neat and effective construction.

The positive feeders after leaving the switchboards are provided with end bells, which terminate the lead sheathing of the cables which run out to the third rail in underground ducts.

The negative leads from the converters run through the foundations and connect to an ammeter shunt which carries the entire station output. The negative feeders are bare 2,000,000-circ.-mil cables, which run out directly to the tracks in pipes.

There are two controlling boards situated at a part of the station which will be the center when the station is extended to its final limits. There is a bench board which carries the principal instruments and control apparatus, whereas an upright board carries the auxiliary control apparatus for lighting, etc. All panels are of natural slate, with black finish, the instrument cases being black oxidized.

CRANES

Each sub-station is provided with an electric traveling crane, which is also supplied with arrangements for hand operation.

STORAGE BATTERY EQUIPMENT

The electric storage battery equipment is believed to be the largest railway battery installation in the world. It not only takes care of load fluctuations, but it is sufficiently large to operate the entire system under normal conditions for a period of one hour, in case of failure of generating apparatus. Five of the batteries have an output each of 2250 amps. for one hour, and the others give 3000 amps., 3750 amps. and 4020 amps., respectively.

The batteries are located in buildings adjoining the sub-stations, and are operated in connection with boosters and switching apparatus in the sub-station.

The discharge is governed by a carbon regulator working in connection with exciters and boosters, the effect of which is to make the batteries discharge when there is heavy demand for current and to charge when the demand is light.

The battery houses are of the most modern construction and have acidproof floors of vitrified brick. The heating and ventilating systems are of the most approved type and are well protected against acid fumes.

STARTING CONVERTERS

Converters may be started either from the direct-current or alternating-current side. In the latter case a gradual application of voltage is insured by taking current from several taps in the secondaries of the power transformers. Starting from the direct-current bus, the machine is started as a direct-current motor through a rheostat. When a speed above synchronism is reached, the direct circuits, including the shunt field, are opened, and the machine runs by its momentum only. The alternating current is then put on by closing the oil switch, and the machine runs as a synchronous motor. It is then only necessary to close the shunt-field circuit to put the machine in synchronism. These operations are made to follow each other rapidly, and are effected by the use of a special combination switch.

LIGHTING

Sub-station lighting is done with incandescent lamps operated by alternating current at 120 volts. The current is taken from the 460-volt power circuits and the voltage reduced by special transformers. The lights are distributed so as to illuminate all apparatus, and at the same time give a good general illumination. All wiring is in conduit, and circuits are controlled from standard panel boxes set in the walls. The lighting of battery rooms has been developed with a view to protection from acid fumes, all wiring in these rooms being lead covered and all sockets of porcelain. Emergency lighting current may be taken from the control battery or charging set.

D. C. FEEDER SYSTEM

The direct-current feeder system is designed to give a duplicate path for the current from the sub-station to the third rail. It is also designed so as to confine any trouble which may occur to one track only, thereby making any interruption of traffic as slight as possible. Switches are provided at the third rail to disconnect all feeders at that point in case of a ground between the rail and the station. A train length section of third rail is separately fed from the sub-station, and is designed to prevent trains bridging between sections. All direct-current cables are installed in tile conduits close to the tracks, except the auxiliary feeders which join the sub-station busses and supplement the conductivity of the third rails. These are, in some localities, run overhead on the transmission poles.

The four third rails and auxiliary feeder are joined together through circuit breakers situated in small houses at intervals along the line, thereby increasing the effective conductivity.

THIRD RAIL

The under-contact third rail, described in the Street Railway Journal for Sept. 2, will be used. The rail, as previously stated, is of special bull-head section, 70 lbs. to the yard, with high electrical conductivity. It is supported by cast-iron brackets bolted to long ties, spaced 11 ft. centers. Insulators fit loosely over the top and web of the rail, thus allowing some vertical play. A clamp fits around the side and top of the insulator and is bolted to the bracket. The top and sides of the third rail will be covered with insulating material to give thorough protection against accidental contact.

ENGINEERS AND CONTRACTORS

The work outlined is under the charge of W. J. Wilgus, vice-president. The details described in this article have been worked out under the direction of E. B. Katte, electrical engineer. Reed & Stem are the architects for the sub-stations.

The following is a list of the principal contractors:

Transmission line poles, McClintic-Marshall Construction Company.

Rotary converters for eight sub-stations, Westinghouse Electric & Manufacturing Company.

Storage batteries for eight sub-stations, Electric Storage Battery Company.

Sub-station No. 1, Butler Brothers Construction Company.

Sub-stations Nos. 2, 3 and 7, Butler Brothers Construction Company.

Lighting and power equipments for the two power stations and sub-station No. 4, Thompson-Starrett Company.

Eight 15-ton traveling cranes for the eight sub-stations, Alfred Box & Company.

Exciter storage batteries for eight sub-stations, Electric Storage Battery Company.

Pintsch gas equipment for the steel suburban cars, Safety Car Heating & Lighting Company.

REPORTS ON BRAKES PRESENTED AT THE TENTH ANNUAL MEETING OF THE VEREIN DEUTSCHER STRASSENBAHN UND KLEINBAHN VERWALTUNGEN

At the tenth annual meeting of the Verein Deutscher Strassenbahn und Kleinbahn Verwaltungen (German Street and Interurban Railway Association) two papers on the subject of brakes were submitted by Messrs. Scholtes and Bjorkegren, respectively. Mr. Scholtes, who is the manager of the Nürnberg Street Railway system, advocated the use of electric brakes, while Mr. Bjorkegren, who is an engineer of the Grosse Berliner Strassenbahn, expressed himself as preferring air brakes.

SUMMARY OF MR. SCHOLTES' PAPER

In selecting a braking system, reliability is the first and cost the second point to be considered. The hand brake cannot satisfy all modern requirements, and the main question has been as to whether the electric brake or the air brake was the better. So long as no definite costs were known, a decision on this point was difficult, but now, after several years' experience, it is possible to reach some definite conclusions.

The following statistics cover all street railway companies in Germany which have adopted the hand, air or electric brake as standard on their lines. In almost every case where either the electric or air brake had been so standardized, the railway companies have expressed their intention to add new equipments of the type already in use.

It will be seen that in number of cars equipped the electric brake leads, with the hand brake and air brake following second and third, respectively. The hand brake is used mainly for light cars on small railways. It appears undesirable for cars over 12 tons in weight where the grades are as high as 10 per cent.

TABLE SHOWING TYPES OF BRAKES USED IN GERMANY

Braking System	No. of Cars and Weight of Car in Tons (Metric)									No. of Cars		No. of Companies	
	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	Total	%	Total	%
Hand	201	431	812	296	520	4	3	42	7	2,316	31	46	49
Electric	7	360	773	1,510	626	103	103	181	10	3,673	49	45	47
Air	21	286	270	175	313	24	422	1	...	1,512	20	4*	4*
										7,501	100	95	100

* On railways like those in Great Berlin, Crefeld, Hannover and Nürnberg, where several systems are used, the most important is taken as a basis.

About twenty railways expressed themselves as opposed to electric brakes, claiming that they cause burn-outs in the motors, controllers and resistance, and that the gearing wears out faster when they are employed. The only point brought out by these objections is that the electrical equipments of these railways are not suited for electric braking. Such troubles can be avoided by selecting apparatus of larger capacity. Another objection raised was that stops were made by jerks when electric brakes were used. This trouble is probably due to an improper gradation of the braking resistances or an improper manipulation of the controller handle. If the brakes are not properly applied, a jerky stop will be made, no matter what system is employed.

Only eleven companies have conducted any braking tests. This small number is probably due to the difficulty of obtaining exact measurements. All of these experiments were with electric brakes, and showed that this system is not surpassed by any other.

Aside from the high first cost and maintenance of the air brake, the objection is made that it fails in cold weather, particularly in new installations. The greater complication of the air-brake apparatus requires also a higher degree of expert attendance. In addition to these factors, another must be considered, namely, the extra current required to compress the air. Only the companies reporting accurately on this last point are given in the following table:

Berlin 40 watt hours per car km for a single truck motor car weighing 8 to 9 tons.
Berlin 67.5 watt hours per car km for a double truck motor car weighing 12 to 13 tons.
Leipzig 40 watt hours per car km for a single truck motor car weighing 7 to 8 tons.
Nürnberg 31.5 watt hours per car km for a double truck motor car weighing 11 to 12 tons.

The calculated cost for compressing air is shown in the following table:

Company	Motor Car Km. in 1904	Additional Power and Cost Due to Air Braking	
		Kw. Hours	Cost
Grosse Berliner Street Railway...	55,110,000	2,204,400	$52,905
Grosse Leipziger Street Railway.	12,622,000	504,880	12,117
Hanover Street Railway.........	9,004,000	361,800	8,683
München Tramways...........	8,004,000	320,160	7,684
Nürnberg-Fürther Street Railway.	5,094,000	203,760	4,890
Crefeld Street Railway..........	2,265,000	90,600	2,174

The above figures are based on the assumption that all motor cars are equipped with air brakes. The average additional power per car-kilometer was taken as 40 watt-hours and the price as 10 pfenings (2.4 cents) per kw-hour. The requirements for trailers are not included.

The average first cost and maintenance charges of the three brake systems are given in the following table:

Braking System	First Cost		Maintenance Charges	
	For Motor Car	For Trail Car	Per Car per Year	Per Car Km.
Hand	Cost included in the price of the complete car		$21.12	$.000504
Electric	$69.60	$90.00	12.48	.000336
Air	288.00	45.60	49.44*	.000792*

* Add to this $.001 per car-km as cost of power per motor car.

It will be seen from the foregoing that the first cost of the electric brake is less than that of the air brake, and that its maintenance cost is lower than even the hand brake. This is due to the less wear of the brake-shoes, which are used only after the car has already been braked electrically. Electric braking requires simply a somewhat larger controller and more closely graduated resistances. The average additional cost for this purpose is $69.60 for the motor cars and $90 for the trailers. The replies show that on trail cars the solenoid brake is now considered preferable to the disc type. The cost of $288 represents an average, but some of the latest installations have not cost more than $228. The trailer air-brake equipments average $45.60 each, but it is not stated whether they will operate automatically in case a train breaks.

Most of the brakes used on the Breslau, Leipzig and München tramways are Böker air brakes. The same brake is also used on some cars in Berlin, Crefeld and Nürnberg, the other cars having either hand or electric brakes. In Hannover the Karpenter-Shultz brake is employed.

SUMMARY OF MR. BJORKEGREN'S PAPER

Mr. Bjorkegren stated that the modern engineer must consider not only the efficiency of a given apparatus, but also whether the benefit gained justifies the cost. In braking, the important factors are reliability and cost, both of which should be carefully considered in their relation to each other. It seemed to him that Mr. Scholtes had laid too much emphasis on the cost factor, and had therefore reached conclusions which he could not wholly approve. He agreed with Mr. Scholtes' statement of the proper field for hand brakes, but not on the comparative merits of air and electric brakes. He thought that the replies received were not definite enough to form accurate conclusions, nor was anything gained by soliciting expressions of opinions from the railway companies, as most of the latter have had experience with only one kind of mechanical brake. Neither would it be fair to say that one system was better than the other because it is more widely used, as most of the brakes now in use were installed without careful study. He would therefore devote most of his paper to a discussion of the experiences which his company, the Grosse Berliner Strassenbahn, had had with different braking systems.

According to the latest figures, the equipment for short-circuiting electric brakes on a two-axle car cost over $72, without considering the possible necessity of using larger motors. The Grosse Berliner Strassenbahn uses two electromagnetic brakes per car, even on single-truck cars. These brakes cost about $96, making the total cost per car $168. The same equipment can be used on a double-truck car by supplying brakes to half of the axles. If all of the axles are equipped, the extra cost would be $102, plus the labor of installation. The price of an air-brake equipment, including the eccentric type of compressor, is about $240, and the cost for the trailer equipment mounted, $48. For a double-truck car, the cost is $252.

According to these figures, the equipment of a train of one double-truck motor car and one single-truck trailer is $270 for electric brakes and $288 for air brakes. This shows that the Berlin company does not find any considerable difference in the first cost of either system. Of course, if the magnetic brakes are omitted, the difference in favor of electric braking is considerably greater, but the Berlin operating conditions are such that the motors would be badly overloaded if short-circuiting brakes were used.

If instead of the eccentric compressor an axle-driven geared compressor is used, the additional cost would be about $72.

Taking all in all, it is plain that the first cost of air brakes is higher. The difference in cost, however, is too small to be considered seriously when equipping a new motor car, but the cost of maintenance is of more importance. Unfortunately, there are very few statistics on that point, but Mr. Bjorkegren hoped that more careful attention would be given to it during the coming year so that the report at the next convention would be more conclusive. The data compiled by the Grosse Berliner Strassenbahn show the annual maintenance cost of the electromagnetic-brake equipment (used in connection with hand brakes) to be $16.80 for motor cars and $10.80, while the respective figures for air braking are $36 and $6. The cost for the maintenance of the electric system does not include extra wear of motors, controllers and resistances, but even if such figures were obtainable it is not likely that the total would be as high as the air brake. Solenoid electric brakes seem to cost less for maintenance than the disc type, although the former are harder on the brake-shoes. The larger part of the maintenance cost of the air-brake system is due to the renewal of the brake-shoes.

To secure accurate knowledge of the maintenance expense of the air-brake system, including shoes and labor as well as compressor-lubrication, the Grosse Berliner Strassenbahn made an arrangement in October, 1904, to have the manufacturer's employees look after this work at a certain car shop, the railway paying for the labor and furnishing the material. The result showed that this method of organization effected a saving in repair parts and led to the cure of many defects found in the air hose. The monthly maintenance costs for air brakes looked after in this car house were as follows:

October	$3,744
November	3,740
December	4,272
January	4,128
February	4,276
March	5,136
April	3,360
May	3,408
June	3,024
July	3,240

It will be seen from the above that the cost decreased from March to July. A further reduction Mr. Bjorkegren did not consider possible, bearing in mind the fact that the cars on this railway are used to the utmost. The motor cars carrying the above equipments ran about 150 km (90 miles) per diem. In any event, it can be seen that the maintenance cost of air brakes is more than that of electric brakes.

As to the additional current used for the air brake, a number of measurements were made with a special car, as a result of which it was found that with two brake applications per kilometer, the Sperry or disc electric brake required 22 watt-hours and the air brake 36.3 watt-hours. This difference the speaker did not consider very important. Of course, with a short-circuiting brake no extra current is used.

If now the total costs of each system as a whole be compared, it is evident that the air brake is the more expensive. From this it follows that the electric brake is preferable when the question is simply that of cost. Reliability, however, as Mr. Scholtes admitted, is the prime consideration, and hence it is necessary to make a comparison of both systems in this respect.

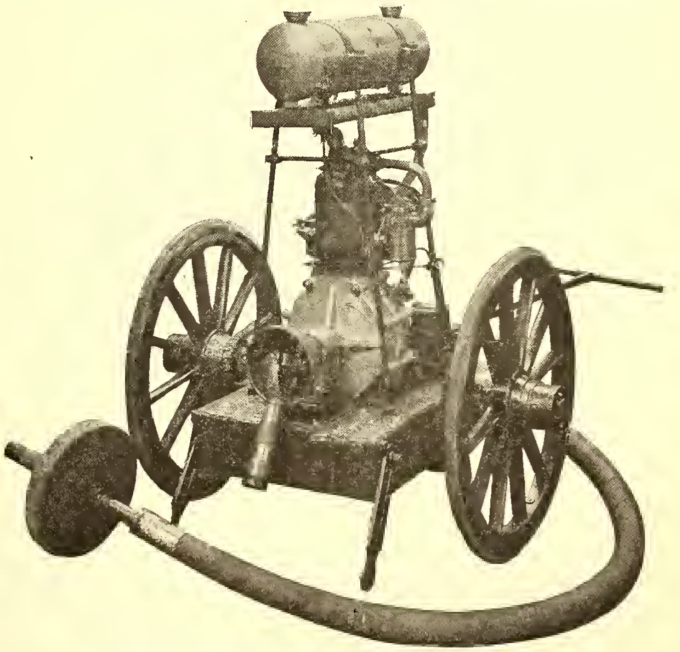
Considered from a purely theoretical standpoint, Mr. Bjorkegren preferred the air brake, because it responded more quickly and could be operated by inexperienced men with less jerking than an electric brake in the same hands. Theorizing alone cannot determine this question, but since the practical determining factor is reliability, it is necessary to study accident statistics. These statistics showed that both systems were equally reliable. It would seem that when the motorman knows that he has a good, reliable brake he is liable to run faster and take more chances than otherwise. However, should the brakes fail or delay action, owing to slippery rails and the like, collisions take place that more cautious running would have avoided.

Against the electric brake it may be said that it is slower to respond; even a delay of less than a second is enough to cause uneasiness to the motorman. Aside from this, the air brake is so much more convenient that the Berlin Company's motormen have asked the management for its general installation. The operation of the electric brake is and must remain largely a matter of "feeling." The motorman must have a certain "feeling" regarding the manner in which he will handle the brakes for various speeds. The proper operation of the electric brake, therefore, demands a certain degree of skill. The air brake has given the better results on low city speeds and the electric brake on high city speeds. It appears also that the air stops are smoother and the jolts less marked than with the electric brake.

Judging from the experience on the Berlin railway, Mr. Bjorkegren asserted that on similar systems either brake was equally reliable, as proved from the collision statistics. It was his opinion, however, that for lines with long, severe grades, electric brakes should not be recommended, owing to the severe strain put upon the apparatus in trying to stop a runaway car. The use of air brakes on such lines also makes it possible to have independent braking for the trailers. Air brakes should also be preferred on high-speed interurban runs with heavy cars. Consequently it may be concluded with regard to reliability that the air brake satisfies all operating conditions and the electric brake only a limited set of conditions.

GASOLINE RAIL GRINDER AND DRILL

Hadfield's Steel Foundry Company, of Sheffield, Eng., the large manufacturer of special work, has recently brought out a novel portable gasoline rail grinder, which is illustrated herewith.

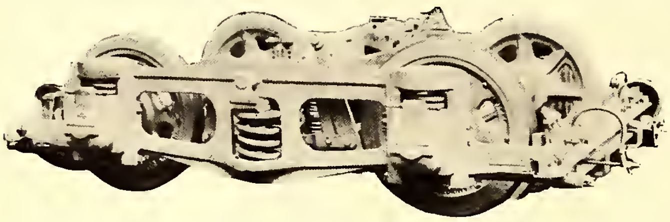


GASOLINE RAIL GRINDER AND DRILL

It contains a 4½-hp gasoline motor with water-cooled head, reservoirs for the gasoline and water flexible shaft, etc., and a sheet-iron case which covers the working parts of the motor when not in use and protects them from injury. The motor requires only about 1½ gals. of gasoline per day when in continual use, and can easily be moved from place to place by two men. It is provided with a drilling attachment, which can be used instead of the emery wheel when desired.

CONSTRUCTION CARS FOR MEXICO CITY USING NEW TYPE OF TRUCK

The Mexican Electric Tramways, Ltd., has lately put in commission the four gondola motor cars shown in the lower cut, which was made from a photograph taken while the cars were waiting for shipment at the plant of the builder, the American Car Company. The cars are to be used in the important construction work being carried on in and around the City of Mexico. In little more than two years upward of 200 miles of track in the city and suburbs has been built. The completely enclosed cabs at each end of the cars provide protection for the crew during the rainy season, which constitutes the winter of that part of Mexico. A window in the rear of each cab is an unusual feature in this style car, and is intended for the use of the motorman to see what is going on at the rear without leaving his controller. The bottom framing is unusually powerful, and includes side sills 5¾ ins. x 11¾ ins. and end sills 5¾ ins. x 8 ins. The sides of the cars are strongly hinged to the sills, and when raised are secured by wrought-iron clamps which extend from one side over the other.



NEW TYPE OF TRUCK ADOPTED FOR MEXICO CITY CONSTRUCTION CARS

The cars are mounted on the Brill No. 23 truck, to which several excellent features have recently been added. The truck is worthy of description, as this is the first time it has been shown in these pages, and there is constant demand at present for motor trucks for fast freight and heavy freight service. The form of the cast-steel side frames evidences enormous strength for the load and also for resisting lateral strains. The truss form of bolster rests at either end on double coil springs of large diameter, and is centered by small spirals in castings which are secured to the ends of the bolster which bear against the outside of the side frames. The bolster, instead of having a filler of oak, has a spacing casting with an adjustable plate at either side, which takes all the wear of the rubbing against the transoms. Double coil journal springs are also used.

A TRAIN OF CONSTRUCTION CARS READY FOR SHIPMENT TO THE MEXICAN ELECTRIC TRAMWAYS, MEXICO CITY

The American Car Company and the J. G. Brill Company have supplied a large part of the equipment of the Mexico city lines. The STREET RAILWAY JOURNAL of July 30, 1904, contains an article on passenger cars built for the Mexico Electric Tramways, Ltd., by the former company.

The Brooklyn Heights Railway Company has recently placed an order with the Westinghouse Electric & Manufacturing Company for a substantial addition to its present equipment, consisting of 300 No. 101-B Westinghouse d. c. railway motors and 150 sets of controllers. The order for motors is in addition to one placed some months ago for 600 similar motors.

SHORT STORY CONTEST IN DETROIT

Responsive to hundreds of requests, the time limit for those wanting to participate in the short-story contest of the Detroit United Railways Company has been extended to Dec. 16 at 6 p. m. This is only fair because so many of the children were away for pleasure, rest and health when the original announcement was made. Now they are in the harness again and want a try for the prizes, which run $25, $15 and $10.

STANDARD DIMENSIONS AND SEATING PLANS OF BRILL SEMI-CONVERTIBLE CARS

In the Aug. 5 issue of the STREET RAILWAY JOURNAL an illustrated article was published on the sash mechanism of the improved semi-convertible car built by the J. G. Brill Company and allied companies. The size and importance of orders for cars of the grooveless-post semi-convertible type, so called because of the avoidance of grooves or runways for conducting the sashes into the roof pockets, has caused frequent references to be made of late in these pages. The manufacturer of this type states that orders for twenty-six different companies, aggregating 767 cars, with the grooveless-post semi-convertible window system, are being built at the present time. Standardization of dimensions for certain forms of service naturally follows in a type so largely used as this. These standards are the result of the experience of the managers of a large number of important systems in all parts of the country, and are based on the carefully estimated value of the factors which, combined, produce maximum earning power.

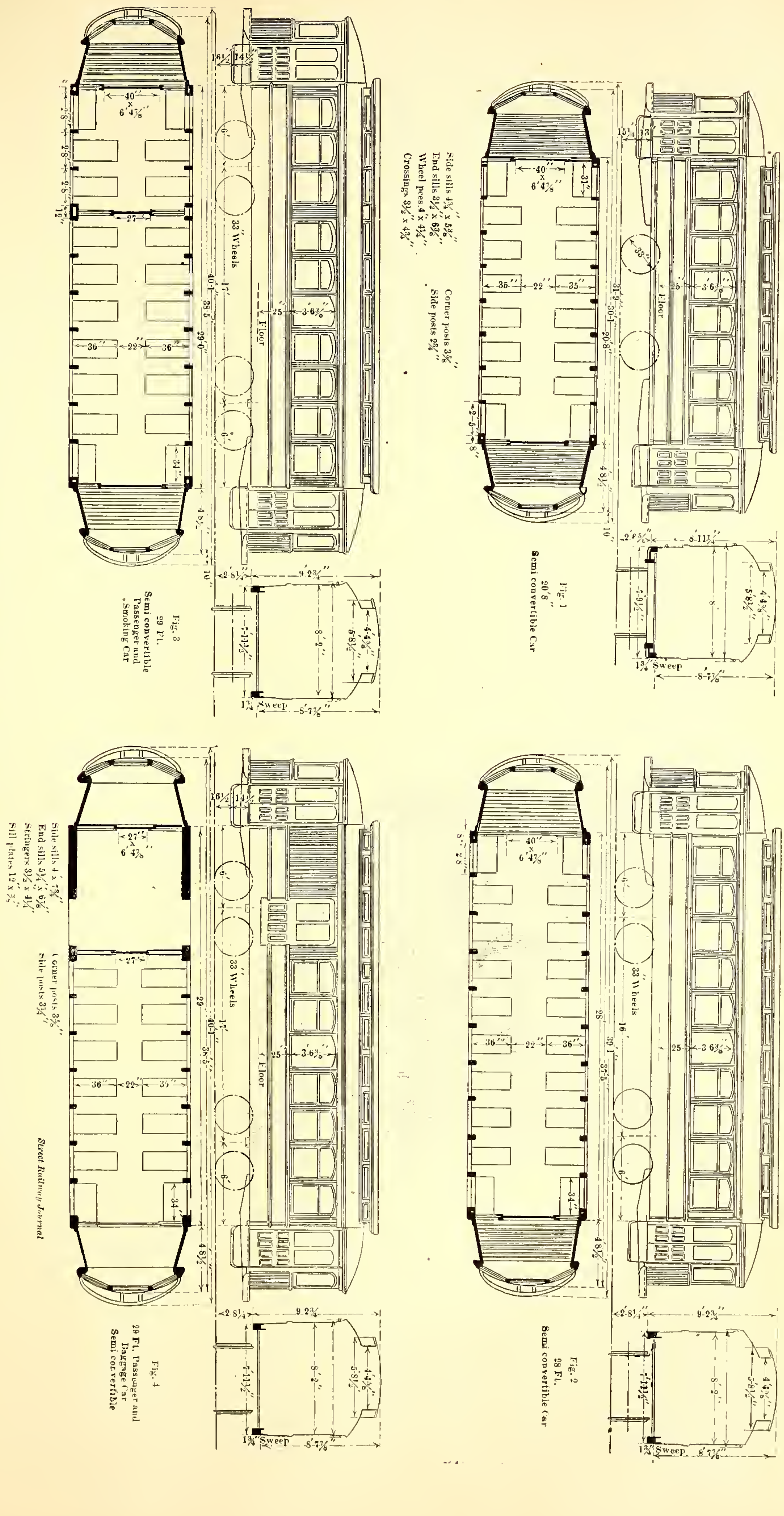
The four sizes of this type of car, shown in the accompanying diagrams, are those which are in largest use. Fig. 1 shows a 20-ft. 8-in. body mounted on a single truck with 7-ft. wheel base. The step heights, 15¼ ins. from track to tread of step, 13 ins. from step to platform and 6⅜ ins. from platform to car floor, are the measurements with the car mounted on a No. 21-E truck, which the builder states is a reduction of 2 ins. from the height of the car as carried by other designs of single trucks. The length of the platforms, it will be noticed, is the same as in the longer cars, which measurement should not be exceeded in a single-truck car of this length. It will also be noticed that the centers of posts are 2 ft. 5 ins. apart, while in the longer cars they are spaced 2 ft. 8 ins. apart. This, of course, is to increase the seating capacity for the length of the body, and although it is usual to have the seat cushions 16 ins. wide, it is feasible, and not a few consider it advisable, to use the same width of cushion as is employed in the longer cars, namely, 17½ ins.

Fig. 2 shows the double-truck car most largely used in city practice. The step heights on this car and the cars shown in Figs. 3 and 4 are figured on the cars being mounted on No. 27-G trucks; the height from platform to car floor in each case is 8 ins. The bottom framing of the larger cars invariably include 12-in. x ⅜-in. sill plates, which take the place of inside and under trusses. The wide sill plates not only do away with the necessity of inside trusses, but, by securing the bases of the posts to the plate, add considerably to the firmness of the posts.

The sides are but 2 ins. thick, and the seat ends, being brought between the posts and against the side linings, make it possible to use seats of a proper length and still have the aisle wide enough for two persons to pass each other comfortably. The increased width of the aisle not only adds to the standing space of the car and enables the conductor to work more freely, but very materially reduces the time consumed by the movement of passengers in and out.

Fig. 3 shows a car with 29-ft. body, having a smoking compartment at one end. For city service, where the majority of passengers are carried for short distances, it is customary to use longitudinal seats in the smoking compartment to increase the capacity. The combination passenger and baggage car, shown in Fig. 4, is a suitable type for interurban service, where the stops are frequent, and it is desirable to carry the car body low on short base trucks. The baggage compartment may be used for smokers, and is generally provided with folding seats.

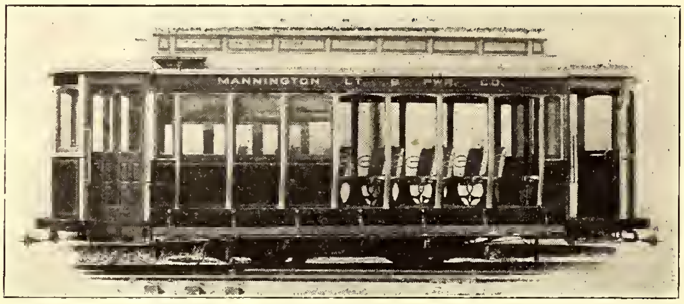
Attention is directed in all of the cars shown to the low window sill and the usually high window opening.



GROUP DRAWING, SHOWING THE PLANS AND ELEVATIONS OF FOUR TYPES OF SEMI-CONVERTIBLE CARS

EQUIPMENT FOR THE MANNINGTON RAILWAY, W. VA.

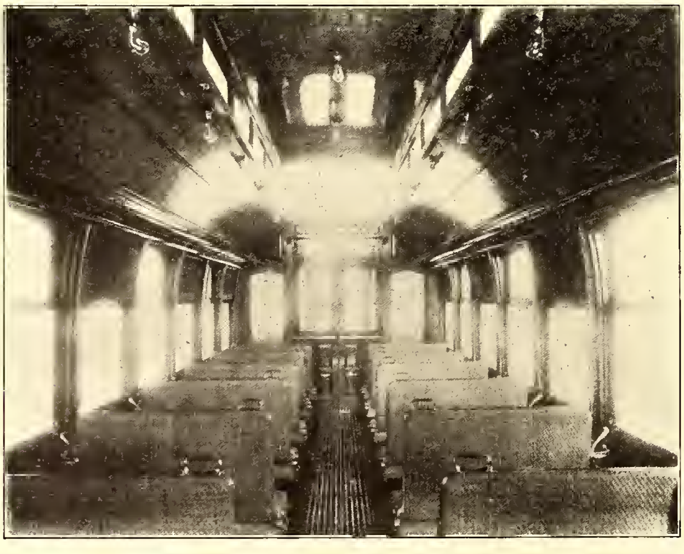
The Mannington Light & Power Company, of Mannington, W. Va., placed in operation on Oct. 1 the type of convertible car shown in the illustrations, built by the G. C. Kuhlman Car Company. Mannington is in the northern part of the State, close to the "Panhandle," and in this section are Wellsburg, New Martinsville and Wheeling, where convertible cars of the same type (Brill) are operated. As this section is mountainous, the altitude of the towns is considerable, so that while the



A VIEW OF THE MANNINGTON LIGHT & POWER COMPANY'S CONVERTIBLE CAR, SHOWING PART OF THE PANELS REMOVED

climate is equable, the changes are sufficient to require cars of this type. The cool mornings and evenings for a long period during spring and fall make it necessary to give more protection to passengers than is afforded by the ordinary type of open car, while in the middle of the day it becomes warm and open cars are desirable; therefore the convertible car is especially well adapted to the conditions.

The length over the end panels is 20 ft. 7 ins., and the length over the vestibule sheathing, 30 ft.; width over the sills, 7 ft. 2¼ ins., and over posts above the belt rail, 8 ft. The doors at



LIGHTING AND SEATING ARRANGEMENT OF THE MANNINGTON (VA.) CONVERTIBLE CARS

the body ends are of the mutually operating double type, and the folding doors at the vestibule entrances have the Brill controlling device. All three sashes in the vestibule drop into pockets in the wainscoting. The seats, which are also of Brill manufacture, are 34 ins. long, leaving the aisle 20½ ins. wide. These seats have push-over backs, with double reversing levers at the aisle end and a single lever at the post end of the cushion. The seat back at the post end is strengthened by a bracket, which also serves the purpose as a grab handle. Though having the appearance of light construction, the seat in its mechanism and back support has a wide margin of strength over the maximum pressure which may be exerted upon it. The seats at the car corners accommodate one person each, and two of the seats at diagonally opposite corners have removable cushions, under which are the hoppers of the sand boxes. The bottom framing includes 5¼-in. x 6-in. side sills plated on the outside with steel for the full width of the sill and reinforced on the bottom and outside by angle iron. The end sills are 4¼ ins. x 6 ins., and the center cross joists, 3½ ins. x 4½ ins. The corner posts are 3¾ ins. thick, and the side posts, 3⅜ ins.; sweep of posts, 5 ins. The interior finish consists of cherry in natural color, with ceilings of birch veneer, neatly decorated. The well-known No. 21-E type of truck is used, having 7-ft. wheel base and 33-in. wheels. The weight of the car and the truck without the motors is 15,500 lbs.

CYLINDER GLASS FOR CAR WINDOWS

It would be difficult to find situations where glass is subject to more breakage than in car window service. Considering the enormous amount of this material used by railway companies, it is not strange that various attempts have been made to produce a grade possessing the strength of plate glass, but of lower cost than the latter. As a result of researches along this line, Semon Bache & Company, of New York, brought out some time ago a special cylinder glass which they manufacture in thicknesses of 5-32 in. and 3-16 in.

This glass is an intermediate grade between common sheet glass and polished plate, in many respects combining the advantages of both. It is much heavier than sheet glass, and also superior in quality. Experience has demonstrated that on account of the superior strength and durability of this glass, it pays for itself after being in use for a short time by reason of the saving in breakage as against sheet glass. As compared with plate glass, the principal advantage is the economy effected by its use, as it is very much cheaper and also obtainable in any quantity desired, whereas thin plate glass is frequently out of the market. There is, however, an additional advantage in the fact that the No. 532 (5-32 in.) glass is very uniform in thickness, which is a matter of considerable importance in view of the light sash used for car windows.

A number of car builders and railway companies are large users of this glass. The Hartford (Conn.) & Springfield Street Railway Company, in particular, has given this material a thorough trial and has found it to give good results under trying circumstances.

EARNINGS OF THE MANILA ELECTRIC RAILROAD & LIGHTING CORPORATION

The first annual statement of the Manila Electric Railroad & Lighting Corporation for the year ending Sept. 1, 1905, is as follows: Net earnings, $273,580; interest charges, $123,028; surplus, $150,552. J. G. White & Company, who built and operate the plant, say in connection with this report, that while it is an annual one, the earnings up to April 10 were only from the sale of current for power and lighting purposes, as it was not until that date that the street railway was opened to the public. There is still considerable work to do before the railway and lighting system will attain its maximum efficiency, and up to the present time the full mileage of the railway lines is not in operation.

In the description of the high-speed carborundum grinder, which was published in the STREET RAILWAY JOURNAL for Nov. 11, on page 896, an error occurred in giving the address of the manufacturer. This popular grinder is made by the Royal Manufacturing Company, of Lancaster, Pa., and not Lancashire, Pa., as first printed.

FINANCIAL INTELLIGENCE

WALL STREET, Nov. 15, 1905.

The Money Market

There has been a decided change in the monetary situation this week. The unusually heavy shipments of funds for this season of the year to the West and South for crop moving and general trade purposes, not only wiped out the surplus of the clearing house banks, but created a substantial deficit instead, while rates for all classes of accommodations reached the highest points reported since the autumn of 1902. Early in the week call loan accommodations were obtainable in quantity at rates ranging from 8 to 12 per cent, but toward the close there were heavy calling and shifting of loans by the banks to strengthen their reserves, which sent the rate to 25 per cent. Time loans also rose sharply, transactions in sixty and ninety-day funds being made as high as 8½ per cent, while the longer periods commanded 6 per cent. As a result of the higher rates for money, considerable amounts were received from out-of-town sources, to be loaned at prevailing quotations. About $1,000,000 was received from as far West as Omaha, while a like amount of American gold coin was received from Canada. Considerable amounts were also placed by foreign bankers against exchange transactions. The influx of these funds created a decidedly easier market at the end of the week, but there is still some apprehension as to the immediate future of the market. Funds continue to be shipped to interior points in moderate amounts, while the banks thus far this week have lost $1,400,000 in the transactions with the sub-treasury. Sterling exchange has declined sharply as a result of the heavy sales of finance bills, but the rate has not yet receded to a point where gold can be drawn from Europe. It is generally believed, however, that relief will be obtained from that source. There is also some talk that the Secretary of the Treasury will relieve the situation by depositing a round amount in depository banks at the interior points and thus stop the outflow of funds from this city. A feature of the week has been the sharp advance in the price of silver bullion, the price at London rising to 29¼d., while the local quotation advanced to 63⅛ cents per ounce, these being the highest prices attained since Jan., 1901. The present high prices are the direct result of the heavy demand for the metal at India, Russia and other foreign countries, and indications are that the present prices will be maintained for some time. The foreign markets have been firm during the week, but money and discount rates have not materially changed. The bank statement published last Saturday made a very unsatisfactory exhibit. The decrease of $15,948,600 in loans was a disappointment. The loss in cash of $10,898,000 was larger than expected. The reserve required was $6,114,925 less than in the previous week, which deducted from the loss in cash reduced the surplus by $4,783,075. The deficit was $2,428,800, and compared with a surplus in the previous week of $2,354,275, $8,894,550 in the corresponding week of 1904, $6,138,525 in 1903, $18,238,350 in 1902, $10,104,825 in 1901, and $7,667,775 in 1900.

The Stock Market

The stock market has been very much unsettled during the past week, and until the close on Monday it was under considerable selling pressure and general liquidation, influenced by the developments in the money market, the deficit reported by the clearing house banks and the advance in call money to 25 per cent. This movement in both the stock and money market has been clearly foreshadowed by a prominent banking official in a recent public address at Washington, D. C., and the liquidation in the stock market was only a natural result of the high rates for money coincident with firm money markets abroad and continued shipments of currency to the West and South. Secretary Shaw announced that there was nothing in the general business situation or the supply of money for strictly legitimate purposes that would justify any action on the part of the Treasury looking to the relief of the local money market, as a temporary stringency therein was due to speculative excesses, and the remedy could be found in speculative liquidation. At the close of the week it was intimated that the Secretary would deposit public funds in national banks in the West and Southwest, in order to prevent any stringency so far as the business interests of the country were concerned. Prices for stocks suffered material declines until Tuesday, when intimation of favorable treasury action influenced active short covering, under which prices recovered a good part of the previous decline, and at the end of the week the market was strong, with an upward movement in progress in a number of industrials, the Kansas and Texas issues, Gould stocks and Hocking Valley. The large improvement in the latter has been on buying caused by reports that the preferred stock will be retired at par, and that the common will be placed upon a 5 per cent dividend basis. There has been some division of opinion among important banking interests, one section working for the curtailment of speculative activity, and forced liquidation on the part of many pools actively operating in the market, but chiefly against the pool in Reading stock, the price of which declined 10 points, and later recovered about half the loss. Aside from the monetary situation there has been no development that could be regarded as adverse to the market, but the point is made by conservative banking interests that money conditions do not justify activity in speculation, and that the latter should be restricted until the return movement of currency from the interior is fairly well under way. The banks are below the legal limit, with a largely expanded loan account, and while there has been some improvement in the situation, it has not been sufficient to warrant any resumption of activity on the buying side of the stock market.

The local traction stocks declined very sharply following the election, the selling of Metropolitan having been on the theory that the defeat of Tammany might prove prejudicial to the Metropolitan in the matter of contracts for the construction of new subways.

Philadelphia

Considerable activity developed in the local traction shares during the week, but the dealings were accompanied by a more or less irregular price movement. In the early trading prices generally displayed an upward movement under the lead of Philadelphia common, but toward the close there were sharp recession, in sympathy with the weakness prevailing in other quarters of the market. Interest centered largely in Philadelphia Company common, which furnished fully two-thirds of the total transactions. From 53 at the opening the stock rose on heavy purchases, said to be for local and New York interests, to 55¼, the highest price at which the stock has ever sold. Later there was a reaction of more than 4 points, in sympathy with the decline in the general market, but at the close there was a rally to 53¼ on renewed buying. Upwards of 55,000 shares were traded in. It is said that official announcement of the plan whereby new interests are to take over a majority of the stock will be made soon. The preferred stock was almost entirely neglected, only 78 shares changing hands at prices ranging from 50¾ to 50¼. Philadelphia Rapid Transit displayed considerable activity, but was under pressure the greater part of the week. Opening at 28½ the price ran off to 26¾, and after a feeble rally it declined further to 26, and closed near the lowest. Upwards of 8000 shares changed hands. Union Traction, after an early show of strength, ran off from 63¼ to 62½ on the exchange of about 1000 shares. In the lower price issues Railways General was conspicuously strong, the price rising from 5 to 6 on the purchase of nearly 2000 shares, and retaining nearly all of the gain. American Railways was also active, about 800 shares selling at from 53⅜ to 53. Other transactions included 350 Consolidated Traction of New Jersey, at from 82 to 81, 197 Philadelphia Traction at 100½ to 101, 100 United Railway & Investment preferred at 91⅞, 100 Fairmount Park Transportation at 17¼ to 16, 200 United Railway of Pittsburg at 50, and 50 Rochester Railway & Light preferred at 105.

Baltimore

Very little interest was manifest in the traction issues the past week. Dealings were considerably smaller than in the preceding week, and with the exception of one or two of the investment issues prices displayed a declining tendency. The United Railway issues, which heretofore have furnished the bulk of the trading, were extremely quiet. Of the 4 per cent bonds only $37,000 were traded in, at prices ranging from 92⅝ to 92¼, the latter figure representing a substantial decline as compared with the previous week's close. The income bonds also were unusually quiet, the transactions aggregating only $34,000, at from 66⅝ to 65⅝. Of the stock 165 shares sold at 10 and 15¾. Norfolk Railway & Light 5s lost a point, $8,000 selling at from 97 to 96. Other transactions included $3,000 Newport News Railway 5s at 96, $2,000

Central Railway 5s at 116 and 116¼, $3,000 Baltimore City Passenger 4½s at 101½, $7,000 North Baltimore Railway 5s at 12, $1,000 Virginia Railway & Development 5s at 99¾, and $1,000 Indianapolis Street Railway 4s at 88¾.

Other Traction Securities

Trading in the Chicago market was extremely dull and without noteworthy feature. West Chicago sold at 60 for twenty shares, while the first mortgage 5 per cent bonds brought 101. Metropolitan Elevated held firm, about 300 shares changing hands at 28. South Side Elevated sold at 97¼ for 200 shares, and subsequently a small lot sold at 96½. Fifty shares of Northwestern Elevated brought 23, and the 4 per cent bonds brought 94¼. Chicago & Oak Park was strong, 220 shares selling at 6¼ and 6¾. The Boston market was quiet but steady. Massachusetts Electric common held firm at 13 and 13¼, while transactions in the preferred took place at 55 and 55½. Boston Elevated, after selling at 153¾ early in the week, ran off to 153. Boston & Suburban common brought 19, while the preferred sold at 63. Boston & Worcester preferred lost ½ from 73 to 72½ on the exchange of 250 shares. West End common was firm at 99½. In the New York curb market, Interborough Rapid Transit ruled fairly active, but very erratic. From 210 the price ran off sharply to 204, but later rallied to 208½, in sympathy with the late strength in the other tractions in the general market. About 5000 shares were dealt in. Other sales included 15 shares of American Light & Traction preferred at 106 and 105, $15,000 New Orleans Railway 4½s at 91¾ and 91¼, and $25,000 Public Service Corporation certificates at 61.

Cincinnati, Newport & Covington common continues to be the most active issue at Cincinnati. During the week it made a gain of 1½ points, closing at 49, a new high record. While there is no offical announcement, there are persistent rumors that the stock will soon pay a dividend. The preferred sold at 95⅛ to 95½. Cincinnati Street Railway declined a point to 146; Cincinnati, Dayton & Toledo Traction sold at 26½, a fractional decline, and the 5 per cent bonds sold at 98¾. Toledo Railways & Light sold at 33 and Detroit United at 94½, a 3-point advance from last sale.

Politics played havoc with several issues on the Cleveland board. The re-election of Mayor Tom L. Johnson caused a slump in Cleveland Electric, and it sold down to 78¾ the day after election. There were numerous transactions at these prices, and by Tuesday of this week it had advanced to 80½. The defeat of Governor Herrick will doubtless prove a deathknell for all plans of rejuvenating and putting through the Miami & Erie Canal Traction scheme, and nothing is left for the property but the sale of the material as scrap. Aurora, Elgin & Chicago declined from 32 to 28½. Several lots of the 5 per cent bonds sold at 98, a fractional decline. Northern Ohio Traction declined from 27¼ to 26⅝ and is now offered at 26½. Lake Shore Electric issues shared in the decline; the common dropped from 15¼ to 13¼ on Tuesday of this week. The old preferred sold at 65, a 5-point decline. Muncie, Hartford & Fort Wayne bonds sold at 95¼, and Northern Ohio 5s at 90.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Nov. 8	Nov. 15
American Railways	52	53
Boston Elevated	153	152
Brooklyn Rapid Transit	75⅝	76¼
Chicago City	200	200
Chicago Union Traction (common)	11¼	10½
Chicago Union Traction (preferred)	—	—
Cleveland Electric	—	81
Consolidated Traction of New Jersey	82	81
Consolidated Traction of New Jersey 5s	108½	109
Detroit United	92	93¾
Interborough Rapid Transit	210	207
International Traction (common)	36½	35½
International Traction (preferred) 4s	76½	75⅞
Manhattan Railway	165	164
Massachusetts Electric Cos. (common)	13	13¼
Massachusetts Electric Cos. (preferred)	55½	56
Metropolitan Elevated, Chicago (common)	28	27½
Metropolitan Elevated, Chicago (preferred)	71	71
Metropolitan Street	121	117½
Metropolitan Securities	77	72¾
New Orleans Railways (common), W. I.	37	37
New Orleans Railways (preferred), W. I.	83⅞	82¾
New Orleans Railways, 4½s	91½	91
North American	96½	97¼
North Jersey Street Railway	28	27
Philadelphia Company (common)	52⅞	53
Philadelphia Rapid Transit	27⅝	26¼
Philadelphia Traction	100	100¾
Public Service Corporation 5 per cent notes	96	95
Public Service Corporation certificates	64	62
South Side Elevated (Chicago)	97¼	96
Third Avenue	123½	121
Twin City, Minneapolis (common)	115½	114¾
Union Traction (Philadelphia)	63	62½
West End (common)	99½	a99
West End (preferred)	114	113½

a Asked. W. I., when issued.

Iron and Steel

The "Iron Age" says there continues to pour in, from all quarters, evidence of the enormous current consumption of iron and steel, with ample proof in the form of fresh orders that there will be an unabated strain upon our productive facilities for many months to come. Contracts for steel rails closed during the week aggregate 100,000 tons. Pressure for structural material continues unabated, and the plate mills are swamped with orders.

JERSEY CITY ATTACKS CONSTITUTIONALITY OF ACT PASSED BY LEGISLATURE IN 1876

George L. Record, Corporation Counsel of New Jersey, appearing as counsel for the Mayor and Aldermen of Jersey City before the main division of the Supreme Court of New Jersey last Friday in an ejectment proceedings against the North Jersey Street Railway Company, raised a novel point touching the question of the granting of limited franchise to public utility companies.

Jersey City is attempting to eject the street railway company from Montgomery Street on the ground that its twenty-five-year charter, secured by special legislation, expired in 1884. In 1894 the North Jersey Street Railway Company leased its property and franchise to the Consolidated Traction Company. The road is now being operated by the Public Service Corporation.

The defendant contends that its franchise was extended under an act passed by the Legislature in 1876, providing that any corporation created by virtue of the laws of this State might have its corporate existence extended for any period not exceeding fifty years by filing an amended certificate to its charter to that effect. On this ground, it is claimed that the franchise was extant in 1894 and still exists.

The argument was heard by Chief Justice Gummere and Justices Hendrickson and Pitney sitting as the main court. Mr. Record attacked the act of 1876 and held it to be altogether nugatory on the ground that it conflicts with the State Constitution as amended in 1875. The last clause of paragraph 11 of section 7 of article 4 of the constitution says: "The Legislature shall pass no special act conferring corporate powers, but it shall pass general laws under which corporations may be organized and corporate powers of every nature obtained, subject, nevertheless, to repeal or alteration at the will of the Legislature."

In his argument Mr. Record maintained that at the first session after the adoption of this amendment, the Legislature, while obeying, as to many classes of corporate powers, the constitutional mandate to pass general laws, yielded to the desire of those interested to preserve official powers about to expire and disregarded the constitutional prohibition against special laws conferring powers by passing the act referred to.

The defendants claimed that the act referred to is not an act conferring corporate powers, but aims simply to enlarge the time for which corporate existence may continue. They hold, also, that as the act is one conferring corporate powers, it is not a special but a general law. Their last argument was that the plaintiff is estopped to deny the corporate existence for corporate powers of the defendant company on the ground that for nearly twenty years Jersey City has dealt with the company and its successors continuously upon the basis of the continuance of its corporate powers.

In answer to this last point the plaintiffs argued that they tried hard enough, without avail, to get the Attorney-General of the State some time ago to test the question of quo warranto proceedings. Because the Attorney-General refused to do what was claimed to be his plain duty, Mr. Record insisted, should not leave the plaintiffs without remedy. Former Judge Gilbert Collins was associated with Mr. Record in the case.

The court gave counsel ten days in which to file briefs and took ten days additional in which to decide the case.

SUITS FOLLOW DISCRIMINATION OF STEAM ROAD IN IOWA

Two indictments were returned by the grand jury of Linn County, Iowa, last week, against the Chicago, Rock Island & Pacific Railroad Company, growing out of its recent cut rate competition against the interurban line between Cedar Rapids and Iowa City. One indictment charges that the company is guilty of receiving a greater compensation for transporting a passenger over its lines in Iowa for a shorter haul than for a longer one. The specific charge is that the company received $1.32 for a round-trip ticket from Cedar Rapids to Iowa City and return, a total distance of 64 miles, and that it received the same rate for a round-trip ticket from Cedar Rapids to Elmira, total distance 46 miles. In other words, the company charged 3 cents a mile straight for 46 miles, and a trifle over 2 cents a mile for the greater distance of 64 miles. The indictment also sets forth that these respective rates were charged for a period of several months, and that the cheaper rate for the longer distance was not an excursion rate, because it was maintained from day to day for a long duration. The other indictment charges the company with failure to prepare, keep and fix uniform proportionate passenger rates.

AN ARMISTICE IN LOS ANGELES CONTROVERSY

An armistice has been declared in the war between the Los Angeles Street Railway Company and the city over the question of the validity of the South Park Avenue line in that city. This incident was referred to briefly in the STREET RAILWAY JOURNAL of Nov. 4, 1905, under the caption "Municipal Endeavor Misdirected." The whole thing is to be regretted, and the dispute could have been settled just as it now will be, in the courts, without any display of violence on the part of the city authorities. It seems that the Los Angeles Railway Company, in building the South Park line, finished only a little more than 1 mile of the road before the expiration of the time limit set by the ordinance for the completion of the entire line. The company was, however, permitted to complete the line without interference from the authorities. Then of a sudden a move was made by the city against the company. At this stage the company secured an injunction to restrain the city from interfering with the conduct of its business. This injunction was dissolved Oct. 12. Immediately the guardians of the public welfare proceeded to demolish enough of the property to prevent the company from operating cars over the line. The residents of the district, deprived of the service which was especially easy of access, became thoroughly aroused and demanded of the Mayor that the privileges be restored of which they had been deprived. As a result, the city has agreed to let the company operate the lines at a nominal rental of $10 a month until the case shall have been finally settled in the courts.

REPORT OF NEW YORK SUBWAY INVESTIGATION

Dr. George A. Soper, the expert chemist employed by Engineer Rice, of the Rapid Transit Commission of New York, to make an examination of the atmospheric conditions existing in the subway, has reported to the board. His report covers conditions, cause, effect and the remedy.

The average temperature in the subway last summer was 78.8 degs., while on the street the average temperature was 72.8 degs., making a difference of exactly 6 degs. He said the high temperature was due largely to the high rate of speed at which the trains are run, as the quick stopping causes much friction on the brake-shoe, and this friction generates heat. He suggested that less speed would remedy this condition to a great extent.

It has been pointed out that a lot of iron dust exists in the subway, which is held together to a great extent by oil. President Orr said he had been informed that the consumption of iron on the brake-shoes alone amounts to a ton per mile each month. Dr. Stoker says there is 1 per cent of oil in the iron dust. Much of this oily dust is retained by the rock ballast on the tracks and, when the train passes over the tracks at a high rate of speed, the dust is stirred.

Three remedies were suggested by Dr. Soper. He said the ballast should be frequently removed and new ballast put down, or else the present ballast be removed entirely and replaced by a concrete surface. He said the toilet rooms in the stations should be better ventilated.

Dr. Soper will file a more complete report, in the near future, making further suggestions and the result of chemical analysis he makes of the air and sanitary conditions, after which the Commission will take steps to have the Interborough Rapid Transit Company adopt some of the suggestions.

NEW HAVEN THIRD-RAIL LITIGATION

The New York, New Haven & Hartford Railroad Company has filed in the Hartford County Superior Court an answer to the action of the city of New Britain to compel the discontinuance of the third-rail electric system within the limits of that city. The complaint set forth that the third rail constituted a nuisance on account of the danger which it created, and that consequently it should be discontinued.

In its reply the company contends that it is authorized by law to operate its railroad by electricity; that the State has never forbidden the operation of the third-rail system; that it does not appear from the complaint that there is any danger from the system except on the defendant's own property, and that even then there is no danger to persons coming on the premises by the railroad's invitation; that there is no danger to any except trespassers; and that the city of New Britain is not a competent party to maintain an action for the abatement of the third rail.

The city of New Britain sought to have the recent Legislature take action to compel the railroad company either to discontinue the system or else take proper steps to erect adequate safeguards around the electrically charged rail. The lawmakers declined to interfere.

BALL OF BROOKLYN EMPLOYEES

The annual ball of the Brooklyn Rapid Transit Employees' Benefit Association, the third event of the kind, was held last Wednesday evening in Clermont Avenue Rink, Brooklyn, and was largely attended. The interior of the rink was prettily decorated and brilliantly illuminated. The dancing was preceded by a concert, consisting of four numbers, by the Brooklyn Rapid Transit Band, which is composed exclusively of employees of the Brooklyn Rapid Transit Company who are members of the benefit association. The dance programme consisted of sixteen well-selected numbers. Many of the officials of the company, heads of departments, all of the division superintendents, operating division and engineering departments were represented among the attendants, while Division Superintendent W. N. Boland, of the Public Service Corporation, of New Jersey, formerly of the Brooklyn Rapid Transit Company, was among the guests, with some of his associates from New Jersey. The officers and trustees of the association are: D. S. Smith, president; G. F. Wolfram, vice-president; C. D. Meneely, treasurer; G. W. Edwards, secretary; H. E. Tiffany, assistant secretary; C. E. Roehl, John Stoll, W. C. Wood, Sanford Dyer, E. C. Shaler, Ernest Wenzel.

THE ELECTIONS

The most significant feature of last week's municipal and State elections was the tendency toward radicalism. This was instanced strikingly in New York, Cleveland, Toledo, Boston and San Francisco, in all of which, with the exception of New York, the candidates who assailed vested interests were successful. Even in the exception noted, the margin of defeat was very small. In Cleveland Mayor Johnson has been returned to office on a platform of 3-cent fares and a State law to permit the city to own and operate street railways. In Toledo was witnessed the election to the office of Mayor of Brand Whitlock, protégé of "Golden Rule" Jones. In Boston John B. Moran, a pronounced lawyer-agitator, as the New York "World" put it, was elected district attorney of Suffolk County. In San Francisco Mayor Schmitz, representing the labor interests, was re-elected, despite the fusion of the Republican and the Democratic organizations against him. Naturally the press have tried to explain this pronounced trend toward radicalism. Some of the conservative papers are appalled that candidates advocating measures doomed to failure should have received endorsement at the polls. Others, like "The Wall Street Journal," take the view that the cure for the epidemic lies in the application of the principles advocated to some particular case at the expense of the community in which the experiment is tried, but to the enlightenment of the entire country. For instance, "The Wall Street Journal," discussing the issue of municipal ownership, says:

"It would perhaps be, on the whole, a good thing for the nation if a practical experiment in public ownership was undertaken by some leading American municipality even under prevailing conditions. The experiment would be a costly one, no doubt, but as it would demonstrate how dangerous and bad municipal ownership would be when coupled with bossism and graft, the effect upon public opinion throughout the country might operate to check for many years to come any tendencies toward State socialism. It would be an object lesson, expensive indeed for the city in which it should be tried, but in the end, perhaps, valuable to the whole country."

INTERURBAN PROGRESS IN IOWA

Despite the statement made public a few weeks ago by H. H. Polk, president of the Interurban Railway Company, of Des Moines, that his company would not do anything in the way of constructing extensions, with the exception of the Woodward and Perry lines, until after the suit brought by the Civic League of Des Moines attacking the franchise rights of the Des Moines City Railway and the Interurban Railway was settled definitely in favor of the companies, the Interurban Company is going ahead with the preliminary work of surveying routes and buying right of way for several other prospective lines. The company has a surveying gang at work on a line between Woodward, the terminus of the Des Moines-Woodward line, now almost completed, and Boone, and also has a gang at work running a line south from the terminus of the Army Post line in the direction of Indianola. The report comes from Boone that A. P. Chamberlain, right of way agent for the Interurban Railway Company, has been in Boone figuring on the purchase of the right of way from Boone west to the Des Moines River. While in Boone Mr. Chamberlain stated to several parties that he had already secured a large part of the right of way from Woodward to the river, and that the only thing that would stand in the way of the construction of the proposed extension would be the excessive cost of the right of way from the river to Boone. It seems that the company has completed the preliminary survey of the route for this extension and that the surveyors now in the field are making the location, or final survey.

News also comes from Newton that the Interurban Railway Company has recently closed a contract with the Newton & Northwestern Railway Company, whereby the former will secure the use of the tracks of the latter from Goddard to Newton for a certain number of years. The Interurban Company is obligated to construct an extension from Colfax to Goddard, a distance of 3 miles, and is to equip the line of the Newton & Northwestern for operation by electricity. A station is to be erected at Goddard to supply power for the extension and enable the cars to make the continuous trip from Des Moines to Newton on power supplied from the central station at Des Moines. The company has already commenced the construction of the 3-mile connecting link between Colfax and Goddard. The grading has been under way for several days. All the material for the bridges and tracks has been assembled and will be put in position as fast as the grading is completed. The company expects to complete the construction of the 3-mile strip and the erection of the transmission station and the equipment of the 11 miles of track between Goddard and Newton for electric car service by April 1, 1906. The Newton & Northwestern will operate switching engines on the interurban track between Goddard and Colfax, the latter place being the center of quite a coal mining district. This extension will give the Interurban a continuous line between Des Moines and Newton about 32 miles in length. The company will maintain hourly service into Newton, where there is a population of 5000, made up very largely of employees in the agricultural implement factories there and those dependent upon them. The population to be served by this line will practically be doubled, three new towns being reached, Goddard, Metz and Newton, and connections being made at Newton with the Iowa Central Railroad.

Since the Rock Island Railroad took off the extra trains operated between Des Moines and Indianola during the summer months, and discontinued the sale of commuters' tickets, the citizens and business men of Indianola have been talking of an interurban electric line to connect the two cities. At a meeting of the City Council of Indianola, held last week, representatives of two interurban projects appeared before the Council and asked for franchises for entering the city with interurban lines from Des Moines. One company was represented by William Wilcoxen, an attorney of Des Moines. This company is called the Indianola Interurban Company. The other is backed by some of the wealthiest citizens of Indianola and has not yet been christened. The Des Moines company, that is, the Indianola Interurban Company, through its representative, agrees, if given a franchise, to have its line constructed and in operation within a year. On the other hand, the Indianola parties agree to have their line constructed within two years. The Indianola citizens backing the latter company are: H. P. Shepard, F. S. Burberry, F. C. Sigler, J. M. Harlan, J. M. Sampson, William Buxton, Jr., and H. E. Hopper. The requests for the franchises were referred to the judiciary committee of the Council, with instructions to refer them back to the Council at its next meeting with their recommendations thereon.

No one at Des Moines seems to be able to throw any light on the question as to who is backing the Indianola Interurban Company. All that Mr. Wilcoxen will say on the subject is that his company has plenty of means to construct the line and is able to complete and equip it within the year's time asked.

Since the meeting of the Council it has developed that several other interurban projects are under consideration, all having Indianola as the objective point. The Interurban Railway Company of Des Moines, as previously stated, has recently put a corps of surveyors in the field running a line south from the Army Post line toward Indianola. This company would only have to construct 15 miles of road to enter Indianola, the Army Post line extending about 4 miles south from Des Moines in the direction of Indianola. This company may conclude to construct the line without requesting a franchise, if the Council grants a franchise to some other company, as under the new laws interurban railroads can condemn property for a right of way. It is also announced by A. A. McGarry, of Indianola, that he represents an interurban company which is proposing to build a line from Ottumwa via Knoxville and Indianola to Des Moines. And on top of all these comes the report from Des Moines that the Rock Island, which abandoned its interurban service between Des Moines and Indianola, on account of suits brought against the company for like service in other parts of the State, is considering the project of leasing the Des Moines Indianola-Winterset branch to another company, made up of some Rock Island officials, and permitting this company to equip and operate the branch lines as an electric interurban road. The Rock Island profited by the establishment of the interurban service over the line to Indianola and is anxious to retain this field. If the officials find that they can get around the law in this way, it will be done. With four different companies figuring on constructing an interurban line between Des Moines and Indianola, and the Rock Island figuring on re-establishing its interurban service under a different plan and name, it seems certain that Indianola will secure connections with Des Moines.

MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The fifty-second meeting of the American Society of Mechanical Engineers will be held in New York City during the first week in December. The headquarters, instead of being at the Society House, 12 West Thirty-First Street, as in previous years, will be at the Edison Building, 44 West Twenty-Seventh Street, the two upper floors being used. The opening session, at which President John R. Freeman will present the annual address, will be on Tuesday evening, Dec. 5. The second, or business session, will be held Wednesday morning in the main saloon of the steamship "Amerika," at the docks of the Hamburg-American Line, at Hoboken, N. J. Following this session a special train will take those desiring to make the excursion to the new Henry R. Worthington Hydraulic Works, at Harrison, N. J. Wednesday evening there will be an illustrated lecture at the Edison Building by Prof. R. W. Wood, of Johns Hopkins University, on "Photography of Invisible Phenomena." The third session will be on Thursday morning at the Edison Building, and besides the presentation of professional papers there will be a discussion on the subject of bearings. Thursday afternoon there will be a reception at the New York School of Automobile Engineers, 146 West Fifty-Sixth Street. The usual reception at Sherry's will occur on Thursday evening. The closing session will be at the Edison Building on Friday morning, and will be devoted to the presentation of professional papers.

NEW ENGLISH RAILWAY SUPPLY COMPANY

The Consolidated Supply Company, Ltd., with headquarters at Northampton Park, Canonbury, London, has recently been organized with a capital of £50,000, divided into 25,000 preference shares and 25,000 ordinary shares, registration being effected on Sept. 14. This company has acquired the business and patents, etc., of A. K. Baylor; also the works, plant, patents, etc., of the Consolidated Electrical Company, Ltd., at Northampton Grove, Canonbury. The directors are: A. K. Baylor, chairman and managing director; Montagu Pearse and J. H. S. Thomson. As will be remembered by all in the electrical traction business, Mr. Baylor has been prominently and well known in this country for several years in various electrical enterprises, being at one time connected with the British Thomson-Houston Company, and more recently with the British Electric Car Company, Ltd., of Manchester. When that company was recently absorbed, Mr. Baylor proceeded with the business which he had developed for many years in the nature of various tramway supplies, more particularly in destination indicators, and for the past year or so had made arrangements with the Consolidated Electrical Company for their manufacture. The new company is now the outcome of this, and it commences with an already established business to which Mr. Baylor will devote the whole of his time, and will doubtless build up a successful business in the many tramway accessories in which he is interested.

SANDERSON & PORTER ENTERTAIN AT NEW ORLEANS

On Nov. 7, Sanderson & Porter, contracting engineers of New York, entertained their friends and engineers at a banquet at the St. Charles Hotel, New Orleans, followed by a theater party at the Tulane Theater. The firm are consulting engineers for the New Orleans Railway & Light Company and constructing engineers and contractors for the company's numerous improvements and extensions, and several members of the firm were present, together with some of the officials of the New Orleans Railway & Light Company, including President Foster and Vice-President Jos. H. DeGrange. Mr. Blossom represented Sanderson & Porter and acted as host and toastmaster. He stated in his address that the dinner was given in testimony of the loyalty and devotion of the employees of the firm in the accomplishment of the work on hand during the prevalence of yellow fever in New Orleans, as many of them were from other States and not immune. Speeches were made by Mr. Blossom, Colonel DeGrange, Mr. Haller and Mr. Foster, who complimented Sanderson & Porter on the successful issue of the work undertaken, and the starting of the new underground lighting system of more than 2700 new arc lamps, and putting into operation the new power station at Market Street. Toasts were offered to "New Orleans"; New Orleans Railway & Light Company"; "Sanderson & Porter," and "The Absent Ones."

EARNINGS OF THE MILWAUKEE COMPANY

The statement of earnings of the Milwaukee Electric Railway & Light Company for October and for the ten months ended Oct. 31, and of the Milwaukee Light, Heat & Traction Company for similar periods has been made public. The earnings compare as follows:

Milwaukee Electric Railway & Light Company

Oct. 31—	1905	1904
Total gross earnings	$280,535	$280,386
Operating expenses	128,763	130,197
Net earnings	151,772	150,188
Deductions from income	80,075	78,790
Net income	$71,697	$71,398
Ten months ending Oct. 31—		
Total gross earnings	$2,669,332	$2,656,480
Operating expenses	1,285,404	1,323,306
Net earnings	1,383,928	1,333,174
Deductions from income	769,217	756,734
Net income	$614,710	$576,440

Milwaukee Light, Heat & Traction Company

Oct. 31—	1905	1904
Total gross earnings	$50,474	$38,726
Operating expenses	19,845	17,154
Net earnings	30,629	21,571
Deductions from income	21,330	17,670
Net income	$9,298	$3,901
Ten months ending Oct. 31—		
Total gross earnings	$514,701	$387,461
Operating expenses	214,139	183,041
Net earnings	300,561	204,420
Deductions from income	210,097	168,016
Net income	$90,464	$36,404

The gross earnings of the Milwaukee Electric Railway & Light Company in September showed an increase amounting to only .18 per cent, but as operating expenses were cut down during the month to the extent of $6,204 the increase in net was proportionately greater than that of gross, and amounted to 4.4 per cent. Other income and charges increased slightly, and the net result was that the September surplus showed an increase of $5,593 as against Sept., 1904. For the nine months of the current fiscal year only a slight increase was shown in gross earnings, but as expenses were reduced by $36,466 with other modifications, the income account shows an increase available for dividends amounting to $37,972, and a total surplus for the nine months of $543,011. Last year the company paid the full dividend on the preferred stock of 6 per cent, making a disbursement of $270,000, and 5 per cent was paid on the common stock which required $400,675. This left a surplus of $105,829 on the operations of the year.

In connection with these statements of earnings it is important to call attention to the reason that the receipts of the company have been about stationary as compared with last year. This is the fact that on Jan. 1 last the company began to honor commutation tickets (twenty-five for $1.00, six for 25 cents) all day long, whereas for five years previous tickets had only been good during 2 hours in the morning and 1½ hours in the evening. President Beggs, of the company, says the use of tickets averages from 110,000 to 120,000 daily. This means that about 80 per cent of those riding on the cars now use tickets. In spite of this reduction in fare the increase in traffic has prevented any reduction in gross receipts. The operating expenses have also been kept down in spite of this increase in traffic.

CHANGES IN THE TAYLOR IRON & STEEL COMPANY

At a meeting of the directors of the Taylor Iron & Steel Company, held in New York City on Oct. 31, several changes were made among the executive officers of the company. Lewis H. Taylor resigned as president and was succeeded by Robert E. Jennings, of Jersey City, N. J., who has been vice-president of the company since it was organized in 1891. Percival Chrystie was elected vice-president to succeed Mr. Jennings. Knox Taylor was elected general manager. The officers at present are as follows: President, Robert E. Jennings; vice-presidents, Percival Chrystie and Dr. Henry M. Howe; secretary and treasurer, T. F. Budlong; general manager, Knox Taylor.

Lewis H. Taylor has been president and director of the Taylor Iron Works and the Taylor Iron & Steel Company since the former company was organized in May, 1868. For several years he has been anxious to relinquish the presidency, but the directors were unwilling to have him do so until the present time, when Mr. Taylor insisted that his age was such that he should be relieved of all care and anxiety in business matters. In accepting Mr. Taylor's resignation the board unanimously elected him honorary president.

Robert E. Jennings has been well and favorably known in iron and steel circles for a great many years, having been formerly connected with the Spaulding & Jennings Company, of Jersey City, N. J., later with the Crucible Steel Company of America and still later as receiver of the Carpenter Steel Company, of Reading, Pa. Upon reorganization of the latter company some months ago, Mr. Jennings was elected its president, which office he now holds.

Percival Chrystie has been connected with the Taylor Iron Works and the Taylor Iron & Steel Company in various capacities since 1887, and Knox Taylor has been with the company for the past four years. Mr. Chrystie and Knox Taylor make the fifth generation of the Taylor family who have been interested in the manufacture of iron and steel in Hunterdon County.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED NOV. 7, 1905

803,614. Car Brake; Ernest H. Miller, Lancaster, Pa. App. filed Nov. 26, 1904. Improved brake mechanism for equalizing the "pull" or force exerted upon the brakes by an electromagnet or solenoid or other suitable brake-cylinder having oppositely movable pistons therein for applying the brakes.

803,806. Trolley Wheel; Emily Brossy, West Hoboken, N. J. App. filed July 20, 1904. A spherical trolley wheel provided with an annular groove for the reception of the conductor.

803,874. Brake Beam; Herry C. Buhoup and Gilbert P. Ritter, Chicago, Ill. App. filed Jan. 10, 1905. A brake head having inclines upon the rear face thereof extending laterally in a direction transverse to the shoe-receiving face of said head.

807,917. Brake Apparatus for Railway Vehicles; Charles Luyers, Vilvorde, Belgium. App. filed June 29, 1905. A friction pulley fixed on the axle of the vehicle is divided up into a number of recessed or perforated elements connected together by ribs, brake-blocks adapted to act upon each element, and means for operating the brake-blocks. The object of the invention is to insure rapid dissipation of heat generated by the friction.

803,935. Track Sanding Device; Homer Stokes, West Bridgewater, Pa. App. filed Aug. 22, 1905. Two sand-containing receptacles arranged one above the other, the upper receptacle being stationary and the lower receptacle being movable so that holes in the top and bottom thereof will register respectively with a hole in the bottom of the upper receptacle and a discharge opening in the bottom of the car. The lower receptacle is normally held out of registering relation by springs.

803,962. Car Seat; Joseph Applin, Philadelphia, Pa. App. filed Sept. 20, 1904. Car seat mechanism of the "walk-over" type wherein the reversing movement of the back will transmit corresponding movement to a shifting and canting seat cushion and at the same time correspondingly reverse the position of a swinging foot-rest, so as to adapt the same for the use of the occupant of the next seat in the rear.

803,963. Car Seat; Joseph Applin, Philadelphia, Pa. App. filed Sept. 20, 1904. A seat of the "walk-over" type in which the back-supporting arms are pivoted near the lower portion of the frame, a rock-shaft extends between the members of the frame and carries a shifting foot-rest and levers outside the side members of the frame, the lower ends of the levers being bifurcate and the bifurcation coacting with egg-shaped lugs carried by the back arms.

804,000. Switching Attachment for Railway Cars; Herman Fenske, St. Louis, Mo. App. filed Feb. 18, 1905. Comprises a bracket mounted to a truck frame between the axles, a bifurcated bar supported in the bracket, a disk carried between the bifurcations, toggle arms, bell-crank levers connected to the toggle arms, cables connected to the bell-crank levers, and an air system for tightening the cables to manipulate the device and bring the disks in contact with the outer surface of the rail to convey the car to the track desired.

804,001. Switching Attachment for Railway Cars; Herrman Fenske, St. Louis, Mo. App. filed June 26, 1905. A device whereby the trucks are operated laterally by a lever mechanism operated by compressed air, the trucks being so manipulated for rounding a curve without the use of rail-switches.

804,150. Safety Device for Car Brakes; Ernest H. Miller, Lancaster, Pa. App. filed April 25, 1904. Consists in combination with a car brake, of a controller wherethrough said brake may be operated, a lever for operating the controller, a brake staff, a draw-bar connection between the draw-bar and the controller-operating lever.

804,156. System of Electric Motor Control; Charles A. Mudge, New York. App. filed March 2, 1905. Consists of a main controller, one or more motors, a master controller and a main operating device having hydraulic means for governing its operation through successive steps.

PERSONAL MENTION

MR. CHARLES T. YERKES, of the London Underground Railway Company, was a passenger on the Crown Prince Wilhelm which arrived at New York from Bremen on Tuesday, Nov. 14.

MR. S. K. PATTESON has resigned as manager of the Alabama City, Gadsden & Attalla Railway Company, his resignation to take effect Dec. 1. Mr. Patteson has decided to return to Philadelphia, where he has business connections.

MR. R. E. DANFORTH, general manager of the Rochester Railway Company, and Mr. Frank Silliman, Jr., general manager of the Scranton Railway Company, together are on a tour of inspection of the street railway properties of the Middle West.

MR. MATTHEW C. BRUSH has been elected vice-president of the Newton Street Railway Company, Newton & Boston Street Railway Company and Lexington & Boston Street Railway Company, and will, in the absence of the president, perform the duties usually delegated to that official.

MR. A. J. PURINGTON, of Springfield, Mass., has been elected general manager of the Fairmont & Clarksburg Traction Company, of Fairmont, W. Va., to succeed Mr. A. L. Linn, who has become connected with the accounting department of the New York Central Railway Company, in New York.

MR. WILLIAM L. SHIPP, auditor of the Indianapolis Traction & Terminal Company, died in Fort Garland, Col., a few days ago, from the effects of pneumonia. Mr. Shipp had been auditor of the Indianapolis Company for nearly two years, and was also an extensive stockholder in several Indiana electric railway companies. Mr. Shipp is survived by a widow and three sons.

MR. ROBERT T. IVORY, for several years manager of the Youngstown Park & Falls Railway Company, of Youngstown, Ohio, has resigned on account of ill health. He will recuperate this winter and next spring will supervise the building of a new road in Pennsylvania. Mr. E. J. Kane, who has succeeded Mr. Ivory, has been assistant manager of the company.

MR. H. W. WOODCOCK, Jun. Am. Soc. C. E., resigned his position as assistant general superintendent of the Brooklyn Grade Crossing Commission on Nov. 1, 1905. He has entered in partnership with Mr. E. C. Swezey, C. E., under the firm name of Swezey & Woodcock, and will engage in a general civil engineering and surveying practice, with offices in Brooklyn, N. Y.

MR. W. H. FORSE, for the past two years general bookkeeper for the Indiana Union Traction Company, of Anderson, Ind., has been promoted to the position of auditor of the company, succeeding largely to the work of Mr. Isaac McQuilkin, whose resignation from the company to become connected with the Clinchfield Corporation was noted in the last issue of the STREET RAILWAY JOURNAL.

MR. A. E. STONE, who has been auditor of the Boston & Worcester Street Railway since operation was first begun, has been appointed general passenger and ticket agent of the company. His headquarters will be, as formerly, at the general offices, South Framingham, Mass. Mr. Herbert Linwood Hanlon has been appointed press representative of the company and will make his headquarters in Worcester.

MR. C. F. SWIGERT, vice-president of the Portland Consolidated Railway Company, of Portland, Ore., and Mr. H. C. Campbell, of the same company, who retired when the property passed to Eastern interests recently, are on a tour abroad that will take almost a year to complete. They are now in the Mediterranean, where they propose to spend about three months. Later they will visit Egypt and the Holy Land.

MR. G. W. CHANCE has resigned his position as general manager of the Traction Company of America, with headquarters in the Drexel Building, Philadelphia. Mr. Chance was for a number of years manager of the Trans-St. Mary's Traction Company, of Sault Ste. Marie, and has also had an extended steam and electric railway experience with the Norfolk & Western Railway, the Chicago & Northwestern Railway and other companies.

MR. BERNARD V. SWENSON, secretary and treasurer of the American Street & Interurban Railway Association, has returned to New York from Madison, Wis., where he went to complete arrangements preparatory to taking up permanent residence in New York City. Mr. Swenson has succeeded in securing desirable offices at 60 Wall Street, New York, which will be the headquarters of the association, where a library will be established and records filed.

MR. GEORGE W. VOIGHT, who for the past few months has been master mechanic of the Danville, Urbana & Champaign Electric Railway, has been made general superintendent of motive power of the Illinois Traction Company's system. Mr. Voight was for seven years with the Chicago Union Traction Company as master mechanic, and for five years with the National Electric Company as general salesman. Mr. Voight's ability is solely responsible for his promotion. He assumed his new charge on Nov. 15.

MR. E. P. BURCH, consulting electrical engineer, is giving a course of four lectures on "Heavy Electric Railroad Work," before the senior engineers at the University of Minnesota. The subjects of the individual lectures are: "The Physical and Financial Advantages of Electric Traction for Heavy Railway Work," "The Speed-Torque Characteristics of Steam Locomotives," "The Speed-Torque Characteristics of Electric Locomotives," and "The Physical Data for the Electrical Equipment for Operating a Division of a Transcontinental Railway."

MR. C. B. SMITH, chairman of the Temiskaming & Northern Ontario Railway Commission, who is also expert engineer to the Hydropower Commission, has returned from a visit to the Continent and England. He went abroad to study the electrical railway systems which operate with high-voltage alternating currents. His report will reinforce the recommendation of the Commission that the first 100 miles of the Temiskaming & Northern Ontario Railway from North Bay to New Liskeard should be operated by electricity. There are good water-powers all along the line. Plans and specifications of the work and its cost will shortly be laid before the government. Mr. Smith visited Belgium, Germany, Austria, Italy, Switzerland, France and England.

MR. G. E. PELLISSIER, for some time chief engineer of the Holyoke Street Railway Company, of Holyoke, Mass., has resigned from that company to enter the employ of the Goldschmidt Thermit Company, of New York, in the interest of which he will travel in the West as far as the Pacific Coast. Mr. Pellissier took up railway work with the Holyoke company in 1898 as a conductor and motorman, and also worked in the repair shop at Holyoke. Later he entered the Worcester Polytechnic Institute and was graduated in 1904 from the civil engineering course with the degree of Bachelor of Science. During his course there he gave special attention to the study of maintenance of way on electric railroads. He then went back to Holyoke and was placed in charge of track construction and maintenance of way for the Holyoke company. This company was the first to use Thermit joints in this country, and installed 172 of these joints in Holyoke in July, 1904.

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NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

Of this issue of the Street Railway Journal 8000 *copies are printed. Total circulation for* 1905 *to date,* 384,150 *copies, an average of* 8173 *copies per week.*

The Indiana Convention

The November meeting of the Indiana Electric Railway Association marks another epoch in the history of that organization. The interchangeable coupon ticket question took up a large percentage of its attention during the first few months it was organized. While no official action on the part of the association has resulted from the extensive work done upon that matter, the long consideration of it has brought the different companies to realize the situation and a number have adopted the Ohio mileage plan. At the convention of last week a move was made toward securing uniformity of rates and practice in freight and express. It was shown that there was much need for such uniformity and for provisions for the interchange of freight which would put electric roads more on the same basis in dealing with the public. This movement to have a conference of freight traffic managers of the roads of the State bears about the same relation to the freight business as the movement to establish uniform mileage rates had to the passenger business. There are not so many obstacles in the way of uniform freight practice, however, as were in the way of uniform rates for passenger mileage.

The free baggage question came up again for discussion, and Mr. Norveil, in his paper, brought up some evidence as to the effect of free baggage in increasing passenger business that is worth more than a great deal of theorizing on this subject. Mr. Norveil's figures seem to show beyond question that the handling of baggage free results in a considerable gain in the net revenue because of the additional passenger traffic attracted. These conditions would probably not exist in some places.

The Arnold Report

In this issue we publish the full text of the report just rendered on the street railway system in Chicago to the local transportation committee of the Chicago City Council by B. J. Arnold, consulting electrical engineer of the city. This report is in a sense a continuation of the report made by Mr. Arnold in 1902, and which was published in extenso in our issues of that time. It analyses the probable returns to the city and to the Chicago City Railway Company during the next twenty years if the graduated percentage of gross receipts suggested by the company on the proposed twenty-year basis should be adopted. The result of this calculation is that during this period the company will earn, net, $96,044,000, or with the cost of renewals deducted, $69,043,000. Of this amount the city would receive in taxes, or their equivalent, $34,643,000. On the other hand, the company, after deducting interest on the cost of necessary reconstruction and payments for twenty years to a sinking fund to cover the estimated value of its franchise, would be able to pay $10,923,000 in dividends, or at the rate of 1.437 per cent for twenty years. The sinking fund payments are based on a franchise value of $25,000,000, which is the difference between the price paid for the stock and the value of the physical property. A similar estimate for the Union Traction Company, of Chicago, is not given, as it was impossible to prepare a complete statement in the limited time available, but Mr. Arnold believes that it is not probable that a close analysis of the properties of this company would show a more favorable condition, as it offers to pay the city the same rate of compensation as that proposed by the Chicago City Railway Company. The report is a most interesting and valuable one as an analysis of the future conditions of a large city proper. It is difficult to see how the city could benefit more largely than it would under the proposed plan, by which it will receive nearly three and one-half times as much as the company without a dollar of investment, whereas the returns to the company on its investment is less than 1½ per cent.

Inducing Pleasure Traffic in Winter

The past few years have brought about a noteworthy development in ways and means of creating increased traffic in the summer months by providing artificial attractions of one sort and another at parks and pleasure resorts. Progress in this direction, both as regards attractions and amusement novelties, as well as in the methods of conducting pleasure resorts, has been frequently recorded in the columns of this paper. As a direct sequence to the success achieved by intelligent efforts toward artificially creating pleasure travel in summer, electric railway managers are this year turning their attention more than ever before to continuing similar efforts through the winter months, with the idea of building up traffic on light traffic lines. As a matter of fact, experiment in this direction offers an exceedingly attractive field for originality, especially as it gives promise of attractive possibilities in the way of increasing revenue at a season of the year when operating expenses usually go up and receipts go down.

As a single example of one of the little things that can be done on suburban lines for inducing travel in winter may be cited the experiment described in a recent issue, whereby the Rochester & Eastern Rapid Railway has built up a profitable theater travel by undertaking to act as agent in securing reservations of theater tickets for people living outside the limits of the city terminal.

In line with this same policy of creating winter traffic, announcement is made that the Boston & Northern and Old Colony Street Railway companies, operating 880 miles north and south of Boston, are planning ways and means for making the several park resorts which they serve as popular in winter as in summer. The efforts in this direction include the building of toboggan chutes, artificial skating rinks and other attractions for winter sports. Facilities for ice games, such as hockey, curling, etc., will be offered, and it is believed various athletic organizations as well as individuals will be glad to avail themselves of these opportunities for enjoying the winter sports. It is the idea to arrange special events in the nature of fancy skating contests, skating races and masquerade carnivals. The same methods of advertising, by means of newspapers, notices in the cars, hand bills, etc., as are used in the summer time will be applied to giving publicity to these winter attractions, and there seems to be no reason why the induced travel cannot be made as large in winter as it is in summer. At all the skating ponds rustic shelters and cabins are being erected and will be kept well heated for the comfort of skaters and coasters. These shelters will be made self-sustaining by the sale of hot drinks and lunches. At certain places where the companies have no ponds suitable for skating purpose, the management is co-operating with outside individuals who are erecting winter attractions of different types and descriptions on private grounds.

From various parts of the country come reports of successful attempts to revive interest in roller skating rinks, bowling alleys and similar resorts, and it would appear that under proper conditions many of these pastimes can be made as popular in winter as in summer.

The results achieved from these and similar efforts toward building up pleasure riding during the colder months will be watched with interest, and any suggestions whereby the large investments tied up in parks and pleasure resorts, as well as in idle rolling stock and equipment, can be made to produce revenue during the hitherto non-productive season of the year will be eagerly sought by electric railway managers.

Fire Extinguishers on Cars

A great deal of attention is being paid at present to the proper protection of car houses by automatic sprinklers, chemical extinguishers and other improved methods, and there is no doubt that the subject is well worth the consideration of every railway company. In perhaps no other department of railway work has there been such a great advance during the last two or three years as in the ideas of the proper construction of car houses with a view to protection against fire. We have discussed this subject and the value of sprinklers on other occasions, and expect to refer to them again, but wish also to call attention to the importance of protecting the cars on the road, especially interurban cars on long runs where there is no fire department to call upon for assistance. The modern 40-ft. to 60-ft. interurban car, with its electrical equipment, represents an investment of a good many thousand dollars; in fact, more than the average suburban residence. Nevertheless, the fire risk is high, and statistics show that even in a single State like New York, each day an average of more than a car is burned up while on the road.

The contributing factors to danger from fire are many. Foremost is probably that makeshift method of wiring to which we have often referred, and which is in evidence not only under the car, but throughout other parts of the car body. Other prevalent causes of fires are controllers and resistances which are inadequate for the service demanded or have deteriorated through lack of care, poor connections and a vast number of other reasons, some of which are avoidable and some inevitable, even with the best of management. All of these have been causes for fires in cars both in and out of the car house. But there is this difference, that when in the car house modern methods of fire protection are available, but on the road the chances are that the car will be destroyed before protection is secured, unless it is carried on the car in the form of some kind of extinguisher. Extinguishers are now made in a variety of types and are extremely compact, so that they can be stored in the motorman's compartment, locker or elsewhere on the car. They have proved very satisfactory additions to the equipment of power stations and car houses, and have been approved by the underwriters. They should be equally useful for protecting rolling stock when on the road, and their cost is certainly trifling compared with the risk involved.

Automatic Alarm for Cars in Car Houses

The chief danger from fire in cars when they are located in a car house is that the fire usually originates underneath or inside the car, where it is screened from observation. It may start from defective wiring, live coals left in the heater, or from any one of a variety of causes. As it gains in intensity it burns upward and into the car, where it not only remains unseen until the car is practically enveloped, but being confined within the car the heat is retained, so that the fire gains rapidly in intensity. The inflammable nature of the material of which the body is constructed assists in the work of destruction and, when the entire car is on fire, in spreading the flames to adjoining cars or to the house itself.

We believe that if some form of automatic signal device or alarm were provided within the car by which the presence of a small fire should be made known promptly to the night watchman, it would not be a difficult thing to put the fire out before much damage should be done. Even if this device consisted of several thermostats connected in a local circuit, which would ring an annunciator or buzzer in the office of the night watchman, a great deal would be accomplished. Such thermostats could be located under the seats, in the monitor or elsewhere in the car. One side of the circuit would be through the wheels and the other through the trolley pole on to the dead wire which parallels the trolley wire in the car house, and on which the pole should always rest instead of against the overhead wire itself. The dead wire in each aisle would then be connected to an indicating device which would announce that a fire had started in one of the cars in that aisle. If more accurate knowledge was desirable, the dead wire could be divided into insulated sections, each connected with an annunciator of the usual form, so that the exact car in which the fire existed would be designated. The local car circuit could be cut off by a switch during the daytime.

With a watchman whose somnolent tendencies were prevented by a time clock, an annunciator alarm of this kind, a few extinguishers and a sprinkler system to protect against a more general conflagration, there would be practically no danger of loss of cars by fire.

Multiple-Unit Equipments in Interurban Service

During the past two or three years the advantages of the multiple-unit system have become thoroughly appreciated in urban rapid transit circles, and the experience gained in New York, Chicago and Boston has demonstrated beyond question that the basic principles of automatic train control are sound and capable of meeting the most exacting conditions of city transportation. Multiple-unit equipment has undergone considerable evolution in detailed design since the first trains fitted with it began commercial operation, and the apparatus of today is both electrically and mechanically superior to that of even three years ago. The depreciation and maintenance bugbear has not materialized as the opponents of multiple-unit control expected; the removal of heavy currents from the platform controller has proved a great advantage, and in point of flexibility, the equipment has certainly made good the claims of its sponsors.

The interurban road has also offered an attractive field for multiple-unit operation of late, particularly in cases where a considerable suburban traffic is handled. The facility and safety of double-header operation, the reduction of useless mileage and the ability to maintain fast schedules in rush hours because of uniform acceleration characteristics, regardless of the number of cars in a train unit, all contribute to the usefulness of automatic control in handling variable traffic. The cost of a car equipped with multiple-unit control need be no greater than that of a car fitted with ordinary platform controllers. In some cases it is actually less, so well standardized are the contactors, relays, reversers, etc., which make up the systems now on the market. There is little objection consequently to the use of train control on individual motor cars, and in propositions where the traffic is irregular in volume, it is of great value to be able to operate car units grouped in trains without doubling the motorman expense per train-mile.

The use of trailers, however, is always a matter worth consideration before purchasing a large number of motor cars for interurban service. It must not be forgotten that the operation of a multiple-unit train made up entirely of motor cars throws a heavy burden of power fluctuations upon the generating, transmission and distributing system. The like motor characteristics which prove so useful in holding to the schedule under varying conditions of traffic exact their price through the enormous rush of current drawn from the line, as the motors all accelerate simultaneously. A two-car multiple-unit train in which each car is driven by four 50-hp motors will often consume 1000 amps. to 1200 amps. in attaining full speed from a standstill, and a demand of this size is no ordinary drain upon the equipment of the average interurban sub-station and feeder system. It has often been shown that the first cost of electrical equipment upon an interurban road depends very definitely upon the acceleration employed on the cars, and it is a question if the fluctuations caused by operating all multiple-unit cars on a long line where the headway is not less than half an hour are not sometimes too large to permit either economy in first cost or in running expenses. It would seem advisable to provide for the use of trailers in such cases, even at the sacrifice of the fastest schedule time in the busy hours. Interurban and suburban service are two very different things, and when the volume of traffic will not bear heavy power plant, line and sub-station investment, it is better to economize in power equipment by securing the lower energy consumption per train-mile of motor-trailer trains, dropping the schedule a few per cent, at the most, below the fastest time made in the hours of lighter traffic. There is no reason why the running time of all trains on an interurban road should be the same any more than on steam roads, and although one would not advocate slowing down the schedules to any serious degree, there is no doubt that the practice of using trailers instead of all-motor multiple-unit trains is well worth while on many of the longer and sparsely settled interurban systems.

The Reliability of the Telephone in Despatching

For years it has been urged by men brought up in the steam railroad business and by telegraph operators that the telegraph is a much safer and more reliable method of transmitting train orders than the telephone. This has kept the telephone from being used by steam railroads more extensively, and has also cast some disparagement on despatching methods on interurban electric railways as compared to those of steam railroads. We have never been able to see why the telephone, in its present state of perfection and with proper safeguards thrown around the sending and receiving of orders, should involve any larger percentage of mistakes in transmission than might occur with the telegraph. Our conviction in this matter is strengthened by the experience of the Indiana Union Traction Company with its telephone despatching system, which is described elsewhere in this issue. As this is the largest interurban system in the country, and as a regular despatching system using the telephone for the transmission of orders has been in operation since 1901, this experience should throw much light on this matter. This experience, as stated elsewhere, is that since the despatching system was started, not a single accident has been traced to faulty transmission of orders. On account of the alleged weakness of the telephone in this respect, the management of the company has always been sharply on the lookout for mistakes in the transmission of orders whenever accidents ocurred, but no such mistakes have been found. What accidents have occurred in connection with the despatching system have not been due to the faulty transmission of orders. While it would not be reasonable to suppose that mistakes will never occur in transmitting orders by telephone, such a long record as this without mistakes goes to show that the telephone is by no means the imperfect tool that our telegraphic and steam railroad friends would have us believe.

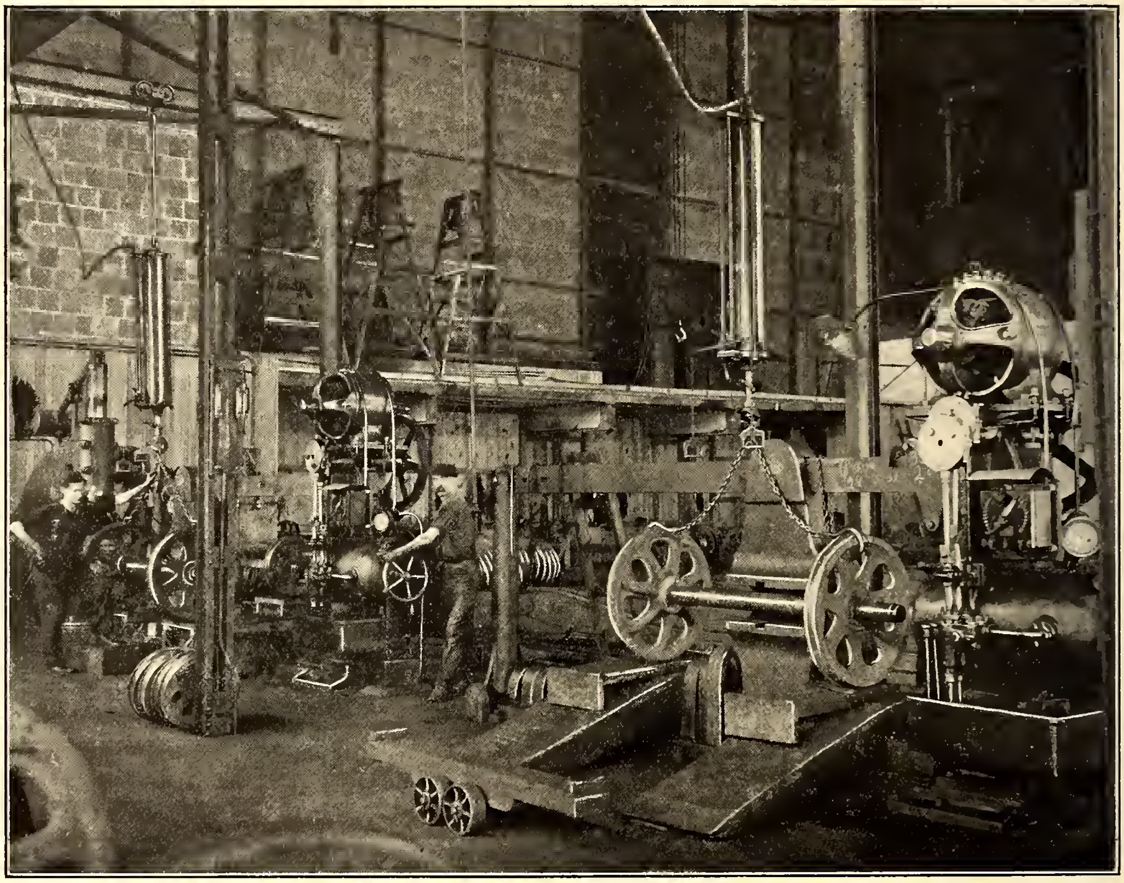
NEW WHEEL-SHOP OF THE NEW YORK CITY RAILWAY COMPANY

The wheel problem is one of the most difficult of those encountered in the mechanical department of the New York City Railway Company, and is of more than ordinary interest, owing to the peculiar conditions of operation encountered in this city. In perhaps no other city than New York can similar conditions of enormously heavy traffic with frequent stops, as well as such enormous amounts of special work, be found. As a result of recent changes of management of the traction properties in New York City, all the surface lines in both Manhattan Borough and the Bronx are operated by the New York City Railway Company, which now embraces a total of over 650 miles of track. Of this trackage, 478 miles of track are in Manhattan Borough, and for this portion of the system the company has an equipment of 3663 cars, of which over 2000 are normally required in daily operation. The lines operated by the company in the borough of the Bronx and vicinity embrace a total mileage of 180 miles and an equipment of 580 cars.

A development of the shop equipment, consistent with the rapid growth of the transit facilities, has not been possible in Manhattan Borough until recently, on account of the varied character of motive powers which were in use up to a short time ago. These motive powers included horses, cable, storage battery and the present underground conduit electric system. Another disadvantage under which the company has always labored, so far as its shop equipment is concerned, is the very high cost of real estate in Manhattan Borough, which has made it impossible to lay out large and commodious shops. At the same time, the enormous distance between the center of gravity of the system and the outskirts of the city has precluded the possibility of doing much work in large shops erected far from the operating car houses. The first difficulty, that of different motive powers, was removed when the underground conduit, the present standard system, was definitely settled upon for the lines of heavy traffic, and an opportunity was given to the mechanical department of the company for developing and settling upon the details of established practice.

The principal repair shop of the company is located at the Fiftieth Street and Sixth Avenue car house. The facilities here include a machine shop, blacksmith shop, new wheel shop, paint shop and plow shop, thus providing for work of all classes except electrical repairs of a very extensive nature. The latter are handled at the 146th Street and Lenox Avenue shop, where all armatures and other coil winding is done, together with controller and other extensive electrical repairs. At this shop are also located a machine shop, truck shop and paint shop. At the Sixty-Fifth Street and Third Avenue shop a large woodworking shop equipment is in operation, together with a machine and blacksmith shop.

The latest and most important of the shop improvements has been the installation of the new wheel shop at the Fifty-First Street and Sixth Avenue car house, which embraces an installation of more than ordinary interest. It differs in many particulars from other shops for wheel work, particularly in that grinding is resorted to for mounted wheels, thus insuring their accurate centering in relation to the journals. This is a feature often overlooked, but is of great importance for securing satisfactory results to both wheels and the car equipments. Another feature of the shop is the extensive use of pneumatic hoists.



THE TWO 200-TON WHEEL PRESSES AND THEIR PNEUMATIC HOISTS

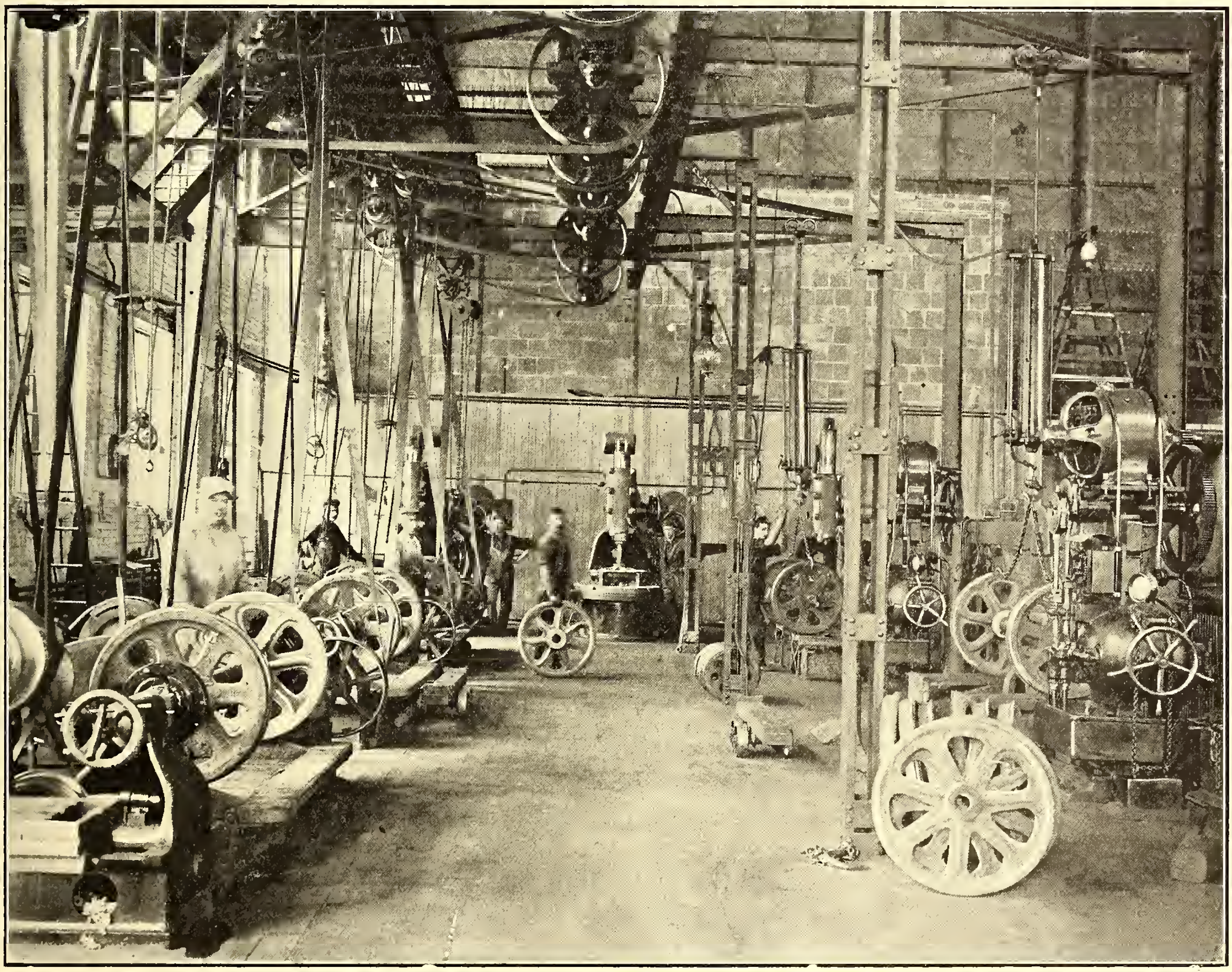
The machine tools here include three car-wheel borers, three wheel-grinding machines, one axle lathe, one engine lathe and two wheel presses, which together provide for the wheel work of the total equipment of nearly 4300 cars. Their arrangement in the shop, as well as the hoist facilities provided, are shown in the accompanying illustrations. The wheel borers are located at one side of the room, and the axle lathes at the other, and the wheel presses between them, so that the finished wheels and axles are merely brought toward the middle of the room for assembling. Overhead runway air hoists are provided in all sections where needed, so that the handling of pieces into and out of the machines is accomplished mechanically for economy of time. In another part of the room a space larger than that occupied by the machine equipment is devoted to the storage of finished work and wheels returned for overhauling.

The wheel-boring machines are of the horizontal revolving table type of the Niles-Bement-Pond Company (Pond design), and have each a capacity of boring hubs of wheels up to 42 ins. in diameter on the tread. The tables are provided with five chuck jaws, each of which may be operated simultaneously or independently, as desired. The boring is accomplished by a vertically traveling spindle, counterweighted and provided with several rates of feed, while the hub facing is handled by a horizontal spindle projecting from the rear housing. An important feature of this tool is the power crane for lifting wheels onto and off the table, which consists of a swinging arm at the side of the machine with a friction clutch operated hoist, easily controlled from a lever above the arm. This feature is effective in doing away with a helper, as one man with the hoist can easily take care of the entire operation of the tool. Each of these machines is operated individually by a 7½-hp General Electric variable-speed motor, with controller near the table for convenience of manipulation of the motor speeds by the operator.

The axle lathes consist of a center-head double Niles lathe mounted upon the headstock of the lathe, from which it drives directly through gearing and gear changes to the headstock.

The wheel presses are of the Niles hydraulic pattern, each of 200-ton capacity, and have individual motor-driven pressure pumps, the motors being mounted above the ram cylinders. The presses are designed for wheels up to 44 ins. in diameter on the tread, and will accommodate long work, as the maximum distance between the ram plunger and the resistance head is 8 ft. 4 ins. The motors operating the pumps are 7½-hp General Electric constant-speed motors and drive through gearing reduction to the pump shaft.

For the handling of wheels and axles into and out of the presses and onto cars, a system of air hoists has been installed which is effective in greatly facilitating the handling. Runways of I-beams are carried over the various machines and over the shipping track, upon which the hoists have considerable travel; the runways are supported by a structural steel framework, as shown. Over the shipping track at one corner of the room there is an air hoist suspended upon a runway swinging as a jib crane, which is used for loading and unloading the wheel cars, as shown in one of the illustrations. These hoists are all the air-balanced pneumatic hoists built by the Chicago Pneumatic Tool Company, and are supplied with air by a Franklin air compressor, driven by a 25-hp General Electric motor.

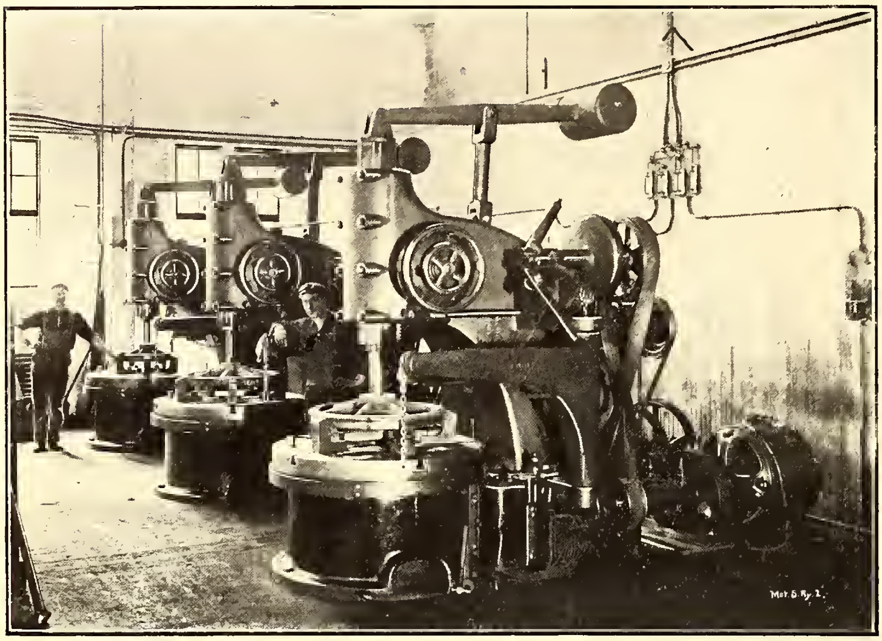


GENERAL VIEW OF WHEEL SHOP, SHOWING WHEEL GRINDERS AT LEFT

and a 24-in. LeBlond lathe, with the usual type of headstock. The former has a 12½-in. hole in the center head, with a double equalizing driver, and has a capacity between centers of 8 ft. Automatic feed release attachments on the apron provide for throwing out at desired points for convenience in the cutting of wheel and gear seats. This tool has a convenient hoisting crane mounted upon the rear of the bed, by which axles are lifted into and out of the machine. The crane is a cast-iron swiveling jib with about 5 ft. overhang, so as to cover the driving head. This tool is driven by a 10-hp General Electric variable-speed motor.

The single axle lathe has a swing over the carriage of 14 ins. and a capacity between centers of 8 ft. 2 ins., thus providing for an extensive range of work of other classes, if desired. This tool is supplied with only a single carriage, with a steady rest, providing especially for cutting to special sizes. This tool is individually driven by a 2-hp General Electric motor

The wheel-grinding machines are of a special type of grinding lathe, built by the Springfield Manufacturing Company, Bridgeport, Conn., for the grinding of wheels mounted upon their axles. They are designed with exceptionally accurate and rigid centering devices at both head and tailstock, for revolving the wheels, and two grinder heads, one for the tread of each wheel. These grinder heads are each driven separately by belt from a countershaft above, and have independent adjustments to their wheels. The centering devices are no doubt the most important features of these machines, as instead of making use of the original end centering holes of the axles, the faces of journals are relied upon to determine the centering of the mounted wheels. The wisdom of this will be at once apparent when the tendency of journals to wear unevenly is considered.



THE THREE 42-IN. NILES WHEEL-BORING MACHINES

Thus if an axle should wear off a few thousandths of an inch more on one side than the other and a new wheel be pressed upon it, the result will be an uncentered unit, with troublesome results. But by centering the newly-mounted wheels relative to the journals of their axles, with which they should be concentric, and then grinding them down to true, a perfect result will be obtained. It is often found that mounted wheels are obtained which are several hundredths of an inch out of center with the journal surfaces.

The practice in the operation of the shop is to turn out the work in advance for shipment to the various division repair departments at car houses where running repairs are made. Damaged, broken and discarded wheels are returned to the wheel shop and their wheels pressed off to be replaced by new ones. Very few new axles are required, however, one axle outlasting many pairs of wheels. The practice of pressing wheels on and off is in accordance with usual railroad shop standards, press fits being used with wheel seats turned up from two-thousandths to three-thousandths of an inch larger than the bore of the wheel. After pressing on, all wheels go to the grinding lathes for their final truing prior to going into stock for delivery.

The shop work is directly under the charge of Thomas Millen, general master mechanic of the company.

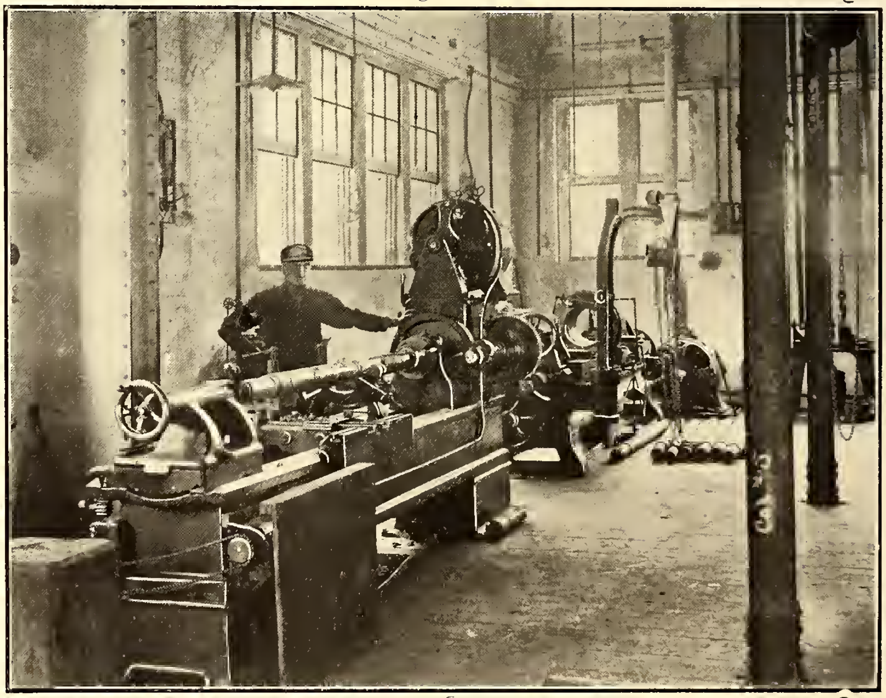
The Secretary of State of Ohio reports that during the year ending Nov. 15, 44 street and electric railway companies, with a total capitalization of $23,768,500, were incorporated in Ohio. The increase in capitalization amounted to $13,122,000.

DESPATCHING ON THE INDIANA UNION TRACTION SYSTEM

The Indiana Union Traction Company, which operates the largest system of interurban railways in the United States, was one of the first to go thoroughly into the matter of train despatching, and the system which it has in force to-day for this purpose is probably the most completely worked out of any that is in use on interurban roads of the country. In response to requests from readers of the JOURNAL for a full account of this despatching system, which has been briefly mentioned in previous articles, the following description has been prepared:

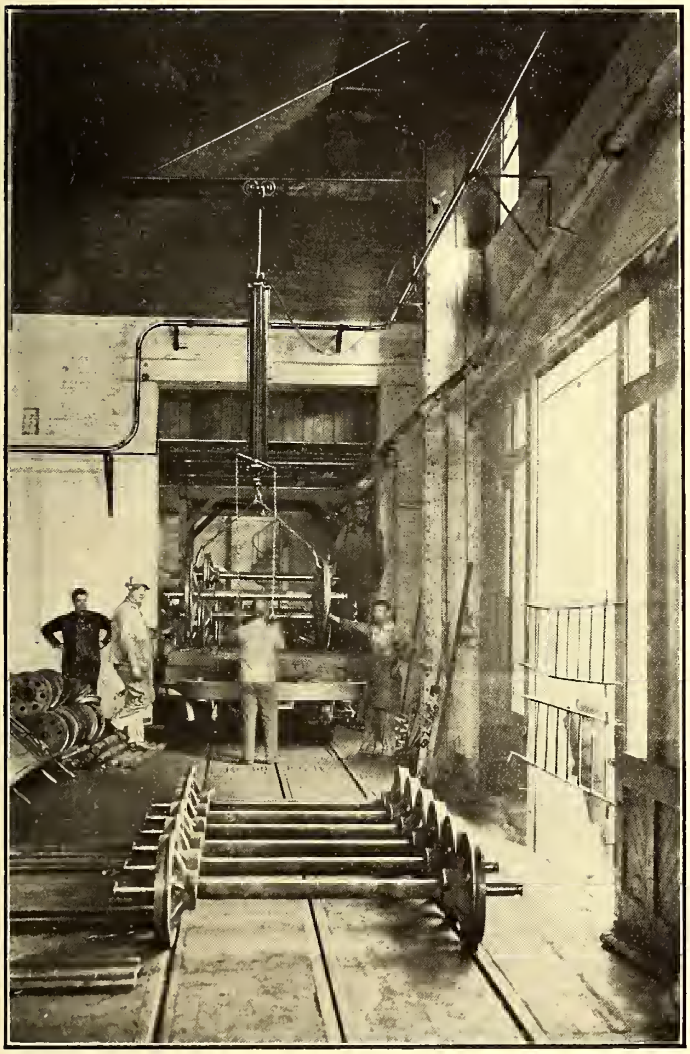
The telephone is used entirely for transmitting train orders. Although it had been claimed by steam railroad men that the telephone is not as reliable as the telegraph for transmitting train orders, the experience of the Indiana Union Traction Company has been that since the despatching system was put in force Oct. 13, 1901, not a single accident had ever been traced to a faulty transmission of orders, although diligent investigation has been made after each accident. Accidents have all been due to some other cause.

The company keeps its despatching system of telephones entirely independent of those used for transacting the general business of the road instead of making the same pair of wires serve both purposes, as is very common. One pair of wires over the entire system is set aside to despatching purposes only, and another pair of wires is used for general business. In case



THE TWO AXLE LATHES

the despatching wires are out of order on any section of the road, the general business wires are temporarily made despatch wires. The despatching wires are provided with connection boxes at every switch or turn-out, by which any train crew can obtain connection with the despatcher. Each car carries a telephone with a sufficient length of flexible cord so that connection can usually be made by reaching out of the vestibule window to a connection box. If for any reason it is necessary to take this telephone from the motorman's cab, it can be done, as it is a portable instrument. Ordinarily there is no ringing in the regular operation of the despatching system. The despatcher keeps his receiver constantly at his ear, having the usual telephone outfit used by telephone operators. When a train crew wishes to talk with the despatcher, the car telephone is hooked into circuit and conversation begun at once without ringing. As the only instruments on the line are the despatcher's, and whatever car telephones may be in use, it is possible to keep long lengths of despatching line in circuit without interfering with the talking over the line. The despatcher's switchboard is arranged, however, so that he can separate the lines going in different directions from the office.



PNEUMATIC CAR-LOADING HOIST, SHIPPING TRACK AND SPECIAL ELECTRIC WHEEL CAR. THE LATTER HAS A LONGITUDINAL CONTROLLER TO ALLOW WHEELS TO BE ROLLED OFF OVER BUFFER, NEW YORK CITY SHOPS

When this is done it is necessary for the train crews to ring in order to call the despatcher, each circuit being provided with drops on the switchboard for this purpose.

On the telephone lines devoted to general business there is a connection box every half mile along the entire line for use by construction train crews and in case of accident. Telephone instruments are rented from the Bell Company. The line and instruments are maintained by the railway. The repairing of the telephone instruments is done by the sub-station attendants to utilize their spare time.

Semaphores are provided at the sub-stations, which are about 10 miles apart, by which a despatcher can telephone to a sub-station and stop any train for orders in case it is necessary to do so between regular reporting points.

The Indiana Union Traction system is too large to be handled by one despatcher, not only on account of the number of trains, but because of the difficulty of telephoning with certainty under all conditions of weather over so large a system. One despatcher located at Anderson has 101 miles of road under his charge, and another despatcher at Tipton has 119 miles.

To add still further to the reliability of the system, the company will soon put telephones in booths at all regular meeting points for use in despatching. The portable telephones on the

Form 317 100M 12-03

Indiana Union Traction Company.

TRAIN ORDER BLANK, FORM A.

Order No................. *Date*................190....

To Conductor and Motorman,

Train No......... *Motor No.*........ *at Siding No.*........

Meet Train No......... *Motor No.*........ *at Siding No.*........

Meet Train No......... *Motor No.*........ *at Siding No.*........

and report at Siding No.................

....

....

....

....

....

Complete................ *M*................

Dispatcher.

Form 348-1M 6 03

Union Traction Company of Indiana.

HOLDING ORDER.

No................. *Date*................ *1903.*

To Substation Operator at Siding No.................

Hold Train No................. *Motor No.*................

Hold Train No................. *Motor No.*................

Hold Train No................. *Motor No.*................

Block Set At................*M.*

Dispatcher................ *Operator*................

FORMS USED IN DESPATCHING CARS

car will still be retained. This will call for seven booth telephones on the 101 miles operated from the Anderson despatching office.

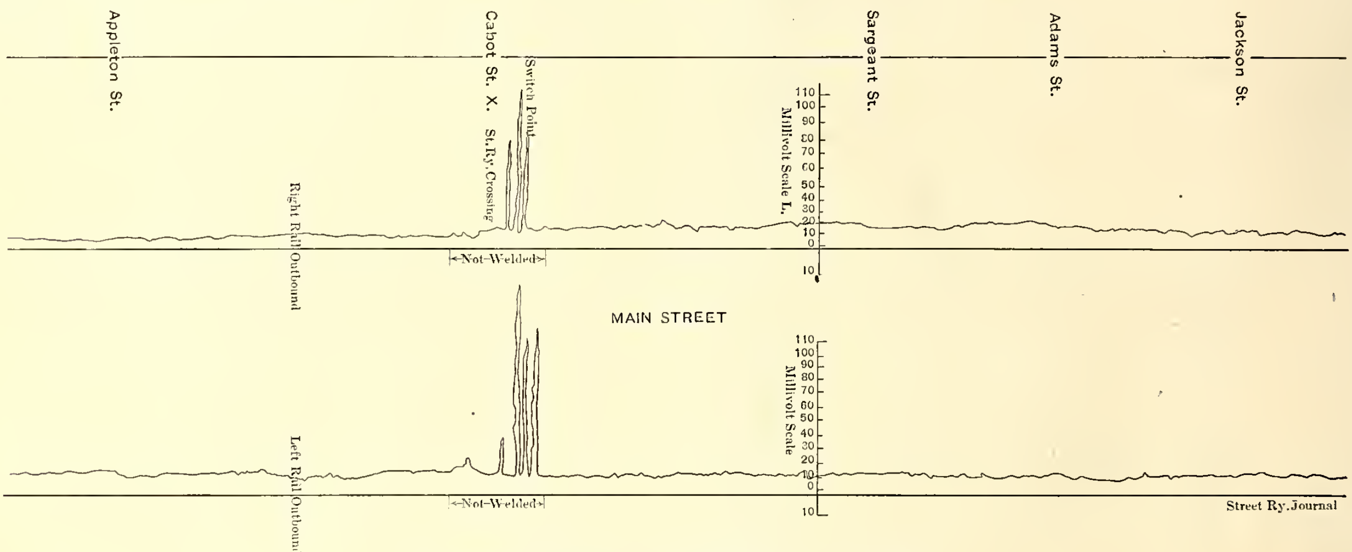
The company has a continuous record of train movements since October 13, 1901, when the first time-table, written orders and train sheets were put in force. To give an idea of the amount of business done, the following figures are given, which apply to the 101 miles operated from the Anderson office. On this part of the road there are 288 trains in twenty-four hours. The regular time-table calls for sixteen trains operating at once. Besides this there are, of course, whatever extras and work trains are needed. The despatchers work in three shifts: the first from 8 a. m. to 4 p. m.; the second from 4 p. m. to midnight, and the third from midnight to 8 a. m. The man on the last shift checks over train orders during the quiet hours.

The company makes use of trailers to increase its carrying capacity when the traffic is heavy rather than to increase its capacity by running trains oftener than once an hour. In order to maintain schedule time with trailers, the plan is adopted of having a motor car with a trailer form the first section of a train and make the town stops only. The second section consists of a single motor car, making the country stops. In this way the whole service is maintained without serious loss of time.

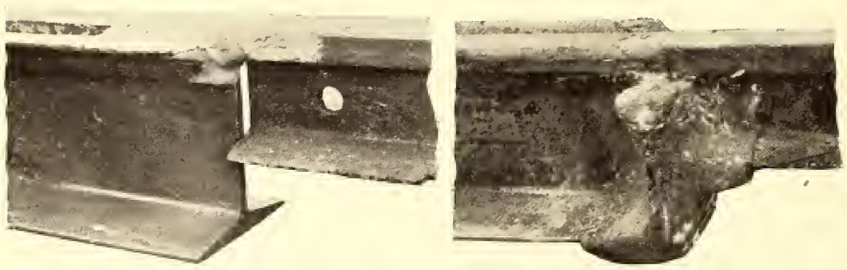
Only two forms of order blank are used, one of which, Form A, reproduced herewith, is carried by the train crew, and the other (which is a holding order) is kept at sub-stations. The despatcher keeps duplicates of these orders, writing them down as he transmits them over the telephone. The orders are received by the motorman and read to the conductor. Timetables for the entire system are issued in book form, these time-tables giving meeting points in bold faced type. In addition to the time-tables, this book contains lists of the company's surgeons in different towns on the system, and a set of rules governing the movement of trains. This is the only rule book as yet published by the company. In addition to this, bulletins are posted with special or temporary regulations. A meeting, at which the rules and bulletins are gone over by an officer of the company with the train men, is held once a month at different places, so that all men get the benefit of the meetings.

RECENT THERMIT WELDING IN HOLYOKE

An account was published in the STREET RAILWAY JOURNAL for Feb. 18, 1905, of the welding of 1 mile of track on Main Street, Holyoke, Mass., by the thermit process. The welding was commenced Aug. 8, 1904, and was one of the first pieces of track welded with thermit in the United States. A year later, or in August, 1905, the track was tested by the Herrick autographic test car. A copy of the record is presented herewith: The distance scale of this record is 480 ft. of track to 1 in. of record. The voltage scale is 160 millivolts for 1 in. The resistance of any bond bears the proportion of the height of the spark line to the height of the line adjacent rail. If the spark line be four times the height of the current line adjacent to the joint, the resistance of the joint is equal to that of 16 ft. of solid rail. When a joint exceeds 60 ft. of rail an open bond mark is shown on the side of the record, but none appears in this record, and this is noted as an open bond. Joints beyond 12 ft. of solid rail are marked as defectives. Street intersections are given by raising the record pen of the top line from one curb to the other as the car passes this street.



TEST RECORD OF MAIN STREET, HOLYOKE



COMPROMISE JOINTS BEFORE AND AFTER WELDING WITH THERMIT

In addition to its track welding by thermit, the Holyoke Street Railway Company has just completed welding 1300 ft. of 56-lb. T-rail to be used merely as conductor for the return current. Main Street runs by the power station about 1300 ft. from it, and through this street the return current from the entire system flows, amounting at times to 4000 amps. The conductor which connected the Main Street rails with the negative bus-bars formerly consisted of the two rails of a spur track extending from Main Street to the power station and three No. 0000 supplementary ground wires. The spur track is bonded with two No. 000 bonds. On testing this piece of track the bonds were found to be in bad condition and it was decided to supplement the conductor already there with a double line of 56-lb. T-rail, which was laid in the following manner:

A trench 3 ft. deep was dug from the street to the power station. Across this trench old ties were laid two to a 30-ft. rail. Two lines of rail were then laid upon these ties and welded by thermit, the collar of metal extending clear around the section of rail. The two lines of rail were then bolted together about every 20 ft., the joints being staggered, and the whole lowered into the trench. Connections with the rails in the street were made by inverting the conductor rails and bolting the flanges to the traffic rails. After this was done the flanges were welded together, suitable molds having been made. At the power station the ends of the conductor rails were allowed to project about 6 ins. through the walls. Copper lugs were then soldered to the ends of the rails, from which a 2,000,000 circ. mil connected each rail to the negative bus-bar. The cost of the entire work was about $700, including the value of the old rails.

The accompanying photographs illustrate some compromise joints which were made by the thermit process and have been in service under heavy traffic since June of this year.

R. S. Masson, consulting electrical engineer, and G. B. McLean, mechanical and electrical expert, of the Pacific Electric Railway Company, have installed in the main corridors and in the women's waiting room of the great Huntington depot at Sixth and Main Streets, Los Angeles, a system of enunciators that will henceforth do away with the harsh voice of the train crier. These enunciators are in the form of huge automatic signs, which respond to the work of the starter beside the tracks on the outside. When the coaches for the various stations are prepared to start, the operator has merely to press a button, whereupon will ring a loud gong, and then will appear the announcement of the destination of the waiting car upon big signs in white letters across a black background.

RESULTS AT PLEASURE PARKS IN EASTERN MASSACHUSETTS AND PLANS FOR WINTER SPORTS

The Boston & Northern and Old Colony Street Railway companies, operating 880 miles of track north and south of Boston, in addition to the natural advantages for pleasure travel during the summer months offered by the seashore resorts, historical towns, lakes and rivers for which Eastern Massachusetts is noted, own several pleasure parks scattered in various sections over the systems.

Five of these parks, namely, Lakeview Park, located outside of the city of Lowell; Glen Forest, near Lawrence; The Pines, a short distance from Haverhill; Highland Park, convenient to the city of Brockton, and Sabbatia Park, on Sabbatia Lake, near Taunton, are under the direct management of the companies, and are all within a 5-cent fare limit from their respective centers. These parks have beautiful groves, and every care has been taken to preserve the natural beauties. Glen Forest and The Pines are delightfully situated on the banks of the Merrimac River. Lakeview and Sabbatia Parks border on the shores of a large lake, affording good opportunities for boating, etc., while Highland, the most beautiful of them all, has no water privileges. In addition to these, the companies have two other parks, which are sub-let.

These parks have been running for many years, with vaudeville performances at the chief attraction, but the patronage from season to season did not increase sufficiently to justify the heavy investments that had been made at the various resorts. During the latter part of the season of 1904 the "Jack and the Beanstalk Company," a musical comedy, made a circuit of the parks, with such success as to thoroughly convince the officials of the companies that high-class entertainments, such as operas, operettas, farce and musical comedies, with an occasional vaudeville show, would bring an increased popularity to the parks. This plan was inaugurated and carried out. It is worth noting, however, that at one of the parks the demand for vaudeville predominated, and the companies were obliged to cut out other shows at this place.

CHILDREN'S HUNT, HIGHLAND PARK, BROCKTON

The seating capacity of the theaters at all the resorts was enlarged, but reserved seats were graded in three classes—5 cents, 10 cents and 15 cents, which more than offset the additional cost of the performances over previous years. The official opening of the parks took place on June 29, with fireworks, band concerts and performance. The attendance far exceeded the expectations of the management, and had the weather been favorable for the opening, set for June 26, the crowd would have been much larger. From the opening to the closing of the season, the efforts of the companies in keeping the parks on a higher plane were well rewarded. At Highland Park the attendance was fully 75 per cent greater than any previous year; at Glen Forest it was over 100 per cent; The Pines, which had been on the decline, was restored to its former popularity, while Lakeview Park and Sabbatia Park showed a very satisfactory increase. After the closing season of the parks, the managements gave band concerts and fireworks on certain days, which brought out good attendances.


CHILDREN'S HUNT, HIGHLAND PARK, BROCKTON

On Sept. 23 an "animal hunt" was held in the parks for school children. These were open to all primary and grammar school scholars. Tags were hidden in various places, bearing the name of some animal, the finder receiving whatever pet was named thereon. A second hunt for prizes, such as toys, watches, etc., was held on Sept. 30. The attendance was about 26,000 at each hunt, both of which proved most successful in every way.

The methods of the companies for advertising this year consisted of five advertising cars (see illustration), which were kept on the lines every afternoon and evening. Straight advertisements, advance notices and reviews in the various newspapers also did their full share in popularizing these resorts.

The season just closed has demonstrated to the management the necessity of giving to the public entertainments of a high class in order to receive the good will and patronage of the people.

The electric companies have plans under way for making their pleasure resorts as popular in winter as in summer, and are now at work constructing toboggan chutes, artificial skating rinks and other attractions for winter sports. Various ice games, such as hockey, curling, etc., will be provided, and it is believed that athletic clubs and schools will take advantage of the excellent opportunities which will be offered for hockey matches and other sports. At different times during the season the companies will offer prizes for fancy skating, also for costumes, it being the intention to hold masquerade carnivals on the ice.

In some sections where the companies have no parks, they will co-operate with private individuals who are erecting similar attractions on private grounds. Some of these will contain only an artificial skating rink, while others will have the toboggan slide also.

A rustic shelter or cabin will be erected in the parks, and will be kept well heated for the convenience of skaters and coasters. Hot drinks and light lunches will be served also.

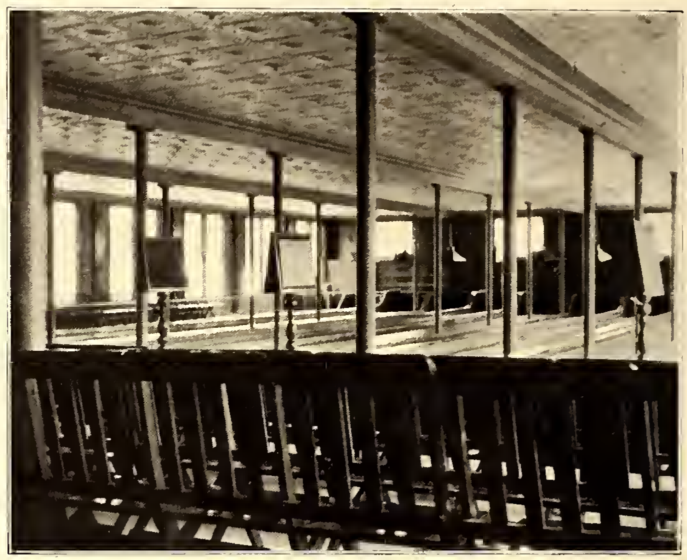
ADVERTISING CAR

Toboggan sleds owned by private parties will be kept at the parks without any charge, while those who do not have sleds of their own may hire them at a very nominal sum.

The evolution of the street car as exemplified by the various types of car in use in Rochester was strikingly illustrated in a recent article in the Rochester "Herald." No less than ten different styles of cars were shown, from the horse car to the 500 type, the latest adopted for use in Rochester. To illustrate the trend in interurban car building, a car in regular use on the Fonda, Johnstown & Gloversville Railway was shown. The writer says that the system in Rochester has grown from one of one horse car and three drivers to one of 300 cars and a working force of 1000 men.

A COMBINED ROLLER-SKATING RINK AND BOWLING ALLEY

The Worcester Consolidated Street Railway Company early last summer decided to add to the attraction features at Quinsigamond Park, which it controls, and developed the idea of erecting a building that would combine facilities for a bowling alley in the basement and a roller-skating rink in the upper part of the building. The scheme was carried out, and although the building was not ready for use until the season had well progressed, leaving but seventy days during which the attractions were in commission, the venture has demonstrated not only the return to popularity of old-fashioned roller skating, but also the possibilities of well-conducted bowling alleys as drawing cards for pleasure parks. In view of the financial results achieved at Worcester, it is worth the while of those having electric railway parks in charge to note that these two forms of amusement—i. e., roller skating and bowling—which several years ago were very popular, but gradually fell into disfavor, can now be revived, and if maintained with proper surroundings will prove exceedingly popular with the best class of park patrons. The decline in both of these sports was undoubtedly due to the fact that proper care was not exercised in maintaining a good refined tone about them, so that the better class of patrons gradually refused to participate in these forms of amusement in public places. The reports not only from Worcester, but from other points during the past season


GENERAL VIEW OF ALLEYS



BOWLING ALLEYS AT QUINSIGAMOND PARK, WORCESTER

seem to demonstrate beyond doubt that if these sports are provided in pleasant and refined surroundings, and any suggestion of rowdyism or commonness is excluded, the better sort of people will patronize them with considerable enthusiasm.

At Quinsigamond Park a wooden structure was erected especially for these two attractions. The building was constructed upon the side of a hill, so that the bowling alleys located in the basement are reached from a side door on the lower level. The main floor, which is devoted to roller skating, is reached from the ground level at the top of the hill. The accompanying views give a good idea of the design and construction of the rink and alleys. The roof over the rink is supported on light steel trusses, and the outside of the building, including the side walls and roof, is finished in green shingles. Between the skating floor and the ceiling of the bowling alley room were laid layers of deadening felt, and an air space of about 1 ft. was left so as to do away with vibration and noise in the lower room when people were skating in the room above. The ceiling of the bowling alley was formed of pressed sheet metal, painted a dead black color, but brilliantly illuminated with incandescent lights.

There were installed in the basement ten exceptionally fine standard alleys made by the Narragansett Machine Company. These were equipped with all modern devices for making this game thoroughly enjoyable. In order to make the alleys permanent, they were laid upon a foundation consisting first of 4 ins. of tar and gravel concrete, upon which were laid crossties running clear across the width of the ten alleys. On the cross-ties were placed the longitudinal timbers, upon which rest the polished floor of the alleys. The construction with crossties and longitudinal members in this way gives about 7 ins. of air space under the alleys, and this insures freedom from moisture and any tendency of the hardwood floors to shrink or warp. Each alley is fitted with a pedestal for holding the score sheets, and back of the bowling space were arranged a

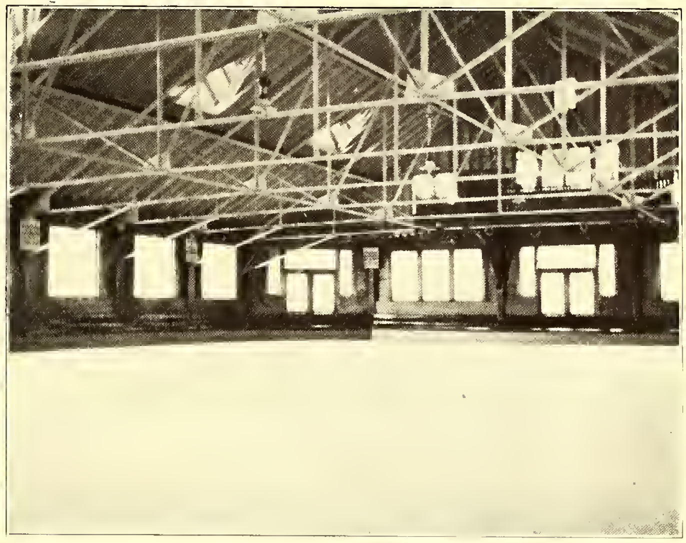
CASINO, WORCESTER

number of seats for spectators. Back of these seats were placed a line of lockers in which the players may keep their hats and coats.

During the past summer while the alleys were open a uniform charge of 10 cents a string was made for the use of any alley and there was hardly an hour during the afternoons or evenings when the alleys were not in commission, and on many of the days there was a long line of people waiting their chance to play.

The skating rink was stocked with 335 pairs of Winslow steel roller skates, and on several occasions the demand exceeded the supply. Five skating sessions, averaging two hours each, were held each day and a charge of 20 cents for each man and 10 cents for each woman was made for each session. This charge will be increased next season to 25 cents and 15 cents, respectively. Good music was provided afternoons and evenings for the skaters.

As to the financial results, J. W. Lester, treasurer of the Worcester Consolidated Street Railway Company, who had full charge of the company's park during the past year, states



SKATING RINK, WORCESTER

that the cost of erecting and equipping the building complete was $14,700, of which $8,500 was charged to the bowling alley and $6,200 to the skating rink. At the close of the season, after seventy days' running, the net receipts, after paying all expenses, in the case of the skating rink amounted to $1,309, or 15.4 per cent return on the investment of $8,500, and in the case of the skating rink the net receipts amounted to $1,550, or a return of 25 per cent on the investment of $6,200. With the full season of 145 days, the management is confident that the net receipts can be more than doubled.

NEW CLUB HOUSE IN GRAND RAPIDS

The Grand Rapids Railway has fitted up a club room for the motormen and conductors employed on its lines at its Wesley Avenue car houses, and according to an official of the company, the men are taking advantage of the social features offered thereby so enthusiastically that in all probability every car house in the city will be equipped with a club room. The main room contains a pool table, which is always in commission. Checkers and other games also furnish amusement for the men. The furniture is of the mission kind, and the soft leather seat which extends around the room lends the charm of the den. Pictures are arranged artistically on the walls, and toilet rooms with baths are accessible from the main room. A large electric sign hangs in front of the building bearing the words: "Conductors and Motormen's Club Rooms." A pool tournament is being held and the company will give a handsome cue as a prize to the winner.

The promoters of the proposed Tiffin & Fremont Railway recently carried out a rather novel plan of demonstrating to farmers and property owners along the proposed line the advantages resulting from a modern interurban road. They took a large party in a special car over the Lake Shore Electric Railway to Toledo, thence over the Toledo & Western Railway to Pioneer and return. The growth and development of the country districts and towns along these lines were plainly demonstrated.

NOVEMBER MEETING OF THE INDIANA ELECTRIC RAILWAY ASSOCIATION

One of the most important, interesting and enjoyable meetings of the Indiana Electric Railway Association that has yet been held was that of Nov. 9 at Rushville. About sixty members of the association from all parts of the State were present. The selection of Rushville for the November meeting was at the invitation of Charles L. Henry, president of the association and president of the Indianapolis & Cincinnati Traction Company, who entertained the convention.

The party left Indianapolis at 9 a. m. on special trains, each member being provided with a round-trip ticket, including a dinner coupon at the Windsor and Scanlan Hotels. Members of the association have expressed the desire ever since the Rushville division of the line has been placed in operation to inspect it, as it was the first road in the West to operate under the single-phase system. An opportunity for such inspection was afforded the members by this trip over the 40 miles of double track. This road has been fully described in previous issues. En route to Rushville the party visited three transformer stations situated about 12 miles apart. These stations require no attendants, being simply closed buildings. The power station, car shops and general offices at Rushville were all inspected, and there was the most generous praise of the admirable construction from start to finish.

The members were next taken to dinner—thirty dining at the Windsor and thirty at the Scanlan Hotel—as the guests of the Indianapolis & Cincinnati Traction Company.

The meeting of the association was called to order by the president, C. L. Henry, in the Rushville Club rooms. After the reading of the minutes and attending to some routine business, President Henry called for nominations for vice-president to succeed the late John W. Chipman. The name of A. W. Brady, of Anderson, president of the Indiana Union Traction Company, was presented, and Mr. Brady was unanimously chosen. The first paper on the programme was presented by N. E. Graston, superintendent of the freight and express traffic of the Indiana Union Traction Company. Mr. Graston's subject was "Interurban Express and Freight Traffic." He said in part:

INTERURBAN EXPRESS AND FREIGHT TRAFFIC

I will try to give you briefly a few of the most important items, as I see them, that are necessary to have in conducting the freight and express traffic of interurban lines. It is only within the last few years that some managers have come to look on the transportation of freight and express by interurbans with favor, and I think those that have inaugurated this class of service find that it is profitable and does not interfere with their passenger traffic. The freight and express business, as you know, is still in its infancy, yet it has shown that it can be operated at a profit even with a small volume of traffic.

At the present time every company is confining its traffic to its own line. This business could be increased very materially if the traffic managers of the different interurbans would get together and arrange for a system of through rates between their respective lines on the same rate basis as steam lines have between like points. Until this is done we cannot hope to increase our through traffic, as the sum of the two local rates amounts to so much that shippers will not favor us with the business. Every company has a certain amount of fixed charges connected with the operation of the freight and express department, such as salaries of agents, rent of stations, etc. Through traffic could be handled without any noticeable increase in expenses, and at the same time it would bring in quite a nice revenue. We can handle it if we will only organize and get through rates into effect.

Our inability at this time to interchange freight traffic with steam lines is working a great hardship on us all, and I hope the time is not far distant when they can see their way clear to arrange for connections and working arrangements with us whereby we can interchange traffic with them. When we can do this our traffic and revenue will show a nice increase. Until then we will be handicapped, and it is costing us loss of considerable traffic which we should have for local points on our own lines, as well as traffic to points on connecting lines, because heavy shippers of merchandise refuse to give us any business, as their doing so would entail additional expense to them. They claim that they can send all their output to steam lines with one cost of transfer. We should arrange for interchange with all lines as quickly as possible, as I believe this will be best for all concerned.

The traction lines of Indiana were very fortunate in getting their lines so located that they traverse not only the most thickly inhabited portion of the State, but the very best agricultural districts as well, especially adapted for dairy purposes, vegetable raising and fruit growing, and I believe we should give the development of these commodities special attention along our respective lines. No class of traffic is more profitable to traction lines than these commodities. We should assist the farmer in every way possible to find a market for his product, as it will encourage him to increase his shipments, and by so doing we also increase our revenue.

It should at all times be the policy of electric lines to put in good side-track facilities at each station on their lines, and at such other points where the business will justify the expense, as good track facilities is a very important item to the traffic department, since it helps the company to secure business and enables it to take care of the same in a satisfactory manner after it is secured. Then we should have good side-track facilities to enable us to get our trains over the road with the least delays possible, thereby enabling us to keep the operating expense down to a minimum.

Take a walk through the yards of steam lines and you will find that they have the very best facilities to handle their traffic, and we must do likewise if we expect our proportion.

I think the official classification should be adopted on interurban lines as to the mode of classifying freight, but it has some few articles classed other than they should be. One article I call to your attention is household goods. I think they are classified too low for profitable business to interurban lines, and it would be well if the traffic managers of electric lines would get together, go over the classification carefully and get out an exception sheet to those articles named in the official classification which they think are not properly classified for interurban traffic, to be uniform on all lines.

We should at all times hold our rates to the highest possible point and see that our agents apply them properly to get the most revenue out of every shipment. Our rates should be made up on the same basis as steam lines. You will find that the latter are figured on a profitable basis. Before we publish a new rate sheet and have not the figures of steam lines at hand, we take the matter up with the traffic department of lines in the territory for which we are arranging a tariff by asking them for their class rates to and from same points, and in this way we are enabled to get out our tariffs on the same basis and avoid any conflict in rates. To secure our share of the traffic, it is necessary to make the same rates between the same points as the steam lines.

In billing freight we are using a way-bill which consists of four sheets, the original and three copies. This is so folded that forwarding agents make all the copies at one writing by use of carbons. The way-bill shows station from, destination, date, car number, name of consignee, consignor, description of articles, weights, rate and amount of freight. After the forwarding agent makes the way-bill, he delivers the original and one copy to the conductor, who checks his freight to and from the car with it. When he gets the freight to destination, he delivers the original and copy to the agent. When the agent makes delivery of the freight, he signs the original and delivers it to the consignee with the goods, which is his expense bill, and he has the consignee sign the copy, which he retains for his receipt of delivery. The forwarding agent sends one of the two remaining copies he has to the auditor and keeps the other for his files. You see, the forwarding agent makes the expense bill at the same time that he makes the way-bill.

Each company should be provided with sufficient equipment so that it can handle and move all the business offered to it daily without delay to the traffic, for my experience has taught me that failure to move your traffic promptly diverts it very quickly, and once taken from you it is a very hard matter to regain it. For this reason we should be prepared to move it without delay. To overcome this complaint it is necessary to keep a few extra cars ready for immediate use at all times to care properly for any traffic that might be secured. The cars for use in handling freight should be good, large cars (45 ft. to 50 ft. in length). The motor cars should be equipped so that they could handle trailers without difficulty. Every company should have several good box-car trailers to take care of carload business, in addition to the handling of local traffic. I think there should be as much business handled with trailers as possible, since it serves to keep down the operating expenses.

Too much care cannot be given to the erection of freight stations and platforms. These should be so erected that the floors will be on a level with the floors of the freight cars. This will not only enable trainmen to handle their freight more quickly and carefully, but leaves freight where it will be convenient for transfer men to load on their drays. I find at stations where we are not equipped with high platforms that we are losing considerable traffic. The merchants at these points tell us that they would gladly give us their business if our facilities were equal to those of the steam lines.

We should be very careful in the selection of our agents, especially at our most important stations. They must be good, intelligent, sober and industrious men, as they come in daily contact with the business public in general, and on them depends to a large degree the success of the company in their respective cities. Each representative should put forth every effort to please the transfer men at his station as well as his patrons, as my experience has taught me that the transfer men practically control a very large per cent of the less than carload business in their respective cities, and we should let them know by word and action that anything they do for our company will be appreciated. When this is done you will find them a great help to us in securing local traffic for our lines in their cities.

One of the greatest difficulties that we are experiencing at present is to get our patrons to understand that we are prepared to handle all kinds of freight traffic. Most of them have the idea that we cannot handle any class of freight but small packages.

I think that it is very essential to have a good solicitor to go out to see each merchant and shipper, keep after them for more of their business and bring our line before them. Our competitors have solicitors on the road all the time, and they have special instructions to give the territory paralleled by interurbans their attention first of all. One of these representatives, in conversation with me, stated that he had special instructions to do everything possible to divert business from interurbans. The steam roads are strong rivals, hence it is necessary to have a good man out to keep the territory well canvassed and hold the patrons in line.

To increase the volume of business requires watchfulness, care and solicitation to foster trade and to handle it in a way that is sure to give general satisfaction. Industries must be served to the best advantage. The ideas of shippers, merchants and business community must be given consideration. The business public and a common carrier are of mutual value, and therefore all patrons are entitled to courtesy. The business must be developed, and small shippers should be accorded the same liberal treatment that is given to shippers of large tonnage. It is quite easy to secure business by cut rates or other inducements that mean a loss of revenue to the company, but this must be guarded against at all times. It should be our endeavor to improve the service on our lines and establish a standard for them of quick despatch and careful handling, free from loss and damage—a service that will commend itself to the business public in general, and one that is far superior to any like transportation offered by steam lines. To do this it is necessary that each and every employee should give the handling of the business his careful attention, and know that the same is properly cared for while in his charge.

DISCUSSION

Mr. Graston's paper was well received and elicited a vigorous discussion. A. M. Fletcher, superintendent of the freight department of the Indianapolis & Eastern Traction Company, said that it had brought out some excellent points, especially on that of classifying freight products; that the paper had been of great benefit to him, and that he was now more than ever convinced that the freight traffic men of the interurban lines should get together and agree upon a rate that would be equitable to the shipper as well as profitable to the road. He said it was not fair that household goods, by reason of their bulky nature, should be transported at the same rate as less bulky freight. The paper brought out the necessity for a more commodious equipment if all classes of bulky freight were to be solicited for carriage. He claimed that speedy transportation was a point in favor of the interurban lines. If a merchant is once disappointed in the shipment of goods, it necessitates going back to him and talking very nicely in order to get him to continue to send goods over the same line. He thought that the freight business was becoming more important every day, and in order to cultivate it properly, we must do as much for it as we do for the passenger business.

Frank D. Norveil, of the Indianapolis & Northwestern, said that the freight business was a hobby of his. It is necessary to look beyond the passenger business for an increase of earnings. We are not handling more than 5 per cent of the freight business. It is now largely confined to packages, and it costs as much to handle this almost as it would to handle more bulky freight. Carload lots of freight should be gone after more than has been done in the past. The business is confined too much to vegetables, groceries and a few high-class freight products. Mr. Norveil said that at first they attempted to conduct a freight business from the street, as many other interurban lines had done. They then built freight stations at Crawfordsville and Lebanon and equipped them for business, and from practically nothing they had secured all the freight they can handle with present facilities. There is more business coming to them every day with the increase of population and the industries, and in his judgment the interurban freight traffic is susceptible to cultivation and the companies will have to provide for its growth. We cannot expect the people that pay out their money to feel any better toward the traction lines than they do the steam lines, and especially if it does not cost them any more one way than it does the other. In 1904 the freight cars of Mr. Norveil's company made 8500 miles in October and earned $2,091.30, and in October, 1905, 9000 miles and earned $3,194.74, an increase of 35.5 per cent. Mr. Norveil advocated a freight bureau, freight sheets, etc., and a more uniform system among the interurban lines.

Mr. White, superintendent of the traffic department of the Indianapolis & Martinsville line, said he desired to speak in reference to the classification of freight as brought out in the paper. Mr. White thought it was difficult to classify such a mixed class of freight as is usually offered to interurban lines. He thought a classification would complicate the business.

Mr. Fletcher said that Greenfield was 21 miles from Indianapolis, and the steam line rate on freight was 15 cents, against 7 cents charged by the interurbans. He thought the difference entirely too great.

Mr. Norveil said that he agreed with Mr. White and Mr. Fletcher that there was no money in a 7-cent rate classification lower than for first-class freight. He thought that interurban lines were not in a position to go into too great a classification. It is a hard proposition to keep the accounts of the business. He thought it inequitable to carry a barrel of sugar on a 10-cent rate and a box of goods, occupying the same space, on a 15-cent rate. He finds it more advisable to take the 16-cent rate and the 9-cent rate and make one classification at 11 cents.

F. M. Fauvre, president of the Indianapolis & Eastern Traction Company, said it was a question that would have to be settled by the heads of departments. He thought it would be well for them to get together. Be careful not to make the mistake made by the steam lines. Take into consideration the facilities and promptness of the service. Even in case where a traction line has all the business of a certain wholesale house because of low rate and prompt service, the rate should not be placed lower than a profitable rate simply to hold the business of the house, nor should it be placed so high as to be a detriment to the shipper.

Mr. Graston, Mr. Norveil, Mr. Nichol, Mr. Henry and others spoke on the subject and cited examples and instances of inequitable classification of rates concerning the freight business as now conducted by the interurban lines. In the matter of express or package business, Mr. Norveil said that his road was taking steps to establish a delivery system in the better class of towns along their line; that their express cars were now averaging from $15 to $25 a day, which would be increased to $40 a day during the holidays. He said he thought it advisable for the interurban lines to take up the subject of establishing a system of delivery of packages in the various cities and towns along their lines.

Mr. Henry said that the author of the paper claimed that he was anxious for the time to come when interurban and steam lines should be compelled to exchange freight business. As for himself, he was in no hurry for it to come. The electric lines have about all they can do at present without exchanging with the steam lines. The electric freight business will grow of itself, and in order that the expense account thereof does not grow out of reason, it would be better to cultivate what opportunities exist rather than enter into a traffic arrangement with the steam line.

Mr. Norveil called attention to the fact that in order to enter into a traffic arrangement with steam lines it would require considerable readjustment of equipment, and he did not think the electric lines were quite ready or willing to take on that additional expense. The discussion closed with a motion that each interurban line appoint a representative from the head of its freight department to form a committee to compile a freight schedule and classification of a scale of prices for the interurban freight business.

The next paper was presented by F. D. Norveil, superintendent of the freight and baggage department of the Indianapolis & Northwestern Traction Company, on the subject: "Shall Baggage Be Carried Free?" On this subject, Mr. Norveil said:

SHALL BAGGAGE BE CARRIED FREE?

The subject of this paper is one that has been discussed informally at almost every meeting of this association, and is one that I believe can better be handled in open discussion than in a lengthy paper that, in the end, is only a theory.

Early in the current year the Northwestern, under the belief that better results and more revenue would be derived by so doing, put into effect a system of free baggage. One hundred and fifty pounds was to be carried free on tickets, the minimum price of which tickets was 25 cents. Excess baggage was to be charged for at the rate of 25 cents per 100 lbs., or fraction thereof, over the 150 lbs. allowed free. This rule, slightly modified, is still in force, but on account of the lack of weighing facilities at most places, we usually check one piece of baggage free and charge 25 cents for each additional trunk or large suit case, depending much on the judgment of the agent or employee doing the work to do justice to the company and be fair with the passenger as well. Acting on the theory that only about 4 per cent to 6 per cent of the passengers carried have baggage that required checking, I have compiled a report of the number of pieces of baggage handled in September and October of 1904, with revenue derived therefrom, and for the same months of the current year:

	Number Pieces	Amount Collected
September, 1904	1,591	$397.75
October, 1904	1,757	439.25
September, 1905	2,534	243.50
October, 1905	2,210	278.00

Taking the month of October, which shows the least odds, having 453 pieces of baggage more than the year previous, and estimating only five passengers to each trunk, we carried 2265 more passengers at an average of 50 cents per passenger, or $1,117.50, as against a loss on baggage of $161.75. We have no means of getting at the exact figures as to the increase in number of passengers carried, but as the general average is about sixteen or twenty to one piece of baggage, it would seem fair to place the increase about five to one; this low per cent I base on the idea that the increase on pieces of baggage does not come from the masses that travel, but from individuals and families who are taking advantage of this free feature, and, all things being equal, travel by electric in preference to steam.

I would here ask your permission to read an extract from the STREET RAILWAY JOURNAL, Feb. 4, 1905, page 205, part of an article on interurban baggage, and on pages 271-272, Feb. 11, 1905, part of an editorial, and a paper by F. W. Coen, of the Lake Shore Electric line, read at the meeting of the Ohio Interurban Railway Association, Feb. 11, 1905.

The mere fact that nearly all Ohio roads have adopted free baggage in some form seems to the writer as the best argument that can be advanced in its favor, and I venture an assertion that twelve months hence every electric road in the State will be handling baggage under certain conditions free. Whatever my former ideas were on the subject, I do not now believe that it was ever necessary for interurbans to make the low rates now in effect, and fully believe that, with the ordinary volume of traffic, the interurban, all things being equal, can get more than an even divide as against their steam competitor, but with good train service on the steam lines, their fast time and free baggage accommodations offered, it is business suicide to expect the public to patronize the electric line whose fare is higher and every other accommodation which is free with your competitor be charged for by you. I have heard this remark made: "I would prefer the steam line because the time is faster, seats larger, and one can put his feet on the cushion and rest, and I don't have to pay for my baggage." The more frequent train service on the electric line has its effect, of course, but where the steam road has from four to six trains in each direction daily, the additional service is only a small factor.

The above argument would have no effect with the road not paralleled by a steam road which has met the electric lines' tariff. We have nearly all adopted free baggage on interline business, and why do not the same reasons hold good for local traffic as well?

We have as yet only a few figures to produce, but they are, to my mind, very conclusive evidence that there is money in free baggage to any company that is up against a competitor who meets it on equal grounds and makes any effort to retain its former local traffic.

DISCUSSION

Mr. Norveil's paper brought out quite an animated discussion upon the general proposition as to whether baggage should be carried free. A. W. Brady said the paper was very interesting to him and treated in a very able manner an important subject. Mr. Henry said it was both an important and a vital question, and that he wished to go on record as not being in favor of carrying baggage free. He referred to the example cited in Ohio, that carried on an average one trunk to every 139 passengers. He said it was not right, in his judgment, to carry the 138 passengers without baggage at the same rate that the 139th passenger is carried, with a large trunk in addition. The companies may be driven to do it, but it is not right. It is not right, because the baggage of the one man takes more time and expense than for all the others. The kind of passengers that walk on and off the cars with no baggage to handle by the employees are the most profitable. He said he had as much respect for traveling men as he ought to have. But they were somewhat exacting and hard to please and not entitled to any more consideration than other passengers, and there was no good reason that their accompanying baggage should be carried free.

Mr. Norveil said that while he did not believe it right to carry baggage free, nevertheless he attributed the increase of business on the Indianapolis & Northwestern line to the free handling of baggage. He said he thought that, as a rule, at least three passengers followed each piece of baggage handled. He cited a case of Mrs. Jones, who telephoned him for the passenger rate to Lafayette. When advised, she asked if her trunk would be carried free. When told that it would cost her 25 cents, she replied that she would go on the steam line, where her trunk would be carried free. She said she would prefer to go on the interurban line, because Mrs. Smith and Mrs. Brown and several children were to accompany her. He said that he quickly volunteered to carry Mrs. Jones' trunk free, and secured nine passengers by so doing.

Mr. Brady said he was not an advocate of handling baggage free; that his system had all the baggage now that it can take care of, and he thought it poor business to increase the amount of baggage and decrease the receipts by an increase of the expenses required to handle free baggage. He said his system was now carrying about 5000 trunks a month, and the revenue derived was worth something, and that no line should carry baggage free unless compelled to do so by reason of competition or otherwise. He said traveling men never complain of paying a reasonable price for the transportation of their heavy baggage.

Mr. Norveil thought that the best thing for electric lines to do is to increase their fare to 2 cents a mile and then carry baggage free. This would enable them to compete successfully with steam lines when compelled to carry baggage free.

A new and important feature of the programme was that of the question box. Unfortunately, the hour for adjournment was at hand and the questions submitted could not be discussed. Mr. White, the secretary of the association, said the questions found in the question box were interesting and important, and asked that they be turned over to him to be included among the subjects treated in the next programme.

Mr. Brady thanked the association for honoring him with the vice-presidency of the association, and promised to do whatever he could to make the meetings a success and the association profitable to all its members.

A vote of thanks was unanimously tendered to Mr. Henry for the liberal and courteous manner in which he had entertained the members of the association, and also to the citizens of Rushville for their generosity and kind treatment.

The return trip to the city was made at the rate of 40 m.p.h., and all agreed that the meeting and the trip had been interesting and enjoyable.

POWER STATION FIGURES FROM THE TOLEDO, BOWLING GREEN & SOUTHERN RAILWAY COMPANY

In the Aug. 12 issue of the Street Railway Journal an extended account was published of the system and new power station of the Toledo, Bowling Green & Southern Traction Company. The station was put under steam July 20, 1905, and the figures on cost of production are interesting. The station supplies current to the Findlay Street Railway, the Toledo, Bowling Green & Southern Railway Company and the Hancock Light & Power Company, of Findlay. It also supplies hot water from its condensers for public heating.

The total switchboard output for October, 1905, was 575,000 kw-hours. The figures on cost follow:

Coal consumed 1215 tons, at $1.45 (Hocking Valley N. & S. coal)		$1,761.75
Oil—Cylinder, 70 gals., at 57 cents		39.90
Oil—Engine, 110 gals., at 23 cents		25.30
Oil—Grease		4.50
Waste		9.30
City water at 7 cents per M gals		81.30
Repairs (material)		26.75
Miscellaneous supplies		11.50
		$1,960.30
LABOR		
One engineer	$110	
Two engineers—$65	130	
Two oilers and switchboard—$55	110	
Two firemen—$50	100	
Two general help—$50	100	
	$550	
General supervision	150	
	$700	700.00
Total station costs		$2,660.30
Sub-stations—Labor		110.00
Total distribution cost		$2,770.30

$$\text{Cost of power per kw-hour } \frac{2,770.30}{575,000} = .0048$$

$$\text{Cost of fuel per kw-hour } = .0030$$

In 1903 the company's power cost with a much smaller service was in excess of $80,000, so that on its present showing the new power station and its distribution will show a net saving of nearly $50,000 per annum.

Mention of the fact has been made that the Toledo Urban & Interurban Company supplies hot-water heat to customers in Findlay. The revenue from this source pays more than one-half the entire station fuel bill.

Mr. Darrow, the constructing engineer, has also recently built a plant for the Cincinnati & Columbus Traction Company along similar lines, which is doing equally as well. He has also built three other plants during the past few years. They are producing current at the switchboard for $.0075 per kw-hour, or less, although they are all of medium size.

The Havana Central Railway, of which G. F. Greenwood is the general manager, has just secured the concession for an electric railway from Guines to Cienfuegos and from Guines to Batabano.

THE SYSTEM OF THE HUDSON COMPANIES

In the Oct. 14 issue of the Street Railway Journal an account was given of the opening on Sept. 29 of one of the tunnels between Hoboken and Morton Street of the Hudson Companies. Since that event the plans of the company for an extensive surface railway system in Jersey City and the equipment of a high-speed electric line between the present Pennsylvania Railroad terminal in Jersey City and Newark have been made public. The accompanying map shows the complete system as now decided upon.

In this map the tunnel systems under the river are indicated by heavy black lines. As will be seen, the system forms a Y-shaped line from Thirty-Third Street, Manhattan, down Sixth Avenue, across the Hudson River to Hoboken, then back from Jersey City to the corner of Cortlandt and Church Streets, with spurs on Ninth Street, Manhattan, and to the Lackawanna and Jersey Central stations on the New Jersey shore. At the Cortlandt Street station the company has secured two blocks on the west side of Church Street between Cortlandt and Fulton Streets, where two huge terminal office buildings will be erected. Contracts have already been let for this work, and all tenants have been notified that they must vacate before Dec. 1, when the work of demolition will begin. Between this terminal and Broadway, an underground passage will be built in Dey Street so that passengers from New Jersey can walk underground to the Fulton Street station of the Interborough Rapid Transit Company. The stations for the subway in New York on Sixth Avenue will all be located underneath the stations of the elevated railway.

In addition to the surface system in Hudson County, which is shown by light lines on the map, and which comprises 52 miles of track, the company will equip a high-speed line between Jersey City and Newark. For this purpose two of the existing tracks of the Pennsylvania Railroad between these cities have been secured. Under the new plans of the Pennsylvania Railroad, all its through trains will run from Newark north until the terminal of the present Thirty-Fourth Street tunnel on the Jersey side is reached, and these trains will all enter the new Pennsylvania station at Thirty-Fourth Street and Seventh Avenue. This will leave the line between Newark and Jersey City free for the operation of the electric tunnel cars of the Hudson Companies. It is proposed to run through trains by this route from Newark to Church Street, New York, in 20 minutes. As the line approaches Newark, the tracks diverge from the Pennsylvania tracks and will be depressed so as to pass under the Passaic River by tunnel. A subway is then to be constructed up Market Street to High Street and around the Court House, as indicated by the dotted line in the map.

In addition to the railway plans already described, the same interests have purchased the property of the Hackensack Meadows Company, and have organized the New Jersey Terminal Dock & Improvement Company, which will develop the now largely useless tract of the meadows between Jersey City and Newark. Here the company is planning to build a large power station to supply current to all of its railway system.

The company which is building the four tunnels is the Hudson Companies, a New York corporation with a capital of $16,000,000 preferred and $5,000,000 common. After the tunnels are completed they will be operated by the following companies:

The Hudson & Manhattan Railroad Company will operate the tunnels in New York State between the center of the river and Church Street. The Hudson & Manhattan Railway Company will operate the tunnels from the center of the river in New Jersey to the Erie Railroad station. The Hoboken & Manhattan Railway Company will operate the tunnels from the Erie station to the Delaware, Lackawanna & Western station and to the center of the river at the foot of Fifteenth Street, Jersey City. The New York & Jersey Railroad Company will operate the tunnels from the center of the river up to Thirty-Third Street, New York, and Astor Place, New York. The Hudson Street Railroad Company is the company which will build and operate the street railway system in Hudson County.

It is expected that the subway in New York and the tunnel lines will be ready for operation on Jan. 1, 1907, and that the trolley system in Jersey City and Hoboken will be completed within the following year.

As already announced, the consulting electrical engineer in charge of this work is L. B. Stillwell, who is being assisted by Hugh Hazleton.

AN EFFECTIVE STOP-GATE USED BY THE ROCKLAND, THOMASTON & CAMDEN STREET RAILWAY COMPANY

The Rockland, Thomaston & Camden Street Railway Company, of Rockland, Maine, has recently installed at steam railroad crossings on its line an electric railway stop-gate, invented by Valentin Chisholm, the superintendent of this company. This stop-gate takes the place of the derailing switch at steam

FIG. 1.—CONDUCTOR RAISING THE STOP-GATE

railroad crossings, which is not a success where there is much ice and snow. The application of this device is well shown in the two accompanying illustrations.

Fig. 1 shows the conductor in position to raise the gate in front of the car. In order to do this, he pulls downward on a spring bar, which action raises the gate. The conductor continues to hold the gate in this position until the car has crossed the track and cleared the gate under which he is standing. He then releases the spring rod, which releases and drops the gate under which he stands, leaving it in position to stop any car

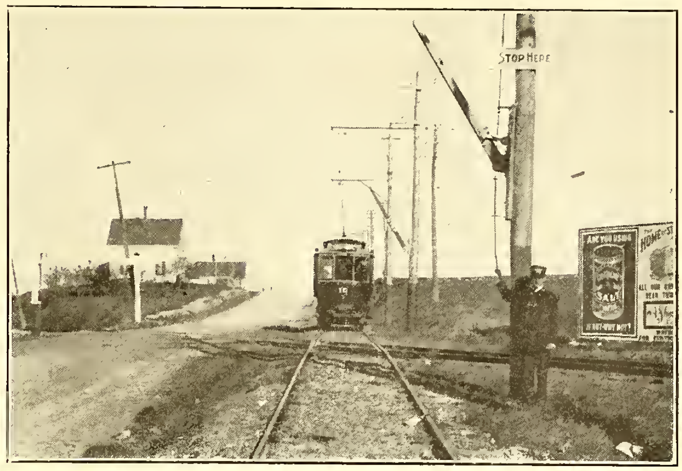


FIG. 2.—CONDUCTOR HOLDING THE STOP-GATE UP

going in the opposite direction. Fig. 2 shows the gate raised. The conductor keeps the gate in this position until the car has crossed.

The company has found that these gates will absolutely prevent a car from running over a steam railroad crossing until the conductor first has crossed the track and seen that it is clear to let his car cross.

GRAND RAPIDS, HOLLAND & CHICAGO RAILWAY RAISES FARES AND DROPS MILEAGE SYSTEM

The Grand Rapids, Holland & Chicago Railway has raised its rates of fare and will not issue mileage books. The Ohio interchangeable mileage books will also be withdrawn. The new schedule does away with fares of odd amounts and makes all multiples of five. The company gives as a reason for the change of rates that the extra work required in making change under the old system and the issuing of receipts so overburdened the conductors that they were unable to attend to their other duties properly. Tickets may be purchased at the company's offices, however, at the old rates. All fares collected on the cars will be registered.

NEW SCHEDULE ON BOSTON & WORCESTER

The Boston & Worcester Street Railway has just issued a winter schedule, made up on the same lines as those of steam roads, and containing the time of arrival and departure of all east and westbound cars at the various points reached by its lines. It also has a time schedule of the Hudson, Marlboro & Southboro branches, as well as distances, fares and running time between points on the line. On pleasant Saturday afternoons, Sundays and holidays throughout the winter a 15-minute service will be maintained from Chestnut Hill, Brookline, west to South Framingham and Worcester. During the rush hours extras will always be sent out from Chestnut Hill.

The Toledo, Bowling Green & Southern Traction Company has inaugurated limited service between Toledo and Findlay. It will have three special cars each way daily, making the 50 miles in 1 hour and 50 minutes, as compared with 2 hours and 30 minutes for regular local cars. This was made possible by the opening of the new power station, which was described in a recent issue of the Street Railway Journal.

REPORT ON PROBABLE GROSS EARNINGS AND DIVISION OF PROFITS BETWEEN THE CHICAGO STREET RAILWAY COMPANIES AND THE CITY OF CHICAGO

The following report on the probable gross earnings and division of profits between the Chicago street railway companies and the city of Chicago has just been submitted to the committee on local transportation of the Chicago City Council by Bion J. Arnold. Mr. Arnold is the expert of the committee on local transportation of the City Council of the city of Chicago, which consists of Charles Werno, chairman; Robert R. McCormick, William E. Dever, Nicholas R. Finn, Thomas Carey, Michael Zimmer, William T. Maypole, Walter J. Raymer, John J. Bradley, Milton J. Foreman, Frank I. Bennett, Thomas M. Hunter and Linn H. Young.

REPORT

Chicago, Nov. 8, 1905.

Gentlemen.—Complying with your request to confer with the engineers of the traction companies and submit for your consideration a report showing the probable earnings, from 1906 to 1925, both inclusive, of the Chicago City Railway Company, the North Chicago Street Railroad Company and the West Chicago Street Railroad Company, the two latter comprised in the Chicago Union Traction Company, together with statements and analyses thereof, showing the financial plan upon which the companies base their offer of compensation to the city in the ordinance now pending before you, I have the honor to submit the following:

In arriving at the conclusions herein contained, many conferences between the companies' engineers and myself have been held, with the result that the following premises have been agreed to and accepted by all:

1. That curve "L," plate 14, of the Arnold report of 1902,* represents the probable gross earnings of all the surface and elevated railways of Chicago during the above-mentioned period.

2. That operating expenses, including maintenance, may fairly be taken at 60 per cent of the gross earnings during the same period.

3. That the valuation of the physical property of the companies as given in column "B" of the Arnold report of 1902 are fairly made and accepted for present valuations after making due allowances for additions and depreciation since the values in that report were determined.

4. That the cost of rehabilitating the property of the Chicago City Railway Company was fairly stated in my letter of June 25, 1903, to the transportation committee, and that the amount therein stated of $16,560,077 shall now be taken, assuming that the amount of underground conduit construction therein specified will be built within five years from date; also that $10,000,000 additional will be expended by the company for extensions and additional equipment between 1911 and 1925.

5. That the average depreciation of all physical property of the companies after rehabilitation will be 5 per cent per annum.

6. That the interest rate on new money for rehabilitation purposes may be fairly taken at 5 per cent per annum.

Assuming these premises to be correct, and applying them to the property of the Chicago City Railway Company, we have the following analysis:

CHICAGO CITY RAILWAY COMPANY

Analysis of Income and Expenditures from Jan. 1, 1906, to Dec. 31, 1925

Gross Earnings—			
As derived from Curve "L," Plate 14, of Arnold Report, November, 1902..	$240,111,000		
Operating Expenses—			
Including maintenance, but not renewals, 60 per cent of gross earnings....	144,067,000		
Net earnings, 40 per cent gross earnings			$96,044,000
Deduct Depreciation Renewals—			
Based upon an annual depreciation of 5 per cent, and the assumption that 4 per cent of the value of the physical property (after rehabilitation), part of which is spent as renewals as required, and the balance put aside each year and compounded, will amount to 100 per cent, or the value of the physical property, at the end of the depreciation period:			
Previous valuation of Nov. 1, 1902, as given on page 204 of Arnold Report of 1902...........................		11,747,818	
Reconstruction and equipment added since Nov. 1, 1902.................		3,282,314	
Total		$15,030,132	
To determine the physical value of the property on Nov. 1, 1905, deduct depreciation for the three-year period from Nov. 1, 1902, as follows:			
Valuation of 1902....................		$11,747,818	
Less value of land...................		628,059	
		$11,119,759	
$11,119,759, at 5 per cent per annum for three years.....................		$1,667,963	
Installed during 1902, $471,135, at 5 per cent per annum for three years.....		70,670	
Installed during 1903, $893,539, at 5 per cent per annum for two years.......		89,354	
Installed during 1904, $198,279, at 5 per cent per annum for one year........		9,914	
Installed during 1905, $1,719,361. (No depreciation			
			$1,837,901
Total value of physical property, Nov. 1, 1905............................			$13,192,231
Cost of reconstruction as per Arnold estimate of June 23, 1903, accompany tentative ordinance, submitted Nov. 14, 1903 (copy hereto attached).....			16,560,077
Estimated cost of additional equipment and extensions needed during fifteen years from end of construction period, or from Jan. 1, 1911, to Dec. 31, 1925, amounting to $10,000,000, or an average of $666,667 per year. The cost of the renewals on the additional investment of $10,000,000, at 4 per cent for a period of fifteen years, equals $3,200,000. This amount distributed over twenty years is equivalent to an annual renewal cost of $160,000, which is equal to 4 per cent on..........................			4,000,000
			$33,752,308
4 per cent on $33,752,308 equals $1,350,050, this being the average renewal costs for one year; 80 per cent of $33,752,308, equals the total renewal cost for the twenty years...........			$27,001,000
Net earnings, less renewals..........			$69,043,000
Deductions—			
Taxes on real and personal property, not including capital stock or franchise tax, estimated for twenty years at an average of 3 per cent of gross earnings (present tax 2 per cent of gross earnings, with physical property of the value of $13,192,231)....		$7,203,000	
Interest on cost of reconstruction, 5 per cent for seventeen years on $16,560,077		14,076,000	
Interest on $10,000,000, cost of additional equipment and extensions expended from Jan. 1, 1911, to December 31, 1925, at an average of $666,667 per year, at 5 per cent..........		4,000,000	

* See Street Railway Journal for January 17, 1903, page 117.

Sinking fund payments to provide for extinguishment by 1925 of value of present franchise and ordinance rights, which is the difference between present total value of the property and the present physical value of $13,192,231. The company claims the present total value to be the market value of its stock at time control was purchased by present owners, plus its then indebtedness, or approximately, $38,000,000. On this basis the present franchise value would be $24,807,769, or, approximately, $25,000,000, which would require for twenty years an annual payment to a sinking fund, compounding annually at 5 per cent, of $750,000, or a total for the twenty-year period of....................		15,005,000	
Dividends on present total value of property as claimed by the company at 1.437 per cent for twenty years on $38,000,000, would be..............		10,923,000	
Compensation to city of Chicago as proposed by the company:			
3 per cent for three years on $24,165,000 of gross earnings	$725,000		
5 per cent for two years on $18,090,000 of gross earnings	904,000		
7 per cent for ten years on $119,286,000 of gross earnings	8,350,000		
10 per cent for five years on $78,570,000 of gross earnings	7,857,000	17,836,000	
Average, 7.428 per cent for twenty years on $240,111,000		$69,043,000	
Total deductions			$69,043,000
Balance..................			nil

SUMMARY

From the above it will be seen that the company, on the basis set forth, would earn a sufficient amount during the twenty-year period to retire its present assumed franchise value of $25,000,000, and in addition pay an annual dividend of 1.437 per cent on the combined value of this franchise and the value of the present physical property.

If it be assumed that the above franchise value is correct and that the rates of compensation to the city are fixed as above, and that the amounts above stipulated to be put into the property are put into the property, it will be seen that there are but three ways in which the above dividend of 1.437 per cent per annum can be increased, namely:

1. By the increase of the gross earnings;
2. By decreasing the operating expenses;
3. By borrowing reconstruction, extension and new equipment money at a lower rate than 5 per cent.

For each 1 per cent of decrease in operating expenses, the above interest rate on a valuation of the total property of $38,000,000 would be increased by 0.31593 per cent. To produce an annual income of 4 per cent on the $38,000,000 would necessitate operating for 51.8375 per cent of the gross receipts, a figure not probably attainable.

By borrowing reconstruction, extension and new equipment money at 4 per cent instead of 5 per cent, the annual dividend rate on the $38,000,000 would be increased by 0.4757 per cent, or from 1.437 per cent to 1.9127 per cent.

On the other hand, if the company should fail to realize 5 per cent on its sinking fund payments, then for each successive 1 per cent decrease below 5 per cent, the annual dividend rate on the $38,000,000 would decrease by 0.21799 per cent, 0.2372 per cent and 0.2573 per cent, respectively; if 4 per cent only were realized on the sinking fund payments instead of the 5 per cent taken in the above statement, the annual dividend rate would be decreased by 0.21799 per cent, or from 1.437 per cent to 1.219 per cent; if 3 per cent only were realized, the annual dividend rate would be further decreased by 0.2372 per cent, or to 0.9818 per cent.

If the gross earnings of $240,111,000 for the twenty-year period should not be realized and the operating expenses remained at 60 per cent, then for each 1 per cent those earnings fell below the $240,111,000, the annual dividend rate on the $38,000,000 would fall by 0.126 per cent. A decrease of 11.4 per cent in the gross earnings—that is, a decrease from $240,111,000 to $212,738,000—would reduce this dividend rate to zero.

TOTAL REVENUE REALIZED BY THE PUBLIC FROM THE CHICAGO CITY RAILWAY COMPANY

Those parts of the expenditures in the above statement, composing a direct return by the company to the public in cash or its equivalent, during the twenty years covered by the proposed ordinance, are as follows:

1. Taxes, not including capital stock tax, 3 per cent of gross earnings	$7,203,000
2. Compensation to city of Chicago, 0.7428 per cent of gross earnings	17,836,000
3. Street sprinkling, street cleaning, track elevation and viaducts (these items amounted in the years 1895 to 1904 to $622,856, or 1.1 per cent of gross earnings for that period) 1.1 per cent of gross earnings....	2,641,000
4. Paving and renewals of paving included in reconstruction and renewals (these items amounted in the years 1895 to 1904 to $1,622,950, or 2.9 per cent of the gross earnings for that period), 2.9 per cent of gross earnings..............................	6,963,000
Total direct revenue to public, 14.428 per cent of gross earnings	$34,643,000

If the above assumed franchise value of $25,000,000 be reduced, then for each million reduction the amount of annual sinking fund necessary to retire the franchise value will be reduced by $30,242, and this sum applied to the dividend earnings on the new total value of the property would increase the annual dividend to the rates shown in Table I., which are obtained by adding $30,242 for each million deducted, to the original annual dividend of $546,150 and dividing the sum by the original valuation of $38,000,000, less the number of dollars deducted from the original assumed franchise value of $25,000,000. The resulting annual dividend rates would be as follows:

TABLE I.

Franchise Value	Corresponding Value of Entire Property	Resulting Annual Dividend Rate, %
$25,000,000	$38,000,000	1.437
24,000,000	37,000,000	1.557
23,000,000	36,000,000	1.685
22,000,000	35,000,000	1.819
21,000,000	34,000,000	1.962
20,000,000	33,000,000	2.113
19,000,000	32,000,000	2.274
18,000,000	31,000,000	2.444
17,000,000	30,000,000	2.627
16,000,000	29,000,000	2.822
15,000,000	28,000,000	3.030
14,000,000	27,000,000	3.255
13,000,000	26,000,000	3.496
12,000,000	25,000,000	3.757
11,000,000	24,000,000	4.040
10,000,000	23,000,000	4.347
9,000,000	22,000,000	4.682
8,000,000	21,000,000	5.049
7,000,000	20,000,000	5.452
6,000,000	19,000,000	5.898
5,000,000	18,000,000	6.394
4,000,000	17,000,000	6.948
3,000,000	16,000,000	7.571
2,000,000	15,000,000	8.278
1,000,000	14,000,000	9.085
nil	13,000,000	10.016

TABLE II.

Year	Total Gross Receipts of all Surface and Elevated Railroads of Chicago Taken from Curve "L"	Curve "V" Gross Receipts C. C. Ry. Co. 27% of Curve "L"	Curve "W" Gross Receipts W.C.S.R.R.Co. 22.23% of Curve "L"	Curve "X' Gross Receipts N.C.S.R.R.Co. 12.24% of Curve "L"
1906 ...	$28,500,000	$7,695,000	$6,342,000	$3,490,000
1907 ...	29,800,000	8,046,000	6,631,000	3,650,000
1908 ...	31,200,000	8,424,000	6,943,000	3,821,000
1909 ...	32,700,000	8,829,000	7,277,000	4,005,000
1910 ...	34,300,000	9,261,000	7,633,000	4,201,000
1911 ...	36,000,000	9,720,000	8,011,000	4,409,000
1912 ...	37,800,000	10,260,000	8,411,000	4,630,000
1913 ...	39,600,000	10,692,000	8,812,000	4,850,000
1914 ...	41,400,000	11,178,000	9,213,000	5,070,000
1915 ...	43,200,000	11,664,000	9,613,000	5,291,000
1916 ...	45,000,000	12,150,000	10,014,000	5,511,000
1917 ...	46,800,000	12,635,000	10,414,000	5,732,000
1918 ...	48,700,000	13,149,000	10,837,000	5,965,000
1919 ...	50,600,000	13,662,000	11,260,000	6,197,000
1920 ...	52,500,000	14,175,000	11,682,000	6,430,000
1921 ...	54,400,000	14,688,000	12,105,000	6,663,000
1922 ...	56,300,000	15,201,000	12,528,000	6,896,000
1923 ...	58,200,000	15,714,000	12,951,000	7,128,000
1924 ...	60,100,000	16,227,000	13,373,000	7,361,000
1925 ...	62,000,000	16,740,000	13,797,000	7,593,000
Totals .	$869,100,000	$240,111,000	$197,847,000	$108,893,000

Owing to the large amount of detail work required to check the estimates given me by the companies on the cost of rehabilitating the properties of the North Chicago and West Chicago Street Railroad companies, it has been impossible for me to prepart complete statements regarding them in the limited time that has elapsed since being requested by you to report upon this subject. I am able to fully report upon the Chicago City Railway because of the fact that the cost of rehabilitating its property was established by me two years ago when the first tentative ordinance was under consideration.

Since it is not probable that a close analysis of the properties of the North and West Side companies, comprised in the Union Traction Company, would show a more favorable condition, and as these companies offer to pay to the city the same rate of compensation offered by the Chicago City Railway Company, in case franchises are granted, it would not seem necessary to prepare fuller detailed statements unless other questions arise.

In order, however, to show the total gross receipts the companies will probably earn and the resulting revenue to the city therefrom, I have prepared "plate 16," showing gross passenger earnings of all the roads, and Table II. shows the results obtained by reading the curves on the plate. From Table II. has been deduced the results shown in Table III. The results of the analysis of the properties of the Chicago City Railway Company are shown in Table IV.

TABLE III.

Year	Total Yearly Gross Receipts C. C. Ry. Co. N. C. S. R.R. Co. W. C. S. R.R. Co.	Per Cent. Gross Receipts to City	Yearly Compensation to City Including Franchise Tax and License Fees Mentioned in Ordinance	Amount of Compensation to City at end of any Year if Yearly Compensation is Paid into a Fund and Compounded Annually at 4%
1906....	$17,527,000	3	$525,810	$525,810
1907....	18,327,000	3	549,810	1,096,652
1908....	19,188,000	3	575,640	1,716,158
1909....	20,111,000	5	1,005,550	2,790,354
1910....	21,095,000	5	1,054,750	3,956,718
1911....	22,140,000	7	1,549,800	5,664,787
1912....	23,301,000	7	1,631,070	7,522,448
1913....	24,354,000	7	1,704,780	9,528,126
1914....	26,461,000	7	1,782,270	11,691,521
1915....	26,675,000	7	1,859,760	14,018,942
1916....	27,675,000	7	1,937,250	16,516,950
1917....	28,782,000	7	2,014,740	19,192,368
1918....	29,951,000	7	2,096,570	22,056,633
1919....	31,119,000	7	2,178,330	25,117,228
1920....	32,287,000	7	2,260,090	28,382,007
1921....	33,456,000	10	3,345,600	32,862,887
1922....	34,625,000	10	3,462,500	37,639,903
1923....	35,793,000	10	3,579,300	42,724,799
1924....	36,961,000	10	3,696,100	48,129,891
1925....	36,130,000	10	3,813,000	53,868,087
Total..	$546,851,000	Av. 7.428%	$40,622,720	

The last column shows the amounts of money which the city will derive from the railway properties, provided the assumed gross earnings are realized, and the money is applied to a sinking fund and compounded annually at 4 per cent. This money could be applied at any time to the purchase of the railway properties.

I desire to call attention to the fact that I do not understand it to be a part of my duty to express an opinion upon the correctness or incorrectness of the assumed franchise value or rates of compensation to the city given in this report, for it has been necessary for me to assume these, as stated, as conditions precedent to my analysis. I have, however, endeavored to discuss the effect upon the results in case other assumed quantities which I have been instrumental in establishing should vary, and also to show how a reduction in franchise value would affect them.

In concluding, I also wish to direct your attention to the necessity of formulating, before final conclusions are reached, some practicable plan for insuring the city that whatever amount of money is finally agreed upon, to be put into properties for rehabilitation and renewals by the companies, will actually be expended upon the properties in the manner agreed upon, in order to insure the quality of service and maintain the properties at the high standard of efficiency which it is assumed such investment will give.

COPY OF LETTER ACCOMPANYING TENTATIVE ORDINANCE SUBMITTED BY SUB-COMMITTEE NOV. 14, 1903

Chicago, June 25, 1903.

Frank I. Bennett, Esq., Chairman, Committee on Local Transportation, Chicago City Council, Chicago.

Dear Sir.—Answering the question asked by your committee this morning of me relating to the comparative costs submitted by the Chicago City Railway Company for the reconstruction of certain portions of its lines, to comply, as far as quality of construction is concerned, with the general recommendations made in my report submitted to you Nov. 19, 1902, I reply as follows:

The basis outlined by you for the comparison of figures was that the tracks of the Chicago City Railway Company would be equipped with underground conduit construction on the following streets:

1. Double track on Clark Street from Twelfth Street north to Madison Street; then single-track construction north on Clark Street to Washington Street; thence east on Washington Street to State Street; south on State Street to Madison Street; thence west on Madison Street to Clark Street, where it joins the double-track construction. This total is equivalent to 2.45 miles of single track.

2. Double-track construction on State Street from Twenty-Second Street to Madison Street; then single track north to Lake Street; thence east on Lake to Wabash Avenue; thence south on Wabash Avenue to Madison Street; thence west on Madison Street to State Street, where it joins the double track previously mentioned, consisting of the equivalent of 4.73 miles of single track.

3. Double-track construction on Wabash Avenue from Twenty-Second Street north to Madison Street; thence single track north on Wabash Avenue to Randolph Street; thence east on Randolph Street to Michigan Avenue; thence south on Michigan Avenue to Madison Street; thence west on Madison Street to Wabash Avenue, where it joins the double track previously mentioned, consisting of the equivalent of 4.58 miles of single track.

It will be noticed that this practically makes double-track construction between Madison Street and Randolph Street on Wabash Avenue, and between Madison Street and Washington Street on State Street, owing to the tracks of the various loop systems paralleling each other on these streets, and that the total underground conduit work amounts to 11.76 miles.

I understand that you desire to know what the total cost would be to the Chicago City Railway Company to reconstruct and improve its present system to such an extent that it would comply with the character of construction stipulated in my report, so that the lines thus equipped would be capable of giving the quality of service called for by my report, so far as such service could be given on the above described lines, when not operated as a part of a combined or unified system as originally outlined by me.

In order to arrive at this figure I have made a careful comparison of figures submitted to me by the Chicago City Railway's engineers and my own, and submit them herewith, as follows, in parallel columns:

ESTIMATE OF CHICAGO CITY RAILROAD

	C. C.	B. J. A.
Track—		
11.76 miles underground single-track construction—		
$113,416. C. C.	$1,333,701.60	
$100,000. B. J. A. estimate J*		$1,176,000.00
11.76 miles paving at $18,400, as per estimate H	216,384.00	210,384.00
24.96 miles of single-track cable track to be rebuilt as electric track, and paved with dressed granite, as per estimate I,* at $42,365.01	1,057,430.55	1,057,430.55
12.48 miles of double-track overhead construction at $8,100 for above, as per estimate G*	101,088.37	101,088.37
1.5 miles of single track (¾ mile of double track) on Clark Street, from Archer Avenue to Twelfth Street, to be rebuilt and paved at once, at $42,365.01	63,547.51	63,547.51
Total track	$2,722,152.03	$2,614,450.43
Power House—		
40,000 kw at $110	$4,440,000.00	$4,440,000.00
Power house site	135,585.00	135,585.00
Sub-station—		
80,000 kw at $40	3,200,000.00	3,200,000.00
Sub-station sites	125,000.00	25,000.00
Feeders and Conduits—		
210 miles at $9,524. C. C.	2,000,000.00	
210 miles at $5,500. B. J. A.		1,155,000.00
Total power house, etc.	$9,900,585.00	$8,955,585.00
Car Shops and Machinery—		
Including sites	$450,000.00	$458,245.00
Car houses and sites	750,000.00	960,000.00
Office building	160,000.00	133,333.00
Total buildings, etc.	$1,360,000.00	$1,551,578.00
Cars—		
682 47-ft. double-truck 4-motor cars, complete, at $6,000	4,009,200.00	4,009,200.00
Other rolling stock, snow plows and sweepers	150,000.00	171,600.00
	$4,159,200.00	$4,180,800.00

* These estimates were in the original report. See STREET RAILWAY JOURNAL, Jan. 24, 1903.

From the above figures should be deducted the market value of the obsolete property which the company could sell or dispose of, as follows:

From sale of old cable track material—		
9.31 miles single track in conduit district at $3,000 per mile per estimate J of original report	$27,300.00	
24.96 miles of single track outside of conduit district at $3,000 per mile, per estimate J	74,880.00	
2.45 miles of old rail to be taken up on Clark Street between Twelfth Street and Archer Avenue—200 tons at $11 per ton	2,200.00	
		$104,380.00

From utilization of old cable plants and sale of machinery and equipment now contained therein, as per valuation estimate No. 1, original report—

TABLE IV.—SPECIAL ANALYSIS COVERING THE PROPOSITION OF THE CHICAGO CITY RAILWAY COMPANY

(Col. 1) Year	(Col. 2) Yearly Gross Receipts Chicago City Ry. Co.	(Col. 3) Per Cent Gross Receipts to City	Distribution of Yearly Expense: (Col. 4) Operating Expense including Maintenance, but not Taxes, Depreciation or Renewals—60%	(Col. 5) Depreciation put into Property or Paid into Fund.	(Col. 6) Taxes on Real and Personal Property, not Including Corporation or Franchise Tax.	(Col. 7) Total Expenses (Cols. 4+5+6)	(Col. 8) Net Balance (Col. 2—Col. 7)	(Col. 9) Compensation to City including Franchise Tax and License Fees Mentioned in Ordinance.	(Col. 10) Balance to Company for Interest on Present Physica Value and Cost of Reconstruction, Extension and Additional Equipment (Col. 8—Col. 9)
1906....	$7,695,000	3	$4,617,000	$1,190,092	$230,850	$6,037,942	$1,657,058	$230,850	$1,426,208
1907....	8,046,000	3	4,827,600	1,190,092	241,380	6,259,072	1,786,928	241,380	1,545,548
1908....	8,424,000	3	5,054,400	1,190,093	252,720	6,497,213	1,926,787	252,720	1,674,067
1909....	8,829,000	5	5,297,400	1,190,092	264,870	6,752,362	2,076,638	441,450	1,635,188
1910....	9,261,000	5	5,556,600	1,190,092	277,830	7,024,522	2,236,478	463,050	1,773,428
1911....	9,720,000	7	5,832,000	1,216,759	291,600	7,340,359	2,379,641	680,400	1,699,241
1912....	10,260,000	7	6,156,000	1,243,426	307,800	7,707,226	2,552,774	718,200	1,834,574
1913....	10,692,000	7	6,415,200	1,270,092	320,760	8,006,052	2,685,948	748,440	1,937,508
1914....	11,178,000	7	6,706,800	1,296,759	335,340	8,338,899	2,839,101	782,460	2 056,641
1915....	11,664,000	7	6,998,400	1,323,426	349,920	8,671,746	2,992,254	816,480	2,175,774
1916....	12,150,000	7	7,290,000	1,350,092	364,500	9,004,592	3,145,408	850,500	2,294,908
1917....	12,636,000	7	7,581,600	1,376,759	379,080	9,337,439	3,298,561	884,520	2,414,041
1918....	13,149,000	7	7,889,400	1,403,426	394,470	9,687,296	3,461,704	920,430	2,541,274
1919....	13,662,000	7	8,197,200	1,430,092	409,860	10,037,152	3,624,848	956,340	2,668,508
1920....	14,175,000	7	8,505,000	1,456,759	425,250	10,387,009	3,787,991	992,250	2,795,741
1921....	14,688,000	10	8,812,800	1,483,426	440,640	10,736,866	3,951,134	1,468,800	2,482,334
1922....	15,201,000	10	9,120,600	1,510,092	456,030	11,086,722	4,114,278	1,520,100	2,594,178
1923....	15,714,000	10	9,428,400	1,536,759	471,420	11,436,579	4,277,421	1,571,400	2,706,021
1924....	16,227,000	10	9,736,200	1,563,426	486,810	11,786,436	4,440,564	1,622,700	2,817,864
1925....	16,740,000	10	10,044,000	1,590,092	502,200	12,136,292	4,603,708	1,674,000	2,929,708
Total	$240,111,000		$144,066,600	$27,001,846	$7,203,330	$178,271,776	$61,839,224	$17,836,470	$44,002,754
Even figures used in analysis	$240,111,000		$144,067,000	$27,001,000	$7,203,000	$178,271,000	$61,840,000	$17,836,000	$44,004,000

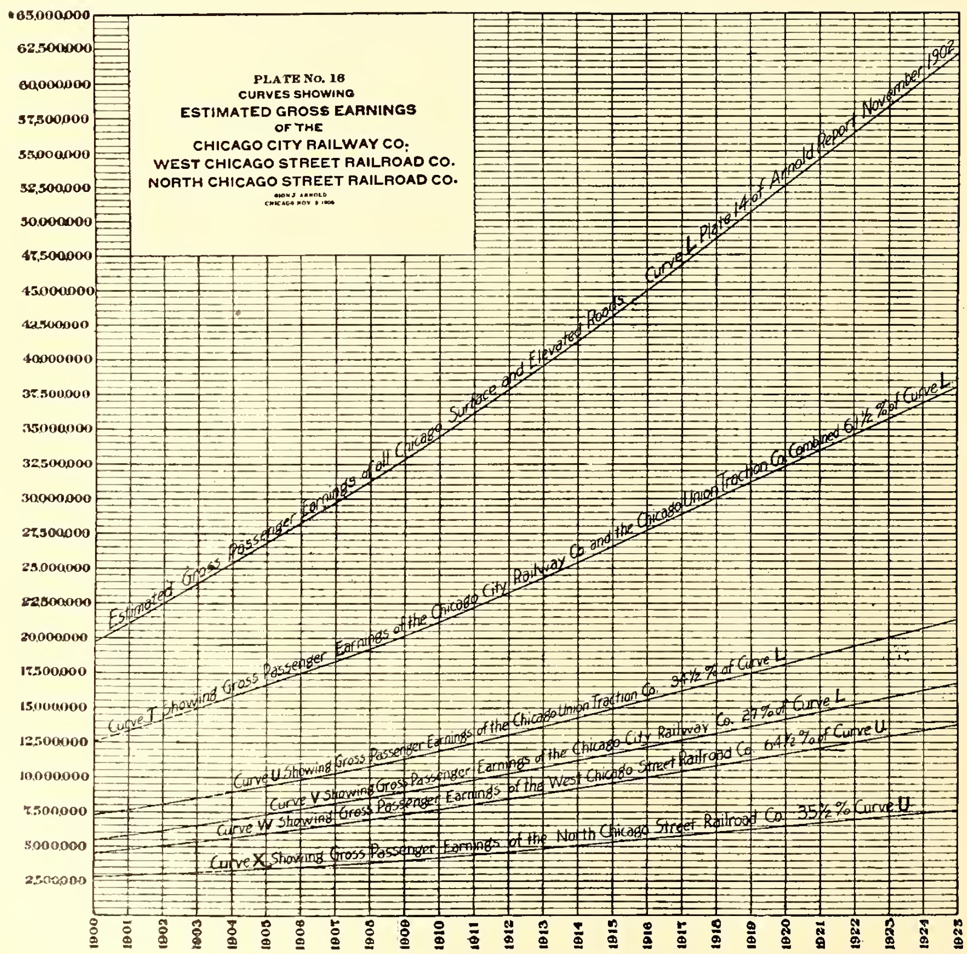
NOTE—By dividing the amount given in Column 10, for any year, by the total cash investment at that time (as outlined in the analysis on Page 5) the exact interest upon the money then invested in physical property can be obtained. The everage interest upon the actual cash investment, during the 20-year period is, by this method. found to be approximately 6.92% per annum. In this calculation no franchise value has been allowed.

Buildings, etc.	$70,274.00	
Machinery, etc.	97,362.00	
		167,636.00
From sale of such portions of the equipment of the present electric power plant as would be obsolete		316,050.00
From sale of rolling stock—		
Electric	$84,920.00	
Cable	26,900.00	
		111,820.00
From sale of such material now in Twenty-First Street power plant as would not be required		42,450.00
Total salvage		$742,336.00

RECAPITULATION

	C. C. Ry.	B. J. A.
Track	$2,772,152.03	$2,614,450.43
Power house, sub-stations, etc., feeders and conduits	9,900,585.00	8,955,585.00
Buildings, barns, etc.	1,360,000.00	1,551,578.00
Rolling stock	4,159,200.00	4,180,800.00
	$18,191,937.03	$17,302,413.43
Less salvage	742,336.00	742,336.00
	$17,449,601.03	$16,560,077.43

From these figures it will be seen that the estimate of the railway company is about 6 per cent higher than mine, and this is largely due to the fact that the distribution system, when designed to fit the specific case of the Chicago City Railway Company, and operated from its power house, located as contemplated, becomes more expensive than the proportionate amount of this distribution system would be for a complete unified system, and from the further fact that this company has figured upon placing its entire feeder system in underground conduits. Furthermore, the Chicago City Railway Company contemplates in some instances, such as for the underground conduit construction in the downtown district, somewhat better construction than called for by my report, and also contemplates constructing additional buildings, etc., which were not required by me, but which the officials of this company believe necessary owing to their having to reconstruct and operate their property as an independent property, the proportionate expense of which need not be so great if the entire surface railway properties of the city were combined under one ownership.

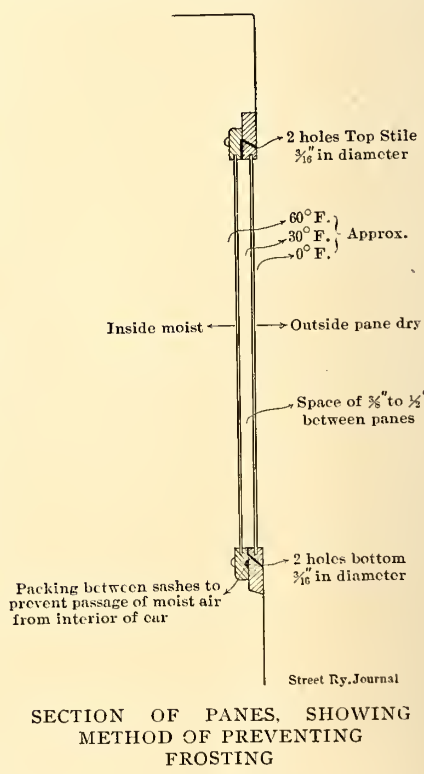


While the cost of the underground conduit construction in the downtown district and the feeder and outside conduit system as planned by the Chicago City Railway Company might equal the cost figured by them, I am of the opinion that the entire installation as herein outlined can be installed for the net figure given by me, viz., $16,560,077.43, for I believe that when the railroad company gets to actually purchasing its apparatus it can save sufficiently on some things to make up the additional cost of such parts as they have figured higher than I have. Respectfully submitted,

(Signed) BION J. ARNOLD,
Consulting Electrical Engineer.

MONTREAL STREET RAILWAY COMPANY'S METHOD TO PREVENT VESTIBULE WINDOWS FROM FREEZING OVER

The Montreal Street Railway has adopted an ingenious arrangement of double glass for the front vestibule windows in all its cars operated during the winter months in order to prevent the window from becoming coated with frost or ice and thus obstructing the motorman's view. The scheme, which is the suggestion of D. E. Blair, superintendent of rolling stock, consists of putting two panes of glass in each window with an air space of from ⅜ in. to ½ in. between the two. The inner pane is set in rubber weather strips, so that it is air tight all around the sash. The air space between the two glasses is connected with the outside air by two small holes bored through the sashes, top and bottom, as shown in the sketch, and the cold air from the outside is free to circulate through these holes between the two surfaces of glass.



SECTION OF PANES, SHOWING METHOD OF PREVENTING FROSTING

With this arrangement of windows it has been found that no ice or frosting will form on either pane, no matter what the temperature outside or inside the car may be, except possibly a little frost may sometimes accumulate at the top or bottom of the glass near the ventilation holes, where it does not obstruct the view and does no harm. The explanation is that the warm, moist air from the inside of the car cannot penetrate into the air space between the two panes, and by reason of the ventilating holes, the cold dry air from the inside will fill up this air space, but at considerably reduced temperature. From tests that have been made it has been found that with the inside of the car at 60 degs. F. and zero temperature outside, the air between the two panes will remain at about 30 degs. F., so that neither pane will freeze.

FIREPROOF OIL FOR BEARINGS

An effort is now being made to introduce an oil among electric railway companies which has been fairly well known among steam railroads for the past nine years, and which has certain remarkable qualities which make it non-volatilizing under the high temperature of heated journal bearings. The Champion Oil Company, of Chicago, which makes this "hot-box oil," has the testimony of dozens of steam railroad men as to its efficiency in cooling down journals which have already become hot, no water being used on the journal, but the box being simply filled with the fireproof oil and the waste stirred up. The manufacturing company believes that an oil which has made such excellent record on steam railroads will prove valuable to electric railways on all classes of car and motor journals. While it is a cure for hot boxes, it is preferably used as the regular lubricant without waiting for journals to become hot. It is a rather thick oil, although it does not gum, and consequently does not escape out of a bearing as readily as thin oils. It seems to have the quality of tenacity to the bearing surfaces, although a film of it between the journal and bearing forms an excellent lubrication, as is proven by its performance in cooling down boxes which have already began to run hot.

The municipality of Berlin has voted to build an underground railroad from the north to the south of the city.

RAPID TRACK LAYING ON THE FORT WAYNE & WABASH VALLEY

The L. E. Myers Company, of Chicago, has a contract for the construction of the line of the Fort Wayne & Wabash Valley

FIG. 1.—SHOWING THE GRADER PLOWING AND THEN ELEVATING THE DIRT INTO THE WAGON ALONGSIDE

FIG. 2.—STEAM GRADER AT WORK ON THE LINE OF THE FORT WAYNE & WABASH VALLEY TRACTION COMPANY

FIG. 3.—TRAIN OF CARS USED FOR THE TRACK-LAYING OPERATIONS ON THE FORT WAYNE & WABASH VALLEY TRACTION COMPANY

Traction Company between Fort Wayne and Bluffton, Ind., and some very rapid track laying work is being performed there with the aid of improved machinery. The company has a large amount of such machinery for rapid construction work. Construction work is also being pushed between Lima and Toledo. Fig. 1 shows one of the first stages of grading. This is a Port Huron steam grader. A traction engine is attached to the grader. The grader plows and elevates the dirt into a wagon driving along the side. As soon as one wagon is full, the following wagon comes up to take the discharge. Another steam grader designed by the company is shown at work in Fig. 2.

The next stage in construction is shown in Figs. 3 and 4. This is a Holman track-laying machine in operation. With this machine about 6000 ft. of track are being laid per day. The best record for a short time was 3000 ft. of track in three

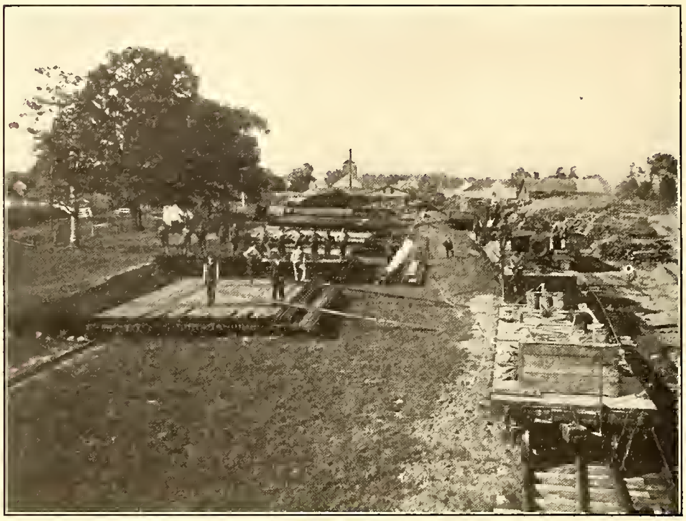


FIG. 5.—STORAGE YARD FOR TIES AND RAILS, USED IN THE BUILDING OF THE FORT WAYNE & WABASH VALLEY RY.

hours. The track-laying outfit has two troughs running the full length of the train of flat cars; these cars being loaded with rails and tiles. Each trough is provided with an endless chain conveyor. In one trough ties are conveyed and deposited at the end of the train, Fig. 4. These ties are deposited at right angles to the track and have only to be slipped backward or forward to proper position by the workmen. For every fifteen ties discharged by the machine, the endless chain on the other side discharges a rail, which is immediately slipped in place.

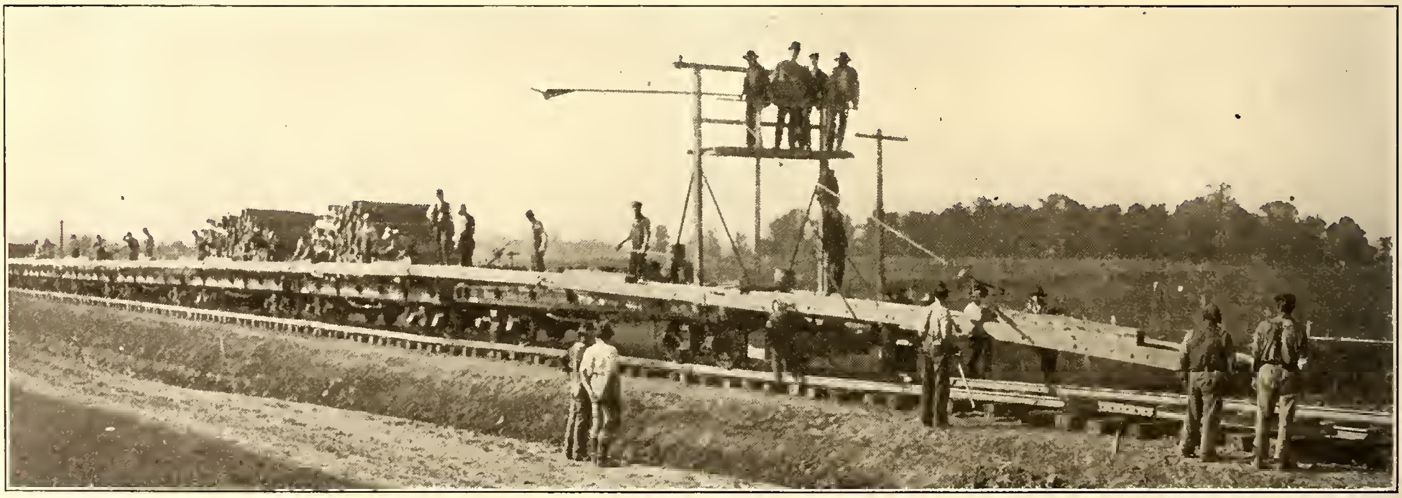


FIG. 4.—THE TRACK-LAYING APPARATUS AT WORK PLACING ABOUT 6000 FT. DAILY

Each rail has a pair of angle bars bolted on one end loosely, so that the next rail can be slipped between the angle bars and a single bolt put in to hold the joint temporarily. As fast as the rail is down, the train advances without waiting for the rails to be spiked. The wheels of the train spread the rails to proper gage, and they are prevented from spreading beyond the gage by track bars, which are removed after the spikes are driven.

Fig. 5 shows one of the storage yards used by the company for storing track material. When required in the work, the ties and rails are loaded on to the track-laying trains, which have just been described.

EQUIPMENT FOR NEW LINK OF ILLINOIS TRACTION SYSTEM

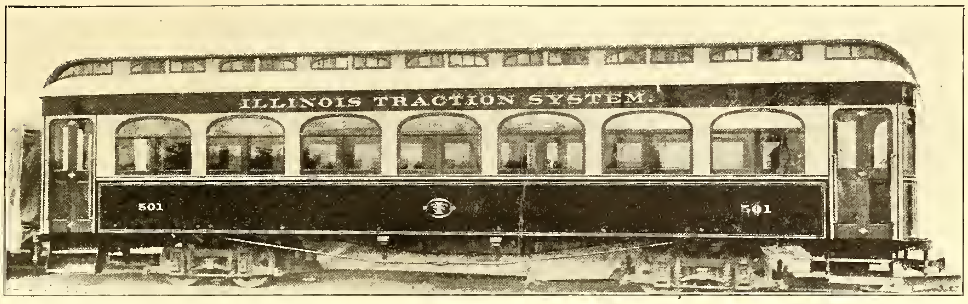
The Illinois Traction System has recently received from the American Car Company six large motor semi-convertible cars

INTERIOR OF THE TRAILER CAR FOR THE ILLINOIS TRACTION SYSTEM

of the Brill type as shown in the accompanying view, which was taken just as the cars were leaving the works for Springfield on their own wheels. There were also two large trailer cars, one of which is illustrated. The picture shows the car on a pair of short base trucks on which it was temporarily mounted to be photographed. The trucks on which the cars were shipped were the Brill No. 420 type. The American Car Company has furnished a large number of cars to the Illinois Traction System during the last three years, both for city and interurban service, articles on which have been published by the STREET RAILWAY JOURNAL from time to time. The cars are for operation on the new link of the system between Riverton, 30 miles east of Springfield, and Auburn, 40 miles south. When completed the line will cross the center of the State in a southwesterly direction from Danville to St. Louis, and the entire system will embrace about 250 miles.

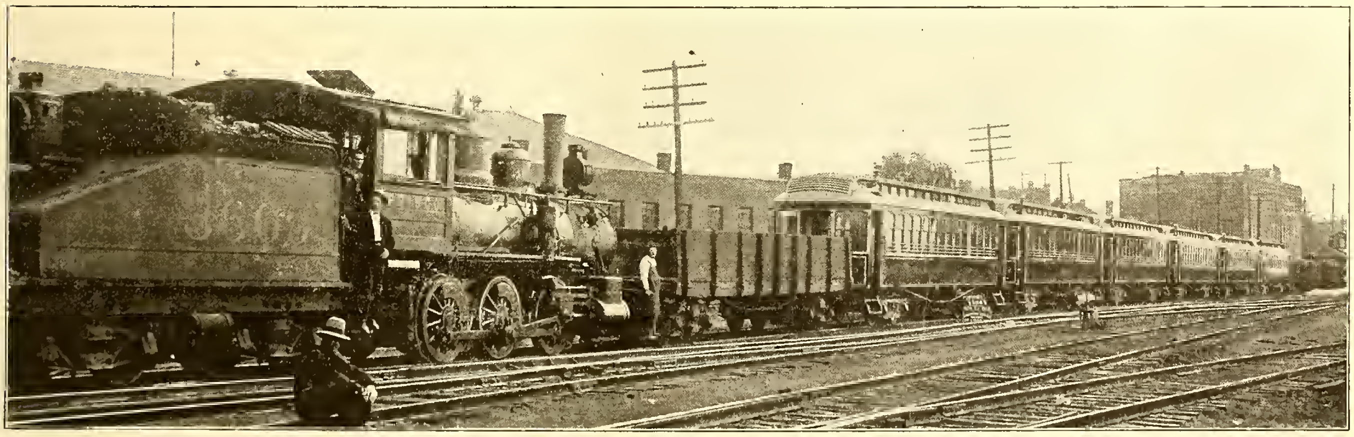
The semi-convertible cars measure 39 ft. 8 ins. over the bodies and 49 ft. 8 ins. over the vestibules. The cars are divided into two compartments, the main compartment occupying the space of ten windows and the smoking compartment four windows. The total seating capacity is fifty-two. The seats in both compartments are of the Brill manufacture, with tilting cushions and push-over backs. A saloon of standard character is located at the end next the vestibule door of the main compartment. The interiors are finished in golden oak, with ceilings of the same. The window sashes are double and arranged to slide into pockets in the roof; the lower sash automatically engages the upper in being raised, and both are pushed up into the pocket with one operation. The bottom framing includes I-beam center sills and 4¾-in. x 7¾-in. yellow pine side sills, plated on the inside with 12-in. x ⅜-in. steel; the white oak end sills are 4 ins. x 7¾ ins. The corner posts are 3¾ ins. thick, and the side posts, 3¼ ins. All three sashes of the vestibules are arranged to drop into pockets, and the folding doors have automatic controllers.

The trailer cars are 38 ft. 8 ins. over the bodies and 48 ft. 1 in. over the vestibules; width over the side sheathing, 8 ft. 10 ins. They are generally similar to those built by the American Car Company for the Champaign division of the Illinois Traction System, except that they are without the baggage compartment. The interiors are handsomely finished, as the illustration shows, in semi-empire style, with the lights placed on the deck rafters, the woodwork consisting of mahogany neatly inlaid. There are seven double Pullman style windows on each side of the cars, the upper parts of which are glazed with opalescent glass, and the lower sashes are arranged to raise about 22 ins. above the arm-rail. The bottom framing consists of six sills, the side sills being of long leaf yellow pine, 5 ins. x 7¾ ins. and 2 ins. x 6 ins., with a 7-in. x ⅝-in. plate bolted between, bent at the ends at right angles and securely bolted at the end sills. The cars are seated for fifty-two passengers. The seats are 37 ins. in length and are upholstered in leather; the backs of the seats are stationary.



THE STANDARD TYPE OF CAR USED BY THE ILLINOIS TRACTION SYSTEM FOR INTERURBAN SERVICE


INTERIOR OF THE SEMI-CONVERTIBLE MOTOR CAR FOR THE ILLINOIS TRACTION SYSTEM, SHOWING THE RATTAN CROSS SEATS, POSITION OF THE HEATER, ETC.


A TRAIN OF NEW CARS FOR THE ILLINOIS TRACTION SYSTEM LEAVING THE CAR WORKS ON THEIR OWN TRUCKS

INDIANA ELECTRIC TRACTION MILEAGE

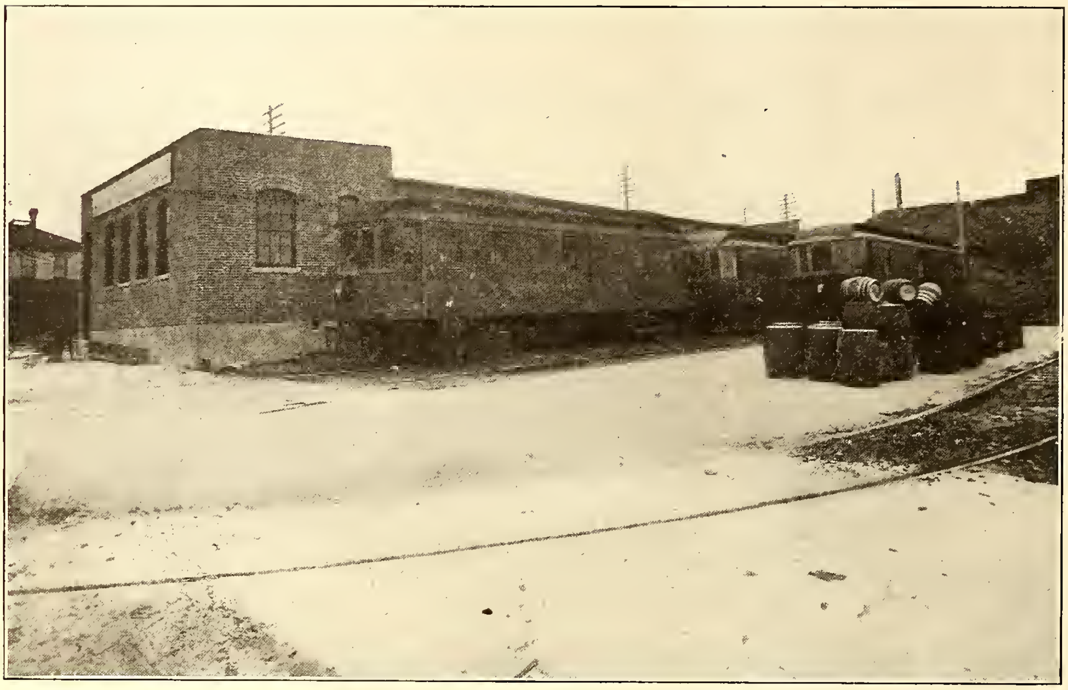
According to statistics recently compiled there is now in operation in Indiana 913 miles of traction lines. Of this amount the United Gas Improvement Company, of Philadelphia, controls 512 miles. Besides the 913 miles already in operation, 213 miles are now building, and of this amount the larger part is probably controlled by the company named.

SUSPENSION OF ELECTRIC RAILWAY MAIL SERVICE CAUSES COMPLAINT IN PENNSYLVANIA

The people living along the line of the Newtown Electric Street Railway, between Doylestown and Bristol, Pa., 28 miles, are complaining in no uncertain tones about the mail service, which is no longer served by the railway, but by a star route carrier. Instead of receiving and despatching four Philadelphia mails per day, but half that number are now handled, and the city papers, which formerly arrived along about breakfast time, jog in somewhere around supper time. The electric railway received $2,100 per year for two round trips, or 112 miles daily. To care for the service a mail compartment was provided in one of the regular cars, the clerk, of course, being furnished by the government. It now costs $1,525 to carry one-half as many mails one-half the distance by wagon. It is said that the electric railway company was willing to put on a special mail car for $3,100 per year.

NEW FREIGHT HOUSE BUILT IN GRAND RAPIDS BY THE GRAND RAPIDS, GRAND HAVEN & MUSKEGON RAILWAY

The Grand Rapids, Grand Haven & Muskegon Railway has completed and is now occupying a new freight house in Grand Rapids, Mich., erected at a cost of $30,000. Until the completion of the new house the freight business of the company was



THE FREIGHT YARD, SHOWING METHOD OF LOOPING CARS AND THE STORAGE TRACKS

handled from a building in the heart of the city. The company has a pro rate agreement with the Goodrich Transportation Company, operating a line of boats between Chicago and Grand Haven and Muskegon. The Goodrich Company has had a similar agreement with the Grand Trunk and the G. R. & I. Railway Companies, but last spring the railroad companies notified the Goodrich Company that its arrangements with the interurban must be canceled or they would not renew their agreement for the handling of through business. The boat company renewed its agreement with the interurban, and since then the railroads have not accepted any of its through business. This has resulted in an increase in the through business of the Muskegon line of more than 50 per cent, and made necessary the building of the new freight house.

THE SEPARATE TRAMWAY TO FACILITATE UNLOADING

The building is one story, 40 ft. x 100 ft., constructed of red brick with a cement outside wall 24 ins. thick. The foundation wall goes 3 ft. below the surface of the ground. Running the length of the building beneath the floor are three 18-in. brick walls, 10 ft. apart. The floor is double, of matched pine planks. The lower floor is of 1-in. lumber, and the upper of 2½-in. planks. The building has a gravel and tar roof. The office is 12 ft. x 40 ft., in the front of the building, and has ample light from four windows in the front. It is finished in oak. In the freight house are four receiving doors, level with the bottom of a wagon.

In the yards are storage roof for six cars, two of which can be loaded from a team track and four through the freight house, three tracks being provided. The entire site is 115 ft. square and is paved with brick. The team-way to the receiving doors is 40 ft. wide, allowing teams to back up to the door ahead of those which are unloading. The team-way is separated from the sidewalk by an iron railing and a cement retaining wall. The ground is well drained.

In the freight house are two pairs of Fairbank's standard scales.

The building is lighted by 42 incandescent lights.

Since the building of the new freight house, giving better facilities for handling business, the local business of the road has increased one-third.

General Manager Morley has placed an order for four new freight cars for delivery in the spring. Each of these cars will be 38 ft. long, with a capacity of 30,000 lbs., and will be equipped with two 150-hp motors and air brakes.

The Lake Shore & Michigan Southern Railway (steam) has issued a new form of transportation throughout Northern Ohio between points where there is electric competition. It is a 25-ride book, good for bearer between certain points for one year, and it makes a rate of 1½ cents a mile. Any number of people can ride on the book.

FINANCIAL INTELLIGENCE

Wall Street, Nov. 22, 1905.

The Money Market

There was a further relaxation in the monetary situation during the week, rates for all classes of accommodations receding quite sharply from the recent high levels. From 11 per cent, the extreme high figure for the week, call money declined to 4 per cent, while the interest charges on loans for all fixed periods ruled about ¾ per cent below those prevailing at the close of last week. Sixty and ninety-day funds were obtainable in quantities at 6 per cent, while six months' maturities were liberally offered at 5¼ per cent. The comparative ease in the situation was due largely to the restoration of the surplus reserve by the clearing house institutions and to the more reassuring conditions in the foreign markets, especially at Paris and Berlin. Another important factor was the decline in rates of exchange in New York at interior points, indicating that the demand for money at those centers for crop moving and general trade purposes has been about satisfied and that an early return movement in funds to this city may be expected. In fact, the return movement has already started, several of the larger institutions reporting receipts of moderate amounts on balance from the interior for the first time in several months. It is not expected, however, that any decided ease will develop in the local situation until after the turn of the year. The January disbursements are expected to break all previous records, which, together with the enormous volume of business being transacted in all branches of trade, will be sufficient to prevent any material decline in money rates. In addition, preparations must be made to finance the $12,500,000 loans to be floated by the city of New York this week, and later in the month the new Japanese loan must be taken care of. The total authorized amount of the Japanese loan is £50,000,000 sterling, bearing 4 per cent interest and maturing in twenty-five years, optional after fifteen years. Only £25,000,000 will be issued at present, the balance being reserved to provide for the conversion of existing 6 per cent sterling loans. Of the amount to be issued now, £12,000,000 will be placed in Paris, £6,500,000 in England and the remaining £6,500,000 in Germany and the United States. Foreign exchange has been active and erratic. At the close a week ago demand sterling ruled at a point that foreshadowed a resumption of gold imports from Europe, but later decided strength developed and the price rose to near the gold export point. Shipments of the yellow metal were averted, however, by the freer offerings of bills against cotton and grain shipments, and by the offerings of bankers' loan bills. Silver bullion continued strong, prices here and at London reaching the highest points attained in several years. Government finances show a decided improvement. Receipts are considerably larger than last year, and present indications point to a surplus for the month of November of $5,000,000. Government bonds refunded to date amount to $34,964,350. The Secretary of the Treasury announces that the refunding of the 3 per cent bonds of 1908 and 1918 and the 4 per cent loan of 1907 will be discontinued on Nov. 29 next. The foreign markets have ruled somewhat easier as a result of the improved situation in Russia, but rates for money and discounts have underwent no material change. The bank statement published last Saturday made a gratifying exhibit. Loans decreased $27,204,200. The decrease in cash of $1,968,500 was considerably less than expected. Deposits decreased $29,849,800. The reserve required was $7,312,450 less than the previous week, and deducting from this the loss in cash of $1,968,500, the surplus was increased by $5,343,950. The surplus now is $2,915,150, as compared with a deficit of $2,428,800 in the preceding week, a surplus of $9,589,700 in the corresponding week of 1904, $3,911,350 in 1903, $19,529,975 in 1902, $14,486,925 in 1901, and $12,278,275 in 1900.

The Stock Market

Following the recent stringency in the money market with its attendant adverse influence on the general share speculation, there was a decided relaxation in monetary conditions during the past week, which naturally had a favorable effect upon values. From the previous low level prices recovered quite sharply, and in not a few instances stocks rose to a new high level; and while very little interest was manifest by the outside public, professional operations assumed somewhat large proportions. The fact that the Treasury Department found it unnecessary to come to the relief of the monetary situation, coupled with the assurance that it stood ready to do so should occasion require, constituted one of the chief factors in bringing about the better tone to the stock market, although the improvement was attributed in no small degree to the much more peaceful aspect which the Russian situation assumed after it had appeared that that country was on the verge of a revolution. London was not very much of a factor in our market, but the improved temper of the foreign securities markets, following the more encouraging developments in Russia, had a good moral influence here. The continued shortage of railroad equipment, thus testifying to the superabundance of traffic now moving, the generally gratifying character of the earnings statements made public, and the declarations of not only regular dividends but also of a higher rate in at least one instance, that of the Atlantic Coast Line, afforded ample ground for the bullish sentiment with reference to railway shares in general, once the money scare was out of the way. A maintenance of the same prosperous conditions in the industrial world, to which reference has frequently been made, created an improved demand for most of the shares of the manufacturing companies, and in this class some stocks reached the highest figures ever attained, the most striking point being American Smelters. The Copper stocks responded to a further advance in the price of the metal to 17¼ cents, at which figure considerable quantities were reported to have been sold by a large producer. The shares of the Southern Coal & Iron Company likewise exhibited pronounced strength, this having been due to revived talk of an impending amalgamation of these various properties. While the volume of trading was on a large scale, dealings were pretty generally specialized and the movement of prices was not such as to attract a very general outside following. However, the presence of such factors as those already set forth, and the possibilities for stockholders in the way of not only increased cash dividends but also of valuable rights, as exemplified in the action of the New York Central in offering shareholders an opportunity to subscribe to nearly $18,000,000 of new stock at par, inspired confidence on the part of both speculators and investors, and with a comfortable working of the money market this will undoubtedly lead to a broader and stronger market generally.

The movements of the local traction shares have not been uniform. On the contrary, Brooklyn Rapid Transit has displayed pronounced buoyancy, while the Metropolitan issues have been heavy and under pressure all week. The principal reason for the sharp rise in the first named to the highest figures in years is the continued expansion in earnings of the property, although pool operations which were assisted by renewed rumors of Pennsylvania Railroad control, etc., were to some extent responsible for the great activity and strength in the stock. The only apparent cause for the weakness in the Metropolitan issues was the fear of an early call of the $50 assessment on the shares of the Metropolitan Securities Company.

Philadelphia

The local traction stocks developed considerable activity this week, and although prices moved with some irregularity, the general trend of values was toward a higher level in sympathy with the improvement in the general stock market. Interest centered largely in the speculative issues, and especially in Philadelphia Rapid Transit, which was the overshadowing feature both as to activity and price movements. Opening at 27½ the stock rose to 32 on heavy buying, but later eased off on sales to realize profits. In the final dealings there was a further advance to 32⅜, the highest price attained in several months. The close was within ⅝ of the highest, showing a net gain of more than 5 points. Transactions in the stock amounted to 40,000 shares. There was no news to explain the movement in this stock. Philadelphia Company continued active, upwards of 25,000 shares changing hands. In the early dealings there was some selling by disappointed holders which carried the price off from 53¼ to 51⅝, but later on the announcement that the United Railways Investment Company of San Francisco was seeking control of the property caused a partial recovery, the final transaction being made at 52¼. The preferred was extremely quiet, a few small lots changing hands at prices ranging from 49¼ to 50. A better inquiry was noted for the investment issues. Union Traction displayed increased activity, upwards of 1800 shares selling at from 62⅜ to 63, an advance of 2½ points. Philadelphia Rapid Transit sold to the extent of several hundred shares at 100¾ to 101. Railways General rose ½ to 6¼ on the exchange of 300 shares. Other transactions included United Traction of Pittsburg preferred at 50, United Companies of New Jersey at 270¼ and 270, and American Railways at 53¼ to 53.

Baltimore

There was a further falling off in the dealings in Baltimore traction issues, and prices showed very little variation from those ruling at the close of last week. The United Railway issues were extremely dull, $59,000 of the 4 per cent bonds selling at 92 and 92¼, while $18,000 of the free incomes brought 65½ and 66. Fifty shares of deposited stock sold at 16. Other sales included $2,000 Macon Railway & Light 5s at 100; $2,000 Norfolk Railway & Light 5s at 96; $4,000 Virginia Railway & Development 5s at 99¾; $3,000 City & Suburban 5s at 115, and $1,000 Washington City & Suburban 5s at 106.

Other Traction Securities

The feature of the Chicago market was a drop of 2 points in West Chicago to 58 on the exchange of a small block of the stock. Otherwise prices held firm, but trading was very quiet. Chicago Union Traction sold at 11½ and 12½ for 135 shares. Chicago & Oak Park common sold at 6, and the preferred brought 20¼ and 21. Metropolitan Elevated common held firm with sales of small amounts at 27¾ and 28, but the preferred declined from 71 to 70. Northwestern Elevated moved up from 22¼ to 23 on the purchase of 257 shares. South Side Elevated sold at 97 and 96¾ for a few hundred shares. Trading was also quiet in the Boston market, and apart from West End common, which declined from 100 to 98 on light transactions, values generally remained firm. West End preferred sold at 114. Boston Elevated sold at 152 and 152½ for nearly 400 shares. Odd lots of Boston & Worcester common brought 27 and 29, while full lots of the preferred brought 72½ and 73¾. Massachusetts Electric changed hands at 13¼ and 13 and the preferred sold at 56 and 57. West End bonds of 1915 brought 102½ for $5,000. On the New York curb Interborough Rapid Transit has displayed increased activity and strength. From 208½ at the close a week ago, the price ran off further to 204¾, but subsequently there was a sharp advance to 216¾. At the high figure moderate realizing developed, which carried the price off to 213½, which was the closing price. About 9000 shares were dealt in. The strength in Interborough was attributed to the heavy traffic on both the subway and elevated lines of the company. Other sales included 10 shares of American Light & Traction preferred and $4,000 New Orleans Railway 4½s at 91.

Little activity in tractions in Cincinnati. Cincinnati, Newport & Covington common was again the leading feature, with sales of about 1300 shares with a fractional advance from 48⅞ to 49. A small lot of preferred sold at 95½. Detroit United sold at 93¾; Cincinnati, Dayton & Toledo sold at 25½ to 26. The 5 per cent bonds sold at 98, and Southern Ohio 5s, an underlying issue, sold at 98¼.

Northern Ohio Traction and Lake Shore Electric common are having another bull movement in Cleveland. The former moved from 26¼ to 29 on improvement in money conditions, while the Lake Shore advance from 13½ to 16 was undoubtedly due to the announcement of the dissolution of the voting trust and the reversion of the property to its owners, mention of which is made in another column of this issue. The preferred stock advanced from 65 to 68 for the same reason; this is not yet paying dividends, but it has about 20 points' accrued dividends attached, which will doubtless be paid next year. Cleveland Electric advanced from 80½ to 82½. The early part of this week there was considerable activity in all of these issues, with practically stationary prices. A large block of Northern Ohio 5s sold at 90.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Nov. 15	Nov. 22
American Railways	53	53
Boston Elevated	152	152½
Brooklyn Rapid Transit	76¼	87⅛
Chicago City	200	200
Chicago Union Traction (common)	10½	11
Chicago Union Traction (preferred)	—	—
Cleveland Electric	81	82
Consolidated Traction of New Jersey	81	80
Consolidated Traction of New Jersey 5s	109	108
Detroit United	93¾	93⅛
Interborough Rapid Transit	207	212
International Traction (common)	35½	36½
International Traction (preferred) 4s	75⅞	75¾
Manhattan Railway	164	163
Massachusetts Electric Cos. (common)	13¼	13
Massachusetts Electric Cos. (preferred)	56	56
Metropolitan Elevated, Chicago (common)	27½	27
Metropolitan Elevated, Chicago (preferred)	71	70
Metropolitan Street	117½	115¾
Metropolitan Securities	72¾	70¼
New Orleans Railways (common), W. I.	37	37
New Orleans Railways (preferred), W. I.	82¾	82½
New Orleans Railways, 4½s	91	90¾
North American	97¼	100¾
North Jersey Street Railway	27	27
Philadelphia Company (common)	53	52
Philadelphia Rapid Transit	26¼	31¼
Philadelphia Traction	100¾	100½
Public Service Corporation 5 per cent notes	95	94
Public Service Corporation certificates	62	61
South Side Elevated (Chicago)	96	96
Third Avenue	121	120
Twin City, Minneapolis (common)	114¾	116¼
Union Traction (Philadelphia)	62½	62½
West End (common)	a99	98
West End (preferred)	113½	114

a Asked. W. I., when issued.

Iron and Steel

The "Iron Age" says the bookings of finished iron and steel continue exceedingly heavy in all lines, and thus far this month are nearly up to the rate of October. It is quite unprecedented that there should be such a volume of buying at this season of the year, when usually the works are eager for winter work. The strain in all directions is tremendous and prices are kept down by main force. During the week leading interests advanced tin plate 10 cents a box, and the sheet makers put up prices on sheets $2 per ton. In the structural trade the inability to make deliveries is still a conspicuous feature. There is increasing evidence of a shortage of pig iron for steel-making purposes.

R. D. APPERSON PURCHASES ANOTHER SOUTHERN PROPERTY

R. D. Apperson, of Lynchburg, Va., who, with associates, controls the Montgomery Traction Company, has purchased the Montgomery Street Railway and all of its properties, including Electric Park. The purchase promises, according to the word of President Apperson, a line 10 miles to Wetumpka, and there is an understanding that there will be other interurban routes in the future. However, the interesting thing will be the immediate improvement of the tracks and the service of the city of Montgomery. There are 40 miles of track now, with two modern amusement parks, two baseball parks and several minor parks. All these will be given next summer ample facilities as well as fine equipment. The traction company now has two lines right by the historic old Capitol of the Confederacy, and can take the tourists to the place where "Jeff Davis stood to be inaugurated" every few moments.

QUARTERLY REPORT OF THE NEW YORK CITY RAILWAY

The New York City Railway Company, operating all the surface street railway lines in Manhattan and Bronx boroughs, reports as follows for the quarter ended Sept. 30:

	1905	1904
Gross receipts	$4,509,610	$4,360,179
Operating expenses	2,292,258	2,073,361
Net earnings	$2,217,352	$2,286,818
Other income	339,416	331,941
Total income	$2,556,768	$2,618,759
Fixed charges	2,803,050	2,798,234
Deficit	$246,282	$179,475
Cash on hand	4,111,114	....
Profit and loss deficit	$5,005,825	....

THE CLEVELAND SITUATION

The Chamber of Commerce of Cleveland has appointed a committee composed of W. H. Canniff, J. G. W. Cowles, S. P. Fenn, John Jennings, George T. McIntosh, M. A. Marks and W. R. Warner, all very prominent business men, to study the street railway problem of Cleveland and make comparisons with, and investigations of, other cities, with a view to settling the long standing controversy over franchise extensions existing between the city administration and the company. The members are men of the highest standing and are acceptable to both the city authorities and the company. Neither the city nor the company is bound to act on the recommendations or findings of the committee, but there is little doubt that its opinions will have great weight in effecting a compromise.

The Cleveland Electric Railway Company has submitted to the Chamber of Commerce and the city authorities, statistics showing the number of transfers issued daily at the public square and at other transfer points in the city. This is in connection with the plans under consideration for building subways through the public square or laying surface loops around the four sections of the square and turning all cars at this point. At present cars are run with through routes across the city, passing through the public square. The company states that an average of 42,367 transfers are collected at the public square daily under the present arrangement, representing 13.6 per cent of the total passengers carried on the system. It is claimed that the plan of looping the cars on surface loops would increase the number of transfers at this point, thereby increasing the congestion. Incidentally, it was noted that the company collected 34,126 transfers daily on the Willson Avenue crosstown line, and 24,726 daily at other points. This indicates that the company carries 311,522 passengers daily, and issues 101,219 transfers, representing 32.5 per cent of the total passengers carried.

The United States Court has rendered a final decision in the controversy between the Cleveland Electric Railway on one side and the city of Cleveland and the Forest City Railway Company on the other, which considerably simplifies the suits over the 3-cent fare situation in Cleveland. The court held that the franchise of the Cleveland Electric Railway Company on Central Avenue expired March 22, 1905, but that the city could not grant a renewal franchise to a new company, and that the Forest City Company could not enjoy the franchise granted it by taking over the property of the Cleveland Electric Railway. The Cleveland Electric Company, under the decision, now has no rights on the street mentioned, but the so-called 3-cent fare company is also restrained from taking possession of the street under the franchise granted a year ago. It seems possible that the city administration will take steps to oust the old company and make a new grant to the new company. The case will be carried to the Supreme Court.

ACCIDENT FAKIRS SENTENCED IN BALTIMORE

Three alleged members of a band who have made a business of swindling street railway companies by means of suits for damages for pretended injuries received in fictitious accidents were sentenced to jail in the Criminal Court, Baltimore, Nov. 16. They are Frank Bobson, alias Frank Wiens, alias Frank Davis; his wife, Martha Wiens, alias Martha Bobson, and Edward Eagan Reilly, alias Edward Moran, alias F. B. Moran. All pleaded guilty to an indictment charging them with conspiring to defraud the United Railways & Electric Company, of Baltimore, by means of a pretended accident on June 5 last. Bobson was sentenced to five years, Reilly to two years and the woman to six months' imprisonment.

After the pleas of guilty had been entered, State's Attorney Owens explained the case to Judge Phelps. In carrying out their scheme, Reilly got employment with the company as a motorman, and when Bobson and his wife got on his car there was an accident. The woman claimed to have been ruptured and otherwise injured in the accident. Investigation showed that it was a "fake" accident and that the woman's rupture was an old one. The trio went from Baltimore to Pittsburg, thence to Cleveland, and thence to Buffalo. They had a well-mapped out scheme and intended to go as far as Los Angeles, Cal. The woman pleaded guilty with the understanding that the State's Attorney would recommend for her imprisonment of not more than four months. She has been in jail since August. The physicians differ as to her health and as to whether or not she is in a precarious condition.

Mr. Owens read to the judge extracts from a diary kept by Bobson containing mention of a pretended accident in Brooklyn, N. Y., in which $2,000 had been obtained, and also containing an account of the travels of the band. Under date of June 5 last, when the accused were in Baltimore, the diary contained the entry "It happened," referring to the pretended accident in Baltimore.

Mr. Owens also read a letter written from Cleveland by Reilly to Bobson. This letter, with the diary, was found among the papers of the accused when they were arrested. In it Reilly asked that $11 be sent him to get a job on the cars in Cleveland, and mentioned the car line which he had selected as best for "our business."

ATTEMPTS TO INCREASE RATES CAUSE TROUBLE

The raising of the fare from Melrose to Boston from 5 to 7½ cents by the Boston & Northern Street Railway Company seems to have stirred up a tempest in a teapot in the suburban city, although the company's action was sanctioned by the Railroad Commissioners after a careful and impartial investigation of the situation. It is natural enough that the citizens of any community should feel dissatisfied with an increase in fares, no matter how legitimate such a course might be on the part of the local street railway, but in attempting to bring the company to terms by boycotting a single line representing probably not over two per cent of its track mileage, the people of Melrose appear to be engaged in a ridiculous and misdirected campaign against conditions which are entirely beyond the control of the street railway people. At a recent meeting of the Melrose Board of Aldermen it was proposed to coerce the company by having the tracks pulled up, revoking the franchise, or reducing the legal speed limit to one mile per hour or thereabouts. These fertile suggestions were nipped in the bud, however, by the city solicitor, who pointed out the legal obstacles in the way of such a course. The facts of the case are plain enough. The Railroad Commissioners, representing the public no less than the transportation company, were convinced that the Boston & Northern was not making enough on its Melrose-Boston line to earn a fair rate of interest on its investment. The figures upon which the decision was based admit of no question, but as the Commission felt that a 10-cent fare would probably be excessive, the expedient of selling ten tickets for seventy-five cents was adopted, and this compromise was generally regarded as a happy solution of a vexatious problem. It is probable that the wrath which is now being so vigorously called down upon the company in Melrose by citizens who are unwilling to acknowledge the justice of the Commission's ruling will largely subside when the people realize that a 7½-cent fare with better service is preferable to a 5-cent fare, which makes first-class service impossible.

The interurban line of the Tuscarawas Traction Company between New Philadelphia and Uhrichsville, Ohio, has been practically at a standstill for two weeks or more. This is a part of the Canton-Akron system, and the tie-up is the result of that company's efforts to raise rates. The rate between these points, a disteance of 10 miles, was formerly 10 cents. Recently the company increased it to 20 cents, in line with its policy of charging 2 cents a mile. This is an old road and it is claimed that under the franchise granted the original company it was to charge not more than 10 cents from any point in either of the villages to any point in the other. General Manager Dimmock of the system states his position as follows: "We believe we are acting within the law. The Circuit Court at Massillon, Ohio, on Oct. 11, rendered a decision which is applicable to this situation. It was in regard to the fare over our Canton-New Philadelphia line between Navarre and Massillon. The court found that the town had no jurisdiction over our line outside of its corporation; neither had the County Commissioners any jurisdiction over rates of fare within a town's limit. We are now charging 5 cents in the city limits and 10 cents between the city limits of each city." For several days the company attempted to collect these rates and a large number of people who refused to pay were forcibly ejected from the cars. Damage suits resulted from these tactics and after considerable disorder the company removed its cars, continuing, however, to operate in the two villages and charging 5-cent fare. United States mail cars are also operated between the two cities, but no passengers are carried. The company maintains that it will not move until its rights have been determined in court. Suits have been brought to oust the company from its franchises. This case is being watched with a great deal of interest by Ohio interurban roads, because a number of lines are hampered by annoying local restrictions which were saddled upon them in the early days.

Trouble growing out of the new fare schedule inaugurated recently by the Grand Rapids, Holland & Chicago Railway has manifested itself at Zeeland, Mich. The township board has served notice on Passenger Agent Floyd asking that the rates formally in effect be restored. The board claims the road can collect only a 5-cent fare across the township, while at present a 5-cent fare is collected in the village and another 5-cent fare between the village and the Holland town line. Mr. Floyd refuses to recognize the authority of the Board to legislate concerning the fares in the village.

ANNUAL REPORT OF THE BOSTON & WORCESTER COMPANY

The annual report of the Boston & Worcester Street Railway Company for the year ended Sept. 30, 1905, showed that the company earned 6 per cent upon its capital stock, after allowing liberal charges for taking care of its track, roadway and equipment. The company is planning to complete the double-tracking of its line through Framingham Center in the spring at a cost of approximately $150,000, and then the road will be double-tracked the entire distance between Boston and Worcester. The management of the company anticipates that, with the completion of the double-tracking, the gross earnings for the first full year after such completion will reach $600,000, without taking into consideration any earnings from the express and parcel business. For the fiscal year ended Sept. 30, 1905, the company's lines carried 9,110,000 passengers, as compared with 8,000,000 the previous year, and its cars ran 1,820,575 car miles, as compared with 1,793,163 car miles the previous year. The statement of earnings follows:

Earnings—	
Passenger	$443,098
Miscellaneous	10,807
Gross earnings	$453,905
Operating expenses—	
Maintenance of way	$12,016
Maintenance of equipment	42,031
Conducting transportation	141,483
General expenses	39,665
Total expenses	$235,195
Net income	218,710
Charges and taxes—	
Interest	80,525
Taxes	33,123
Total charges and taxes	$113,648
Surplus for year	105,062
Dividends	103,494
Added to surplus	$1,568
Previous surplus	57,266
Total surplus	$58,834
Old accounts settled	3,712
Carried forward	$55,122

The principal items compare with last year as follows:

Year ended Sept. 30—	1905	1904
Gross earnings	$453,905	$400,022
Operating expenses	235,195	220,532
Net income	$218,710	$179,490
Charges and taxes	113,648	88,192
Surplus after charges	$105,062	$91,298

SANTA CLARA-SAN JOSE RAILWAY DEAL

The San Jose & Santa Clara Street Railroad, which embraces the electric line running from San Jose to Santa Clara and the narrow-gage electric line from San Jose to Alum Rock, is now the property of Lewis E. Hanchett and his associates, who recently purchased and took possession of the Santa Clara Interurban Railroad Company. The deal was forecasted at the time the interurban road was sold. The latter company some months ago obtained an option on the San Jose & Santa Clara Street Railroad. The purchase price is $650,000, of which $400,000 is in bonds. It is stated that John Martin, vice-president of the California Gas & Electric Corporation, has become one of the new stockholders of the two electric properties, although most of the capital behind Hanchett is Eastern capital. It is understood that Edwin Hawley, president of the Minneapolis & St. Louis and the Iowa Central roads, and one of Gould's associates in the Western Pacific, is one of the principal factors in the electric deal, and it is also understood that the deal has been engineered in the interest of the Western Pacific.

The Santa Clara interurban road is now proceeding with plans to build an electric line from Santa Clara to San Mateo, and it is stated that when its rails are laid to the latter place it will not stop there, but will continue on to San Francisco. Thus the interurban company would afford the Western Pacific an entrance into the Santa Clara Valley and much intermediate territory.

The properties acquired by Hanchett and his associates are to be greatly improved while the new line is being built up the peninsula. A corps of engineers has been engaged for some time past making maps, plans and surveys for the reconstruction of the Alum Rock road, which is to be converted into a broad-gage line and made a modern property in all respects. The new board of directors is as follows: President, L. E. Hanchett; vice-president, John Martin; secretary, Carl Kneiss; A. F. Morrison and Henry Malloch. Chief Engineer Southard will act temporarily as manager.

REPORT OF INTERBOROUGH COMPANY

The earnings of the Interborough Rapid Transit Company, of New York, for the quarter ended Sept. 30, 1905, have been made public. As compared with the previous quarter, or that of the three months ended June 30, they show a decline in gross of $643,747 and a decline in surplus of $592,125. The comparison with the previous quarter is made because the subway was not opened until the latter part of September, 1904. The decline in earnings for the quarter ended Sept. 30, 1905, is attributed mainly to conditions in the subway during the summer months, during which riding was unpleasant on account of the heat. The entire Interborough Rapid Transit system (including the subway and the elevated lines) reports as follows for the quarter and the nine months ended Sept. 30, 1905:

Quarter ended Sept. 30, 1905—	
Gross receipts	$3,905,097
Operating expenses	1,967,447
Net earnings	$1,937,650
Other income	159,841
Total income	$2,097,491
Fixed charges	1,987,672
Surplus	$109,819
Nine months ended Sept. 30, 1905—	
Gross receipts	$13,036,662
Operating expenses	6,107,651
Net earnings	$6,929,011
Other income	475,869
Total income	$7,404,880
Fixed charges	5,864,021
Surplus	$1,540,859

The Subway division of Interborough Rapid Transit reports as follows for the quarter ended Sept. 30, 1905, and since the road opened, Oct. 27, 1904, to Sept. 30, 1905:

Gross receipts	$1,101,620
Operating expenses	652,602
Net earnings	$449,018
Other income	88,541
Total income	$537,559
Fixed charges	310,000
Surplus	$227,559
From Oct. 27, 1904, to Sept. 30, 1905—	
Gross receipts	$4,740,607
Operating expenses	2,502,960
Net earnings	$2,237,647
Other income	270,029
Total income	$2,507,676
Fixed charges	949,589
Surplus	$1,558,087

The Manhattan division of Interborough Rapid Transit reports as follows for the quarter ended Sept. 30:

	1905	1904
Gross receipts	$2,803,476	$3,232,949
Operating expenses	1,314,845	1,369,094
Net earnings	$1,488,631	$1,863,855
Other income	71,300	79,000
Total income	$1,559,931	$1,942,855
Fixed charges, etc.	1,677,672	1,531,544
Deficit	$117,741	*$411,311

*Surplus.

WIDENER-ELKINS OPERATIONS

Reports in the West of renewed activities on the part of the Morgan-Dolan-Schoepf syndicate, better known as the Widener-Elkins syndicate, in the development of its plans for a system of through trunk lines across Ohio and Indiana, are somewhat misleading. For instance, it was stated that this syndicate had secured control of the Canton-Akron system, comprising the Canton-Akron Railway, the Canton-New Philadelphia Railway and the Tuscarawas Traction Company, operating a through system from Uhrichsville to Akron, by way of New Philadelphia, Massillon and Canton with city lines in these towns. These properties are owned by Tucker, Anthony & Company, of Boston, who recently sold the interests mentioned, the Columbus, Buckeye Lake & Newark and the Columbus, Newark & Zanesville lines. It is logical that the two systems should go together, because when linked they form a through route from Columbus to Cleveland. Tucker, Anthony & Company, however, say that the Canton-Akron system has not been sold, and negotiations have never been entered into looking to the sale of the roads to the Morgan interests.

There are also reports that the syndicate is negotiating for the Columbus, Delaware & Marion Railway from Columbus to Marion, and soon to be extended to Bucyrus, this being the most desirable route for connection to Cleveland and Toledo from Columbus. It is stated, too, that the syndicate has acquired the Columbus, Urbana & Western, a 12-mile road running northwest from Columbus, and will extend it on to Marysville, Bellefontaine and Lima, connecting with its Ft. Wayne line, giving a through line from Columbus to Ft. Wayne. Still another report has it that the syndicate is negotiating for the Springfield-Xenia line with a view to extending it to Wilmington, Ohio.

It seems practically assured that the syndicate will secure the Appleyard system with its 160 miles of roads when it is put up for sale after the first of the year.

NEW YORK CONNECTING RAILWAY RENEWS APPLICATION FOR A FRANCHISE

The New York Connecting Railway has renewed to the Rapid Transit Commission its application for a franchise. The application previously approved by the Commission was denied by the Board of Aldermen unless the company would agree to certain conditions required by the aldermen. Those conditions included a fare of 5 cents for the 6½ miles of road, the privilege for the city to string telephone, fire and police wires on the structure; accommodation for vehicular and pedestrian traffic, and the use of electricity alone as the motive power. Samuel Rea, president of the company, and Edward M. Shepard, general counsel for the Pennsylvania road, which will control the connecting railroad, told the Commission that it would be impossible to comply with the terms. Mr. Shepard explained that the structure of the road will be 150 ft. high in places, and therefore useless for wires. Taking into consideration the height of the structure, Mr. Shepard said it would not be feasible to provide for vehicular traffic or for pedestrians. Controller Grout thought some accommodation should be made for citizens of Queens who would like to cross from Astoria to Port Morris, but Mr. Rea said the bridge across Hell Gate is to cost $6,000,000, and that it would cost the city nearly as much to build approaches if it was decided to use it for vehicular traffic. The matter was referred to the committee on contracts. Messrs. Rives and Boardman, counsel to the Commission, presented a report on the status of the Steinway tunnel and the authority of the Commission in regard to it. The Commission, after Mr. Rives had declined to express any opinion as to August Belmont's right to operate the tunnel, adopted a resolution requesting the Corporation Counsel to test the matter in the courts.

APPLEYARD AFFAIRS TO BE CLOSED AND THE PROPERTIES SOLD

Myron Wilson, one of the receivers of the Appleyard properties in Ohio, informs the Street Railway Journal that the United States District Court has ordered the receivers to close up the affairs of the properties preparatory to a sale of the various lines after Jan. 1, 1906. The order in the court covers the Columbus, London & Springfield, the Columbus, Grove City & Southwestern, the Central Market Street Railway, the Dayton, Springfield & Urbana and the Urbana, Bellefontaine & Western. The Dayton, Lebanon & Cincinnati, a steam road, is in the hands of separate receivers and the bondholders of this property are said to have perfected plans for a reorganization.

The various lines will doubtless be offered for sale individually, as there are different circumstances surrounding each. The stockholders of some of the properties have arranged to bid in the lines. It is stated that two different parties are endeavoring to secure options on the securities of the Columbus, London & Springfield, and the Dayton, Springfield & Urbana, $40 per share having been offered for the preferred stock of the latter road. There appears to be little doubt that the Morgan-Dolan-Schoepf interests will acquire these properties in time, as the lines are essential to connect the big system which the syndicate is forming, with which the Appleyard lines now connect.

Notes aggregating $262,000 given by A. E. Appleyard to secure loans obtained from the defunct German bank at Buffalo have been sold at auction to Adams & Company, of Boston, for $52,401. There was no bid for $13,000 of Kenton & Southern bonds, which were also offered; this was a line projected by Appleyard, and on which a small amount of work had been done. Guy M. Walker, of New York, traction expert, acting for the stockholders of the Central Market Street Railway, is working to realize something on this property for the benefit of the stockholders. It is generally believed that the Columbus Railway & Light interests will bid heavily to acquire this property to avoid further competition in that city.

CITY LOSES CASE AGAINST MONTREAL STREET RAILWAY COMPANY

Judgment has been delivered by the Judicial Committee of the Privy Council in the case of the Montreal Street Railway Company and the corporation of Montreal, arising out of the claim of the city for a percentage of earnings on suburban lines owned by the railway company. Judgment was in favor of the railway company. The street railway company appealed from the decision of the the Supreme Court of Canada, and the unanimous decision of the council, just handed down, was that the railway is not liable for a percentage to the city on earnings of suburban lines. The Supreme Court of Canada held that the company was liable. The case was decided on the terms of the agreement with Montreal, and not on the agreement of the railway outlying municipalities. The decision does not apply to Toronto, Winnipeg or other cities. The company stands to gain by the decision approximately $500,000.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED NOV. 14, 1905

804,281. Wheel Fenders. Louis Vogt, Conneaut, Ohio. App. filed April 13, 1905. The usual fender has a supplemental frame hinged above it which closes down upon a person scooped up by the fender, like the jaw of a clam-shell basket.

804,297. Safety Crossing System for Railways. Walter J. Bell, Los Angeles, Cal. App. filed May 15, 1905. The usual trolley wires of each line have tappets adjacent to the crossing which are engaged by the trolley wheels, and serve to throw off the power from the crossing portion of the other line, so that it is impossible for two cars on the separate lines to proceed simultaneously across the crossing.

804,298. Automatic Safety Crossing System for Railways. Walter J. Bell, Los Angeles, Cal. App. filed June 1, 1905. An improvement on the above patent by which it is impossible for two cars upon the same line to collide when the current is turned on suddenly by the automatic devices actuated by a car on the other line at the crossing.

804,371. Electro-Magnetic Wheel. Hugh Behan, Seattle, Wash. App. filed Jan. 6, 1905. The driving wheel of the car has electromagnets radially disposed around its circumference which are successively energized at the instant when they are in proximity to the track.

804,421. Variable Speed Transmission for Vehicles. George W. Marble and William R. Donaldson, Chicago, Ill. App. filed Dec. 7, 1904. A small track-inspection car has a gasolene motor connected to a longitudinal driving shaft. The power is transmitted through friction discs longitudinally slidable upon the car axle so as to drive in either direction.

804,587. Car Fender. Stefan Ebenschweller, Allegheny, Pa. App. filed Aug. 3, 1905. The fender is normally held in a raised position by a pair of pivoted links which are brought into alignment with one another for this purpose. When a trigger at the front of the car encounters an object this alignment is destroyed and the fender falls.

804,588. Brake for Railway Vehicles. Josef Egetz, Wama, Austria, Hungary. App. filed Aug. 26, 1904. A three-armed lever is moved in either direction by one or the other of the usual hand brakes. The brake connections to the two brake arms are so arranged that the brakes are tightened whichever direction from the center that they are moved.

804,648. Trolley. Michael Baker, Chicago, Ill. App. filed Aug. 31, 1904. A supplemental spring-pressed wheel with a corrugated tread is arranged to bear against the trolley wire in advance of the usual wheel, so as to break the ice from the wire.

804,745. Electrically-Controlled Fluid Pressure Railway Brake. John S. Lockwood, Kansas City, Mo. App. filed Feb. 5, 1904. For the purpose of insuring greater certainty of operation of the triple valve of an air-brake system, all the emergency valves are magnet controlled and located in an operating circuit from the usual controller.

804,766. Car Replacer. Harry Pratt, Kenilworth, Ill. App. filed March 13, 1905. Comprises a shoe with flaring or divergent side walls and a rib on its bottom face adapted to engage the usual track groove. The wheel is guided on to rails or guides within the shoe previous to the time when it passes on to the track.

PERSONAL MENTION

MR. JOHN H. HAYES, who for the past two years has been foreman of the Lakeside car house of the Old Colony Street Railway Company, has been appointed superintendent of the Hyde Park division of the company to succeed Mr. George W. Smith.

MR. C. O. SCRANTON, for several years auditor of the Stark Electric Railway, of Alliance, Ohio, has resigned to go into other business. He will be succeeded by Mr. F. E. Wilkin, of Toledo, at present traveling auditor of the Cincinnati, Hamilton & Dayton Railway (steam).

MR. HORACE ANDREWS, president of the Cleveland Electric Railway, denies that there is any truth in the newspaper reports that he will retire on Jan. 1 from the presidency of the Cleveland property to devote his full time to the Vanderbilt-Andrews plans in Central New York.

MR. RANDALL MORGAN, of Philadelphia, who is identified with Mr. W. Kelsey Schoepf, of Cincinnati, and numerous other financiers in the building and acquiring of an important system of traction lines in Ohio and Indiana, last week made an inspection of all these properties, it being the first time he had seen some of them. In his party were Mr. Marshall Morgan and Mr. J. York, of Philadelphia; Mr. Hugh McGowan, of Indianapolis; Mr. W. Kelsey Schoepf and Mr. J. B. Foraker, Jr., of Cincinnati.

MR. R. T. GUNN, general manager of the Lexington Street Railway Company, of Lexington, Ky., has been elected general manager of the Blue Grass Traction Company and the Frankfort & Versailles Traction Company. His election is the first step toward the consolidation of the electric railway interests in Lexington, which were purchased a short time ago by Philadelphia capitalists. These interests consist of the Lexington Street Railway, the Blue Grass Traction Company, which controls the interurban lines to Georgetown and Paris, and the Frankfort & Versailles Traction Company

MR. JAMES F. JACKSON and MR. CLINTON WHITE, chairman and commissioner, respectively, of the Massachusetts Railroad Commission, have been making a tour through the large cities of the central and easterly sections of the country inspecting the newest examples of railroad terminals and street railway and interurban development. They left Boston last week and have visited St. Louis, Chicago, Cleveland and Pittsburg, making numerous side trips. Of especial interest to them have been the methods of operation of interurban roads, the most important example of which in Massachusetts is the Boston & Worcester Street Railway. The subject of freight carrying is being given separate study by Mr. Jackson and Mr. White for the reason that the movement to develop this sort of business in Massachusetts, on existing and projected street railways has recently taken a new start. On their way north Mr. Jackson and Mr. White will stop at Philadelphia to study the elevated and the subway lines now under construction in that city.

MR. FRANK S. DRAKE has been appointed to the position of assistant general manager of the Portland Railway Company, of Portland, Ore., which has taken over the Portland Consolidated Railway Company. Mr. Drake is one of the pioneers of the industry, and his experience has covered the duties of both operative and executive. In 1887 Mr. Drake entered the employ of the Thompson-Houston Company, for which he served at Buffalo and Lynn. Shortly thereafter he became master mechanic of the Buffalo Railway and subsequently served in a similar capacity for the Pittsburg & Birmingham Traction Company. In 1892 he became erecting engineer for the Westinghouse Electric & Manufacturing Company, and in 1893 began his connection with the Johnson interests. This included terms of service with the Allentown & Lehigh Valley Traction Company as superintendent, the Nassau Electric Railroad as vice-president and general superintendent and the Brooklyn Rapid Transit Company as superintendent of rolling stock. In 1899 he accepted the position of superintendent of rolling stock of the St. Louis Transit Company, and the following year supervised the erection of cars in England for the St. Louis Car Company. Returning to the United States in 1901 he again entered the service of the Johnson syndicate, this time as manager in charge of the Philadelphia office. Early in 1905 he gave up the general contracting business, which he had entered, to become connected with the Philadelphia Air Brake Company. It was from the latter company that he resigned to accept the position in Portland.

MR. D. G. EDWARDS, formerly of Cincinnati, has been appointed vice-president in charge of traffic on all the electric railways of Indiana and Ohio controlled by the Philadelphia interests, allied with the Randall-Morgan syndicate. Mr. Edwards has been in the employ of the C. H. & D. and C. C. & L. Railroad, as passenger traffic manager for the past six years, and is regarded highly proficient as a business producer. The position to which he has been appointed is one of the most important ever created in the history of traction management. Among the properties which he will have charge of are: The Cincinnati Traction Company, the Cincinnati & Northern Traction Company, the Columbus, Buckeye Lake & Newark, the Columbus, Newark & Zanesville, the Lima & Toledo, the Fort Wayne, Van Wert & Lima, the Fort Wayne & Wabash Valley, the Indiana Union Traction Company, the Indianapolis Traction & Terminal Company, the Indianapolis & Northwestern, the Indianapolis & Eastern, the Richmond Street & Interurban Company, the Indianapolis & Danville, the Indianapolis & Plainfield, and the Indianapolis & Western. Mr. Edwards will thus handle passenger traffic matters over more than 1500 miles of road. It is announced that Mr. Edwards' first move will be to reorganize the passenger department of the big merger company in as careful and thorough manner as any steam road system, and to this end he will marshall his subordinates for an aggressive fight for all kinds of passenger business. It is not fully determined where Mr. Edwards will make his headquarters, but they will probably be in Indianapolis.

MR. STEPHEN SALISBURY, well known throughout New England through his business interests and his public benefactions, died at Worcester, Mass., last week. Mr. Salisbury was born at Worcester March 31, 1835. He received his early training in public and private schools, and in 1852 entered Harvard College. In 1856 he was graduated, and then went abroad, visiting Greece and Turkey, and studying in the Ecole de Droit at Paris and the Frederick William University at Berlin. Upon his return from Europe, in 1858, Mr. Salisbury studied law in the office of Dewey & Williams, and then entered the Harvard law school, from which he was graduated in 1861, in which year he began his business career as a director of the Worcester National Bank, with which he had been associated since, serving as its president since the death of his father in 1884. In 1877 he was elected a member of the board of investment of the Worcester County Institution for Savings, and was its president from 1892 until July 1, 1904, when the new law went into effect, preventing a man from holding two similar offices in a savings and a national bank. In addition to these connections he was a director of the Worcester Trust Company, a director of the State Mutual Life Assurance Company, of the Worcester & Nashua, Boston, Barre & Gardner and Boston & Albany Railroad Companies, the Worcester Electric Light Company, Worcester Consolidated Street Railway Company, the Worcester Railways & Investment Company, the Worcester & Holden Street Railway Company, the New England Telephone & Telegraph Company, the Worcester Cold Storage Company, and the United States Corset Company.

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NOTICE TO ADVERTISERS.

Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

Of this issue of the Street Railway Journal 8200 copies are printed. Total circulation for 1905 to date, 392,350 copies, an average of 8174 copies per week.

Wiring-Diagrams in Power Houses

While it is not essential that a switchboard operator or electrician in a power house or sub-station should know all the connections of the apparatus, yet if he does know them he may some time be able to meet an emergency which he otherwise would not be able to care for. We know of no better way of encouraging those about the power house to acquaint themselves with the wiring than by placing a well gotten up blue print of all the connections in an accessible position in each station or sub-station. The prints should be pasted to a strong backing and then varnished to protect them against the rough usage that they will doubtless receive. This practice is followed by some of the large companies, and it assuredly has a beneficial effect on the men. They feel that the company is encouraging them to study the plant more closely than is absolutely necessary to carry out their duties, and they are therefore more prone to gather general information about the machinery. While such information may never be used in the operation of the machinery, yet good cannot help resulting from it. When a visitor enters a plant and finds the attendants able to talk intelligently, he always carries away with him the idea that the company is enterprising enough to secure good men, and this consideration alone should compensate for the trouble of providing the blue prints.

The Gasoline-Electric Car

To many the use of a dynamo and motors to transmit power between the engine and wheels of a gasoline vehicle seems an unnecessary complication. Nevertheless, this combination seems to be growing in favor where powers of any magnitude are concerned, as is strikingly illustrated in the new Fifth Avenue 'bus, whose equipment is described in detail elsewhere in this issue, and in the case of the larger motor cars for steam railroads, which have been built and are building. It is, in truth, a striking tribute to the wonderful operative qualities of the electric motor that, in spite of the high first cost, rather modest efficiency and considerable maintenance of the duplex equipment, its operative properties are so admirable as to give it a strong hold on popular favor. Considered merely as a clutch and change gear, a combination of dynamo and motor is held by many engineers as far simpler and, in the long run, cheaper than any mechanical substitute. The tests given elsewhere in this issue on the new Fifth Avenue stage show the mean generator output for an average speed of 9 m.p.h. to be about 8 kw, with a maximum output of about 17.5 kw on the Thirty-Sixth Street grade with the speed cut to 4 m.p.h. This is a good showing in point of efficiency. We very much doubt whether any so-called 12-hp gasoline engine could have done better with the customary form of transmission. The consumption of gasoline in this run is stated to have been, however, 0.6 gal. per car-mile, which would seem high for this duty under favorable conditions.

But the long and short of the matter is that both with gasoline and gasoline-electric cars very much depends on the conditions of the test. The mechanical transmission of a motor car is a fearsome thing of very dubious economy. At certain speeds it can be arranged to be relatively simple and efficient, but at others, and generally at all others, it is at a great disadvantage. Bitter experience has shown that it is liable to great wear, and the way it is thrown in is mechanical assault and battery. Hence, it may well be that with high powers the electric "clutch" of dynamo and motors, despite its moderate efficiency considered as a clutch, may yet do far better, considering the varied speed required in such work as that of the Fifth Avenue 'bus or in independent large motor car work for commercial transportation. As to weight, the electric equipment is at a great disadvantage, although, fortunately, weight is a secondary consideration in the work we are considering.

One issue frequently raised in favor of electric automobiles is that they are substantially foolproof and do not require the services of a chauffeur. Within limits this advantage is a telling one. Whether it extends to a gasoline-electric combination is quite another matter, for a gasoline engine has deviltries all its own and cannot be altogether sanctified even by association with an electric motor. This much is sure, however, that the gasoline-electric combination is going to be tried out on a considerable scale, both for 'bus service and on tracks, and that it has mechanical advantages of no mean order in spite of its apparent complication. Even though it should prove to have small advantage for anything but the heavier kind of service, it would be a useful adjunct. Meanwhile, if the advocates of a straight gasoline system are determined to win out, they must get to work and improve the transmission, which needs improvement badly, as every owner of a touring car fully realizes to his cost.

Proper Hanging of Brake-Shoes

It is apparently not a generally recognized fact that the method of hanging brake-beams and of applying force to the brake-shoes has as much influence upon economy of shoe wear as does the quality or structure of the shoe itself. It is possible by improperly hanging a brake-beam to cause an ensuing unevenness of wear upon all shoes applied to it, which will necessitate their being scrapped before they are even half worn out. This is a difficulty that has been experienced to a large extent both in light street railway service and with the heavier interurban equipments. It has even been found that shoes upon some trucks will wear entirely through to the back at one end before the initial face is worn through at the other end of the shoe, with resultant very low mileage per unit of weight of the shoe.

The cause of this class of uneven wear of the shoes is improper hanging of the shoes relative to the attachment of the brake-gear, which results in an eccentric action upon the shoes in braking, as one end of the shoe is forced against the wheel more heavily than the other. In such a case an analysis of the connections of the brake-gear will without a doubt reveal a condition of faulty alignment of the point of application of the braking force and the hanger support relative to the desired resultant of force against the wheel. In other words, the point of hanger support becomes an offset center around which the braking force tends to revolve the brake-beam and shoes, and the greater the offset, the greater obviously is the eccentric action. Certain forms of hanger, in fact, make this result inevitable, yet with the forms of construction most generally in use it may easily be avoided, and wherever such uneven wear is encountered this cause should be looked to.

The remedy for the trouble is simple and may be applied with certainty of relief. It may be entirely avoided by rearranging the brake-gear and hanger connections so that the direction of application of the resultant of the braking force shall pass through the center of the wheel, which is the condition of freedom from eccentric action upon the shoe. In other words, it is necessary that the line of pull of the brake-gear shall intersect the center line of the supporting hanger for each shoe upon a radius of the wheel to be braked. With this accomplished, an even pressure will be distributed over the entire surface of the shoe, with consequent uniform wear throughout its life. This is not a difficult problem, as it may easily be worked out, even for inside-hung brake systems, by laying out to scale upon the drawing board and analyzing the forces set up during braking. It may also be added in this connection that such an analysis is liable to indicate methods whereby the disagreeable "chattering" of gear and hangers, so often complained of, may be overcome by reconstruction of the hangers.

With the brake-gear thus properly disposed, the question of maximum life of shoes lies in the structure of the shoe. As has previously been stated in these columns, the tendency of practice upon representative electric railway systems points toward the use of the harder shoes or the well-known shoes of soft iron body with hard metal inserts. With the excessive dirt, sand and grit picked up in street railway service, such shoes designed to withstand abnormal wearing conditions are unquestionably the more advisable.

Improving the Waiting Room

A point which progressive interurban railways have been appreciating of late is the influence of attractive waiting rooms upon their passenger business. It is now considered almost a matter of course that clean and comfortable places shall be provided for the use of the traveling public between cars on cross-country lines, and this idea is by no means confined to interurban roads, as may be observed in recent terminal practice in various cities. At the same time, many companies still fail to realize the importance of the subject, judging by the character of waiting rooms maintained.

Waiting rooms are often poorly lighted, destitute of public convenience stations, indifferently heated, illy-ventilated, malodorous and dirty. Even in localities where electric lights are available it is not uncommon to find waiting rooms illuminated by the ghastly glare of half a dozen decrepit Welsbach mantels; little or no provision for the reception of the omnipresent cigar stub; cheap lithographs of doubtful attractiveness on the walls, and a cooking stove running full blast in the rear, separated from the waiting room by a partition impervious to the eye, but not to the nose. Naturally it is a well-nigh perpetual task to keep public places of this character clean, and it cannot be done without an expense of perhaps $1.50 to $2 per week per waiting room; but the steam road long ago realized the necessity of keeping its stations in good condition, and it would seem to be equally important to prevent the making of disparaging comparisons by close attention to details on the part of those street railway companies which have thus far permitted the lessees of their waiting room privileges to take but slack care of the surroundings.

Reasonably good illumination can be obtained by providing one 16-cp lamp for each 30 sq. ft. of floor space, and in some cases this average can be run up to 40 sq. ft. or 45 sq. ft. without much trouble if the lights are skilfully placed. What is wanted is an illumination which will permit the reading of newspaper print with ease in practically any part of the room. Metal waste cans are useful, and a fire extinguisher should not be omitted from the equipment. In the matter of toilet facilities our American cities are none too well supplied with public convenience stations. By maintaining these at its waiting rooms the street railway company does its part in a really philanthropic work, and at very little expense. Perhaps the one point above all others in importance in the conduct of waiting rooms is cleanliness. Public telephone stations, newspaper and magazine stands, lunch counters and first-class illumination count for much as conveniences, but if a waiting room is to attract any other class of passengers in addition to the "great unwashed," it must not of itself fail in the matter of soap and water. In such situations these two commodities may be quite as useful in drawing passengers at city waiting stations as other forms of advertisement. Waiting room privileges should not be sub-let or leased without the retention of supervisory powers on the part of the street railway company concerned.

Some Lessons of the Zossen Tests

We close this week our report of the details of the earlier work done in the Zossen experiments. Although the later tests led to the more sensational results, it must not be forgotten that it took this long period of preliminary tests to bring them to full fruition. The important facts regarding power, air resistance, braking and proper balancing of the trucks were invaluable in determining the success of the final experiments. The work on air resistance may be fairly said to have cleared up that difficulty long before the record-breaking runs were finally made, and the early experiments settled once for all the feasibility of the speeds which were to be attempted. Thereafter the experimenters could settle down to business, safe in the certainty that while accidents might happen, yet so far as power available and power necessary were concerned the issue was certain. It was no small thing thus early in the game to have the major difficulties well in hand. But in addition to these auguries of final success, facts less cheering, but of great practical importance, were developed. At ordinary railway speeds braking is relatively easy. At those attempted in the Zozzen work new conditions arose, for while in point of fact locomotives had repeatedly made the speeds reached in the work of 1902, they had never been under the necessity of braking from such speeds. And right at this point developed what perhaps must be regarded as the gravest difficulty in high-speed railroading of any kind—the lowering of the coefficient of friction between brake-shoe and wheel as the speed rose. This situation was not in itself new in the Zossen tests, but it for the first time there came seriously under observation as a practical matter.

As appeared from the work of 1902, this coefficient of friction fell at, say 70 m.p.h. to about half of its initial value at a few miles per hour. This looked somewhat ominous, and the work of 1903 was doubtless begun with some misgivings upon this score. It is the unexpected which happens, however, and the unexpected is not necessarily evil, for the braking tests of 1903 showed not only that the friction diminished greatly in passing from 5 m.p.h. or 6 m.p.h. to 80 m.p.h., but that beyond that point it held fairly steady up to the highest speeds attained. This is one of the most curious facts brought out in the experiments, but it seems to be pretty well established, and remains for future consideration, as a point which deserves to be explained. Another very singular feature in the work of 1902, as our readers have doubtless noticed, was the very curious distribution of air pressures near the front of the car, showing that there is plenty of field for investigation even after the absolute value of the pressure as a retarding factor has apparently been well determined. It is a pity that the air currents about the head of a car and along the sides of the train cannot be rendered visible, so that their eccentricities can be definitely investigated. One would almost as soon expect a manhole cover on a high-pressure boiler to fall in as a shutter on the front wedge of the Zossen car to fall out, and yet this is precisely what did happen. A close knowledge of the air currents about the train would tell pretty definitely what might be expected from wings used for retardation. Possibly they might prove rather disappointing.

The braking problem certainly seems, both from these early tests and from those of 1903, as decidedly the gravest with which the worker at high speeds has to struggle. After all, even granting that very high retardations could be secured, it is very doubtful how far it would practically be safe to employ them on account of the passengers. All the tests point to the conclusion that it will be a very troublesome matter to stop from a speed near the maximum attained in less than about a mile. This is a longish distance when one considers the problem of running night trains with any system of signaling yet tried in railroading. Possibly the application of wireless may facilitate signaling in such cases, but certainly when one depends in any way upon the visibility of signals, a stopping distance of a mile is longer than discretion would dictate. The obvious moral is that in work at Zossen speeds, the high-speed track should be absolutely independent and the trains run on such headway as to insure clear track for a very long distance. After all, it is merely a matter of headway, for with a clear track assured for a distance beyond that needed for stopping, the way is safe. It is merely the old question of the length of the dangerous space, which on an ordinary electric interurban car may be 200 ft. or 300 ft. instead of 4000 ft. or 5000 ft. as in this high-speed work. In either case the safety precautions must be adjusted to the length of the dangerous space and kept in working order. If high-speed work becomes common it would not appear to be a difficult matter to arrange a set of wireless signals to show in the motorman's cab the conditions in the blocks a few miles ahead, to take the place of our somewhat imperfect track signals.

It must not be forgotten that while all this Zossen work was aimed directly at a three-phase traction system, it hits in actual fact any system of high-speed traction that is likely to be evolved. If our friends of the New York, New Haven & Hartford Railroad carry to success their plan for single-phase traction they will have to meet the same conditions of track and general equipment as would be required for three-phase work, but with the material gain of having to provide for but one overhead working conductor. The great mass of all this Zossen work will be available for the solution of the mechanical difficulties of the situation, which are really the only serious ones. Or if some wizard evolves a scheme for 10,000-volt direct-current motors, the great mass of data are as applicable to such as to any others. The 100-m.p.h.-train, which was vociferously announced so long ago, has not yet arrived, but when it comes its success will turn upon the roadbed and the mechanical equipment of the system rather than upon the details of the motive power. It is for this very reason that we have given so considerable space in our columns to these detailed reports of the earlier work—that they might be permanently in record in English for the instruction of whoever should need them. Of course, the greater interest centers around the later triumph of 1903, but when one wishes to study the causes of that success he must turn to the preliminary experiments that cautiously felt out the way of advance. The data on power and on acceleration and retardation in the tests of 1902 will particularly repay close examination. The time is soon coming we hope in which this country will do its share in high-speed traction. Up to the present it has followed somewhat conservative lines, at least since the earlier days of electric traction. With the beginning of trunk line work, which now seems to be in sight, there will be a new era of pioneering, to which the great Zossen experiments form in their entirety a splendid prelude.

BERLIN-ZOSSEN TESTS OF 1902—II.

An abstract of the first half of the report of the Berlin-Zossen tests of 1902 was published in the STREET RAILWAY JOURNAL for Oct. 28, and was devoted to the air-resistance experiments conducted during that year. The second half of the report for 1902 describes the methods followed in measuring the total energy consumption of the two test cars, the losses in the power transmission lines, the results of the tests on braking, the alterations made in the equipment of the car between the 1901 and 1902 tests and those recommended before the commencement of the 1903 tests, and the effect upon the track. As the car and track in 1903 are described in the 1903 tests, which are in book form, the portion of the 1902 report relating to these features will be omitted from this abstract, which completes the abstracts to be published in this paper.

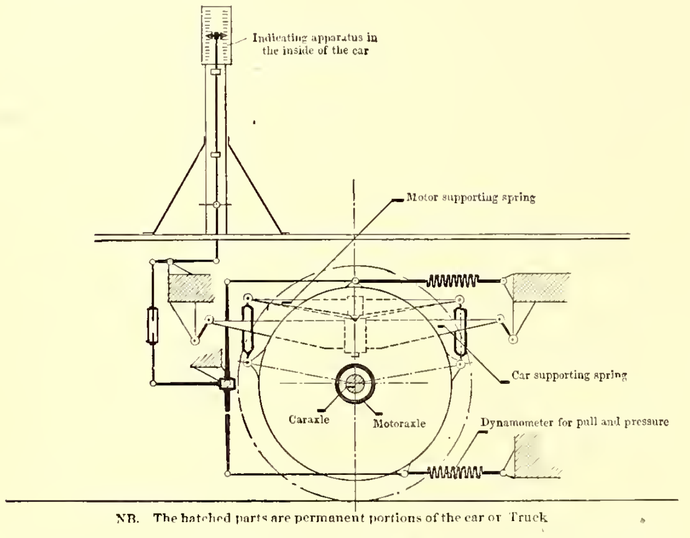


FIG. 1.—APPARATUS USED TO DETERMINE THE POWER CONSUMPTION BY MEASURING THE TORQUE OF THE MOTORS ON THE DRIVING WHEELS

MEASUREMENT OF THE ENERGY CONSUMPTION

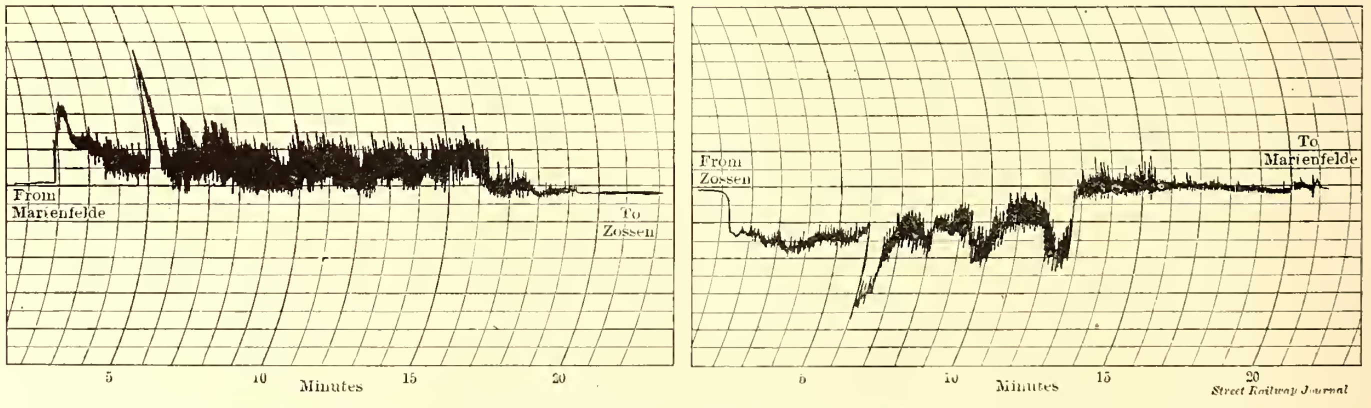
In the earlier tests, the measurements of the energy consumption, the current and the potential were all made in the power house at Oberspree, and were therefore subject to the possible errors of including in the calculations the resistance of the light transmission line from the power house to the feeding point along the trolley line. In order to eliminate these errors as far as possible in the present tests, a special observation station was constructed at the feeding point along the test section near Marienfelde, and was equipped with precision instruments, which were practically not affected by the frequency and the phase angle of the current. This was accomplished chiefly by being able to connect the ammeter and wattmeter directly in the high-potential circuit and thereby avoiding the use of transformers. The instruments in the car were connected in the same phase as those at the feeding point. The readings at the feeding point were taken at intervals of 10 seconds, and in the car, generally after each 20 seconds. For this purpose a clock was used which closed an electric circuit at intervals of 10 seconds each, thus operating one or more signal bells. The time noted by the clock at the feeding point was made to correspond exactly with that recorded in the car by checking them up before and after the tests through telephone.

It was found that the readings taken at 20-second intervals were not close enough to determine accurately the form of the curves, on account of the variation in the loads on the motors, and thereafter the readings were taken at least every 10 seconds. The strain on the observers under these latter conditions was somewhat severe on account of the length of the runs, and a further decrease in the time between the several observations was found not to be possible without an intermission, although a separate observer was assigned to each instrument.

The greatest value was laid upon the results obtained at the feeding point, which, on account of the substantial mounting of the instruments, were intended to form a basis for all further calculations. Unfortunately, this observation station was thrown out of service during a portion of the test, as the insulation would not stand the damp autumn weather and frequent short-circuits affected the readings of the instruments. Although the insulation was strengthened as much as possible, all further experiences indicated that it was not possible to take reliable readings during foggy and rainy weather. Under these conditions, the readings taken at the feeding point and in the car had so slight an agreement throughout that they could not be used in the calculations. However, a series of reliable measurements were made, independent of these disturbances, the results of which are plotted in Figs. 10, 11 and 12 in the article in the STREET RAILWAY JOURNAL for Oct. 28.

The curves of speed, current, potential and load were integrated with a planimeter, and the resulting average values are given separately for accelerating and running in the table of runs presented on the opposite page. The omission of certian values in these tables is due to the unreliability of the readings from which they must be derived. The following remarks apply to these tabulated results:

The car was started with very low accelerations on account of the small load capacity of the steam engine driving the generator, thus giving a low frequency, which resulted in a comparatively small energy consumption and a considerable accelerating distance. By comparing the consumption of electrical energy during the starting period with the theoretical energy consumption at the wheels, calculated from the accelerating power, and the average load due to air and friction resistance, an average efficiency of 45 per cent was obtained, as



FIGS. 2 AND 3.—RECORDS OBTAINED WITH TORQUE-MEASURING DEVICE, FROM TRIPS IN WHICH THE MOTORS WERE SHORT-CIRCUITED WITHOUT THE USE OF A RESISTANCE

in the earlier tests. This low figure is due chiefly to the energy losses in the starting resistances of the cars, but is of little consequence for a high-speed road, as the length of the accelerating periods in comparison with the entire running time will always be very short. The energy consumption and the torque at the wheels, derived from the recorded values measured at the trolleys, were calculated for the running periods by using the efficiencies of the transformers and motors as derived by the electrical companies, and results were obtained which are slightly in excess of those taken from the curves under similar conditions. No apparent reason for this difference was found. Probably a small amount of additional power was necessary in driving the cars by the motors which was not required during through a lever arm to an indicating and recording apparatus with clock located in the car. The turning of the motor as recorded by this apparatus gave a measure of the torque, the value of which was determined by calibration with weights.

It was necessary to alter the suspension of the motor somewhat so that it would turn only on its middle point and not on the original bearing point of the motor-supportings springs, as otherwise an unequal transmission of the load on the spiral springs indicated at the pointer would occur.

In using this recording apparatus it was found that sufficiently smooth curves were obtained only when a resistance was connected in the secondary circuit of the motors, as without such a resistance the pointer and recording pencil vibrated

TABLE MEAN VALUES OF THE ELECTRICAL AND MECHANICAL TERMS FOR THE RUNNING PERIODS OF THE HIGH-SPEED CAR IN THE AUTUMN OF 1902

No. of Run	No. of Motors Working	Total Train Weight. Metric Tons	Average Speed. Km. per Hour	Frequency	Measurements at Feeding Point			At the Trolley of the Car			Hp. at the Trolley	Efficiency of the Electrical Equipment of the Car. %	Hp. at the Driving Wheels	Draw-Bar Pull at the Driving Wheels. Kg.	Remarks
					Amp.	Volts	Kw.	Amp.	Volts	Kw.					
Car A															
4	2	89.5	95	20.6	43.4	5,835	....	42.1	5,543	246	335	82.7	277	788	Car alone.
2	4	89.5	96	20.8	....	5,450	....	64.0	5,190	247	336	69.7	234	660	Car alone.
5	2	89.5	107	24.	45.6	6,460	....	43.8	6,089	302	410	86.4	354	892	Car alone.
2	4	89.5	113	25.	....	6,830	....	71.5	6,390	365	496	79.1	392	938	Car alone.
2	4	188.4	117	25.	84.7	6,647	694	....	.....	644	875	87.1	762	1,760	3 four-axle passenger cars attached.
Car S.															
8	2	77.9	92	20.8	36.7	5,781	....	34.5	5,619	197	268	84.	225	660	Car alone.
8	2	77.9	106	24.	39.2	6,447	....	36.8	6,162	283	385	86.5	333	850	Car alone.
4	4	159.6	117	25.	69.2	6,937	566	65.0	6,685	499	679	85.5	580	1,330	2 four-axle passenger cars attached.
1	4	193.4	118	25.	81.5	6,700	713	75.	6,425	680	925	87.7	810	1,840	3 four-axle passenger cars attached.

TABLE MEAN VALUES OF THE ELECTRICAL AND MECHANICAL TERMS FOR THE ACCELERATING PERIODS OF THE HIGH-SPEED CARS IN THE AUTUMN OF 1902

No. of Run	No. of Motors Working	Total Train Weight. Metric Tons	Distance Meters	Average Grade in Per Cent.	Average Acceleration Meters Per Sec.	Maximum Speed Km. per Hr.	Frequency	Measurements at Feeding-Point			Measurements at the Trolley of the Car			Hp. at the Trolley	Remarks
								Amp.	Volts	Kw.	Amp.	Volts	Kw.		
Car A															
5	2	89.5	4,430	.030	0.08	88.6	20.6	51.2	5,662	....	50.0	5,376	358	487	Car alone.
2	4	89.5	3,950	.084	0.12	97.5	20.8	....	5,165	....	74.2	4,835	446	606	Car alone.
6	2	89.5	7,930	.054	0.07	106.	24.	51.1	6,383	....	50.1	6,024	407	553	Car alone.
2	4	89.5	4,550	.057	0.11	102.5	25.	....	6,740	....	76.	6,360	535	727	Car alone.
3	4	188.4	8,700	.061	0.07	113.3	25.	101.	6,253	880	....	.....	813	1,105	3 four-axle passenger cars attached.
Car S.															
9	2	77.9	2,744	.111	0.13	91.2	20.8	52.6	5,472	....	51.8	5,257	394	535	Car alone.
9	2	77.9	4,294	.068	0.12	105.6	24.	51.1	6,290	....	50.5	5,950	434	590	Car alone.
6	4	159.6	5,583	.060	0.11	116.7	25.	108.2	6,237	1,010	105.6	5,938	928	1,261	2 four-axle passenger cars attached.
1	4	193.4	8,300	....	0.07	115.	25.	110.	6,140	988	107.	5,450	855	1,160	3 four-axle passenger cars attached.

coasting. Also, the efficiencies of the electrical equipments of the cars, which were determined by calculation at low frequencies and loads, might not have agreed absolutely with the real values. After a great many more runs have been made it may be possible more accurately to locate this disagreement and find a reason for it.

Attempts were also made to determine the energy consumption during the trip by direct measurement of the torque transmitted by the motors to the driving wheels. For this purpose an ingenious device, illustrated in Fig. 1, built by the Allgemeine Elektricitäts-Gesellschaft, was attached to one of the motors of car A. The motor was supported, not by rigid links, but by spiral springs, which were so arranged as to indicate the turning moment exerted by the motor on its suspension point. This moment has the same value, but oppositely exerted, as the turning moment transmitted by the driving axle. The variation in the length of the spiral spring is transmitted widely and a reliable mean curve could not be approximated. The cutting in of a resistance has no effect upon measuring the power absorbed, although, in this case, it is not possible to make a direct comparison of the torque with the electrical energy recorded at the same instant. In Figs. 2-6 several of these records are reproduced. Those represented in Figs. 2 and 3 are taken from trips in which the motors were short-circuited without the use of a resistance, while those shown in Figs. 4, 5 and 6 were taken with a resistance connected in the secondary circuit of the motors during the trips. The torque calculated from the last three diagrams is plotted in Figs. 7A and 7B. It gives somewhat higher values for the train resistance than those found by the coasting tests. The reason for this disagreement lies possibly in slight discrepancies made by the recording apparatus. In the tests to be made in the future this can easily be remedied, and the apparatus will then be adequate for measuring the torque directly at the driving axle.

DETERMINING THE LOSSES IN THE POWER TRANSMISSION LINES

At the conclusion of the speed tests, measurements of the ohmic and apparent resistances of the transmission lines were made in order to determine the energy and voltage losses in the transmission and trolley lines. These measurements were made separately for the exposed parts of the transmission as well as the trolley lines. The observation station at cable house I., in Johannisthal, served for measuring the former, and cable house II., at the feeding point along the track, served for measuring the latter. The location of these observation stations may be seen from Fig. 8, while the arrangement of the wires on the poles is shown in Figs. 9 and 10.

The transmission line consisted of stranded copper wire 50 sq. mm in area, the trolley lines of drawn figure 8 profile wire of approximately 100 sq. mm area. The measurements of the lines were made as follows:

(1) *Resistance measurements with direct current.*

The lines a, b and c and the earth line E were short-circuited at one end and a small battery was connected alternately in each circuit at the observation station. The measurements of current and potential gave the resistance of each loop.

(2) *Determination of the coefficient of induction for alternating current.*

For this purpose the free and the earth lines were short-circuited as before at one end and energized with alternating current from the power house. Then measurements of the load, current and potential in each phase were made at the observation station according to the scheme shown in Fig. 11. The frequency was noted at the same time in the power house from the revolutions of the steam engine. The apparent resistance, R', of one line for the frequency used during the observations follows from the relation

$$R' = \frac{E}{J} = \frac{\text{Phase voltage}}{\text{Current}} \text{ in ohms.}$$

In order to determine the apparent resistance at any other frequency (n), it is necessary to know the coefficient of self-induction (L) and the capacity (C) of the line;

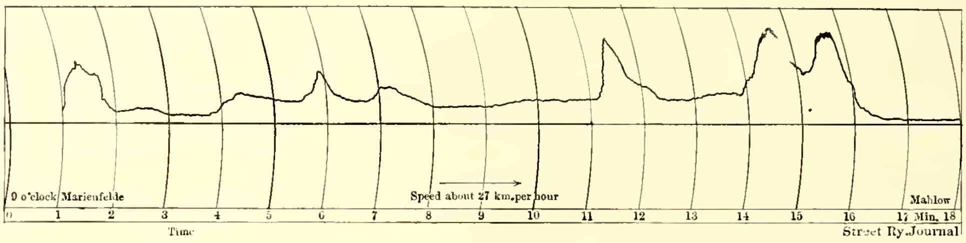


FIG. 4.—DIAGRAM OF MOTOR TORQUE TAKEN ON CAR A DURING RUN ON NOV. 7, 1902 (RUNNING WITH ONE MOTOR)

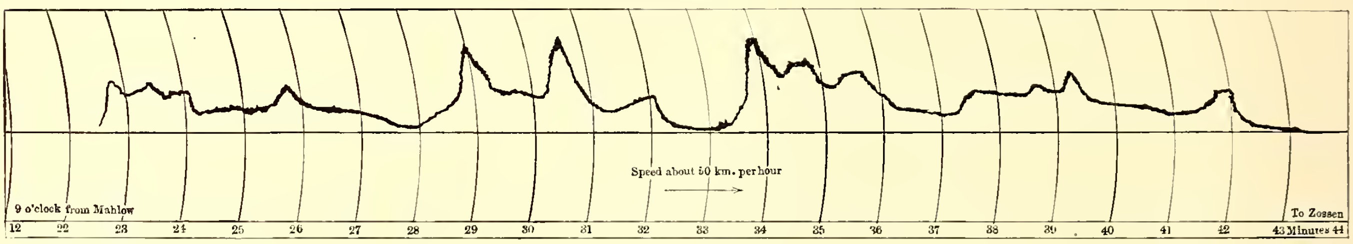


FIG. 5.—DIAGRAM OF MOTOR TORQUE TAKEN ON CAR A DURING RUN 1, ON NOV. 7, 1902 (RUNNING WITH ONE MOTOR)

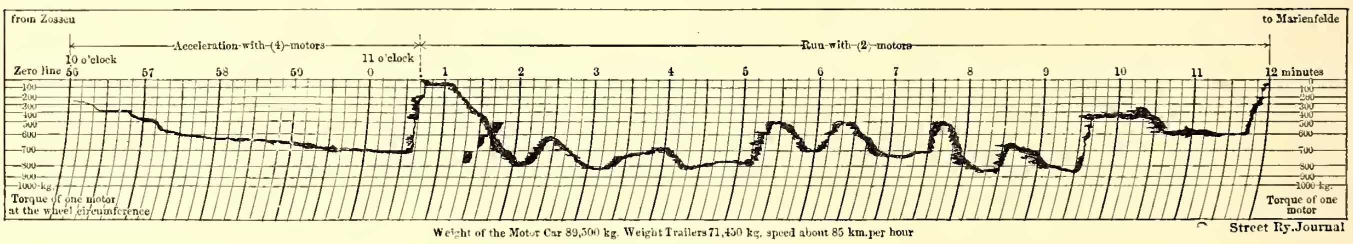


FIG. 6.—DIAGRAM OF MOTOR TORQUE TAKEN ON CAR A DURING RUN, ON NOV. 8, 1902, WITH FOUR THREE-AXLE TRAIL CARS

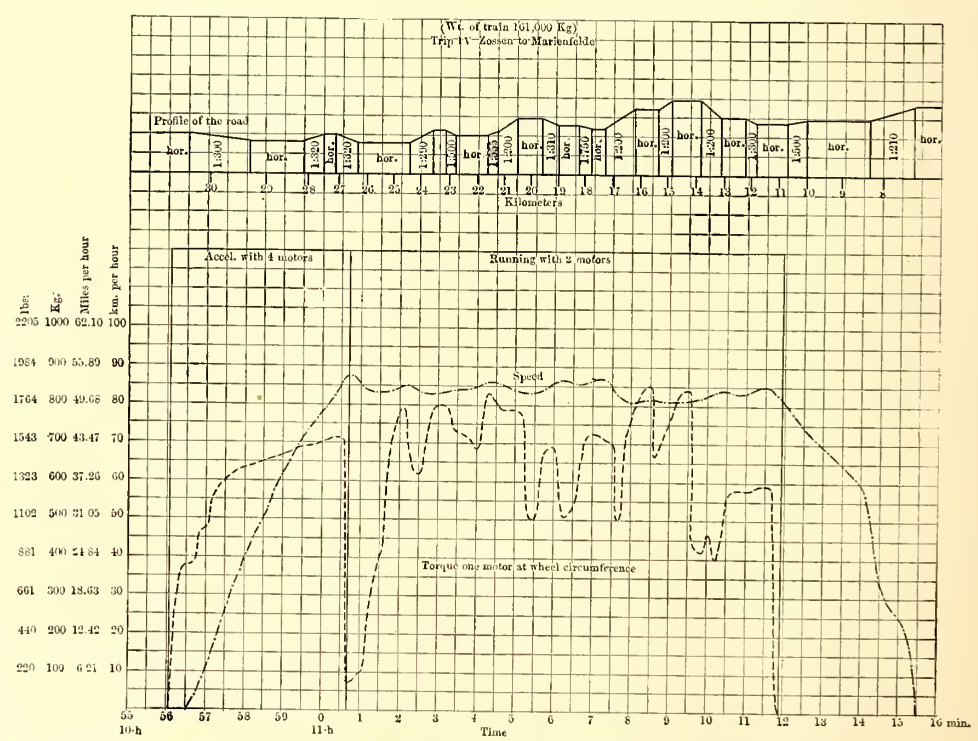


FIG. 7B.—TEST RUNS WITH CAR A AND FOUR THREE-AXLE TRAIL CARS, ON NOV. 8, 1902, SHOWING TORQUE, SPEED AND PROFILE OF LINE for which purpose we may use the approximate relation:

$$R' = \sqrt{\frac{R^2 + \omega^2 L^2}{\omega^2 C^2 \left[R^2 + (\omega L - \frac{1}{\omega C})^2 \right]}}$$

R represents the ohmic resistance determined from the measured watts, which varies very slightly from the value W derived from the direct-current measurements. $\omega = 2\pi n$.

When the capacity C is small, as in this case, the apparent resistance approaches the expression

$$R' = \sqrt{R^2 + \omega^2 L^2},$$

in which it is only necessary to determine the value of L from the measurements. For this purpose we may use the equation

$$E = J\sqrt{R^2 + \omega^2 L^2},$$

and we obtain from the potential diagram, Fig. 12,

$$\cos \Phi = \frac{K}{J \cdot E} = \frac{\text{measured load per phase}}{\text{measured voltamperes per phase}}$$

$$\sin \Phi = \sqrt{1 - \cos^2 \Phi}$$

$$R = \frac{E}{J} \cos \Phi = \frac{K}{J^2}$$

$$L = \frac{E}{Ja} \sin \Phi \quad \text{in henrys.}$$

(3) *Determination of the coefficient of induction for single-phase current.*

For this purpose the lines a, b and c were short-circuited at one end, but disconnected from the earth line E. Two lines were simultaneously connected at the observation station with the power house, and the load, current and potential of this loop were measured. The third line and the earth line remained without current. The connections were made as illustrated in Fig. 13. The calculation of the coefficient of induction follows in the same way as described under division 2, except that in this case it refers to the entire loop, while in the former instance it related only to the single wire, the earth wire acting only as a voltmeter connection, and is considered as carrying no current.

For comparison, the coefficient of induction was also cal-

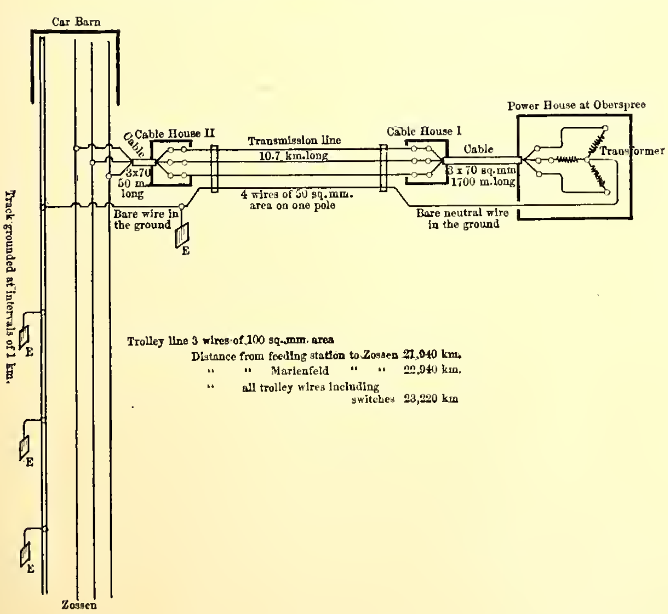


FIG. 8.—SHOWING LOCATION OF STATION FOR OBSERVING THE ENERGY AND VOLTAGE LOSSES IN THE TROLLEY AND TRANSMISSION LINES

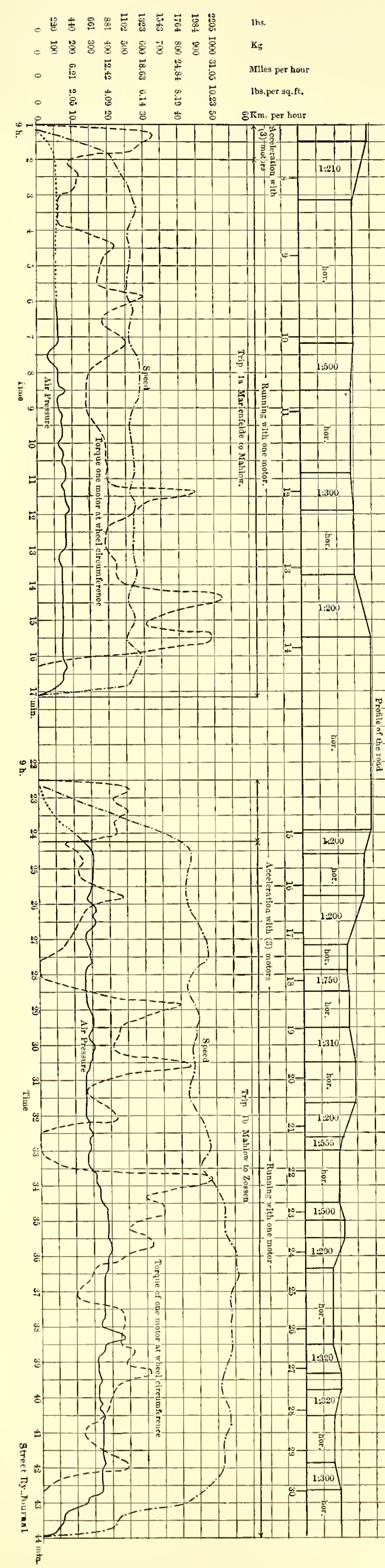


FIG. 7A.—TEST RUN WITH CAR A ON NOV. 7, 1902, SHOWING TORQUE, SPEED, AIR PRESSURE AND PROFILE OF LINE

Weather, dry; direction of wind, northeast; velocity of wind, 5 meters per second; weight of car, 89,500 kg.

culated from the readings taken from the lines according to the formula

$$L' \div \text{km} = 0.4605 \log \frac{d}{r} + 0.05 \text{ Millihenry}$$

correct for two parallel wires of radius r and separated by a distance d for 1 km length of single wire.

Conclusions may be drawn from the more or less perfect agreement of the recorded results with the values obtained from this formula, whether it is possible to neglect the capacity of the lines in the calculations.

The results of the measurements are tabulated in the following:

1. Ohmic resistance for direct current:

(a) Transmission line (10.7 km long)

Resistance of a single line a, b or c (average)

at — 4° C. $W = 3.462$ Ohm

at + 15° C. $W = 3.75$ Ohm

Resistance for the running kilometer

$W \div \text{km} = 0.35$ Ohm

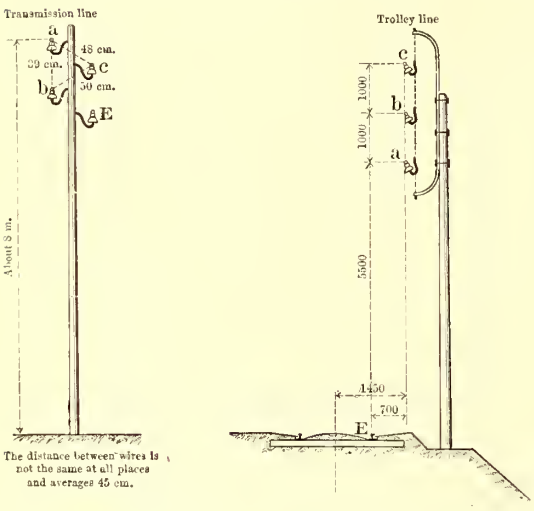
Resistance of the earth line E

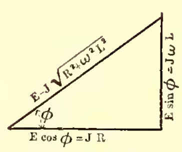
at — 4° C. $W = 0.775$ Ohm

By calculation we obtain

$$W' \div \text{km} = \frac{17.5}{50} = 0.35 \text{ Ohm}$$

(b) Trolley line (approximately 22 km, including the cable at the feeding point).





FIGS. 9 AND 10.—ARRANGEMENT OF WIRES ON TRANSMISSION AND TROLLEY POLES

FIG. 12.—POTENTIAL DIAGRAM

Resistance of a single line a, b or c (average)

at + 4.5° C. $W = 3.85$ Ohm

at + 15° C. $W = 4.02$ Ohm

Resistance for the running kilometer

$W \div \text{km} = 0.183$ Ohm

Resistance of the rail return

at + 4.5° C. $W = 0.42$ Ohm

By calculation we obtain for the trolley line

$$W \div \text{km} = \frac{17.5}{97.3} = 0.180 \text{ Ohm}$$

(By accurate measurement the area was found to be 97.3 sq. mm).

2. Coefficient of induction for alternating current:

(a) Tranmission line (10.7 km long) at — 3° C.

Line a . . . . $L = .01078$ $L \div \text{km} = .001008$
Line b . . . . $L = .01043$ $L \div \text{km} = .000974$
Line c . . . . $L = .01030$ $L \div \text{km} = .000966$

Average . . . . $L = .01051$ $L \div \text{km} = .000983$ Henry

The calculation gives . . . . $L' \div \text{km} = .000995$ Henry

(b) Trolley line (22 km) at + 5° C.

Bottom line a . . . . $L = .0255$ $L \div \text{km} = .001159$
Middle line b . . . . $L = .0234$ $L \div \text{km} = .001064$
Top line c . . . . $L = .0260$ $L \div \text{km} = .001183$

Average . . . . $L = .0250$ $L \div \text{km} = .001135$ Henry

The calculation gives as average . . . $L' \div \text{km} = .001131$ Henry

3. Coefficient of induction for single-phase current:

(a) Transmission line (21.4 wire length) at — 3° C.

Loop a-b . . . . $L = .0208$ $L \div \text{km} = .000974$

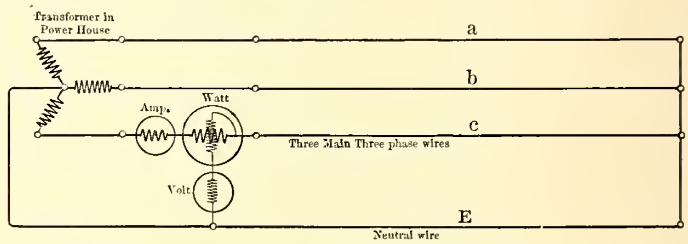


FIG. 11.—SCHEME ADOPTED FOR FINDING THE POWER, VOLTAGE AND AMPERAGE OF EACH PHASE

Loop a-c . . . . $L = .0219$ $L \div \text{km} = .001023$
Loop b-c . . . . $L = .0222$ $L \div \text{km} = .001037$

Average . . . . $L = .0216$ $L \div \text{km} = .001012$ Henry per kilometer and line

The calculation gives . . . . $L' \div \text{km} = .000995$ Henry

(b) Trolley line (44 km wire length) at + 5° C.

Loop a-b (1 m apart) . $L = .0469$ $L \div \text{km} = .001064$
Loop a-c (2 m apart) . $L = .0566$ $L \div \text{km} = .001285$
Loop b-c (1 m apart) . $L = .0483$ $L \div \text{km} = .001096$

Average . . . . $L = .0506$ $L \div \text{km} = .001148$ Henry per kilometer and line

The calculation for the loops gives:

a-b, $L' \div \text{km} = .001085$

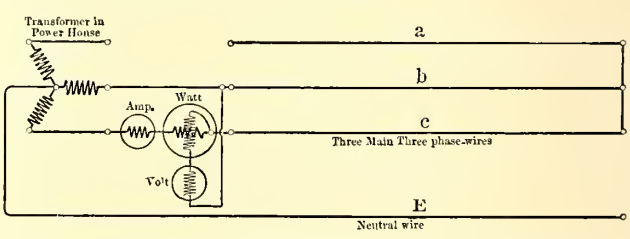


FIG. 13.—WIRING SCHEME ADOPTED TO DETERMINE THE COEFFICIENT OF INDUCTION FOR SINGLE-PHASE CURRENT

a-c, $L' \div \text{km} = .001223$

b-c, $L' \div \text{km} = .001085$

Average, $L' \div \text{km} = .001131$ Henry

After knowing these values, which refer to the line installation, the energy and potential losses in the transmission and trolley lines for the several groups of runs in the accompanying tables are calculated as follows:

The energy loss, according to Joule's Law, is

$$R = 3J^2W,$$

in which J represents the current strength and W the ohmic resistance of one line. Since the length of the line through which the current flows changes continually during the run, the average distance from the feeding point to the middle point of each division of the run must be estimated in order to determine the proper resistance to be employed for the accelerating and running periods.

As the average load will always be referred to time, so also this middle point must be referred to the time interval of the division of the run. That is, it is necessary to determine in the time-distance diagram (Fig. 14) that distance which answers to the mean between the time at the beginning and the time at the end of the division under consideration.

The drop in voltage is found from Fig. 15, in which

Ew = Voltage in car,
Esp = Voltage at the feeding point,
Ej = Voltage at Johannisthal,
JR = Ohmic voltage drop,
$J\,\omega\,L$ = Inductive voltage drop,
$\triangle Ef$ = Voltage drop in the trolley line,
$\triangle Ez$ = Voltage drop in the transmission line.

After plotting the triangle MNO in the vector diagram on the basis of the measurements taken in the car, in which $\cos\Phi$ is calculated from the equation

$$\cos\Phi = \frac{\text{Watt}}{\text{Amp. Volt. }\sqrt{3}}$$

we obtain the voltage and also the load factor at the feeding point and in Johannisthal by combining the diagrams of losses NPQ and QRS for the trolley and transmission lines. Through subtraction, we acquire the voltage drops $\triangle Ef$ and $\triangle Ez$.

The losses thus obtained do not always agree with those obtained by subtracting the measurements taken in the car from those noted at the feeding point. This is due to small errors of observation. A relatively small difference in the measurements of the power and voltage taken in the car and those noted at the feeding point produces a considerable error in only a small fraction of this large total difference. In this case the calculations of the losses based upon the line measurements are authoritative and should be considered as correct.

In the accompanying table the losses in power and voltage for the separate groups of the running periods are collected together in order to give a general idea of their magnitude. It will be seen that they stand in small relative proportion to the energy consumption, and this fact was also apparent during the progress of the calculations. The energy loss is proportional to the square of the current strength; but for a given load may vary considerably, depending upon the height of the voltage and the value of the load factor $\cos\Phi$. The energy loss varies also with the average length of the trolley line. The voltage drop is found from the formula

$$e = J\sqrt{R + \omega L},$$

or graphically from the loss diagram illustrated in Fig. 15. This loss is dependent upon the current strength, the resistance referred to the length of the line and its induction coefficient, also eventually upon the frequency. The induction coefficient and the frequency, or the value of ωL, exert also an influence on the direction of the losses in the potential diagram, from which the value of the resulting voltage at the feeding point (Esp) as well as that at Johannisthal (Ej) is greatly dependent.

BRAKE TESTS

The braking apparatus installed in the cars was described in detail in the preceding year's report. It was also stated that an accurate adjustment of the brake-shoes was attended with great difficulty on account of the numerous brake-rods, and that the desired results were not secured by connecting the Westinghouse pressure-reducing valve in circuit, since the pressure resulting from the operation of this valve was not

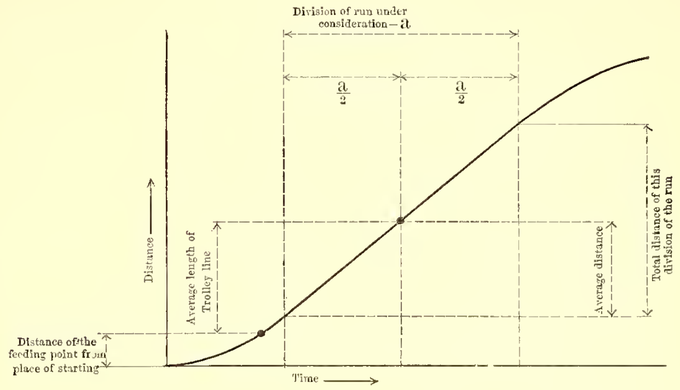


FIG. 14.—TIME DISTANCE CURVE

dependent upon the decrease in speed, but followed after a definite time interval.

As the proposed changes in the brake rigging could not be made on account of the limited space in the trucks, the greatest care was taken in the adjustment of the brake-rods so that the best possible braking effects would be obtained. The pressure-reducing valve was placed experimentally in the motorman's cab of car S and connected through pipes and cut-off cock with the brake cylinder. This made it possible to cut in the valve at any time, to retain the air pressure in the cylinder for a long time and to regulate it in proportion to the speed. The results obtained in the brake tests made with this arrangement may be seen in the table on the next page.

The decrease in speed in proportion to the time is shown by the curves in Fig. 16, which have a similar form to those obtained in the preceding year. As reliable speed recorders were used in this year's tests, the decrease in speed and the corresponding retardation could be accurately determined during the entire braking period, from which the coefficient of friction was calculated.

If we call, as in the preceding year, the

Coefficient of friction .... f.
Total pressure on the brake-shoes .... D.
Mass of the car .... M.
Rotating mass referred to wheel circumference .... R.
Resistance of the car .... W.
Retardation .... p.

TABLE OF THE ENERGY AND VOLTAGE LOSSES

Average Length of the Trolley Line Km.	Average Current in the: Trolley Line Amp.	Transmission Line Amp.	Energy Losses in the: Trolley Line Kw.	Transmission Line Kw.	Voltage Losses in the: Trolley Line. ($\triangle$ Ef)	Transmission Line. ($\triangle$ Ez)	Comparison of the Measured: Load in the Car. Kw.	Voltage in the Car. Volts.	Remarks
12.2	42.7	44	12.4	21.7	205	260	246	5,543	These refer to the test runs of Car A.
11.5	65.0	66	27.0	49.0	277	343	247	5,190	
13.1	44.7	46	14.5	23.7	252	292	302	6,089	
11.0	72.0	73	31.6	60.0	329	418	365	6,390	
14.1	84.0	85	55.2	81.2	527	565	644	6,120	
12.0	35.6	37	8.4	15.4	165	216	197	5,619	These refer to the test runs of Car S.
10.8	38.0	40	8.6	18.0	179	263	283	6,162	
10.8	67.0	70	27.0	55.0	330	463	499	6,685	

then we have:

$$f = \frac{p\,(M + R) - W}{D}$$

Grades are not taken into consideration in this equation, since the braking was done in most cases on level sections of the test track. All terms on the right-hand side of the equation are known. M, as in the preceding year, = 9300, and R = 790. The resistance W is taken from the resistance curve, published in the issue of Oct. 28 as Fig. 6, and D is calculated from the air pressure in the brake cylinder and the lever ratio of the brake-rods.

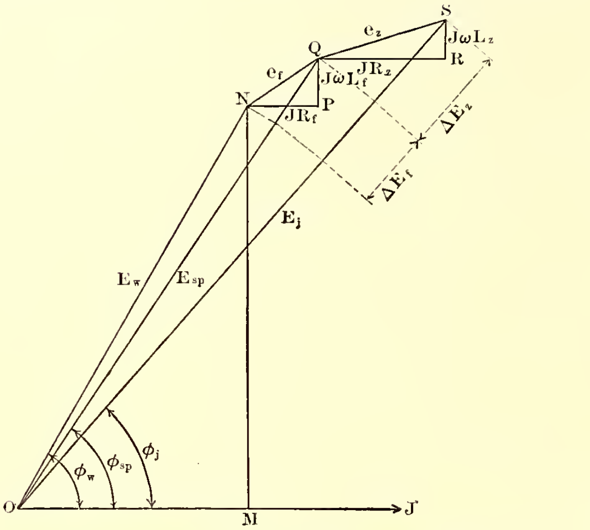


FIG. 15.—VECTOR DIAGRAM LAID OUT FOR DETERMINING THE VOLTAGE DROP

From these values it is seen that the friction coefficient during the first part of the braking period decreases; but with further reduction in speed, rapidly increases. This agrees throughout with the observations which Capt. Douglas Galton published in the year 1878, according to which the friction coefficient at a constant speed decreased with the continuation of the braking. But in the above brake tests the simultaneous decrease in speed must be taken into consideration, as it results in an increase in the friction coefficient. On this account it is to be assumed that at the beginning of the braking period the decrease in the friction coefficient with the time is greater than its increase resulting from the reduction of the speed, while after a few seconds an increase in the friction coefficient predominates as the speed still further decreases.

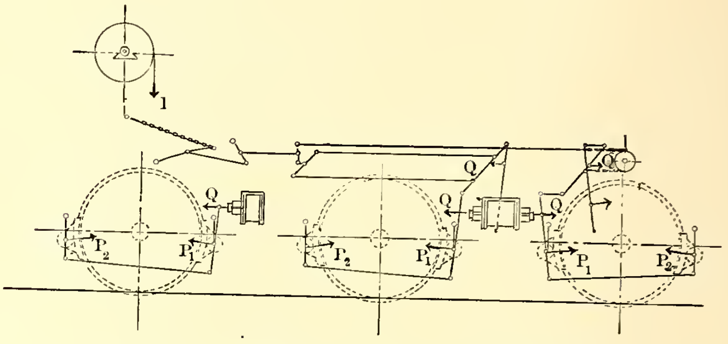


FIG. 17.—SIMPLIFIED BRAKE RIGGING FOR THREE-AXLE TRUCK

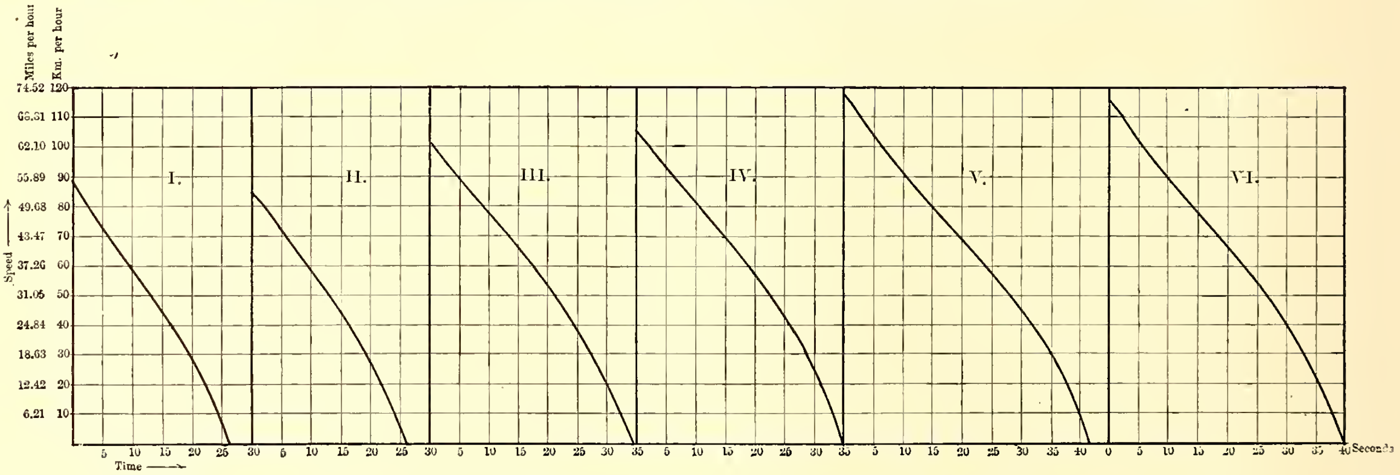


FIG. 16.—BRAKE TESTS ON OCT. 30, 1902, WITH CAR S

In general, the tests gave no better results than braking under the most favorable conditions during the preceding year.

TABLE OF BRAKING DATA

No. of Test	Braking Distance Between Km. Posts	Speed at Beginning of Braking Km. Per Hour	Braking Distance M.	Braking Time Sec.	Air Pressure in the Pipes Atmos.	Air Pressure in the Cylinders Atmos.	Average Retardation $p = \frac{v}{t}$ M. per Sec.	Retarding Force in % of Car Weight $\frac{100\,p}{g}$	Application of the Pressure Reducing Valve	Remarks
I	9.708 to 10.07	89.2	362	26.5	7.8	5.5 to 4.5	0.936	9.5	Ready before braking.	Emergency braking.
II	12.886 to 13.238	85.5	352	26.2	7.5	5.5 to 4.5	0.908	9.3		
III	17.005 to 17.554	102.4	549	34.5	8.5	6.2 to 5.5	0.823	8.4	After 15 seconds.	Emergency braking.
IV	22.494 to 23.081	105.8	587	35.	8.5	6.2 to 5.5	0.840	8.6	After 18 seconds.	Emergency braking.
V	26.23 to 25.469	118.4	761	41.8	8.3	5.9 to 4.8	0.708	8.0	After 25 seconds.	Emergency braking.
VI	16.952 to 16.232	116.2	720	40.	8.5	6.2 to 5.0	0.808	8.2	After 25 seconds.	Full service braking.

The results, presented in the table on the opposite page, give several calculated values of the coefficient of friction for the same speeds, and also the average of these values.

It was also impossible to obtain a shorter braking distance by operating the pressure-reducing valve by hand, through which the highest air pressure could be retained in the brake cylinder for a long time.

With due consideration of the high brake pressure used, the conclusion must be reached that the complicated brake rigging, although the greatest care was observed, could not be adjusted accurately enough. A simplification of the brake rigging is therefore to be desired. For the proposed new three-axle truck with a 5-m wheel base, a brake rigging is already designed, and its principal features are illustrated in Fig. 17. The most important simplification to be gained by this brake rigging will be through placing the brake cylinders in the plane of the wheels and providing so that one piston operates on the

TABLE OF BRAKING DATA

Average Speed. Km. per Hour	Brake Test. No.	Time after Application of the Brakes. Sec.	Retardation. p Meters per Second.	Brake Pressure D. Kg.	Coefficient of Friction. f.	Average Coefficient of Friction
113	V	2–3	0.94	119,000	0.072	0.066
	VI	2	0.83	126,000	0.060	
100	III	1–2	0.78	126,000	0.057	0.055
	IV	3	0.78	126,000	0.057	
	V	7	0.78	119,000	0.060	
	VI	6	0.67	126,000	0.048	
75	I	5	0.83	103,000	0.076	0.062
	II	5	0.89	103,000	0.082	
	III	11–12	0.72	126,000	0.054	
	IV	13–14	0.72	126,000	0.054	
	V	18	0.67	119,000	0.053	
	VI	17	0.67	126,000	0.050	
50	I	14	0.94	91,000	0.100	0.075
	II	13	0.86	91,000	0.092	
	III	21–22	0.83	107,000	0.069	
	IV	23	0.83	119,000	0.068	
	V	28–29	0.67	114,000	0.057	
	VI	27	0.83	123,000	0.066	
25	I	21–22	1.11	80,000	0.128	0.108
	II	21–22	1.11	80,000	0.128	
	III	29–30	1.00	109,000	0.091	
	IV	30–31	1.00	109,000	0.091	
	V	37	1.03	93,000	0.110	
	VI	35	1.06	107,000	0.098	
8	I	25–26	1.39	80,000	0.162	0.149
	II	25	1.44	80,000	0.167	
	III	33	1.33	109,000	0.122	
	IV	34	1.47	109,000	0.135	
	V	41	1.56	93,000	0.168	
	VI	39	1.39	98,000	0.142	

brake shoes of a single wheel. Two double cylinders are carried on each truck, one each between each pair of wheels lying nearest the middle of the car, and single cylinders between each of the outside wheels. The hand brake is commonly connected only with those brake-shoes that are operated by the double cylinders. This seems advisable since the highest admissible brake pressure through the large lever ratio used can be by no means reached even though only two axles of the truck are braked. Through this great simplicity of the brake rigging a good adjustment of the brake-shoes is assured, and it is therefore hoped that the best braking results will be obtained that are possible with wheel brakes.

DAILY REPORTS TO THE GENERAL MANAGER IN ROCHESTER

In the final results the value of any system of departmental records and reports in electric railway administration must depend upon the promptness and accuracy with which the system renders available the salient information required by the manager or head of department. In other words, there is certain information the general manager wants each morning concerning the previous day's happenings and results. There is another class of information, particularly with reference to details, which, although significant and of prime importance, does not necessarily demand the personal attention of the manager each day. If the attempt is made to include too much of the latter class of details in the daily reports to the manager, the main object aimed at may be defeated in that the salient information is buried in the mass. In short, any successful system of reports must be so devised as to render available each morning an epitomized summary of the previous day's operations. And it should be emphasized that the workings of the system of reports should be such as to provide that these daily reports be delivered at the manager's desk automatically, in so far as any specific attention on the manager's part is required.

As a "pointer" on the preparation of daily summarized reports, the system instituted by R. E. Danforth, general manager of the Rochester Railway Company, is suggestive. No attempt is made to use an elaborate printed form. The digest reports are typewritten on sheets the size of an ordinary letter head. The form of report reproduced herewith covers the mechanical, line, track and claim departments, and it will be seen, lays bare at a glance a summary of the previous day's work and happenings. The principle is carried even further, and the report includes not only a record of the previous day's results, but also covers the work and conditions for the day on which the report is made, so that report received "this morning" shows track work, line work and cars in shops and on road "to-day," and accidents, emergency calls and cars disabled "yesterday." The same idea is carried out with reference to the operating departments, and thus, by glancing over two small and conveniently handled sheets, the manager is able to keep close watch from day to day as to the general conditions on his property.

FORM OF DAILY EPITOMIZED REPORT MADE TO GENERAL MANAGER, ROCHESTER RAILWAY COMPANY

Rochester Railway Company, Oct. 7, 1905.

To-day in shops, Car Numbers

500 Paint.
501 "
502 "
511 "
452 "
457 "
458 "
459 "
73 Sodus—Overhauling.
328 Paint.
341 School.
315 Damaged.
430 Damaged.
126 Wheels.
226 Wheels.
200 Wheels.
303 Wheels.
441 General overhaul 17

STATE STREET DIVISION

80 Cars running on road.
25 Cars available in shed.
10 Swing cars to go out.
14 Disabled cars in shed...... 129

EASTERN DIVISION

51 Cars running on road.
43 Available cars in shed.
9 Swing cars to go out.
17 Disabled cars in shed...... 120
37 Cars stored.................. 37

SODUS DIVISION

9 Cars running on road.
4 Available cars in shed.
1 Disabled car in shed....... 15

SUBURBAN DIVISION

10 Available cars in shed.
2 Disabled cars in shed...... 12

330

LINE WORK

1 Wagon to Platt Street bridge.
1 Wagon to West Main Street.
1 Wagon to Hudson Avenue.

TRACK WORK

1 Team to South Avenue, a/c 1.
2 Teams to Franklin construction.
4 Teams to Genesee St., job No. 431
1 Team to Portland Ave., job No. 399.
7 Men to South Ave., a/c 1.
30 Men to Franklin construction.
40 Men to Genesee St., job No. 431.
12 Men to Hudson Ave., job No. 323.
4 Men to Park Ave., job No. 38.
6 Men to Park Ave., job No. 454.
20 Men to Portland Ave., job No. 399.
1 Man to Saratoga Ave., job No. 430.
3 Men to Curve cleaning.
2 Men to blacksmith and helper.
1 Man and cart.

EMERGENCY CALLS (Yesterday)

Main and Caledonia Ave. bridge, trolley wire broke.
Hudson and Ave. E, ear off.
Charlotte line, cemetery, ear off.

SODUS WORK

2 Putting up crane, job No. 36-A.
8 Surfacing tracks, job No. 36-A.
2 Flagging Hudson Ave., job No. 323.
1 Flagging Park Ave., job No. 369.
18 Sand account.
4 Line work, job No. 37-E.
4 Track repairs, section 2.
4 Track repairs, section 3.

ACCIDENTS (Yesterday)

Man stepped off moving car and fell; injured his hand.
Car struck horse; was knocked down; leg scratched and thill broken.
Car struck wagon.
Man caught car and fell.

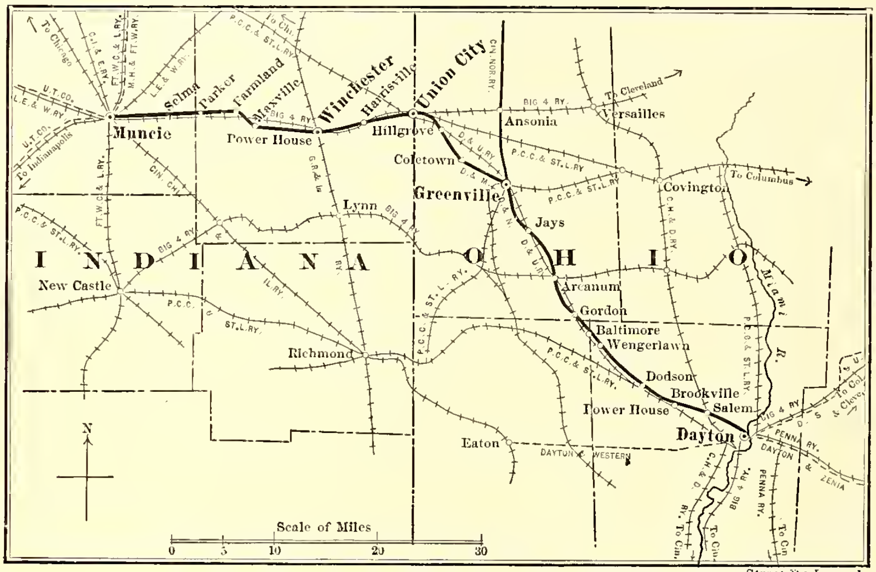
DISABLED CARS (Yesterday)

8 Motor trouble.
4 Brakes.
1 Miscellaneous.

Of course, reports as to minute details follow with all possible promptness.

THE DAYTON & MUNCIE ELECTRIC RAILWAY

The Dayton & Muncie Traction Company has recently completed its line into Muncie, Ind., forming a most important link in the great chain of lines in Ohio and Indiana. It affords through service from Dayton to Muncie, and it also furnishes the most direct route for travel on electric lines from numerous points in Southern and Central Ohio to points in Central and Northern Indiana. The Dayton & Muncie proper extends from Greenville, Ohio, to Muncie, Ind., but at Greenville it connects with the tracks of the Dayton & Northern, which joins Greenville and Dayton. The two properties are under the same general ownership and management, and although at present through passengers are transferred at Greenville, it is probable that this will soon be done away with, since, from the general operating standpoint, the two roads are a unit and will doubtless be consolidated in the not very distant future. Through limited service has been provided for and will be instituted as soon as the track on the new line is in better shape.



MAP SHOWING ROUTE OF DAYTON & MUNCIE TRACTION COMPANY

The distance from Dayton to Muncie, including city entrances, is 86.5 miles, the Dayton & Northern having 41.6 miles of track and the Dayton & Muncie 44.9 miles. It is interesting to note that the population tributary to the system is much greater in Indiana than in Ohio, as the Dayton & Muncie has 1054 people per mile of road as compared with 471 for the Dayton & Northern, which lies wholly in Ohio. It is the numerous towns and the densely settled rural districts that have made Indiana the premier traction State in the Union.

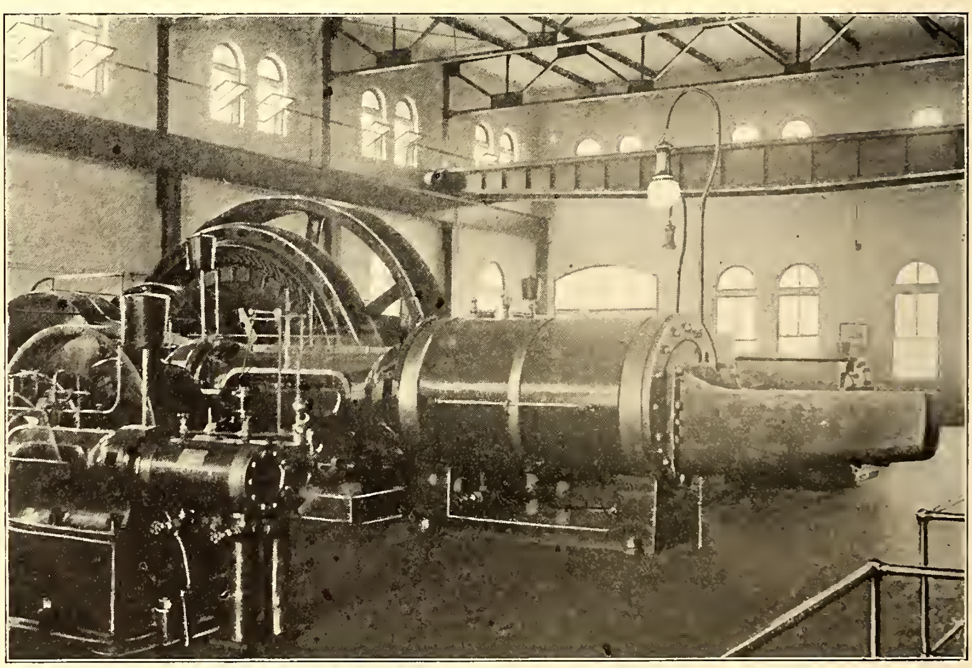
The towns on the Dayton & Muncie may be described briefly as follows: Greenville is the seat of Darke County, Ohio, which ranks first as an agricultural county in Ohio. The population is about 8000, having experienced a splendid growth since the building of the Dayton & Northern three years ago. It has four banks, a large stove factory, a screen door factory, wire fence factory, lumber yards, planing mills, several machine shops, etc. Union City, on the State line, has about 7500 population. It is an important railroad center, and it has a large automobile factory, lumber yards, planing mills, six grain elevators, city waterworks, natural gas, sewer and electric light systems. Winchester, seat of Randolph County, Ind., has a population of 6000; fine county and city buildings, excellent public utilities, three banks, several hotels and manufacturing establishments. Farmland has a population of about 2000. It has two banks, several manufacturing concerns, and within the past two years it has grown rapidly owing to the discovery of oil; at present the town is surrounded by hundreds of wells. Parker City has a population of about 1500, and is said to be the center of the richest oil district in Indiana. It has a large furniture factory and several oil supply houses. Selma has about 900 population, and large oil interests are represented there. Muncie in 1900 had 21,000 population. At present, owing to the growth of the oil industry, it is claimed the population is 32,000. It has numerous manufacturing plants, including glass works, iron mill, barb wire factory, nail mills, harvesting machinery factory, numerous fine office buildings, city and county buildings, and a number of hotels, which are always crowded. The Muncie, Hartford & Fort Wayne Traction Company connects for Bluffton and Fort Wayne, while the Indiana Union Traction Company operates to Anderson and Indianapolis, and connects for numerous other cities. The traction interests centering there have completed arrangements for the erection of a fine freight and passenger station. Other lines are projected from Muncie, and it promises to be the second most important traction center in the State.

When the Greenville-Muncie extension was decided upon, several preliminary designs were worked out relative to the location of the power station, and the general plans were as follows:

(1) Increasing the Dayton & Northern power house.

(2) Building a power house solely for the new section.

(3) Building a new power station for both sections and transferring all of the power generation for both roads to it.



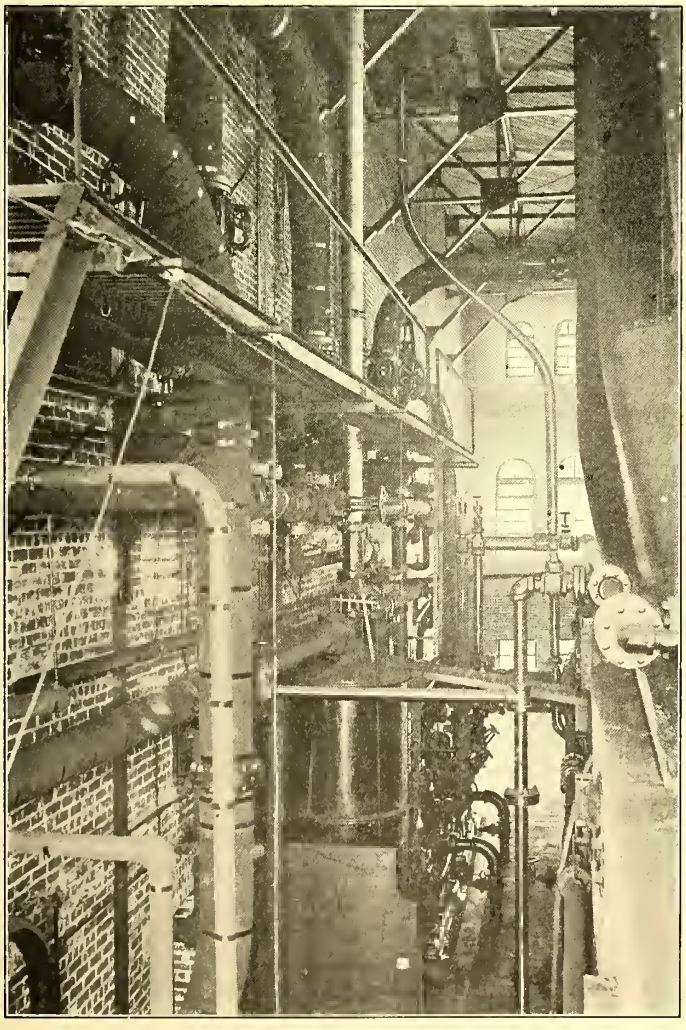
INTERIOR OF DAYTON & MUNCIE STATION AT WINCHESTER

Preliminary estimates of the first cost and operating expenses were made for each of the general plans and for several subdivisions, and the decision was to locate a new station at Winchester, Ind., to be used chiefly for the new section, and to locate a large sub-station at Greenville and have this sub-station feed a portion of the Dayton & Northern, thereby relieving its station.

One difficulty encountered was obtaining ample water for condensing purposes, especially at a point on the line of the road where it was possible to obtain coal direct from a steam road. The Dayton & Northern station was furnished with water from a very small stream and from wells, and had cooling trays, and there was not sufficient water to more than double the output, which would be necessary to provide power for the entire system.

POWER STATION

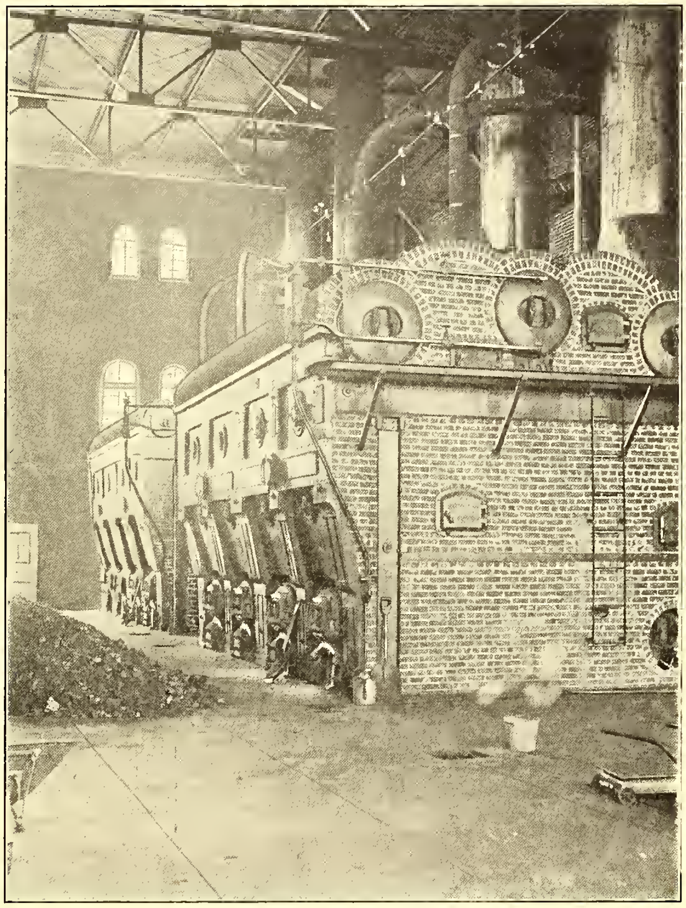
As stated above, the new station was located at Winchester, where there is a small stream, which was dammed to create a pond, and cooling trays were installed. A connection was also made with the city waterworks system. This enables the station to pump into the city mains in case of fire. The power house also has a fire pump for its own protection and that of the adjacent car house, while the connection above mentioned



STEAM PIPING AND PUMPS BACK OF BOILER

enables the city and railway to be mutually helpful in case of emergency.

The station building is of plain but neat design, and is of machine brick with red mortar and stone copings. It has a wing on one side for fuel storage bins, and on the other for a static room. In the engine room are two Westinghouse 500-kw 400-volt a. c. generators of the revolving-field type, driven by 21-in. and 42-in. x 48-in. horizontal cross-compound Buckeye engines operating at 95 r. p. m. Provision has been made in the station layout for the installation of a third unit of the same or larger capacity. There are two exciter sets, composed of 37½-kw Westinghouse generators, each driven by a Buckeye simple engine running at 300 r. p. m. The condensers for the main engines are of the surface type, Stilwell-Bierce-Smith-Vaile manufacture. Each engine has a separate condenser, but the exaust piping is cross-connected so that either will handle either engine. A Bundy vacuum oil separator is provided in the exhaust of each engine operated in connection with a 6-in.



BOILER ROOM AT WINCHESTER

x 8-in. x 10-in. vacuum pump. The live steam separators for the exciter engines are Cochrane.

There are two 10-in. x 6-in. x 12-in. boiler feed-pumps of the outside-end packed plunger type and having pot valves. There is a 6-in. x 8-in. x 10-in. duplex piston pattern pump for pumping water to a 1600-hp Stilwell-Bierce open heater. A 5¼-in. x 4¾-in. x 5-in. duplex piston pattern pump provides water to a supply tank for house purposes. A 16-in. x 9-in. x 12-in. Underwriters' fire pump takes care of the fire service. The pumps, the heater and steam piping are arranged back of the boilers, there being a space of about 9 ft. between the wall and the back of the boilers. All of these pumps are Stilwell-Bierce-Smith-Vaile manufacture. Each is provided with a Fisher governor, and they have cast-iron drip pans to catch all drip, pans being piped to drain. All governors are by-pass. All high-pressure receivers, heaters, steam headers, etc., are drained by the Holly system, and an auxiliary feed-water line connecting with each boiler is provided in addition to the main feed line. A Worthington hot-water meter is placed in a by-pass of the feed-water lines. The condensed steam in the engines is discharged into a cast-iron hot well adjoining the feed-water heater. A float valve is placed in the line from the condensing water discharged from the condensers, and an additional connection to the hot well is also made from the city water service. All boiler feed lines, fire lines, city water lines, tank lines and water line to header are cross-connected. There is a cold well outside the building, with lines from this to the condensers and to the various pumps. The suction piping is so connected that the heater pump can take water from either the hot well or the cold well, and the feed-pumps can obtain water from the heater, hot well or cold well and discharge through either feed line to the boilers; also either boiler feed-pump can obtain water from the heater, the second pump obtaining water from the hot well or the cold well.

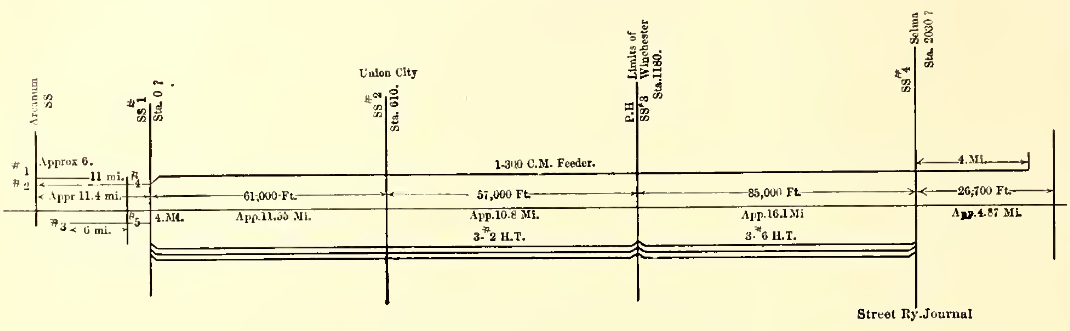
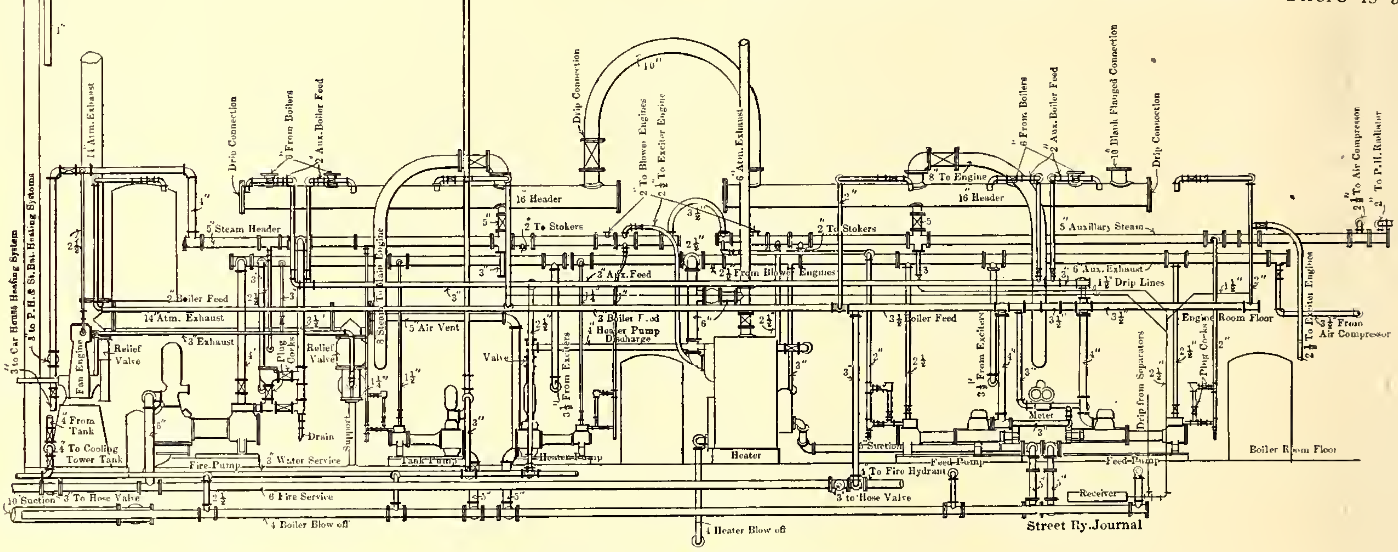
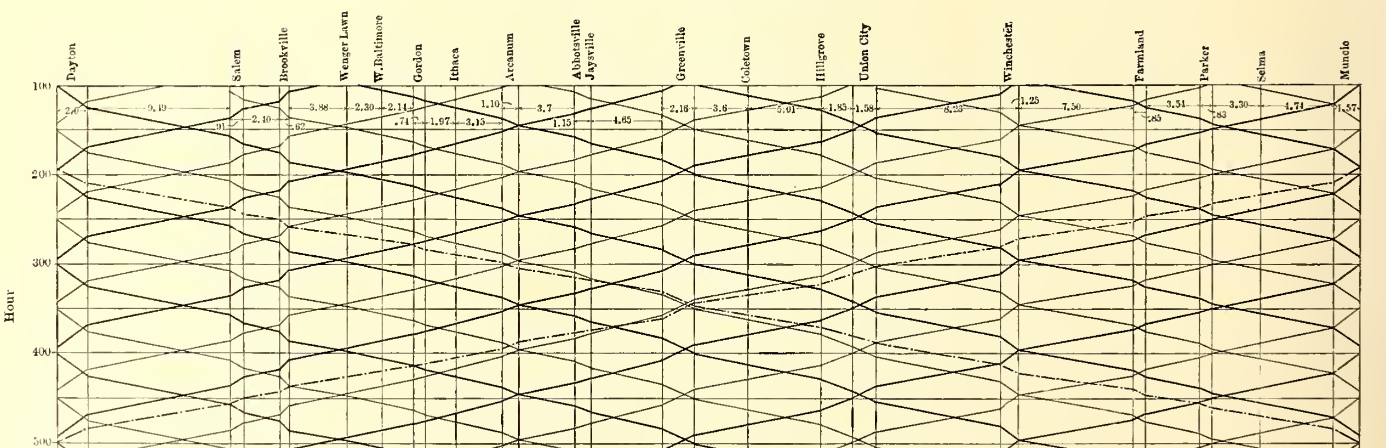


DIAGRAM OF FEEDER SYSTEM



ELEVATION OF BOILER HOUSE PIPING



AFTERNOON TIME TABLE BETWEEN DAYTON AND MUNCIE

The condenser discharge is cooled for re-use by means of the cooling trays illustrated in the view of the power station. The trays were designed to handle double the present capacity of the house, and are provided with sectionalizing walls so that any portion can be cut out for repairs, and they can be leveled up in sections. The water after leaving the trays passes to a point not far from the pond overflow and at some distance from the cold-well intake, so that the coolest water is used first, and if there is any overflow, it is the water from the trays.

A gravity oil system is provided for the engine oil supply. The oil is returned to a 150-gal. Cross filter and storage tank, and is pumped from the tank and filter to a supply tank near the boiler room roof by a small Marsh pump.

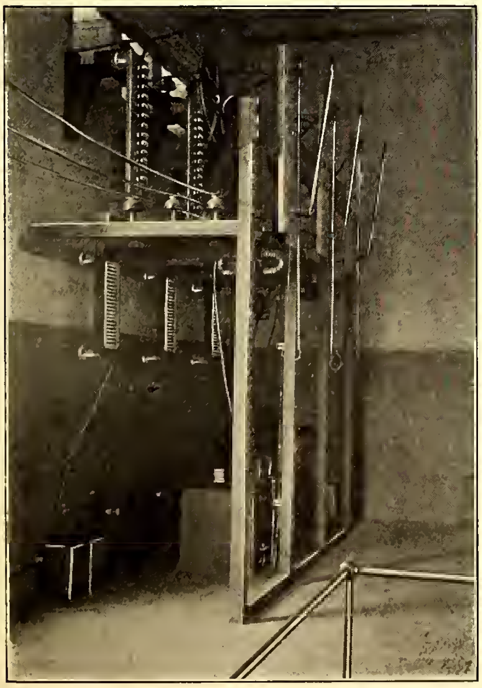
The boiler equipment consists of four 250-hp Stirling boilers with independent steel stacks. The boilers are arranged in batteries of two each. Each battery is piped to a live steam header, and the two headers are cross-connected by a U bend, so that one engine is connected to each header. There is a small header for the auxiliaries below the main headers, and the necessary valves are provided so that the headers can be subdivided into groups for repairs. The connection is such that each main engine is complete with its complement of two

POWER STATION AND COOLING TRAYS AT WINCHESTER

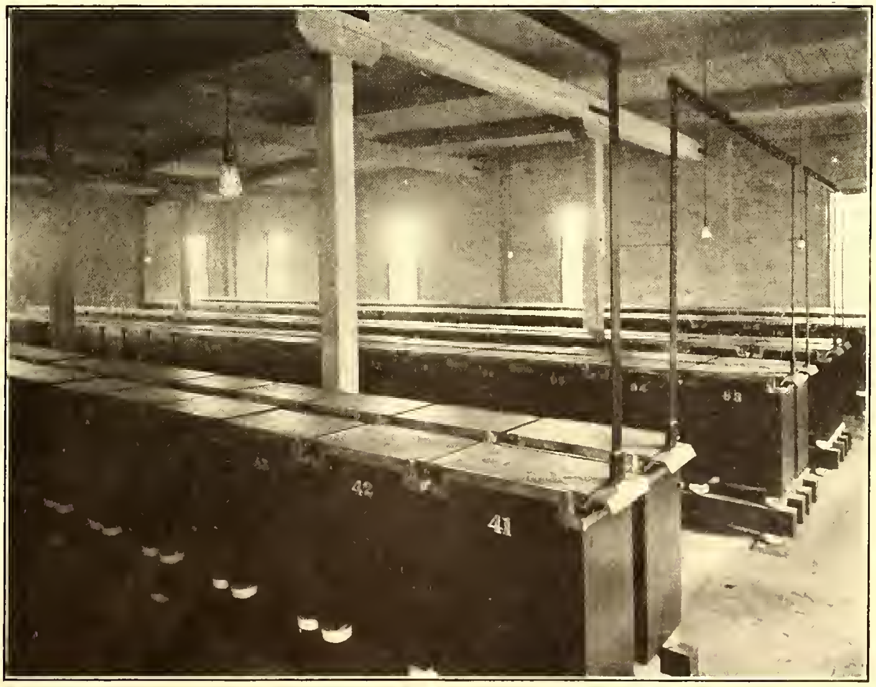
boilers, one feed-pump and one exciter engine. At the same time the auxiliary header connections are such that either exciter engine or feed-pump can be operated off from either battery or boilers.

All piping and steam auxiliaries were furnished by the Shaw-Kendall Engineering Company, of Toledo. The piping is all covered with Keasbey & Mattison pipe covering painted terra cotta, and it presents a very neat appearance. All high-pressure piping has 85 per cent magnesia covering.

In the basement below the static room of the power station there is one bank of 200-kw transformers and one of 100-kw transformers, with extra transformers in each group. The transformers are oil-cooled and raise the voltage from 400 volts to 16,500 volts. Directly above the transformers in the static room are oil switches on the high-tension side, which are operated by hand from the switchboard placed in the engine room. They are provided with automatic trips, operating in case of overloads. The transformers are also connected to the low-tension bus-bars by knife switches and circuit breakers placed on two transformer panels. A high-tension cross-connecting oil switch is also provided. Normally, the bank of 100-kw transformers takes care of the Selma sub-station located at the west end of the line, and the bank of 200-kw transformers provides current for the Union City and Greenville sub-stations to the east of the power station, but the connections are such that either or both banks can be used for either section. Thus, in case of light loads, the bank of 200-kw transformers will take care of the load on both lines.

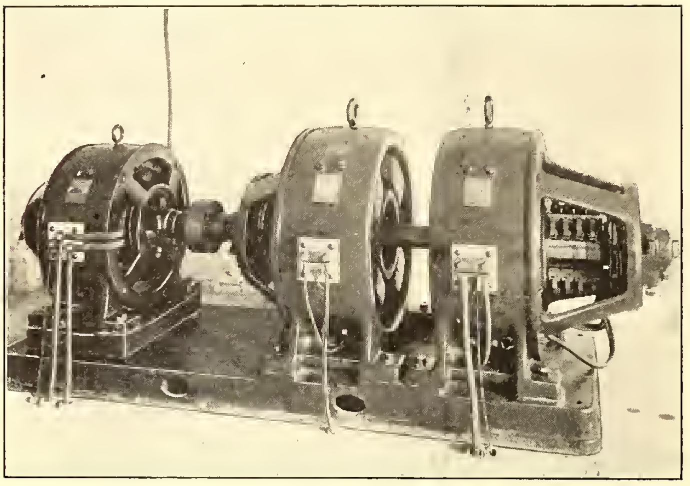


OIL SWITCHES, HIGH-TENSION BREAKERS AND LIGHTNING ARRESTERS



SELMA STORAGE BATTERY PLANT

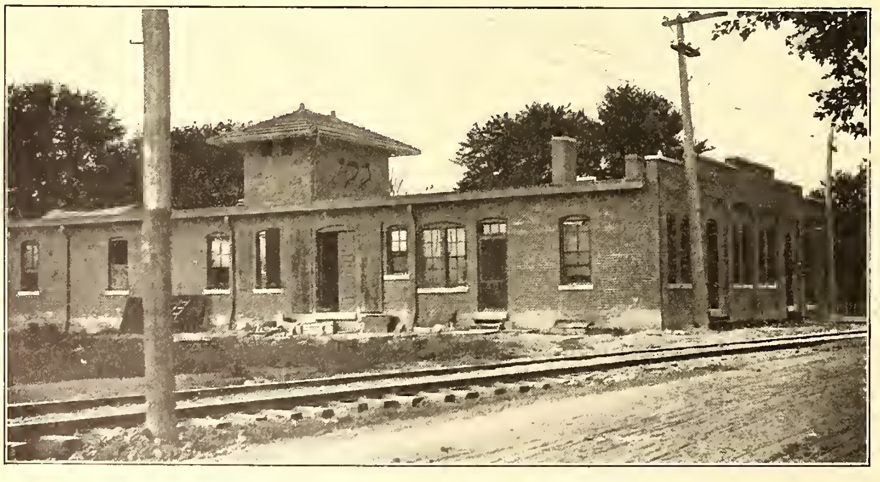
There is also provided in the power station one 200-kw rotary supplying 650 volts direct current. In both the Selma and Union City sub-stations there is a 200-kw rotary with its complement of 75-kw statics, switchboard, etc. The Greenville sub-station is provided with one 300-kw rotary and a bank of 100-kw statics, switchboard, etc. In addition there is a portable sub-station with a 200-kw rotary with 75-kw oil-cooled statics, switchboard, etc. All the above electrical apparatus as well as car equipments were furnished by the Westinghouse Electric & Manufacturing Company.



BOOSTER SET FOR BATTERIES

STORAGE BATTERY

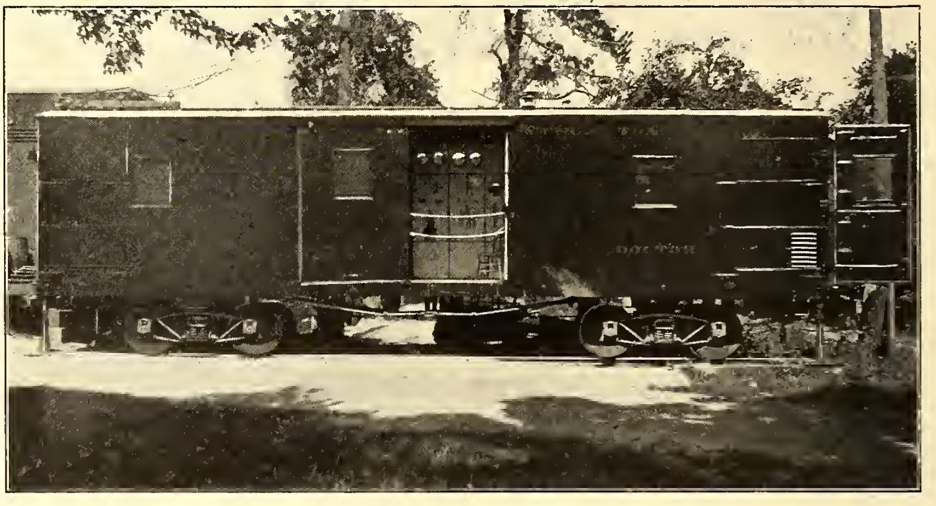
At the power house and at each sub-station there is a Gould storage battery having a normal discharge rate of 320 amps. for one hour, provision being made for an increase in the capacity to 400 amps. Each battery is provided with a booster set, consisting of a booster generator and a c. e. m. f. generator, driven by a 650-volt shunt-wound motor. The booster automatically prevents the fluctuation of load falling upon the rotary or rotaries, from exceeding 5 per cent above or below the average when the average is not less than 60 per cent of the capacity of the rotary or rotaries in operation and the battery is approximately 75 per cent full. The same regulation is also obtained under the same conditions with the average load less than 60 per cent capacity of the rotary or rotaries in operation. It will be seen that the use of these batteries at each station permits of the use of smaller rotaries than would otherwise be necessary, and the regulation at the power station is much better. The batteries were furnished complete with the booster sets and necessary switchboard panels by the Gould Storage Battery Company. The installation is first-class, particular attention being paid to insulation. The battery cells rest on wood blocks resting on porcelain insulators. These rest on heavy stringers, which in turn rest on other insulators, and finally these insulators are imbedded in sulphur blocks on the tile floor. The battery house roofs are of slow-burning mill construction, and the rooms are all steam heated by Peter Smith heaters. At the power station there is a distillery for providing distilled water for the batteries.



SELMA SUB-STATION, DAYTON & MUNCIE

SUB-STATIONS

The sub-station buildings are of three distinct types. At Greenville the building is located on the Public Square, and it consists of passenger waiting room, ticket office, freight office, large receiving platform with track at the side, room for sub-station machinery and battery room. At Union City a three-story brick building, formerly used as a wholesale warehouse, was purchased and remodeled. It is located on the main street, within 100 ft. of the main business corner. The front portion of the first floor was fitted up for ticket office, waiting room and freight room, while the machinery room is in the rear. One section of this was partitioned off with heavy brick wall for the transformers and high-tension apparatus, the high-tension lines running up to the top of the building through a fireproof flue, which also serves to ventilate the transformers. The basement is ceiled off with concrete and tile roof for the storage battery room. The two upper floors have been rented at good profit.



PORTABLE SUB-STATION

The sub-station at Selma has a residence for attendant, in addition to freight and passenger rooms, machinery room and storage battery room, and it is interesting to note that it is but one-story high. The living rooms are arranged so that the attendant from his chamber can see the switchboard and machinery. The static room is ceiled off with fireproof walls and window covers, and the high-tension lines enter through a fireproof tower, which has tile roof. An exterior view and details of this station are presented.

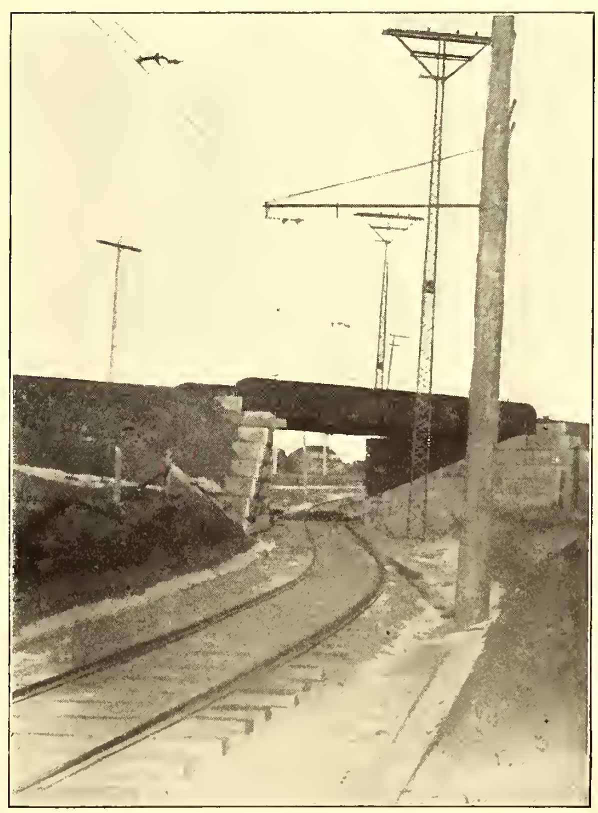
CAR HOUSE AND REPAIR SHOP

The car house and repair shop building is in front of the power station at Winchester. It is 83 ft. x 170 ft., of mill construction. There are four tracks for storage, each long enough for three cars, with pit under each track at the front of the building. The repair shop portion is separated from the storage room by fireproof wall. There is a 90-ft. pit in the shop, and the balance of the space is partitioned off for armature room and stock room. Air is used for cleaning and for certain tools, but not much machinery has been installed, as the heavy work is taken care of at the Dayton & Northern shop at Brooksville.

ROLLING STOCK

The rolling stock consists of eight passenger coaches, two combination passenger and baggage cars, one express car and one work car. The passenger cars are double-end steam coach type with drop platforms and with round three-front window vestibules, step openings being enclosed by double folding doors. They were built by the Stephenson Company, and have Peckham No. 36 M. C. B. trucks and four Westinghouse No. 56 motors. The Christensen storage air system is used for brakes, the air reservoirs being filled at Winchester each half trip.

TYPICAL VIEW ON LINE, DAYTON & MUNCIE

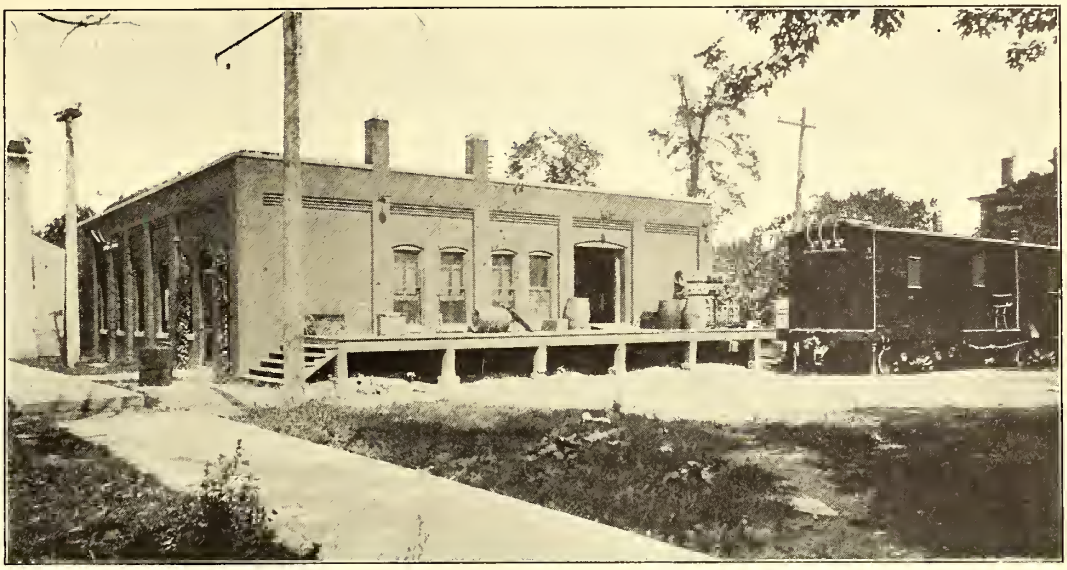


UDERGRADE CROSSING, SHOWING STEEL POLES FOR H.-T. WIRES

Air is supplied by an Ingersoll-Sergeant compressor located in the power station, which also supplies the repair shop. The storage air system is also used on the Dayton & Northern, and the desirability of having the cars of the two lines uniform and interchangeable caused its adoption by the Dayton & Muncie Traction Company.

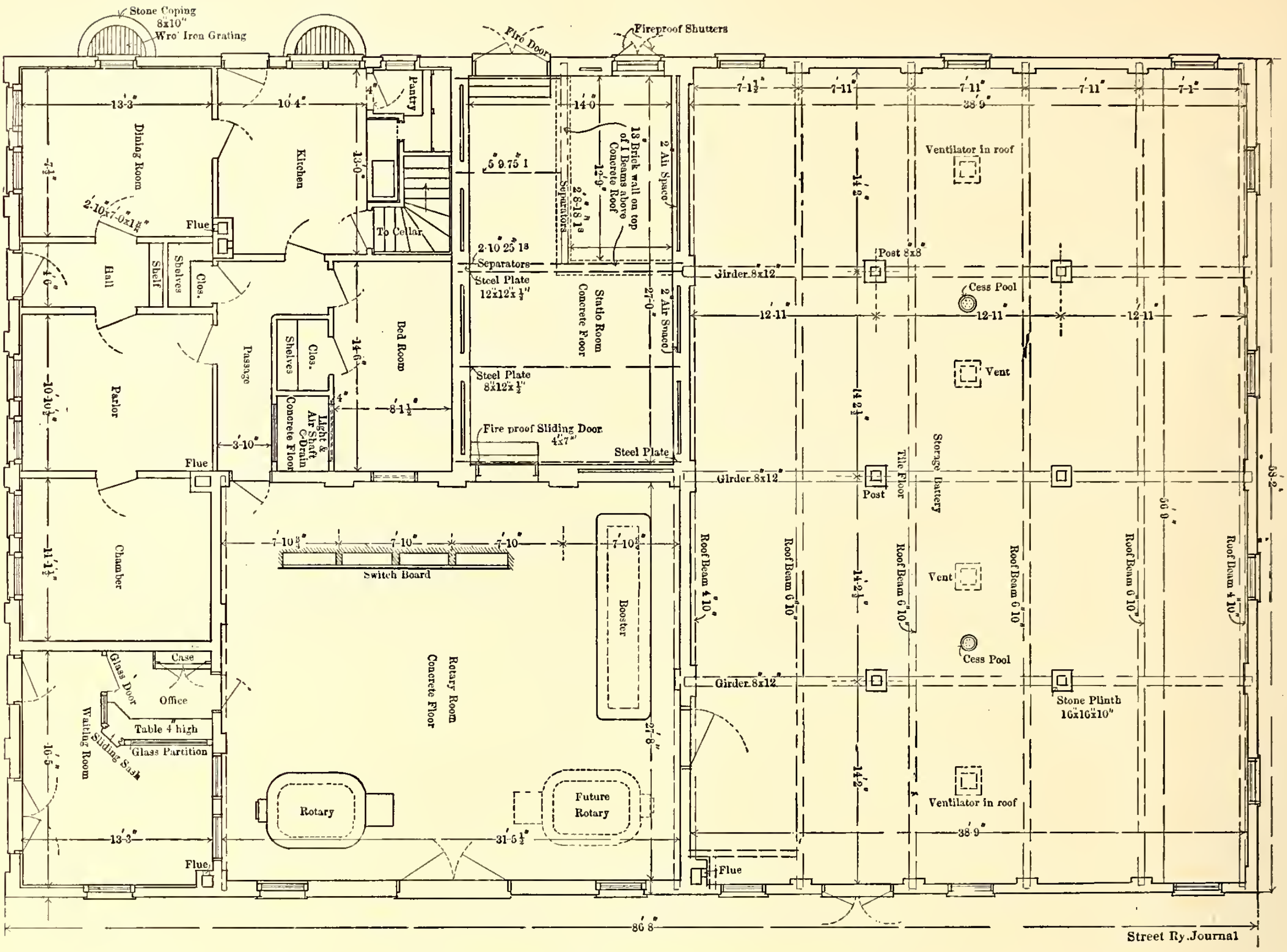
TIME-TABLES

The diagram on page 980 gives a graphical time-table of the company. According to the usual method, distances are shown on the lower horizontal line, and the names of the towns

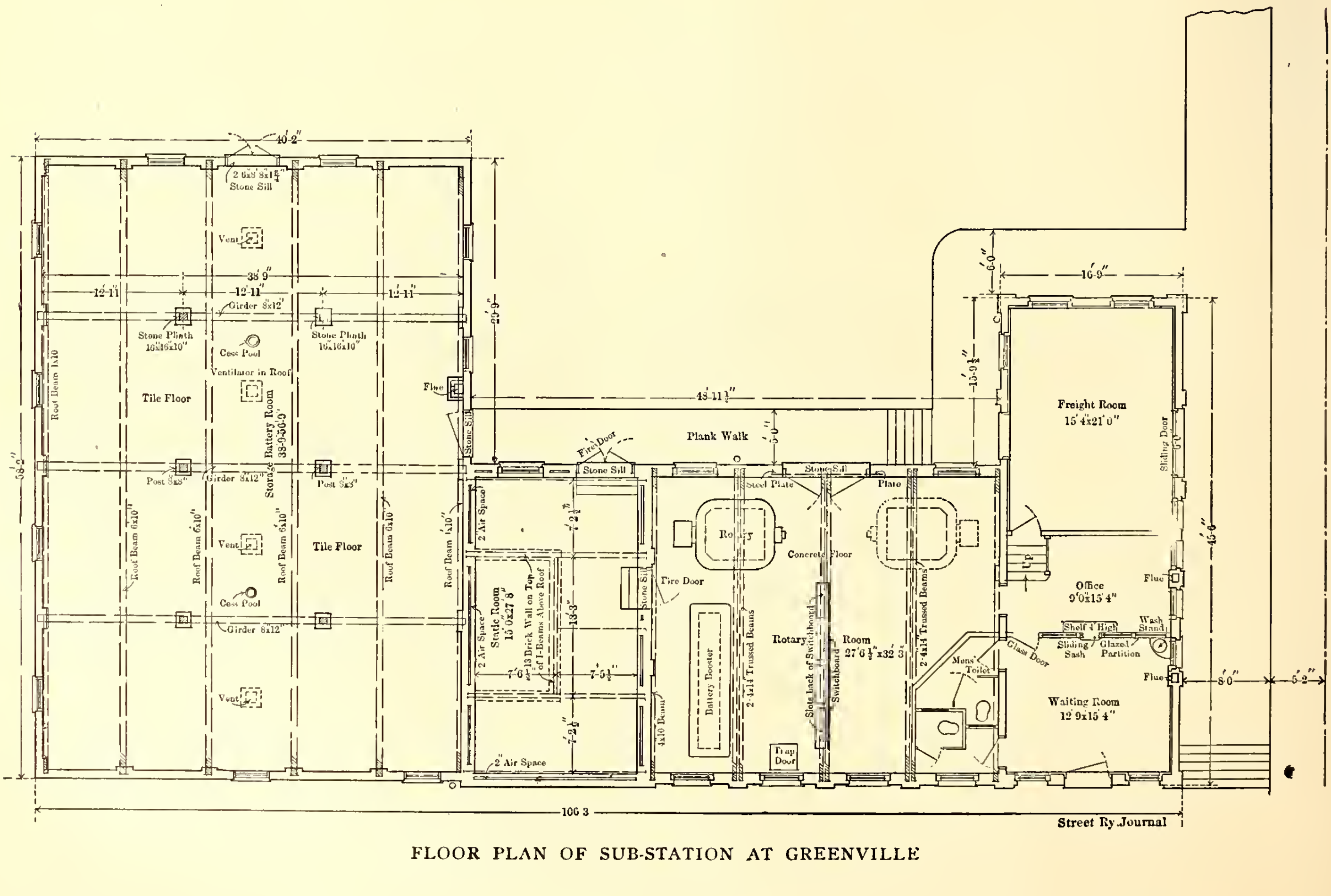


GREENVILLE SUB-STATION, WITH SUB-STATION CAR HELPING OUT

are given upon the upper horizontal line. Time is shown on the vertical line at the left. The diagonal lines represent the movement of passenger cars. The heavy full lines represent cars operated on hourly headway, and the light full lines intermediate cars giving half-hourly service. For example: Starting at the upper left-hand corner of the diagram and following the diagonal, the car leaving Dayton at 1 will be found to reach the terminus at Muncie a few minutes before 5. The dot and dash lines show the time of the run of a "limited" train making no stops in the country and only one stop in each of the principal towns along the route.



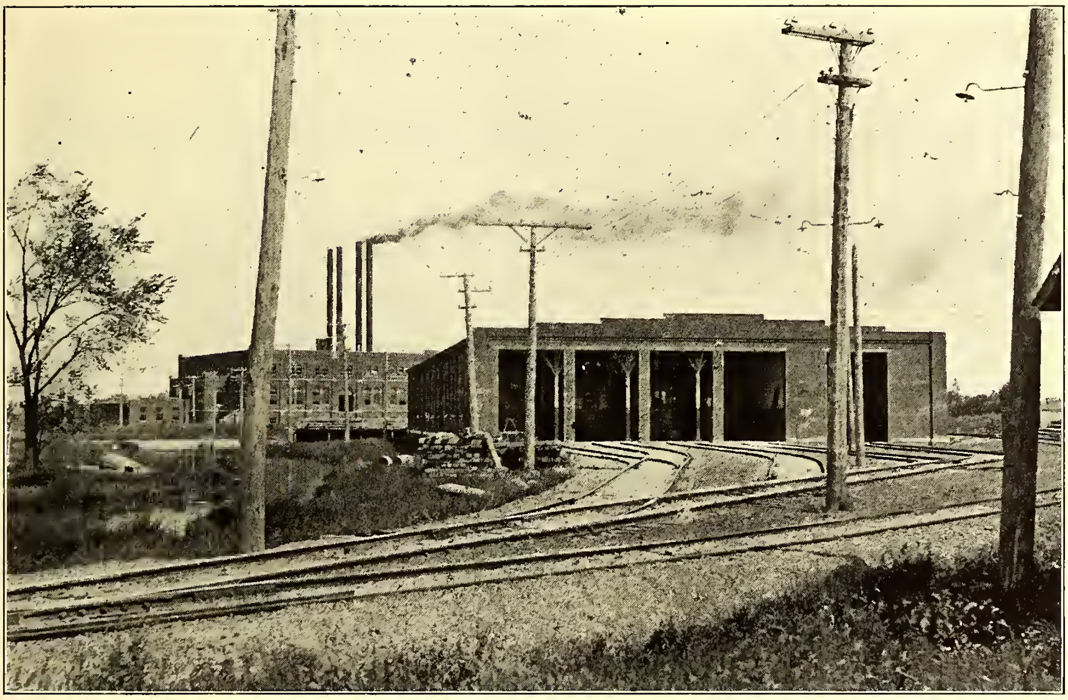
FLOOR PLAN OF SUB-STATION AT SELMA



FLOOR PLAN OF SUB-STATION AT GREENVILLE

LINE CONSTRUCTION

The line work is first-class bracket construction, all Ohio Brass Company's material. Two high-tension lines are placed on a cross-arm and one on the ridge iron at the top of the pole. Double three-pin arms are used on all curves greater than 5 degs. Insulators are 6-in. porcelain. The high-tension line is carried over two railroad crossings on structural iron poles and cross-arms, a grounded copper wire net or guard being suspended below the high-tension wires at these crossings. A 300,000-circ.-mil feeder, extending practically the full length of the line, is carried on malleable-iron brackets. The trolley consists of two No. 000 figure 8 wire. Stromberg-Carlson telephones have been provided at all passenger stations, sub-stations, despatcher's office, car house, power house, sidings and for each car. The telephone wire consists of No. 10 B. B. wire.



CAR HOUSE AND REPAIR STATION, DAYTON & MUNCIE

The line work was furnished and installed by G. E. Fisher, of Detroit.

The right of way averages 50 ft., all of it private, in the country portions. A greater portion of the distance it is adjacent to the highway. Special attention was given to passing through towns without right angle turns, there being but one of this kind on the line. The curves in the country are 3 degs. or less, with the exception of one 7-deg. curve, which is 200 ft. long. There are two overgrade crossings, three undergrade crossings and three crossings at grade, located in towns. The maximum grade is under 2 per cent. The track is laid with 70-lb. rails in 60-ft. lengths, and it is bonded with Ohio Brass Company's 10-in. twisted copper bonds. It is ballasted with good gravel, 150 yds. to the mile. There are eight small bridges, two of them, about 40 ft. long, are through plate girders; the others are I-beam girders on concrete abutments.

OFFICERS

The officers of the Dayton & Muncie Traction Company are F. J. Ach, president; T. J. Weakley, vice-president, and W. B. Gebhart, treasurer. The road was practically completed under the presidency of the late Dr. J. E. Lowes, who also financed and built the Dayton & Northern line. J. E. Feight, secretary, has charge of the operation of the property, and Frank Newsbaum is chief engineer.

The plans and specifications were furnished by the Roberts & Abbott Company, of Cleveland, who also supervised the construction, the company being represented in the field by M. A. Munn, C. E., and Bret Harter, E. E.

INVESTIGATION OF MUNICIPAL OWNERSHIP

A few days ago a call was issued by Melville E. Ingalls, chairman of the committee of twenty-one appointed to investigate municipal ownership under the auspices of the Civic Federation, for a meeting of the committee in New York on Nov. 27. This committee, as announced in the Street Railway Journal for Oct. 14, was appointed by the Public Ownership Commission, organized to investigate actual conditions of municipal ownership in this country and Europe. Mr. Ingalls is chairman of the board of directors of the Big Four Railroad, of Cincinnati, and the members of the committee are heads of corporations, prominent college professors, journalists, publicists and heads of unions in trades.

A sub-committee, which consists of Frank J. Goodnow, of Columbia University; E. W. Bemis, superintendent of the Cleveland waterworks; Walton Clark, third vice-president of the United Gas Improvement Company; M. R. Maltbie, of New York, and J. W. Sullivan, editor of the "Cloth-Trades Bulletin," and which has for some time been engaged in preparing a report on the scope and methods of the investigation, has made the following recommendations:

That as many members of the committee of twenty-one as can find it convenient, visit, in a body, such of the muncipal plants of this country as may be selected as fairly presenting the measure of financial and operative success or failure attained by municipally owned and operated plants in America, and study the conditions and the results to the municipality, the consumer and the citizen generally.

That the sub-committee be authorized to arrange for the employment of engineers and accountants to aid the committee in its work.

That the sub-committee be authorized to select one or more members of the committee of twenty-one to direct and devise such experts in their work.

That, when the committee of twenty-one has made a study of conditions in this country, said committee, or as many of them as may find it convenient, shall visit Europe in a body and examine there, as in this country, into the operation and effect of the various forms of management of public utilities, as indicated by the reports of the experts and otherwise.

That, to collect the facts relating to private and municipal ownership and operation, information be secured upon points falling under the following general heads: (1) Franchise of private corporations. (2) Public supervision of municipalities. (3) History of municipal ownership. (4) Effect of public and private management upon: (a) Political conditions; (b) conditions of labor; (c) character of service; (d) price of service; (e) cost of service; (f) economy of management; (g) improvement in service and methods; (h) financial results.

Each of these subjects is to be carefuly investigated and a list of questions, about 1000 in number, relating to the franchise, political and operating conditions in the different cities.

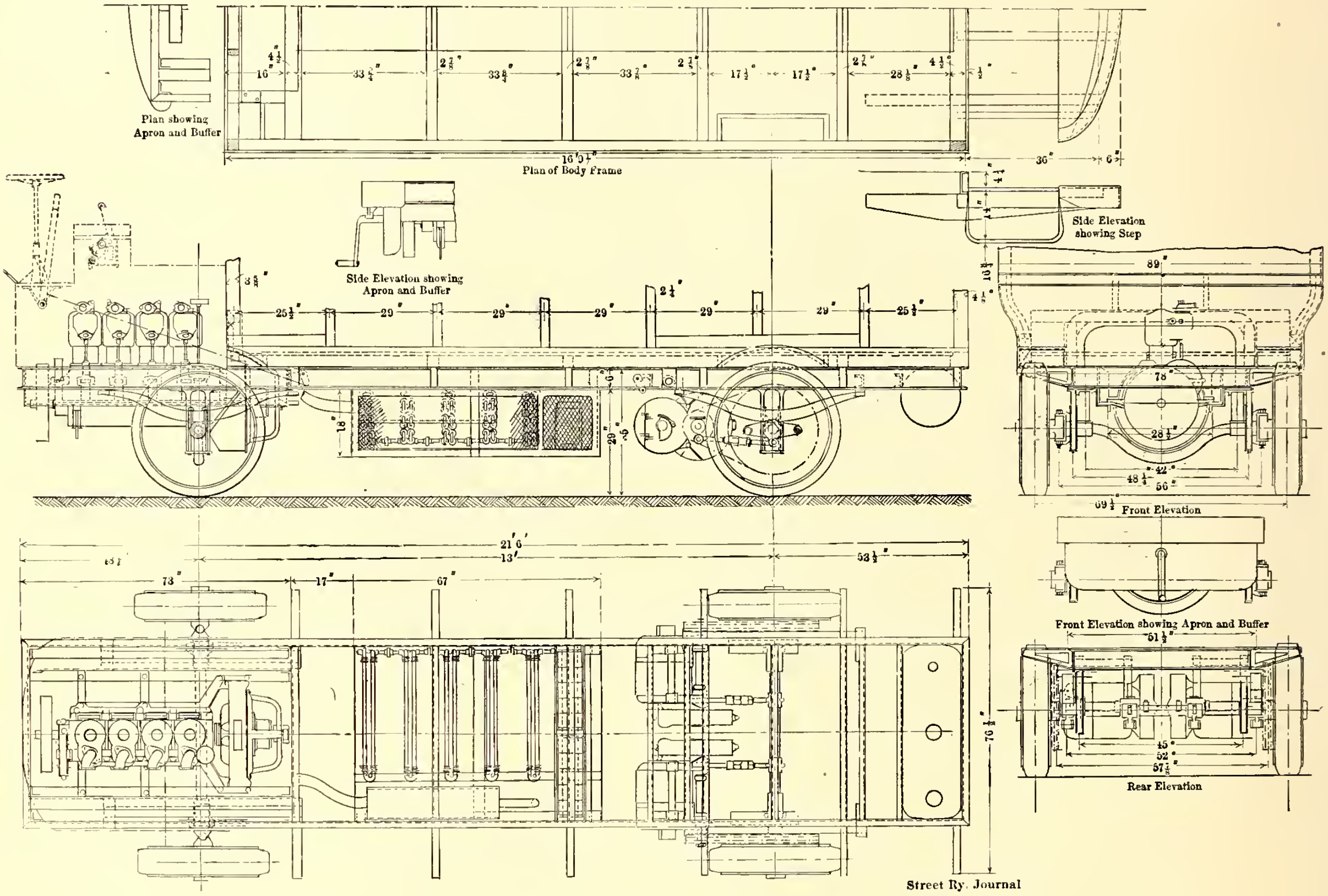
GASO-ELECTRIC EQUIPMENT FOR FIFTH AVENUE 'BUS

In the description of the thirty-passenger gaso-electric omnibus in use on Fifth Avenue, published in the Street Railway Journal for Oct. 28, a short account only was given of the motive power equipment. As stated, it consists of a gasoline-electric set which furnishes power to two series electric motors driving the rear wheels of the car. The generating set, controller and operating mechanism, which were developed and supplied by the General Electric Company, are contained in a compartment forward of the body, and are easily accessible for adjustment and inspection. The engine is supported lengthwise on an underframe, and may be started either in the usual manner, by means of a hand crank at the front of the car, or by the following very simple method:

A small storage battery of ten cells is carried to supply current for the numerous electric lamps used. This battery is not normally in the generator circuit and is removable for charging. By throwing in a knife switch, which connects the storage battery to the generator as a motor, the driver may start the engine without leaving his seat. The importance of this feature cannot be emphasized too highly, as there are times, when handling a 'bus in congested city traffic, that it is of the utmost importance that the driver be able to start his engine immediately, if it should have been stopped.

Another feature worthy of notice is the location of the driver's seat, which is placed transversely on top of the engine compartment. This is an original detail in omnibus design, and represents a saving in total length of the 'bus of about 4 ft. Further shortening of the car is effected by facing the forward inside seat to the rear, which leaves a box-like compartment for the generator.

Suspended from the steel frame, between the front and rear wheels, are the cooling coils, water pump, muffler and lighting battery, all of which are protected at the sides by woven wire screens.



ASSEMBLY OF CHASSIS FOR GASO-ELECTRIC OMNIBUS, FIFTH AVENUE

CONTROL

The speed control of the car is extremely simple, and is effected principally by varying the gasoline motor speed by means of a spring-returned foot pedal, which, when depressed, advances the point of ignition and opens the throttle. The levers which perform these functions are so arranged that the spark and throttle are moved in proper relation throughout the whole range of speed of the engine. If for any reason the driver, either voluntarily or involuntarily, removes his foot from the pedal, it automatically reduces the motor speed to its minimum running point, at which the generator is not sufficiently excited to move the car, even though the controller is on the high-speed notch. It is clear that this device also insures automatic retardation of the spark so that the operation of starting the car is perfectly safe.

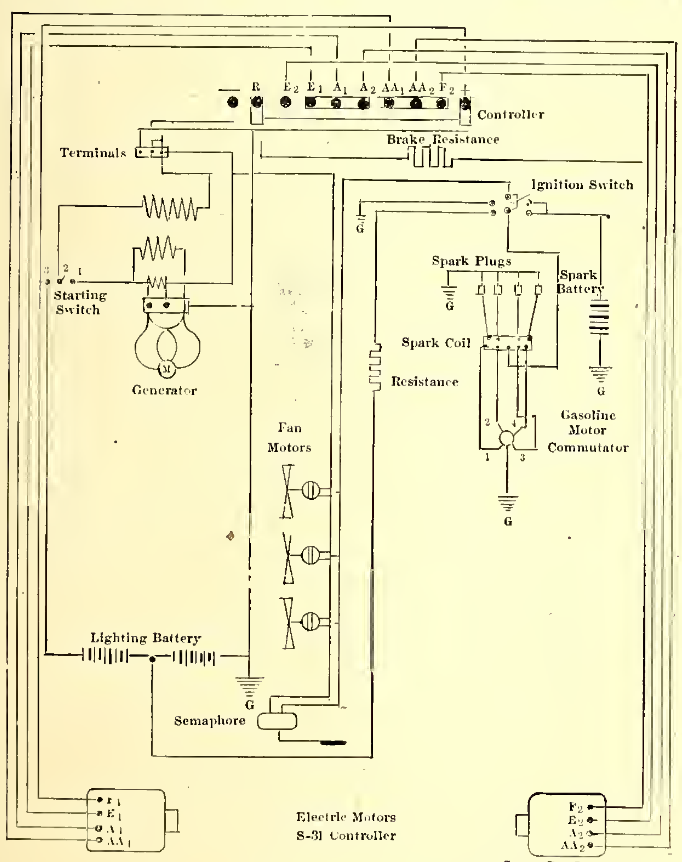
Further control in the speed of the car is secured by an electric controller which is used for reversing the motion of the car, and provides what may be called a low-gear notch, by placing the two motors in series, for very heavy grades or roads. On the high-speed notch, which is used about 90 per cent of the time on average roads, both electric motors are in multiple; on the high-torque notch they are in series. The first notch back of the rest position gives an effective electric brake for forward motion of the machine, and the first notch forward brakes the car when it is running backward. The operation of electric braking is effected by closing the circuit of the motors when the car is running, with a resistance inserted. A diagram of the motor connections is presented herewith. A full stop may be made by the use of the powerful mechanical brake which will be mentioned later.

Under actual running conditions on Fifth Avenue, the driver starts from a standstill, accelerates quickly to the desired car speed, slows down and stops again, using only the single foot pedal, above referred to, over the entire route. In the simplicity of its method of control, this machine is probably unique. Both the driver's hands are always free to steer the car and operate the hand brake for the final complete stop. This permits him to keep his mind on the road, as the movement of the foot pedal is analogous to the functions of the human mechanism which are performed almost automatically as in walking.

By arranging the two motor armatures in multiple, and in series with the two fields, the braking action is positive and independent for each wheel, with a tendency to correct skidding. This feature has been actually demonstrated on several occasions by applying the electric brake suddenly while the car was turning a sharp curve at full speed on greasy pavements, when the rear part of the body slewed only about 3 ft. or 4 ft. An electric brougham under similar conditions would have completely turned around.

EQUIPMENT

The gaso-generator set consists of a 40-hp, maximum-rating, 4-cylinder, 4-cycle engine, built by the Gas Engine & Power Company, directly coupled to a General Electric compound generator, which will give a continuous output of 12 kw and a maximum output for short periods of 24 kw. Both generator and engine are attached to a common base, thereby forming a unit. Careful provision is made for lubricating all bearing



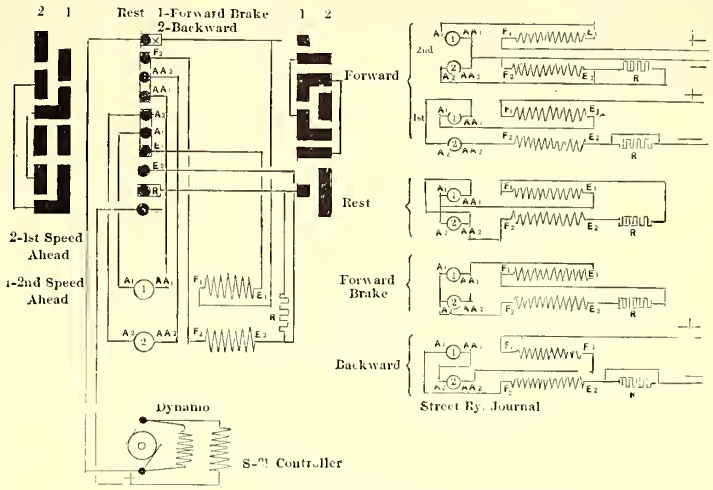
GENERAL WIRING DIAGRAM, FIFTH AVENUE 'BUS

surfaces of the engine, and a mechanical lubricator gives a consistent supply of oil under pressure at necessary points. In addition to this, the cranks are splash oiled. The generator has an oil cellar of large capacity and is ring oiled. The engine is of the usual type and needs no detailed description.

There are two General Electric 1012, 40-amp., 1200 r. p. m. automobile motors of the double-reduction type, suspended side by side from the running frame, forward of the rear axle. Two distance rods, one at the end of each motor, hold them and serve to adjust the chains. These are of the 2-in. standard roller type, and the sprockets have a low ratio of about 3.2 to 1, which gives a quiet and long-wearing condition. The first reduction is by spur gears, which run in oil, and have a ratio of about 5 to 1, giving a total of approximately 16 to 1.

The controller is of the well-known General Electric type for use on automobiles. For this particular work, extra wide fingers and contacts are provided.

A description of the chassis was published in the article on the 'bus in the issue of Oct. 28, so that it will not be repeated



CONTROLLER DIAGRAM, FIFTH AVENUE 'BUS

here. It might be stated, however, that the body is mounted on a running frame composed of light section structural steel channels, to which are fastened short steel axle guides which take all thrust and hold the axles in adjustment as in locomotive construction. The necessary cross members are securely riveted to corner angles and special forgings are used where stresses are concentrated. All four wheels are of artillery type, 36 ins. in diameter, and are made of wood. Seven-inch standard automobile rubber tires are employed for passenger service on account of their resiliency. The car is hung on four long half springs to give easy riding qualities.

The braking arrangement is very complete. Large double-acting internal brakes are fitted securely to the rear axle so that they may be expanded with great pressure against drums attached to the driving wheels of the car. A novel arrangement is introduced in the method of applying them. In addition to the usual foot lever, and on the same shaft, is a long hand lever which may move the brake rocker shaft by means of a dog. The long lever is like the emergency handle of a touring car and has a ratchet segment so that it may be locked in any desired position. Normally it is held by a catch against the seat, and the foot lever may be operated without regard to it. As the hand lever is several times as long as the foot pedal, it is obvious that the brakes may be set to the same degree, by its use, with less pressure but more movement of the body, and to a greater degree by additional pressure.

The total weight of the omnibus, including all supplies and the body, is about 15,500 lbs. The chassis complete with supplies weighs about 10,000 lbs.

PERFORMANCE

In a test run on Fifth Avenue a short time ago, the following readings were taken, showing the average generator output:

Output	KW	Volts	Amperes	Car Speed
Down	7.10	86.9	81.7	9 m.p.h.
Up	8.59	90.0	95.5	9 m.p.h.
Maximum at 36th St., Up	17.47	112.0	156.0	4 m.p.h.

The maximum speed of the car which can be maintained is 15 m.p.h., although it has run on tests slightly higher than this.

The average gasoline consumption is about six-tenths (0.6) gallon per car-mile. Forty gallons of gasoline are carried in a drawn steel tank, which is thoroughly tinned to prevent corrosion. This amount gives a mileage radius of about 60.

RESULTS AT MOUNTAIN PARK, HOLYOKE, MASS.

The Holyoke Street Railway Company, operating in and around Holyoke, Mass., maintains a pleasure park known as Mountain Park, located at the base of Mt. Tom. The place is one of the few self-supporting street railway pleasure resorts in the East. In handling the enterprise, the company has followed a few well-defined policies based on experience accumulated during past seasons. Although, as has been frequently emphasized, governing conditions are so different as to forbid the adoption, in toto, in any locality, of methods and policies found successful elsewhere, nevertheless policies that have made for success in one locality are worthy of careful study and attention, for they will always be found to contain suggestions that lend themselves to general application. When an enterprise like Mountain Park, which draws the greater part of its patronage from a tributary population of less than 100,000, can be made not only to pay its own way, but to return good interest on its own investment, leaving the increased railway earnings as profit, the means by which these results have been accomplished must certainly contain lessons applicable to other situations. And in this same connection, speaking of financial results secured at pleasure parks, emphasis must again be placed on the necessity for proper and conservative accounting methods. More than one manager responsible for the maintenance of a park has realized, to his grief, how easy it is to fool oneself in this matter of park accounting. If proper charges for depreciation, insurance, lighting and all the other incidentals that enter as factors are not included in the park balance sheet, the statement will not only be misleading, but in the day of reckoning ahead is more than likely to cause the manager to condemn street railway parks and pleasure resorts in terms that will leave no question of doubt about his feelings.

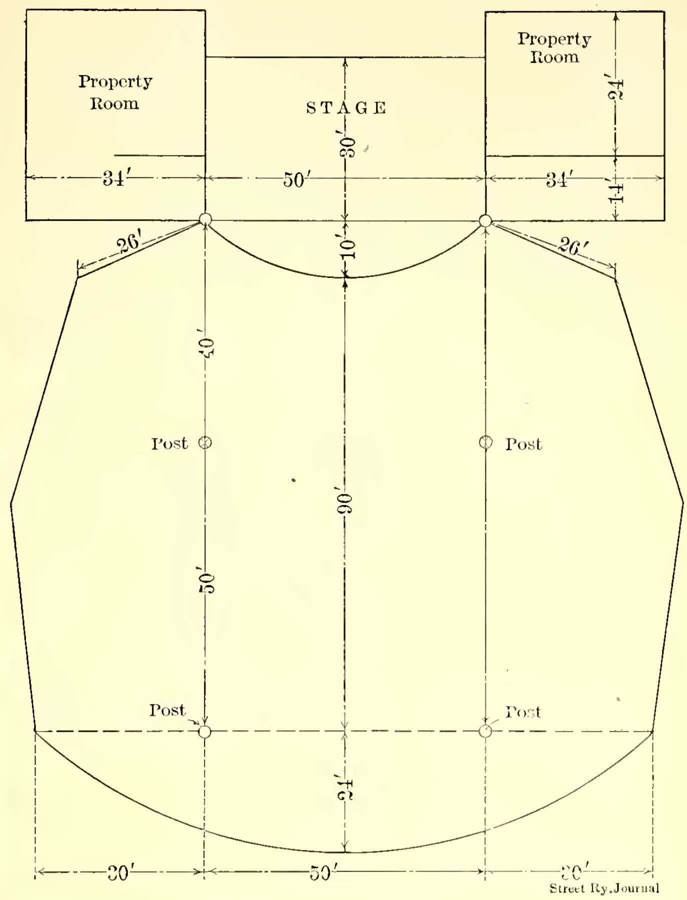
The management of the Holyoke Street Railway Company some time ago formulated the policy of requiring the park to stand on its own merits, and bear all the charges of depreciation, insurance and miscellaneous expenses properly chargeable to the park account. The park comprises a tract of land about 4 miles from the City Hall in Holyoke, and admirably situated with regard to scenic and picturesque surroundings. No attempt has been made to provide the place with a miscellaneous lot of attractions, but a few well-selected attraction features have been added from time to time, the policy in this regard having been to give enough that was new each year to keep the place fresh and popular. The park is directly under the management of L. D. Pellissier, the treasurer of the Holyoke Street Railway Company. The attractions at the present time include a well-conducted theater, a merry-go-round, a photographic gallery, a small zoo and dancing pavilion. The results from the dancing pavilion during the past season bear out the experience reported from other cities to the effect that public dancing at summer resorts, like roller skating and bowling, can now be revived with success, providing, always, that they are offered with proper surroundings and with strict attention to the moral tone maintained about the place.

A VIEW OF MOUNTAIN PARK AND SURROUNDING SCENERY AT THE BASE OF MT. TOM, NEAR HOLYOKE, MASS. THE BUILDING IN THE FOREGROUND IS THE CASINO, AS SEEN FROM THE REAR

With regard to the dancing hall, as well as in connection with the theater and other attractions, the management of the Holyoke Street Railway Company emphasizes the necessity for maintaining at a street railway park not only an outward semblance of respectability, but the highest degree of good order, refinement and chasteness. The point is made that park managements often make a pretense of supervising the character of the attractions at their pleasure resorts, but do not always use the same care in supervising the general character of the people admitted. It is recognized that a summer park is not a Sunday school room, and that the whole spirit of the enterprise includes a certain degree of freedom and fun, but the temptation is often strong to lower the standard just a little in order to make room at the park for all classes of the public who care to use the street cars. The experience at Holyoke, and observations made at other places, tends to the conclusion that if it is necessary to cater to two classes, it is better to establish one park or resort on some other line where, if necessary a certain degree of coarseness can be winked at; but it is impossible to mix the two elements at one place. As W. S. Loomis, president and general manager of the Holyoke Street Railway Company, expresses it: "A bench will hold only about so many people, and if you attempt to crowd on to the lower end of the bench the rougher element, the effect will be simply to crowd off of the other end a much larger element which does not care for license in its fun making, and will not countenance any suggestion of rowdyism or coarseness."

At Mountain Park the theater has a seating capacity of 2800 and is devoted entirely to musical comedies. A plan outline is presented herewith. The admission charge is 20 cents for reserved seats and 10 cents for general admission. The sides of the theater are open so that others can stand outside and witness the performance in this way without paying. High-class vaudeville and other entertainments have been tried, but in every case have been found wanting in this particular locality, and the company has always returned to musical comedy for its theater attraction. Last summer vaudeville was put on for three weeks early in the season, but the summer attraction was light opera, in which twelve performances were given a week for twelve weeks. The railway company organizes its own troupe every season and signs individual contracts with the players. Last year the theater troupe included about twenty-five members, from ten to twelve of which were classed as stars and were paid from $30 to $50 per week. The balance of the troupe consisted of the chorus, the members of which were paid from $12 to $18 per week. The total expenses of conducting an opera of this kind are about $1,000 a week. In organizing the theatrical company and the plays, the railway company avails itself of the services of a man who in the winter time manages city theaters and is well versed in theatrical matters. This man is placed on the payroll of the railway company during the park season, and works under the general jurisdiction of the railway management. He goes to New York early every year and through the theatrical agencies engages the members of the troupe. At the same time he makes arrangements with costumers and producers of stage scenery for all of the costumes and paraphernalia required during the season. Good musical comedies, most of which are copyrighted pieces, and have demonstrated their popularity, are given, and a change of bill is made each week. Appropriate costumes for each production are rented from New York costumers for the week the particular play is given. The change of bill is always made on the Monday matinee, and as a little sidelight on the business, attention is called to the fact that the success of the piece produced during any week will depend

INTERIOR VIEW FROM STAGE OF THE CASINO AT MOUNTAIN PARK, HOLYOKE, MASS., SHOWING ARRANGEMENT OF SEATS



GENERAL PLAN OF THE CASINO THEATER, SHOWING LOCATION OF THE STAGE, PROPERTY ROOMS AND AUDITORIUM

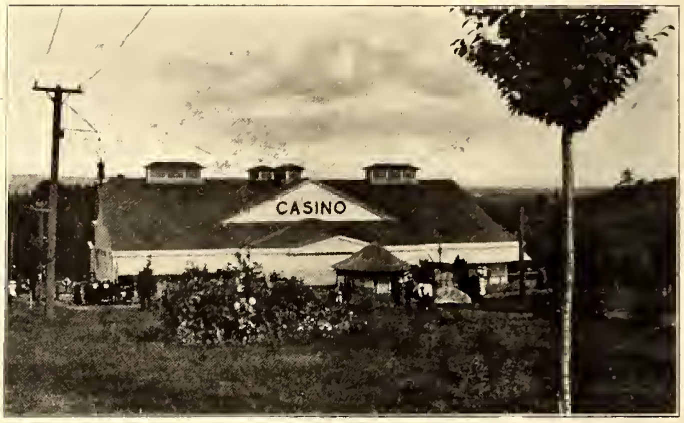
A REHEARSAL OF "FRA DIAVALO" IN THE MOUNTAIN PARK CASINO very largely upon the measure of success achieved at the two opening performances. If the piece and manner of production meets with the approval of these two first audiences, the chances are all in favor of a good attendance during the rest of the week, as the news is quickly spread through the press and by word of mouth that the show is worth seeing.

THE OBSERVATORY ON THE TOP OF MT. TOM

For advertising the theater, the Holyoke Company confines its efforts almost entirely to small cards in the local papers and pasteboard announcement cards in the cars. The announcement cards used in the cars bear a permanent notice concerning the theater and the name of the piece to be given during each particular week is inserted in the permanent card by means of a small detachable slide. More elaborate methods of advertising, such as billposting, have been tried, but are not believed to be warranted as a general thing in a locality where the tributary population is less than 100,000. Additional publicity is sometimes secured by placing a few photographs of the prominent players or special productions in the shop windows on the main street of the city.

With regard to dancing, the Holyoke management has hitherto been somewhat skeptical in consequence of the apprehension that the moral tone set as the standard for Mountain Park could not be maintained. Some time ago, however, it was determined to try the experiment of offering facilities for dancing, and at the outset every precaution was taken to regulate the tone and conduct in the dancing pavilion. A few special officers were stationed at the place with explicit instructions to discourage promptly anything not in keeping with the high standard set. During the first few days and evenings one or two attempts were made to introduce the very things that the management had determined to avoid, but a few cautionary words from the special officers, and in one or two instances quiet ejectment from the park were all that were necessary before the public realized just what the management had in mind by the term "good order." From the first the dancing pavilion has been patronized freely by the best people in the community, and no difficulty was experienced in maintaining the same spirit of etiquette and refinement that would be found in a private dancing academy. The results secured are all the more striking when it is understood that a considerable portion of the park patrons are engaged in paper mills and other factories.

For the dancing pavilion a merry-go-round building was utilized, all that was required to fit it for dancing purposes being the addition of a good floor and the installation of artistic lighting effects. During the season just passed, it was the practice to charge 5 cents per couple for each dance. The collection of the fee was easily regulated by building a light railing around the dancing floor and requesting the dancers to purchase a ticket for each dance at the ticket office. These tickets were then collected as the couples went on to the floor. This practice of charging 5 cents for each dance is believed to include advantages over the system of charging 15 cents or 20 cents or some other stated amount for the entire afternoon or evening. Many of the patrons do not care to dance for a long time, but do enjoy two or three dances during the afternoon or evening. This class of patrons is thus easily accommodated.



A FRONT VIEW OF THE MOUNTAIN PARK CASINO

The performances in the theater never last over an hour or an hour and a half, so that there is always time for the patrons to enjoy several dances after each performance. While a play is being given in the theater, music in the dancing pavilion is given on a piano, but after each theatrical performance the regular theater orchestra moves to the dance hall and furnishes the music for the balance of the afternoon or evening. In organizing the orchestra each year the company takes advantage of the services of local musicians who for the most part are engaged in the local theater during the winter. The dancing pavilion is large enough to accommodate about 125 couples, and if the accommodations were a little larger a separate orchestra would be provided for the dancing.

ENTRANCE TO MOUNTAIN PARK AND CASINO FROM THE RAILWAY TRACKS

THE FEDERAL STREET CAR HOUSE OF THE ROCHESTER RAILWAY COMPANY

BY I. E. MATTHEWS, CHIEF ENGINEER

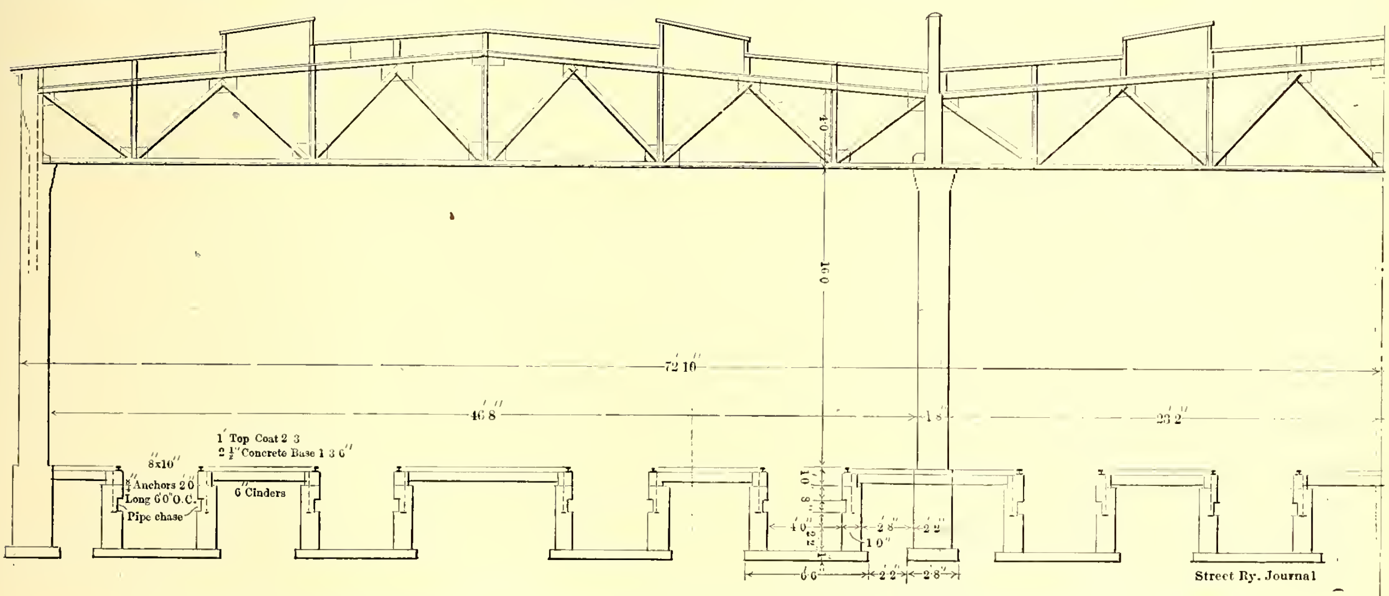
During 1904 the Rochester Railway Company added to its rolling stock to such an extent that all of its car houses were filled to overflowing and many cars had to be stored on tracks outside of the car houses. To relieve this condition it was decided to build a new car house large enough to hold about 100 double-truck cars.

The first step was to purchase about 4 acres of vacant land adjacent to the eastern division car house of the company, which is also the terminal of the Rochester & Sodus Bay Railway, an interurban road operated by the Rochester Railway Company. Upon this land the proposed car house was so located that future extensions can take place, as shown on the map herewith. Plans and specifications were prepared and contracts let for the building during the winter of 1904-5. The work was commenced early in the spring, and was practically completed and buildings occupied in September, 1905.

The car house is 144 ft. x 326 ft., and contains twelve tracks. It is divided by two fire walls into three four-track sections. This was done to keep the floor area within the limits prescribed by the Board of Underwriters, and also to reduce the span and cost of the roof trusses. The foundation walls are built of gravel concrete composed of 1 volume of Portland cement, 2½ volumes of sand and 5 volumes of gravel. They average 2 ft. in width and 5 ft. in depth, going deeper where necessary to secure a firm foundation. The outside walls consist of brick piers 16 ins. x 20 ins., 18 ft. center to center, connected by 8-in. brick curtain walls. The interior fire walls have the piers increased to 20 ins. x 24 ins.; otherwise they are the same as the outside. The walls are built of hard-burned brick, laid with Portland cement mortar. The interior exposed angles of the piers are laid with bull-nose brick. The brick piers carry the steel trusses, built of plates and angles of 48-ft. span, 18 ft. apart and 16 ft. from floor to bottom of truss.

The front of the building has a second story, in which is located the office of the division superintendent and his assistants. The station-master's and receiver's offices are also located here. There are maintained under the direction of a secretary of the Young Men's Christian Association, lounging rooms for the men, containing billiard tables, bowling alleys, reading rooms, tub and shower baths, barber shop and sleeping rooms. It is believed the accommodations for the men during their off-duty hours are more than usually complete. The running of a barber shop within the car house is considered a new feature, and one that the men will appreciate. As will be noticed from the plans, somewhat elaborate provision has been made for bed rooms. The rooms are neatly furnished with cots and toilet and other requisites. The rooms are already popular, and it is probable that during the winter months the sleeping accommodations will be taxed to the full capacity, especially during storms. A charge is made to the men of 10 cents and 15 cents per night for a cot. A register is kept much the same as a hotel register, and the men enter their names for the time they want a room. The rooms are assigned in the order of application. The beds are made and the rooms kept neat and clean by a janitor. The tub and shower baths are the most popular feature of the house.

Entrance to the second story is had through a one-story entrance hall on the north side of the building, and so arranged as to avoid using any of the storage space of the car house proper for the stairway. The entrance hall is extended to contain the toilet rooms for the men, and here is also located the heater for the hot water used in the bath and toilet rooms. Adjacent to this is also the one-story addition for storage of coal used in the car stoves and for sand.



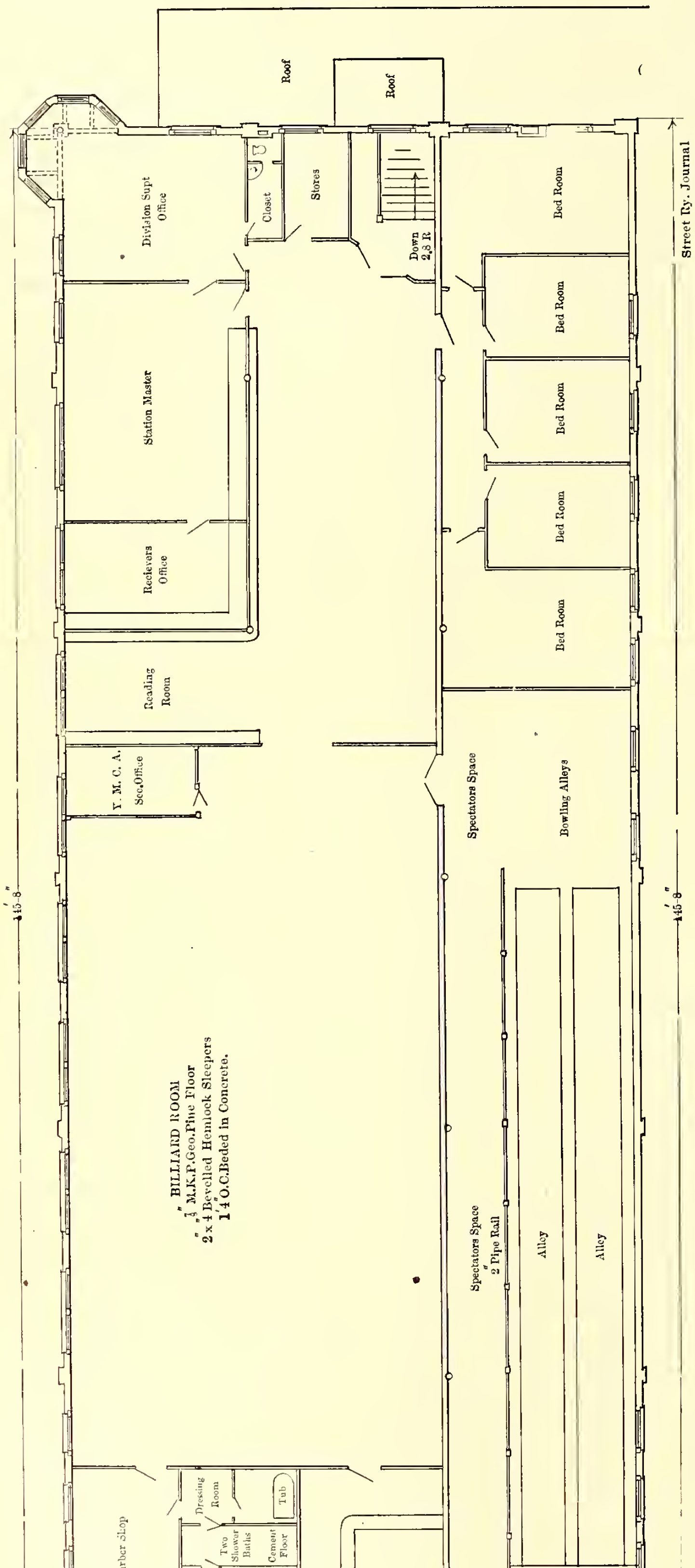
CROSS-SECTION OF FEDERAL STREET CAR HOUSE, SHOWING THE ROOF GIRDERS, PIT LAY-OUT, ETC.

The two-story portion extends across the entire front of the building, and has a width of three bays, or 54 ft. x 144 ft. It is of steel frame construction, the posts being encased in the brick walls and piers, and the floor is of reinforced concrete. The steel work was furnished and erected by the Archbold-Brady Company, of Syracuse, N. Y. The roof of the main portion of the building has 4 x 12 wooden purlins bolted to clip angles on the trusses and spaced about 5 ft. apart, on which are laid the 2-in. matched roof boards. On the two-story portion steel channel purlins are used. The whole roof is covered with an asphalt slag roof. The fire walls extend 3 ft. above the roof and have tile coping, as have also the front and rear walls.

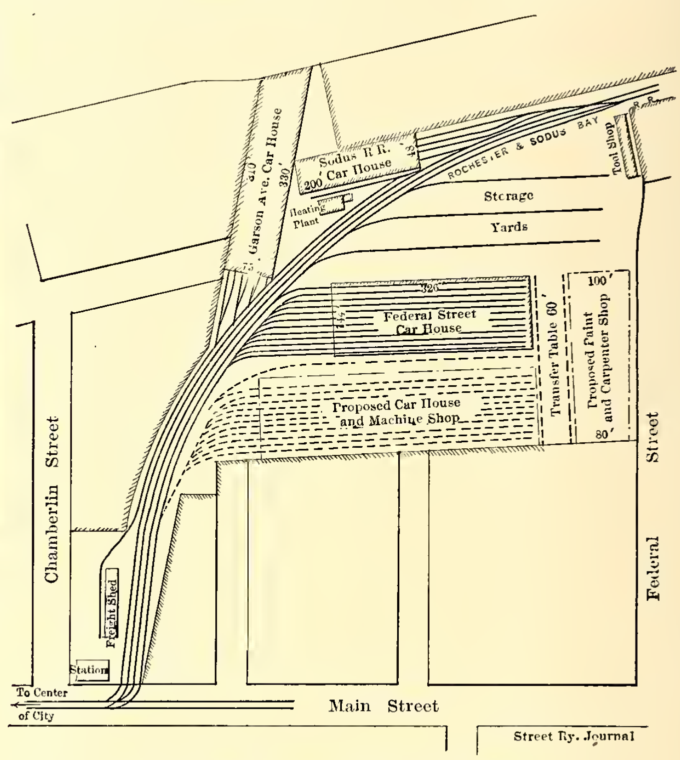
There are no windows in the first story. The second story, however, has windows at front, side and rear, those overlooking the roof being protected by iron shutters. The division superintendent's office, in the northwest corner of the building, has a bow window, so that he can observe from his desk what is taken place along the entire front as well as over the larger portion of the yards surrounding the building.

The interior of the car house proper is well lighted by large skylights furnished by the National Ventilating Company. The skylights are about 5 ft. x 10 ft. in size. Two are placed in each bay, one on either side of the ridge, thus giving about 4500 sq. ft. of lighting surface. Ventilation is secured by 12-in. Globe ventilators at the ridge. The building is lighted at night by electric lights from current supplied by the local lighting company. Arcs are used in the car house proper and in the yards, and incandescent lights in the offices, rooms, etc.

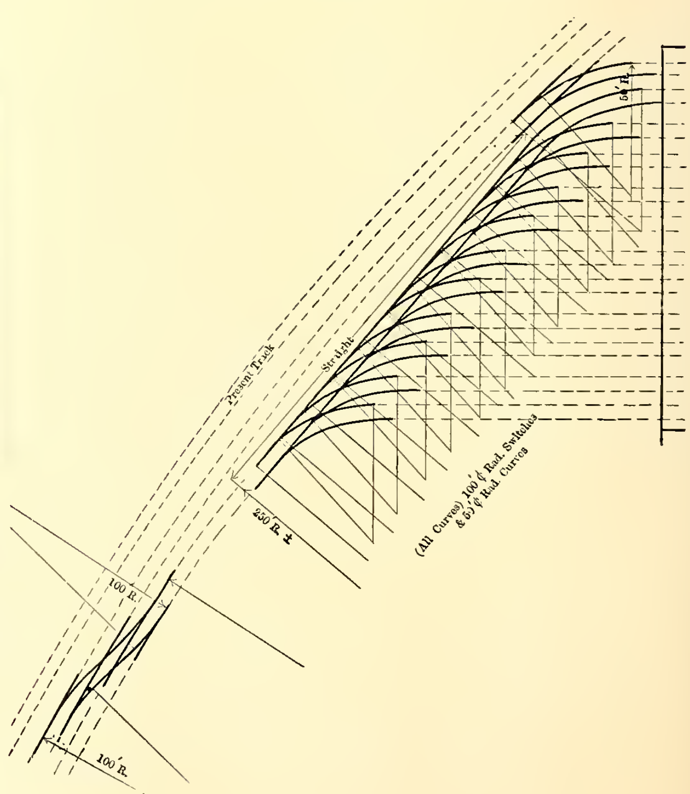
All connecting doorways between the sections of the car house are furnished with self-closing fire doors. The front of the house is closed by Kinnear steel curtain doors. Under all tracks inspection pits are built of gravel concrete walls 12 ins. in thickness. The pits are 4 ft. wide and 4 ft. 6 ins. deep, capped with an 8 x 10 timber fastened by bolts anchored in the concrete walls. To this timber the track rails are spiked. Beyond the pits cross-ties are used under the rails. The pits do not extend the full length of the building, but run for 175 ft. into the house, commencing at the front end of the building. The pits have cement steps at one end. The pits under the



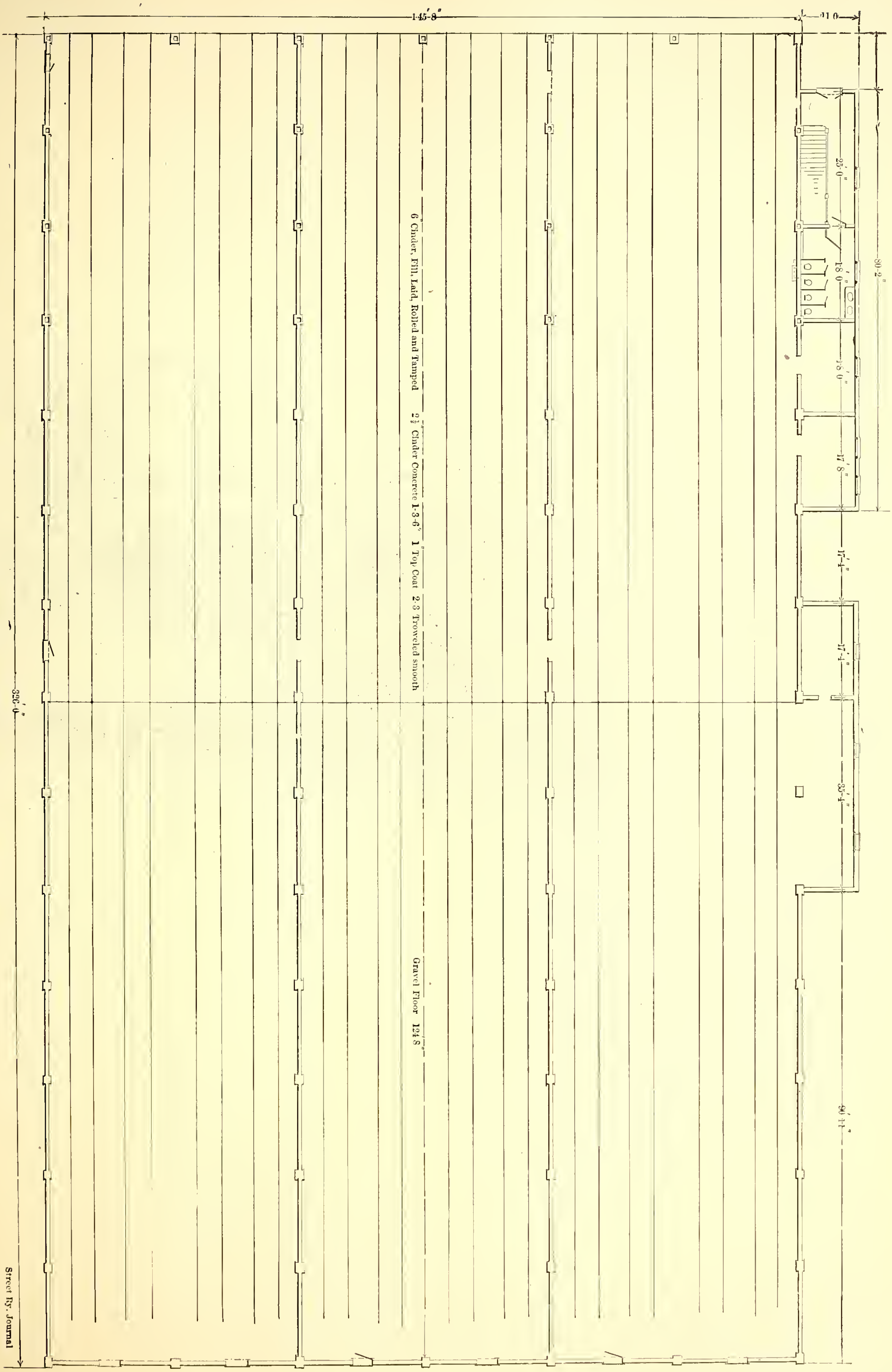
PLAN OF SECOND STORY OF THE FEDERAL STREET CAR HOUSE, SHOWING THE LOCATION OF THE COMPANY'S OFFICES, EMPLOYEES' RECREATION ROOMS, BOWLING ALLEYS, SLEEPING APARTMENTS, ETC.



PLAN OF YARDS AND CAR HOUSES, EASTERN DIVISION OF THE ROCHESTER RAILWAY COMPANY



DETAIL OF ENTRANCE TRACKS AT THE STREET CAR HOUSE OF THE ROCHESTER RAILWAY COMPANY



PLAN OF THE LOWER FLOOR OF THE FEDERAL STREET CAR HOUSE OF THE ROCHESTER RAILWAY COMPANY first four tracks in the section on the north side of the house are to be used as repair pits, and are 9 ins. deeper than the others, and have tracks for the operation of a pit jack in them. These pits are all connected at their inner end by a cross pit 5 ft. in width. Here are located, between tracks, two cranes for handling motors and wheels, and opposite the end of the cross pit is built a one-story addition, 10 ft. x 35 ft., for a small repair shop. Minor repairs only are made here. As the curtain wall in front of this room is omitted for a height of 10 ft., the wall above is carried on steel channel lintels. This serves to give additional width to the room. Connected with the shop is a small storeroom and a toilet room for the car house men.

The floors between the pits consist of a 6-in. layer of cinders, on which a 3-in. Portland cement floor is laid. Beyond the pits in the rear half of the building, which will be used for storage, there is a cinder floor only, except in front of the repair shop, where a cement floor is laid. The pits have a cement floor and are provided with floor drains. There are three lines of 6-in. tile drains running transversely across the building, connecting to all pits and the down spouts from the roof, and to an 8-in. tile sewer running parallel with the building about 10 ft. outside the north walls. This connects by a 10-in. tile to the city sewerage system.

The building will be heated by steam from the heating plant of the other car houses, located about 100 ft. north of the new building. This contains a locomotive type of boiler of 65-hp capacity. It was deemed of sufficient size to heat the new building in addition to the other buildings, if a good return and circulation could be maintained. This the company expects to obtain from the "Paul" system, which has been installed. The steam main, return pipe and air lines of the "Paul" system cross the building at the front end of the car pits. The valves and connections for each pit are enclosed in a pipe duct, and are reached by a trap-door manhole in front of each pit. The pits have a coil of pipe along each side, placed in a recess built in the concrete wall, so that the full width of the pit can be used by the workmen.

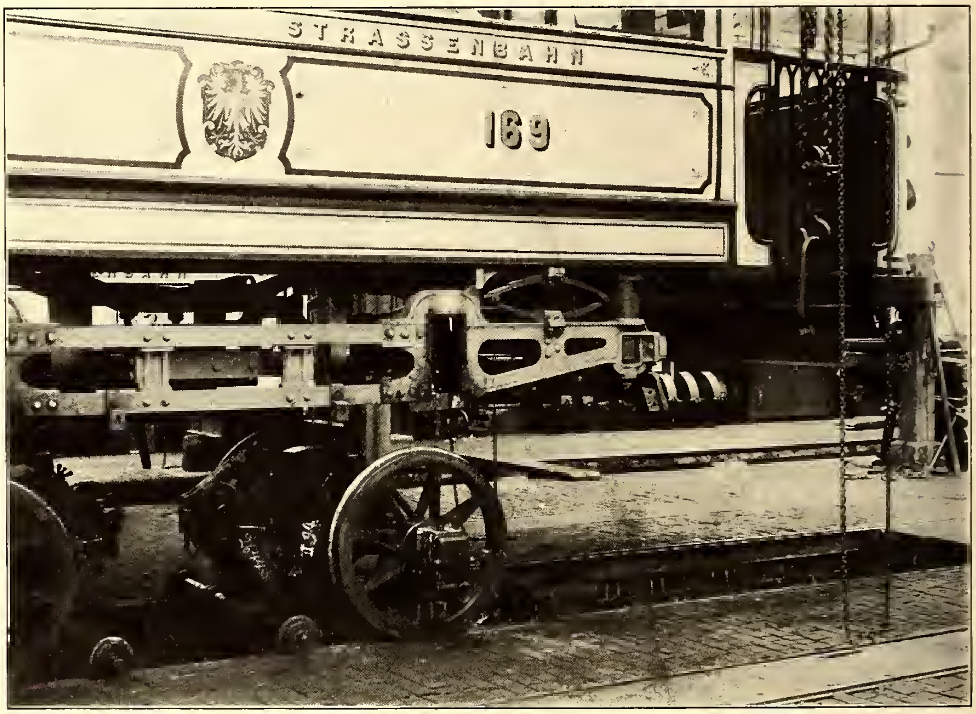
The pit coils furnish the only heat on the first floor. The second-story offices have radiators attached to a steam line tapped from the main supply on the ground floor. The water pipes are laid in the same duct with the steam pipes. Between each track is a floor valve, to which a small hose can be attached for the washing of cars. For fire protection a 3-in. water main extends along one wall of each section, having standpipes about 100 ft. apart, to which are attached coils of about 60 ft., of standard fire hose with nozzle. The standpipes are supplied with gate valves and sealed, and are not to be used except in case of fire. Underwriters' chemical fire extinguishers are placed at convenient points.

The trolley wire in the building is insulated from the wires outside by the breakers at the front doors, and is fed by No. 0000 feeders entering the side of the building back of the two-story portion and crossing transversely, tapping each trolley wire. This feeder is controlled by a switch in each section, placed on the wall near the entrance.

The tracks from the building connect with the approach tracks from the street by Lorain 70-lb. T-rail section, 100-ft. radius switches and curves of 50-ft. radius.

NOVEL METHOD USED IN FRANKFORT, GERMANY, FOR REPAIRING CARS AND TRUCKS

An ingenious method of removing motors and axles from single-truck cars is employed in the repair shops of the Frankfort Street Railway, Germany, and is illustrated in the accompanying engraving. The pedestal jaw-bit bolts are first removed to clear the journal boxes. The nose end of each motor is then dropped down onto a jury axle and pair of wheels which are held in place by the malleable-iron brackets on the motor shown in the illustration. The motor leads are then loosened and the brake levers and shoes are removed. The car body with attached truck side frames is then lifted up by chain block hoists connected to I-beams slipped under the ends of the car. Four chain blocks are used, each having a capacity of 6600 lbs., and requiring only one man apiece for efficient operation. This permits running out the "repair unit," namely, the combination of the car axle, car wheels, motor, gearing and journal boxes. As soon as this combination has been removed, a reserve unit is rolled into place ready for service. By this method it has been found possible in emergency cases to replace the operating equipment in one or two hours instead of five to ten hours. While this exchange is in progress, other workmen inspect the controllers, car wiring, trucks, springs, etc.



VIEW SHOWING METHOD OF HOISTING CAR-BODY AND TRUCKS, LEAVING THE WHEELS AND MOTORS TO BE REMOVED ELSEWHERE

The removal of the motor and wheel combination to a more convenient place than the dark pit under the car body naturally makes the necessary inspection and repairs much easier and quicker, and also avoids the interference arising between men where they must work all over the car at the same time. The handling of repairs in this fashion is the standard policy on the Frankfort system, except where important truck repairs are required, in which case the entire truck is run out.

The following advantages are claimed for this method of making repairs: Space is saved in the shop, because it is usually unnecessary to run out the entire truck; time is saved because the complete truck is not separated from the car body; greater ease is secured in handling a heavy portion of the equipment through the use of the auxiliary running axle and wheels; and a better distribution of the shop work results from the use of reserve units.

CORRESPONDENCE

THE LOCATION OF TOILET AND SMOKING COMPARTMENTS ON INTERURBAN CARS

New York, Nov. 23, 1905.

Editors Street Railway Journal:

Your editorial upon the above subject in the issue of Oct. 28, and Mr. Gonzenbach's letter and accompanying proposed plans of an interurban car appearing in the issue for Nov. 18, have opened up a question of considerable interest in the construction of interurban cars. Since the demands of various interurban roads differ greatly in many important features, it will never be possible to completely standardize an interurban car, but it seems as though it should be possible to establish some recognized standard of construction in the less important details which have no effect upon clearance, dimensions, schedule speeds or other fundamental consideration in the design of the system.

The location of toilet and smoking compartments has become pretty well standardized in steam railroad practice, and while the greater variety of demands upon an interurban car somewhat complicate the solution, there does not appear to be any inherent reason why the many different interior arrangements now in vogue should not be reduced to at least four or five standards adapted to certain general classifications of cars. It is tentatively sugested that all electric cars might be classified under one of the following heads with respect to their interior arrangement:

Street railway open cars.
Street railway closed cars.
Interurban passenger cars.
Interurban combination passenger and baggage cars.
Interurban freight and express cars.

Of these five groups the interurban passenger car is the most difficult to standardize, since it must of necessity meet a great variety of demands. It must be possible to operate the car in either direction at will, so that the inside arrangement should be as nearly symmetrical as possible. It must be arranged to carry not only the maximum seated load, but also be designed to carry under an emergency the maximum standing load. It must be designed to load and unload passengers with the least possible delay. Provision must be made for the motorman and his controller and braking apparatus. Provisions must be made for a heating and lighting system, and there must be toilet and smoking compartments, and the car must be designed so that a reasonable amount of personal baggage will not obstruct the free movement of passengers.

Mr. Gonzenbach's proposed design for such an interurban passenger car certainly contains a number of desirable features, some of which he has himself omitted to mention. Among these latter are: The large seating capacity of the smoking compartments per square foot of allotted floor space; the possibility of opening the windows of the smoking compartments much wider in both summer and winter than would be possible if the partition were not there to prevent a strong draft from one side of the car to the other, and the fact that it will not be necessary to clean the smoking compartments at each end of the line. This latter advantage is of considerable importance, for with the usual arrangement of the smoking compartment in one end of the car, the accumulation of ashes and other refuse soon becomes very objectionable to ladies who are compelled to pass through the compartment in reaching their seats.

There are, however, a few rather serious drawbacks to the proposed arrangement. The isolation of the smoking compartments, just referred to as an advantage, might easily become a nuisance, since there will always be a tendency to neglect to clean the compartments as often as necessary and leave them in an unsanitary condition. This neglect will be fostered by the comparative difficulty of sweeping under the long longitudinal seat and removing the refuse. Another difficulty will be met in arranging a satisfactory system of wiring for the car lights, since there must be enough groups of lights to insure that the burning out of one of a series of five lamps will not leave either smoking compartments, toilet room, platforms, passenger compartments or the aisle between the smoking compartments in darkness.

Another possible objection is that while the aisle between the smoking compartments has the same width as the aisle in the remainder of the car, yet this aisle will be much more easily blocked, since it will be impossible for a person standing there to temporarily crowd between two seats as can be done in the rest of the car. It would also appear that this arrangement of partitions is somewhat wasteful of available standing room. Another objection is that the conductor will be more or less isolated from the other passengers while collecting fares from the smokers, and this might necessitate the installation of electric push buttons at each seat, a practice which has not always met with success.

Any compartment in the center of the car has the disadvantage, of course, as pointed out in your editorial of Oct. 28, of obstructing the view ahead for half of the passengers.

Your discussion of the relative merits of locating the toilet room in the center or at the end of the car naturally applies to Mr. Gonzenbach's proposed location. It would seem that the eventual solution must be to locate a toilet room at each end of the car, although it is realized that the objections to be urged against it are serious. F. A. Giffin.

TROLLEY WHEELS

Galveston Electric Company

Galveston, Tex., Nov. 18, 1905.

Editors Street Railway Journal:

In looking over the question box of the Mechanical and Electrical Association, published in a recent issue of your paper, there are some replies to the questions on trolley wheels, trolley bearings, etc., with which I do not entirely agree.

Thus, under Question 20 there are several compositions for trolley wheels, one of which will make a trolley wheel entirely too hard, as it will be liable to wear the trolley wire nearly as much as it wears itself. It has been pretty well proven that it is cheaper to renew wheels, even to a very large extent, than to renew trolley wire. Everything else being equal, a trolley wheel should be as soft and of as good conductivity as is possible; otherwise the wire will suffer instead of the wheel.

Under Question 31, "What can be done to increase the life of the wearing out of all trolley wheel bearings?" one of the most important factors has not been noticed. This is not only an important factor in the life of the bushing, but also in the life of the wheel itself and in the smoothness of its running. I refer to the absolute balancing of the wheel and the exact centering of the bushing in the wheel, and of the hole of the bushing in the bushing itself. From experiments covering quite a number of years with every make of trolley wheel that I have been able to obtain, including quite a number made by ourselves, it has been clearly demonstrated to me that one-half of the undue wear on any trolley wheel, and especially on the bushing, is due to the fact that the wheel is not in perfect balance. I have taken this question up during the past year with quite a number of manufacturers, and, curious to say, have only found one taking sufficient interest in the matter to go into it thoroughly. These manufacturers write me that they have found this to be true, and in order to take full advantage of it have put in special machines that accurately balance the trolley wheel. The wheel should not only be balanced radially, but there should be just as much metal on one side of the center of the groove as there is on the other, as tests have shown that if the groove is not exactly central on the wheel, the wheel tends to wear to one side or other. I feel certain that if all the users of trolley wheels would insist upon having a wheel that was absolutely perfectly balanced, even at the cost of a few cents more per wheel, they would find, as I have, that the difference in cost pays a very large interest in the additional life of the wheel—other things being equal. The other factors in this case are that the tension should be correct for the service to be done by the wheel; that the base should work perfectly free and be quite sensitive to any change in the direction of either the car or the trolley wire, and that the overhead work should be in at least reasonably good condition. No one can expect to obtain a large mileage where the tension is too heavy, where the trolley base does not respond quickly to the changes of the wire, either vertically or horizontally, or where the overhead work is such as to give constant blows and twists to the wheel.

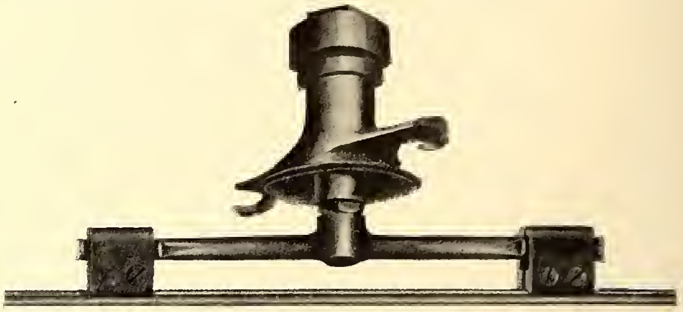
Question 23 is too indefinite for anyone to answer. Local conditions, speed, size of wheel, height of trolley wire, etc., are all factors that would make the mileage of a trolley wheel vary greatly. Under ideal conditions of both wheel, trolley and overload work, I have obtained from 35,000 miles to 40,000 miles, but in actual practice one-half to two-thirds of this we consider very good life.

Under Question 25, in regard to tension in pounds that the trolley wheel should have against the wire, this depends very largely on the height of the wire, the size of the wheel, the character of the overhead work and the speed of the car. For ordinary urban work where the average speed of the car does not go over 10 m.p.h., a tension of 15 lbs. will give perfect contact at the end of a 12-ft. trolley pole, provided that the overhead work is not so high that the trolley is to assume an angle of over 75 degs. From this, which is the lightest safe tension that can be run, it will run up to 35 lbs. on high-speed interurban lines using large and heavy wheels. The most simple way to determine this pressure is to buy an ordinary spring balance having a range of from zero to 50 lbs., loop the ring on top to the trolley rope, hook the hook under the coupler, let up the trolley to its average height and adjust the trolley springs until the spring balance shows the tension desired in pounds. This is but a moment's work, and every trolley newly put on should be tested in this way. Every trolley should be tested in this way at least once a week, as dust, dirt and rust tend to change the tension of the springs, as also do extremes in temperature between summer and winter. These balances may also be used to test the easy movement of the trolley base, as a perfectly working trolley base should not cause a pull on the spring of over 1½ lbs. to 2 lbs. when the trolley is pulled sideways by the balances. H. S. COOPER.

FLEXIBLE SUSPENSION FOR GROOVED TROLLEY WIRE

With the usual rigid suspension of the trolley wire there is a well-known tendency for the wire to break near the ends of the ear, owing to the continual and abrupt flexure of the wire at such points, caused by vibration of the free spans. This tendency is aggravated where soldered ears are used, on account of the effect of the heating of the wire, during the soldering operation, in impairing the mechanical strength of the wire locally.

A device to overcome this trouble has recently been brought out in England by the British Thomson-Houston Company, and is known as the B. T. H. patent flexible suspension ear. As shown in the illustration, the wire is held in mechanical clamps, which are so supported as to allow practically free movement in any direction without producing unnatural curves or abrupt bends, while preserving an even path for the trolley wheel and firmly supporting the wire in position. The upward movement of the wire and clamps, which is caused by the trolley wheel in passing under the ear, is practically parallel, and since the clamps are capable of a limited longitudinal displacement on the supporting bar, the wire takes up a natural curve in which there are no abnormal stresses in any part of its section.



FLEXIBLE SUSPENSION EAR FOR GROOVED TROLLEY WIRE

This improved form of suspension further obviates the objectionable hammer blow which takes place when the trolley wheel passes on to a suspension ear of the ordinary rigid type, thus conducing to smoother running of the trolley wheel and minimizing repairs to the trolley head.

These flexible ears are supplied either with a mild steel drop-forged body, with drop-forged clamps, or with a mild steel drop-forged galvanized body, with gun-metal clamps.

This hanger has been employed in Germany for a number of years, and has been in exclusive use on the trolley lines in Berlin for some time with satisfactory results.

RECENT DEVELOPMENTS IN MEXICO CITY

Before Dec. 12, when the great feats of the Virgin of Guadalupe will be celebrated, the officials of the Mexican Electric Tramways, Ltd., expect to receive from St. Louis the fourteen first-class cars which were ordered in that city some time ago. These cars will be somewhat larger than the present ones now in service, and they will be put on the lines which are most in need of extra service.

A project which the company now has in view is the purchase of observation cars, which will be employed in a special service, to be known as "Seeing Mexico" department. These cars will be built on the lines of the railway observation cars, with large glass windows, and they will run to all the important points in and around the city, wherever the company's system extends. In conjunction with this service the company intends to issue a neat little pamphlet that will contain accounts of the various points of interest along the system. These pamphlets will be distributed around the hotels and at other places where they can be seen and read by tourists and persons desiring to visit the interesting scenes in the neighborhood of the capital. This service is now being seriously considered by the street railway management, and it is possible that it will be inaugurated early during the coming year.

Charles H. Cahan, general attorney for the Mexican Light & Power Company, in speaking of the power that his company is about to furnish to the Tramway Company, states that he expects to be able to furnish some power in about three weeks, but the full power for which a contract had been made will not be furnished until the new machinery which General Manager W. W. Wheatly is about to purchase in the United States had been installed, which, according to Mr. Wheatly's statement, will be about Oct. 1, 1906. The temporary power for the street railway company will be furnished from the electric plant of San Ildefonso.

NEW CARS FOR THE SOUTH SIDE ELEVATED RAILROAD, OF CHICAGO, ILL.

Several shipments of cars have been received by the South Side Elevated Railroad Company, of Chicago, Ill., from the Jewett Car Company, of Newark, Ohio, which company is building seventy cars for the above-named road. Several new features have been introduced in these cars, one being the construction of the cab. The cab is formed by curtains, so that when curtains are raised all that can be seen of the cab is the top and corner pillar, which is an iron pipe. The engineer's valve, gage and other operating mechanism is placed between the outside and inside lining of end of car. The inside lining has a hinged door over the operating mechanism, which hangs down when this mechanism is used. When not in use, the door is closed and the end has the same appearance as the opposite end. Each cab has two individual seats, the one nearest the end of the car being arranged with levers to slide on top of the other seat, so as to give room for the motorman to sit facing the end window. The cab when not used by the motorman will seat two passengers, while in the former cars the cab cannot be used at all by the passengers.

Another change from the former cars is the location of the end doors. The former cars have the end doors near the side of the car, while in the new cars the door is located in the center, thereby increasing the seating capacity two at each end or four per car, so that with the change in the cab, the total seating capacity of the new cars is eight more than the former cars, it being forty-four for the earlier cars and fifty-two for the later rolling stock.

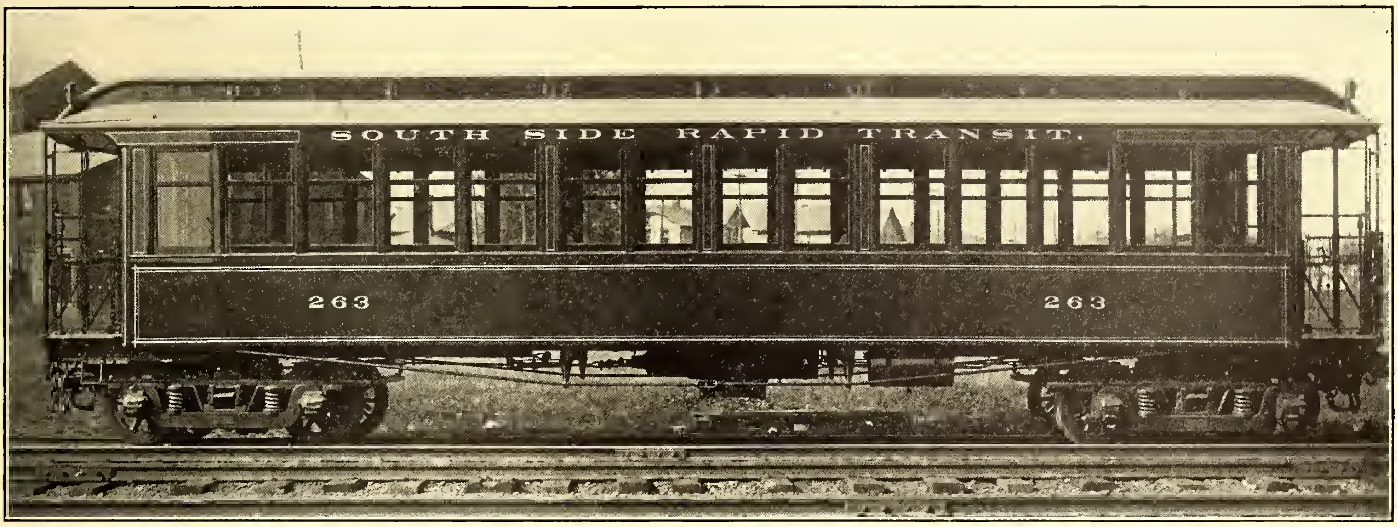


FIG. 1.—AN EXAMPLE OF THE LATEST TYPE OF CAR FOR THE SOUTH SIDE ELEVATED RAILROAD COMPANY, OF CHICAGO, EMBRACING NEW STYLE OF MOTORMAN'S CAB AND DOUBLE FOLDING GATE

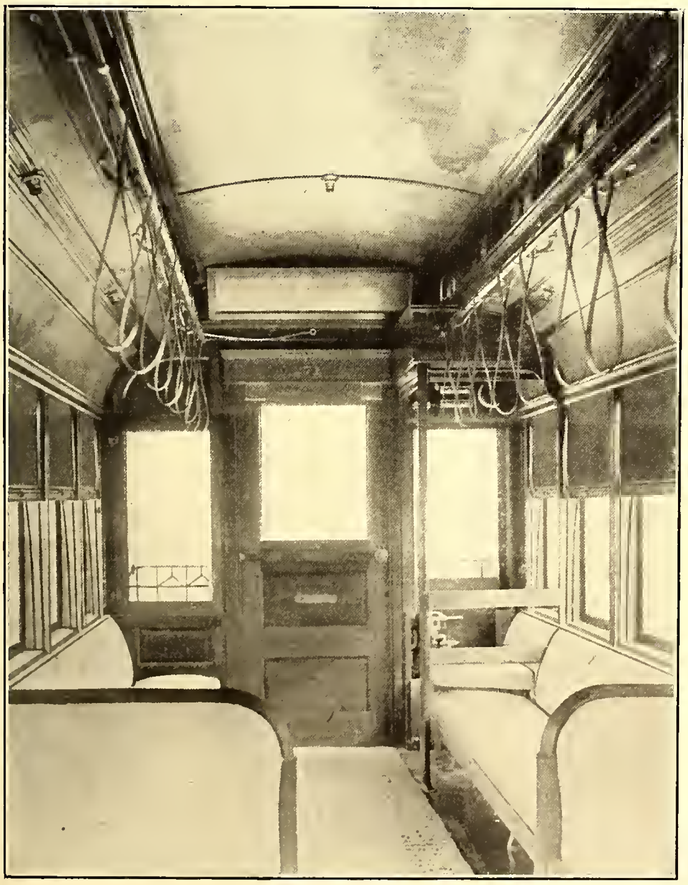


FIG. 2.—SHOWING OPERATING MECHANISM AND CAB CURTAIN RAISED

FIG. 3.—SHOWING CAB CURTAIN DOWN IN THE LATEST SOUTH SIDE CAR

Another new feature is the Jewett double folding gates on the platforms instead of the single gate as on the former cars. This is also a great improvement, as it gives a good deal more room on the platform when these gates are operated, and facilitates the rapid unloading of passengers. Quite a change was

FIG. 4.—VIEW OF CAR INTERIOR, SHOWING THE LONGITUDINAL SEATING AND CROSS SEATS IN CENTER

made from the former cars in the construction of the platform, this change being from wood to steel.

The cars are finished in mahogany, the headlining being quartered oak. The seat cushions and backs are covered with rattan. The curtains are of pantasote material and have pinch handles. Polished plate glass is used throughout the car, except the deck glass, which is ornamental glass. Trimmings are of bronze.

The new features in these cars were suggested by M. Hopkins, general manager of the South Side Elevated Railroad Company.

A RECENT IMPROVEMENT IN FAN CONSTRUCTION

Experience has shown that in handling hot gases with a fan, as in a plant producing induced draft for boilers, it is impossible to give the fan shaft a suitable bearing at the inlet side. A bearing here would necessarily be situated in the inlet area and would be constantly surrounded by hot flue gases. Much better results have been obtained by the use of an overhung wheel having, in addition to the two engine bearings, a bearing on the engine side of the fan, but none on the inlet side. The usual form of construction—that is, providing for a third bearing separate from the engine—has, however, given trouble from the fact that this bearing cannot readily be lined up with the two engine bearings.

In Fig. 1 is shown a new method of construction designed by the American Blower Company, of Detroit, to overcome this trouble. All these journal boxes are cast in the engine frame (Fig. 2) and can all be bored with the same boring bar. Thus it is impossible for them to be out of line. The fan bearing is water-cooled and ring-oiled. From the fact that all bearings are bored at once, a self-aligning bearing, such as would otherwise be necessary, is not required here, still further simplifying the arrangement. In addition to these points, it will be noticed that the bearing is supported by the engine bed and not by the housing of the fan, as would otherwise be the

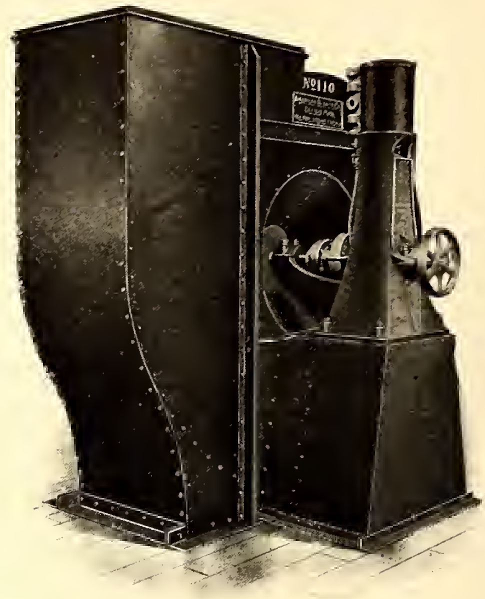


FIG. 1.—SHOWING TYPE OF FAN CONSTRUCTION ADAPTED TO KEEP ALL THE BEARINGS IN LINE

case. This simplifies the construction by doing away with the additional bracing usually found on fan housings.

The wheel (Fig. 3) is varied somewhat from the ordinary construction. In place of the usual three spiders is substituted one heavier one, built of I-beams cast into the hub. The blades are braced upon each other as shown in cut. A wheel constructed in this manner has been shown to be fully as strong and rigid as the ordinary three-spider form. By the use of a single spider the necessity for more than one hub on the shaft is obviated. In this manner the load of the wheel is concentrated upon a comparatively short length of shaft. Moreover, with the deep cone in the casing, as shown in Fig. 1, and the fan bearing sitting far in, as it does, the load of the fan is placed very near to the fan housing. In fact, the bearing is

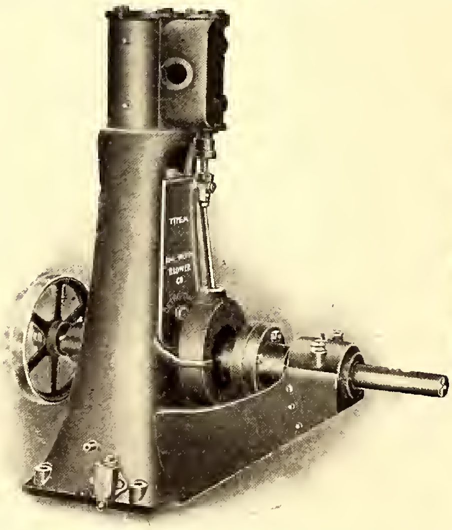


FIG. 2.—ILLUSTRATING THE CASTING OF THE JOURNAL BOXES IN THE ENGINE FRAME

FIG. 3.—NEW TYPE WHEEL COVERING, THE USE OF SINGLE I-BEAM, SPIDER CAST INTO THE HUB

included within the width of the fan blades. This point is of great importance, since, were the fan of the ordinary three-spindle design, the center of gravity would be some distance out from the bearing and there would be the tendency of the shaft to move on the fan bearing as a fulcrum and cause an upward thrust in the engine and on the engine journal caps. With the single spider this trouble is not encountered.

The engine is of the enclosed type, oiled by a recently devised pump which distributes copious streams of oil all over all of the reciprocating and revolving parts, even lubricating the eccentric outside of the frame. Tests in actual practice have proven that it will run several months without oiling or adjustment.

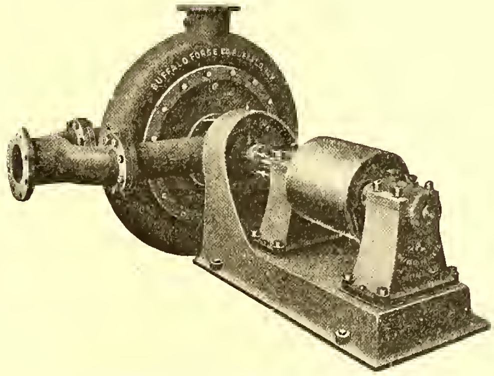
CENTRIFUGAL PUMPS

For the engineer as well as the layman, the centrifugal pump has long stood for a rather crude device, consisting of a shell within which revolved a spider with paddle-shaped arms. When inlets and exits were placed in connection with the center and periphery, such a pump could handle large quantities of water delivering against a head of a few feet. Its sole claim to recognition lay in its ability to handle nearly anything in the way of solid matter which the pipes would accommodate, coupled with the fact of its large capacity and simplicity. A plausible explanation of the operation of such pumps might have been that any liquid subjected to such a vigorous churning would strive to escape the nearest way and thus produce the pressure head. At any rate, logical inquiry and experiment brought little improvement in centrifugal pump design until the last few years. Although denied the stimulation often offered such objects by engineering societies and technical school research, the centrifugal pump has been developed and perfected until results are obtainable to-day which are in the nature of a revelation to those not closely identified with the subject, and which make its relation to the direct-acting pump almost identical with that of the steam turbine and reciprocating engine.

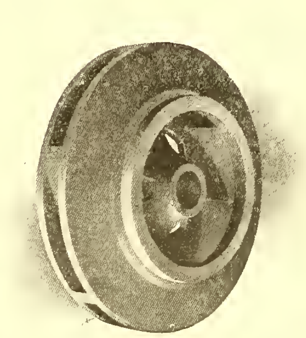
As an indication that the centrifugal pump is coming into its own, it will be remembered that three centrifugal pumps of a capacity of some 35,000 gals. per minute against a head of some 160 ft. supplied the water for the grand cascade at the St. Louis Exposition. Now the city of Buffalo is installing a multiple-stage turbine pump to augment its triple-expansion pumping engine service, with the expectation of superseding one of the engines by a second centrifugal if the first proves satisfactory.

Aside from improvement in detail, the modern centrifugal pump design shows three distinct departures from its spider-and-paddle progenitor. The rotating element, variously called the "runner" or "impeller," is now of the enclosed type, permitting the liquid to pass undisturbed from inlet to periphery through a continuous passage. This will be better understood from a reference to the accompanying cut. This shows a five-bladed impeller with a single entrance. It will be observed that there is no opportunity for loss by eddies or leakage, and the connection between the rotating element and shell is at a machined surface, and therefore susceptible of accurate fitting.

The determination of the proper curvature of these blades or partitions, together with the angles at which the liquid is received and discharged, is the second step in the development of the centrifugal pump as we know it to-day. It has been found that changes in the curvature of these blades will produce marked differences in the behavior of a pump as the operating conditions vary. Thus, an impeller whose blades terminate radially has the property of preserving a constant head, irrespective of the volume of water delivered, providing its speed be kept uniform. This design is applicable for city water supply, boiler feeding, condenser circulating pumps, etc. On giving the blade tips a curvature in the direction of rotation, such an impeller will increase its head with its delivery, providing an ideal means of maintaining a constant pressure at any distant point in a distributing system. Drawing off a large volume at such a point increases the liquid velocity, and therefore the friction head, which is compensated for by the increase in head as supplied by the pump. For dry dock, caisson or excavating work, it is desirable to have a pump which will run at constant speed and full load as the head increases with the removal of water from the enclosure. This necessitates that a large volume of water must be handled at the start, gradually diminishing as the head increases. This situation is met by giving the blades a curvature toward the direction of rotation, when such a pump will deliver liquids against an increasing head with a decreasing volume at a practically uniform efficiency. This control of the relationship of head and volume proves of practical value in the operation of these pumps by motors. Any increase above the normal horse-power delivered by the motor, such as might be occasioned by an accidental reduction of head, would be liable to overload and possibly burn out the motor. Such an accident is prevented by the nature of the impeller surfaces, which may be so laid out that any appreciable diminution of the head after a fixed limit will not be accompanied by an increase in volume delivered, and the horse-power delivered by the motor will not show a dangerous increase.



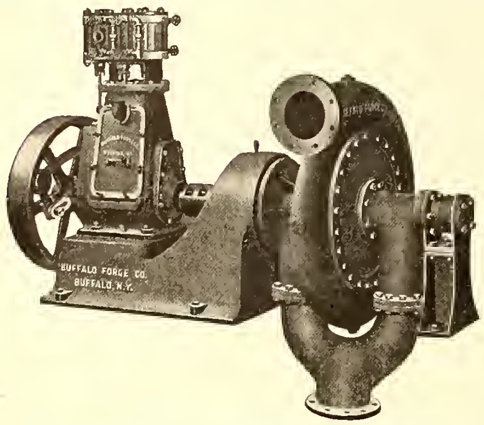
A TURBINE CENTRIFUGAL PUMP AND DIFFUSION VANES



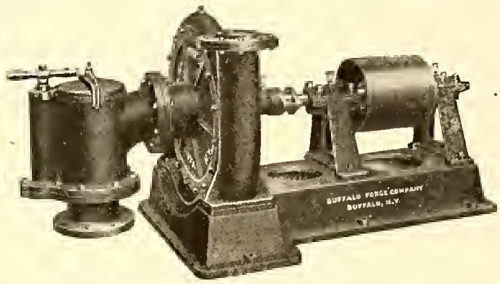
TYPE OF ENCLOSED RUNNER

The third marked improvement in centrifugal pump design is the use of what are called "diffusion vanes," situated in the periphery or shell of pump next to the runner. These are so designed as to receive the water as it comes with a high velocity from the runner and, through the shape and area of the water passages they form, reduce the velocity to pressure head without disturbance or unnecessary friction. As the problem of the centrifugal pump is essentially that of giving a continuous stream of water a high velocity and then allowing the reduction of same to static head and ordinary pipe velocities, the most efficient pump will be the one which accomplishes this with the least shock friction, loss by eddies and leakage. In the high-efficiency pumps these diffusion vanes play an important part in gradually changing the velocity to pressure head without loss by shock. These diffusion vanes are a replica of the guide vanes of a water turbine and are responsible for the name assumed by such pump as "turbine centrifugals."

With the improvements the efficiency of the centrifugal pump has steadily advanced until a figure of 75 per cent has been shown by creditable tests, with the result that there has been an enlarged field open to its use and a demand created for such pumps capable of delivering against comparatively high heads. For such service an ordinary centrifugal pump requires either an extremely high rate of rotation for the runner or a shell of an impractical diameter, and in either case, due to the increased hydraulic friction at high speeds, there will be a serious loss of efficiency. The multiple-stage centrifugal



HIGH-SPEED, DOUBLE-ACTING ENGINE DIRECT CONNECTED TO A CENTRIFUGAL PUMP



CENTRIFUGAL PUMP WITH HAND PRIMER FOR STARTING UP

obviates both these disadvantages and can now be built for all heads up to 2000 ft. A multiple-stage pump is primarily a series of single-stage pumps mounted side by side and with

INTERIOR OF CLOSED SCHUYLKILL CAR, SHOWING CROSS SEATING IN THE MAIN COMPARTMENT, AND LONGITUDINAL SEATING IN THE SMOKERS' SECTION

runners driven by a single shaft. The liquid passes through each in succession, receiving its proportionate increment of pressure at each "stage." Practically the several single pumps are incorporated in one casting, with waterways arranged so as to lead the water from the periphery of one runner to the inlet of the other with the least possible loss.

The use of high pressures and velocities in pumps of this nature has necessitated careful design of impellers so that there shall be no unbalanced forces to be taken up at wearing surfaces. The manufacturers of certain pumps claim a perfectly balanced impeller with no resultant end thrust under all conditions of service. In one instance a four-stage pump showed, under a careful test, an efficiency of 72 per cent when delivering 250 gals. of water per minute against a head of 650 ft.

Among other improvements in centrifugal pump design has come a reduction in the speed, so that they become readily adapted for direct connection to high-speed engines. Thus a most compact and effective unit is provided with a capacity far exceeding a direct-acting pump of the same weight.

For general service the centrifugal pump seems a well nigh ideal piece of apparatus. Commercially considered, its first cost is low, its maintenance expense a minimum, and its effective life a long one. Its operation is too simple to require skilled attendance, and its property of handling liquids of a corrosive nature and containing large quantities of solid matter in suspension renders it indispensable for certain situations. Its high maintained efficiency, quiet operation, absence of heavy foundations, with no danger in stopping and starting under full water pressure, are unmistakable advantages pointing to a widespread use in the future.

The chief disadvantage of the centrifugal pump is its inability to prime or start itself, and unless it is so situated as to be submerged or have water enter the pump at a slight head, some device is necessary to prime them. This may be effected either by filling the shell with water from a tap to water mains, or by an ejector where steam pressure is available, or by a hand pump, as shown in the accompanying cut. On the score of fuel economy, the centrifugal cannot compete with the high-duty pumping engine, inasmuch as it does not include in itself the element of a prime mover. With the advent of the steam turbine, so eminently suitable for direct connection, the centrifugal pump threatens to relegate to the past even these splendid examples of engineering skill.

One of the companies which have given especial attention to the development of the centrifugal pump is the Buffalo Steam Pump Company, from whose apparatus, in fact, the accompanying illustrations were reproduced. Although they represent only a few of the types manufactured, they give an idea of the construction and appearance of this kind of pump.

FINE CARS FOR GIRARDVILLE, PA.

An interesting shipment of six grooveless-post convertible cars to the Schuylkill Railway Company, of Girardville, Pa., has just been made by the J. G. Brill Company. Girardville is in the center of the anthracite region, in the east central part of Pennsylvania, and is connected by electric railway lines, operated by the Schuylkill Railway Company, with a number of important mining towns in the Shenandoah and Schuylkill Valleys, including Shenandoah and Pottsville. The region is thickly settled and the towns populous and close together. The power stations of the system are located at Girardville and

THE SCHUYLKILL RAILWAY COMPANY'S LATEST TYPE OF DOUBLE-TRUCK CONVERTIBLE CAR

Mahanoy City, and the repair shops are at the former place. Two amusement parks are reached by the company's lines.

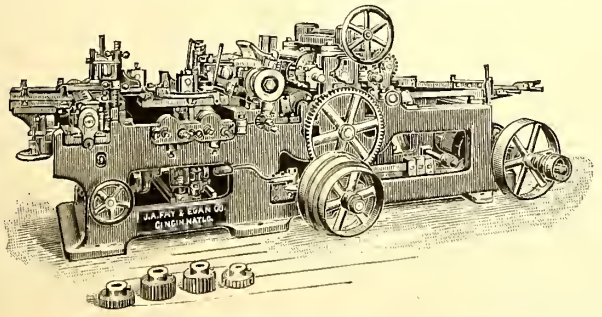
The special feature in connection with these cars is the smoking compartment, which occupies but 6 ft. 5 ins. of the 28-ft. 4-in. body. The compartment has longitudinal seats, which accommodate five passengers each, and with the wide standing space between the seats, the compartment has room for twenty passengers. If at any time it is deemed advisable to use transverse seats in this compartment they can be readily installed and the panels can be made operative without difficulty; but it is hardly likely that the compartment will be changed from the present arrangement, for the larger capacity due to longitudinal seats is an important feature. Smoking will also be allowed in the vestibule which adjoins the compartment, and with the doors opened into the vestibule there will be sufficient ventilation from the outside doors and the deck ventilators to carry away the smoke.

The passenger compartment seats thirty-four passengers. The seats are 35 ins. long and are upholstered in spring cane, with push-over backs. The side posts of both compartments are 2 ft. 7 ins. from center to center. When the panels and sashes are raised into the roof pockets, the clear space from the sill to the center of the arch is 5 ft. 5¾ ins. Between the compartments is a hardwood partition with glazed door and sides. The platforms are the standard length, 4 ft. 8½ ins. from end panels over the vestibule sheathing, and the timbers are reinforced with angle iron in the usual manner.

The side sills are 8¾ ins. x 7 ins., with 8-in. x ⅝-in. sill plates on the outsides; cross members are 3½ ins. x 5⅞ ins., with 2¾-in. x 4½-in. diagonal bracing at the center. The open steel bolsters are 9 ins. wide and 6⅞ ins. deep at the centers; from king-pin to king-pin is 17 ft. 4 ins. The general dimensions are: Length over the end panels, 28 ft. 4 ins., and over the vestibules, 37 ft. 9 ins.; width over the sills, including the sill plates, 7 ft. 7¼ ins., and over the posts at the belt, 8½ ins.; sweep of the posts, 3½ ins.; width of the aisle, 20½ ins.; height from the track to the under side of the sill, 2 ft. 5½ ins., and from the under side of the sill over the roof, 9 ft. 3¼ ins.; from the track to the tread of the platform step, 15⅞ ins.; from the step to the platform, 13 ins., and from the platform to the car floor, 7⅝ ins. The surface of the running boards is 19½ ins. from the track, and from the running board to the car floor is 17 ins. The cars are mounted on No. 27-G-1 trucks, having 4-ft. wheel base, 33-in. wheels and 4-in. axles. Four 35-hp motors are used per car. The weight of the car and the trucks, without motors, is 26,500 lbs.

A NEW INSIDE MOLDER

An improved molder for heavy work has been brought out lately by the J. A. Fay & Egan Company, of Cincinnati. It



INSIDE MOLDER FOR HEAVY WORK

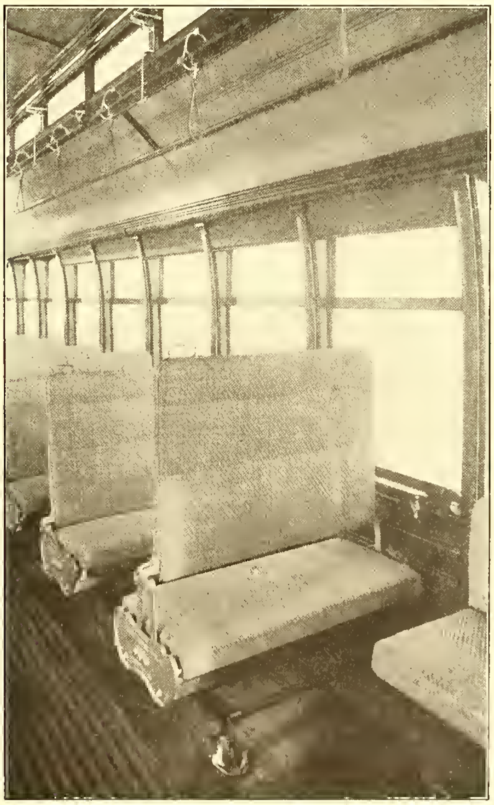
has a capacity for molding lumber up to 6 ins. thick and 12 ins. or 15 ins. wide. The maker has built a large number of molders, and all the points of excellence that could be suggested from long and successful experience have been embodied in the make-up of this one. The following data covers some of the more important features of this machine:

The frame is of a new type—square, open, ribbed inside, strong and rigid. The four steel cylinders are slotted on four sides and their pulleys taper-fitted. The upper head is double-belted and mounted on a housing, raising and lowering on ball bearings, and operated by a crank. The pressure bar of this head is also carried on this housing, raising and lowering with it, and also has vertical adjustment, and to and from the head. The chip breaker of this head is in sections, each independently adjustable, and all pressing close to the cut. The lower head is at the feed-out end, is made single or double-belted, and its frame is vertically adjustable. The pressure bar before this head, also the table after the head, adjusts vertically and horizontally. Both heads are easily accessible. The side heads are of a new construction, and are fitted with many devices and improvements for facilitating operation and permitting fine work. There are four feed rolls, the upper sectional, and either smooth or fluted rolls can be easily inserted.

The feed is driven by cone pulleys, tight or loose pulleys, or by binder. Any desired speed can be furnished for operation.

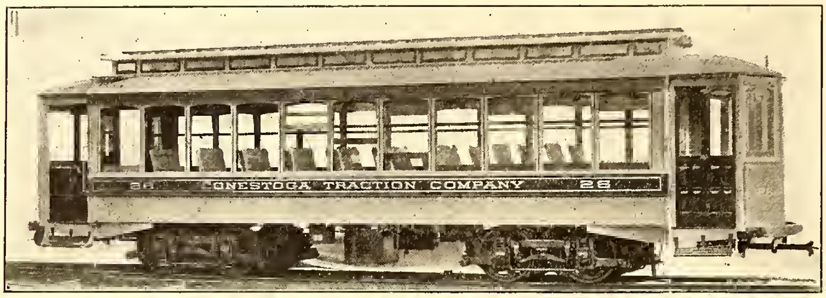
CARS FOR NEW DIVISION OF CONESTOGA TRACTION SYSTEM

About 50 miles directly west of Philadelphia is the manufacturing city of Lancaster, Pa., with a population of about 50,000. This is the operating center of the Conestoga Traction Company, whose lines run out in all directions. A branch



INTERIOR OF CONESTOGA CAR, SHOWING PERPENDICULAR POSITION OF ONE SEAT-BACK TO EXPOSE THE REVERSING LEVERS

of the system, which has recently been completed, extends to the southeast, a distance of 8½ miles to Quarryville, connecting the towns of Refton, New Providence and Camargo. The company has used Brill semi-convertible cars on its various divisions for a number of years, and has just received a further shipment from the car manufacturer for the new branch to Quarryville. The cars include the new "grooveless-post" semi-convertible window system, and an excellent idea of the appearance of this neat arrangement of the posts may be obtained from the illustration of part of the interior of the car. This illustration also shows the style of seats, and one of the seat backs has been pushed half way over to show the simple but strong system of levers for reversing the back. It will be seen that the seat cushions are of the tilting type, and that the levers are so placed as not to come in contact with the bodies of seated



ONE OF THE NEW SEMI-CONVERTIBLE, DOUBLE-TRUCK, VESTIBULED CARS RUNNING ON THE LINE OF THE CONESTOGA TRACTION COMPANY

passengers. Attention is also directed to the compactness of the lever mechanism at the end of the seat next the window. It is evident that the body of a seated passenger may come against the side lining, which is set in between the posts, thereby adding to the comfort of passengers, by giving them a 36-in. seat and permitting their bodies to extend beyond the cushion at either end. The seat is manufactured by the car builder, and is the type most largely used in the city and suburban cars of this manufacture.

The width of the car over posts is 8 ft. 2 ins.; therefore, with 36-in. seats the aisle is 22 ins. wide. A gain of over 7 ins. is claimed by the builder on account of this style of seat and the fact that there are no wall window pockets.

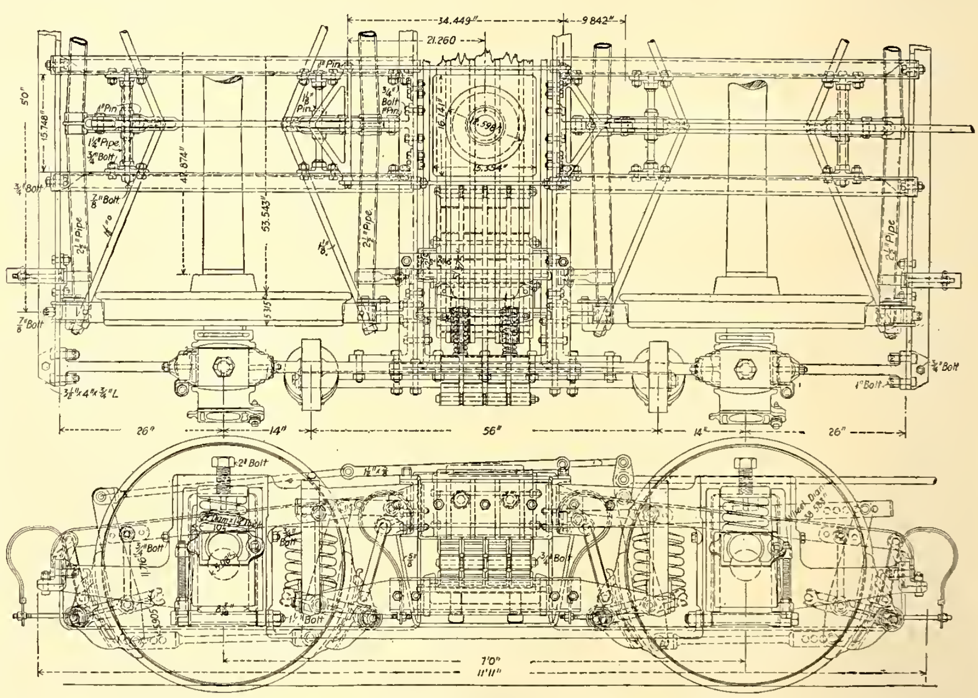
The interior of the cars is finished in mahogany, rubbed to a dull gloss; the heads of the posts are neatly carved, and the paneling is inlaid with a striping of holly. The birch head linings are painted a robin's-egg blue and decorated with a simple design. The standard form of bottom framing of this style of car is adhered to in the design, and includes 12-in. x ⅜-in. steel plates on the inside of 4-in. x 7¾-in. side sills; the center sills are 3½ ins. x 4½ ins.; the end sills, 5¼ ins. x 6½ ins., and the crossings, 3½ ins. x 4½ ins. A pair of 3-in. x 4-in. x ½-in. angle irons, 14 ft. 6 ins. long, support the center of the platform at either end. Besides the seats, the cars are equipped with channel-iron draw-bars, sand boxes, platform gongs, signal bells, brake handles, angle-iron bumpers, vestibule folding door controllers and other patented specialties of the builder's manufacture. The cars are mounted on No. 27-G trucks. The wheel base is 4 ft., and the track gage, 5 ft. 2½ ins.; diameter of wheels, 33 ins., and the diameter of the axles is 4 ins.

The Toledo, Bowling Green & Southern Traction Company has inaugurated limited service between Toledo and Findlay with three special cars each way daily, making the 50 miles in 1 hour and 50 minutes, as compared with 2 hours and 30 minutes for local cars.

AN INTERESTING TRUCK FOR THE MILAN EXPOSITION

At the International Exposition to be opened at Milan, Italy, in April, 1906, the J. G. Brill Company will show, in the large section which it has engaged in the transportation exhibit, a pair of the largest trailer trucks ever built for electric service. The diagram herewith shows the truck in detail, and it will be seen that it is no less than 11 ft. 11 ins. over the frame—considerably larger than the four-wheel trucks in use on American steam railroads, and powerful enough to carry the heaviest Pullman cars; in other words, it has a carrying capacity equal to the largest six-wheelers. The truck is similar in size and type to those which were supplied to the Milan-Gallarate third-rail system three years ago.

The special features of its design consist of a means of adjusting the height of the quadruple elliptics, which carry the bolster; large diameter bolts, which, by being screwed down, take up the wear of the journal bearings; adjustable pedestal gibs, which take up the wear caused by the friction of the journal boxes, by means of long bolts passing through lugs on the sides of the pedestals by means of set screws; and an arrangement of outside and inside brakes which are operated by one rod. Each side frame is composed of a single solid forging 11 ft. 11 ins. long; the center of the side frame is 7 ins. wide and 1⅜ ins. thick; the extensions are 6 ins. wide and 1½ ins. thick, and the pedestals are 4 ins. wide and 4 ins. thick, with the top of the yoke 6 ins. across. Nine-inch channels compose the transoms, and are secured to the side frames with double and single corner brackets 1 in. thick, forged from a



PART PLAN VIEW AND SIDE ELEVATION, SHOWING THE CONSTRUCTION DETAILS OF THE LARGE TRAILER TRUCK TO BE EXHIBITED AT MILAN

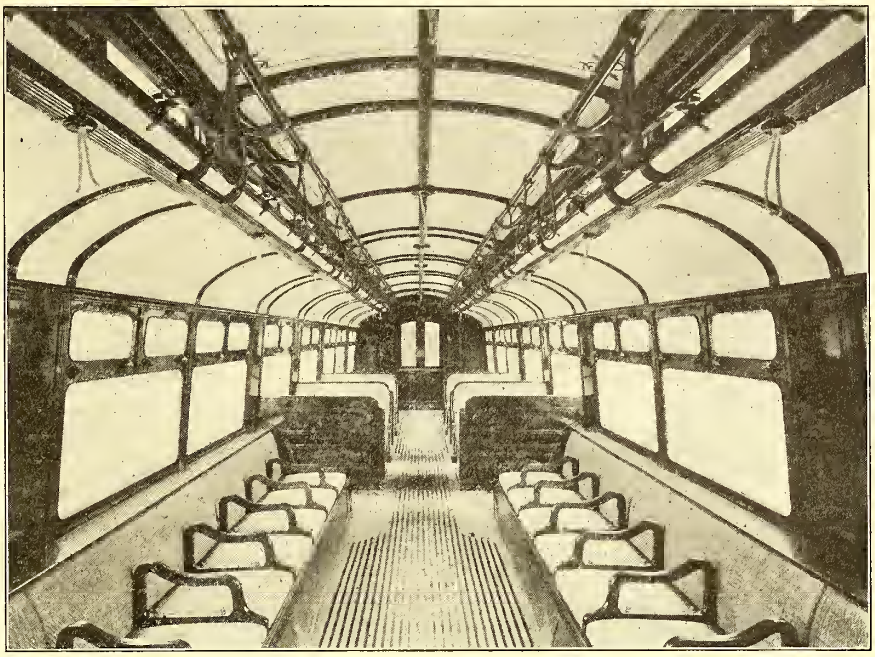
single billet. The end crossings are made of 3½-in. x 4-in. x ¾-in. angle iron, secured at each end to the palms of the extensions with two 1-in. bolts. The frame is thus made capable of keeping the truck square, and the nature of the metal renders it proof against crystallization.

The spring system is composed of three sets of springs working in series, each having to do with the equalization of the load. Instead of having the load bear upon the center of the side frames, it is brought upon them at wide-apart points near the yokes by means of spring links, thereby holding the frame down upon the journal springs with leverage against the wheels and brakes. Besides producing an effective leverage in favor of stability, placing the links near the yokes relieves the center of the side frames of much of the strain; in other words, the load is carried close to the points where the frames are supported upon the axles. Being outside the wheels, the spring links furnish a wider link base than possessed by any other truck, a feature which results in the diminishing of the rocking motion of the car. At the same time they amplify the vertical motion of the elliptics and impart smoother motion to the car. At the entrance to curves the spring links swing outwardly, and at the end of the swing the springs in the links are compressed, driving the car body gently out of the line of its momentum into the new direction without jar or lurch. The wheels share the benefit of this cushioned side swing, as the flanges are not forced violently against the rail-heads. The equalizing bars and spring plank are rigidly secured together, forming a cradle for the bolster. The links which suspend this cradle from the frame enclose what are known as equalizing springs, but these equalizing springs must not be understood to directly equalize the load upon the wheels, as in the "M. C. B." type, for the truck is doubly equalized—that is, the load is equalized upon the frame before it is equalized upon the wheels. The Brill Company will also exhibit a pair of equalizing short base trucks, No. 27-E-1 type; a pair of "Eureka" maximum-traction trucks and a single truck, type No. 21-E; also models and sections of cars and trucks.

STEEL CARS FOR A LONDON UNDERGROUND RAILWAY

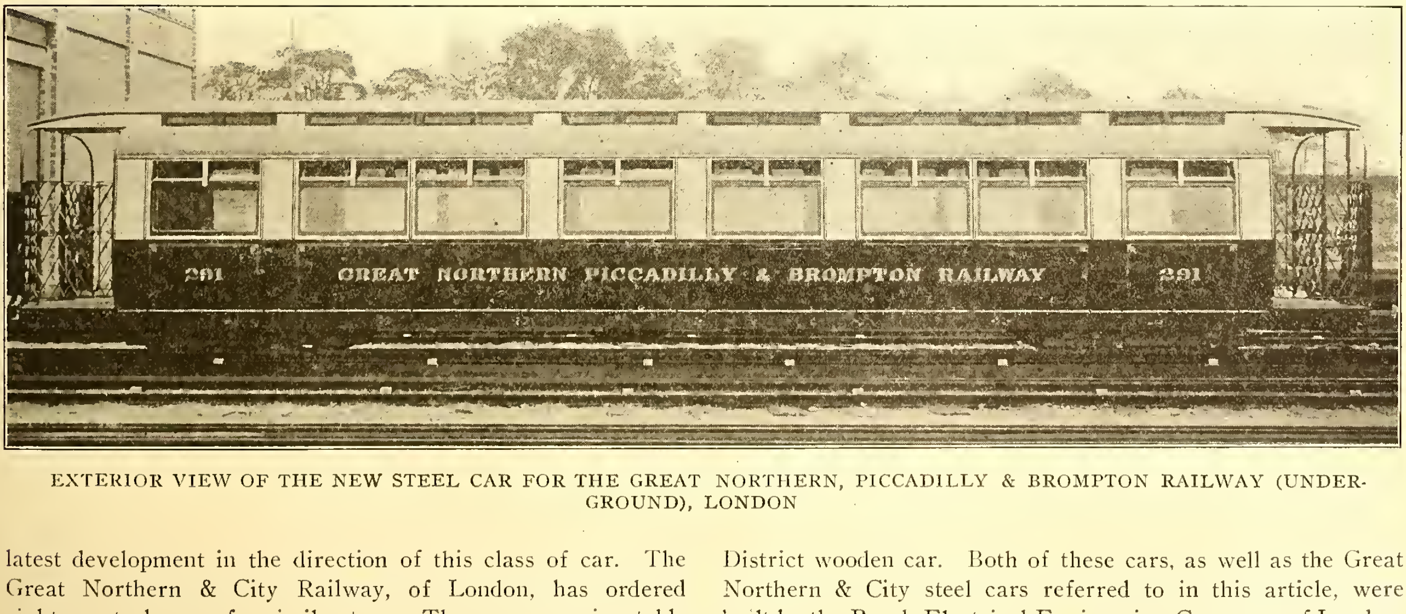
The Great Northern, Piccadilly & Brompton Railway, which is one of the later underground electric lines of the Yerkes system in London, has recently received the first of its steel frame cars. Exterior and interior views are shown in the accompanying engravings. Mr. Yerkes was one of the first advocates of non-combustible cars for underground railways, and, as previously described in this paper, the District Railway has a number of non-combustible cars built of chemically-treated timber. The accompanying illustrations, however, show the latest development in the direction of this class of car. The Great Northern & City Railway, of London, has ordered eighteen steel cars of a similar type. The accompanying table gives the main dimensions and weights of the cars on the three lines which are referred to in this article.

As will be noticed, the saving per passenger seated is 261 lbs. between the Great Northern steel car and the Metropolitan District wooden car. Both of these cars, as well as the Great Northern & City steel cars referred to in this article, were built by the Brush Electrical Engineering Company, of London.



SEATING ARRANGEMENT OF NEW TYPE OF STEEL CAR FOR LONDON UNDERGROUND RAILWAY

Descriptive	Great Northern & City Railway		Metropolitan District Railway		Great Northern, Piccadilly & Brompton Railway Steel Car	
	Ft.	In.	Ft.	In.	Ft.	In.
Length over body	40	8	35	8	41	$8\frac{1}{2}$
Length over platforms	49	6	49	$9\frac{1}{2}$	49	$9\frac{1}{2}$
Width over end posts	9	4	8	9	8	8
Extreme width	9	4	8	$10\frac{1}{2}$	8	9
Height from floor to roof	8	$6\frac{1}{2}$	8	5	7	6
Height from rail to top	12	$4\frac{1}{2}$	12	$3\frac{1}{4}$	9	$5\frac{3}{8}$
Wheel base	6	1	6	6	5	0
Truck centers	34	6	33	$10\frac{1}{2}$	33	0
Diameter of wheels	3	0	Motor, 3′ 0″ Trail, 2′ 6″		2	6
Seating capacity	58		52		54	
	Lbs.		Lbs.		Lbs.	
Weight	42,112		47,600		35,550	
Weight per passenger seated	726		918		657	



EXTERIOR VIEW OF THE NEW STEEL CAR FOR THE GREAT NORTHERN, PICCADILLY & BROMPTON RAILWAY (UNDERGROUND), LONDON

PROGRESS ON THE MEXICO CITY TRAMWAYS

W. W. Wheatly, president, and Paul H. Evans, chief engineer and purchasing agent, of the Mexico Electric Tramways, Ltd., reached New York this week for a short visit. Mr. Wheatly, it will be remembered, went to Mexico as manager of the tramway system in the spring of 1904. He had previously been general manager of the Public Service Corporation, of Jersey City, and before that had been connected for a period of six years with the Brooklyn Rapid Transit Company. Mr. Evans was appointed to the position of chief engineer of the Mexico Company in June, 1904, after an experience in Mexico extending over many years. He went to Mexico first in 1889 as superintendent of construction of the Thomson-Houston Company. Later, upon the organization of the General Electric Company, he became engineering expert for the Mexican branch of that company, during which time he placed to his credit the construction of some of the most notable electric power transmission plants in the Republic, among them being that of the Guadalajara Electric Light Company and the Regla-Pachuca plants. Before going to Mexico, Mr. Evans was for three years with the Atlanta, Ga., street railway system.


W. W. WHEATLY

According to Mr. Wheatly, electric operation on the electric tramways lines in the City of Mexico was commenced in the year 1900, and at the present time there are in operation about 285 electric cars, 200 mule cars and about 85 steam railway cars. There are 106 miles of electric track, 116 miles of mule track and 15 miles of steam track, making a total of 237 miles.

One of the principal causes of the delay in beginning electric operation in the City of Mexico was on account of the high price of coal, which even now costs about $10 gold per ton, and furthermore, the possibility of bringing cheap hydraulic power to the city from some of the numerous waterfalls in the Republic. The work of converting additional mule lines to electric operation, although temporarily suspended during the past year, is now being resumed and will be carried along without any intermission until practically the entire system is converted to electric operation.

The Mexican Electric Tramways, Ltd., has recently made a contract to receive hydraulic power from the Mexican Light & Power Company. This latter company is now completing the installation of its hydraulic plant at Necaxa, where there are about 40,000 hp under process of development, with an additional 40,000 hp held in reserve. The tramways company expects to receive current from these falls about the middle of 1906, and will take all of its power from the Necaxa power plant. The amount contracted for at first is about 5000 kw, but this must necessarily be increased during the next few years to 8000 kw, on account of the conversion of additional mule lines to electric operation and the natural increase of the traffic. According to Mr. Wheatly, his especial mission here at this time is to purchase the electric apparatus for the installation of the company's four new sub-stations which are to receive the alternating current from the Necaxa Company's plant. At the same time he is taking advantage of his presence in New York to make purchases of a large quantity of additional materials for his company.

When asked about the general outlook for business in Mexico, particularly in regard to transportation and railroad enterprises, Mr. Wheatly said that most of the capital for the development of these industries of the Republic of Mexico up to the present time has come from the United States, Canada and England. Mexico to-day, in its physical development, is in about the same state of progress as were the Western Territories of the United States some thirty or forty years ago. The Pacific Coast States of Mexico are still practically virgin and will not receive great impetus toward their development until railroad facilities are forthcoming. The Mexican Central Railway and the Kansas City, Mexico & Orient Railway are now pushing their lines toward the Pacific Coast, and it may not be more than another year until that portion of the Republic is opened up for development. To most of the American people Mexico is somewhat of an unknown country, but there is no reason why, on account of its being one of their two nearest neighbors, it should not be quite as well known to them as are the provinces of Canada. The natural resources of Mexico are not excelled by any other country in the world, and Mr. Wheatly said that he was somewhat surprised to find upon going to Mexico about one year and a half ago that the American people have not taken a greater interest in the development of this rich and fertile country.

In answer to a question as to some of the special characteristics of the tramway system in Mexico, he said that one of the things which impresses the newcomer is the up-to-date character of the company's plant and equipment, which, in his judgment, is second to none in the United States. A distinguishing feature of the operation is the separation of the classes. Although nearly all of the steam railroads of Mexico operate first, second and third-class, the tramway system has only first and second-class cars. A large portion of the public who patronize the tramways is of the poorer classes, and for their especial benefit the second-class service is operated. The fares on the second-class cars are, as a general rule, about 60 per cent of the first-class fares, and second-class operation is confined entirely to what might be termed the suburban lines, as distinguished from the city lines. The rate of fare on the city lines is 6 cents, with no second-class, and on the suburban lines the fares range from 4 cents to 16 cents for the second-class and from 6 cents to 30 cents on the first-class cars. There are altogether seventeen different rates of fare on the company's suburban lines, graded according to distances.

Another especial characteristic of the operation of the Mexican city lines is the handling of the funeral service. Included in the company's equipment are seventy-five to eighty funeral cars. All of the large cemeteries of the city and suburbs are reached by the lines, and the company provides funeral cars for more than 95 per cent of all the people who die there. There are no hearses in Mexico as they are known in the United States, except such as are furnished by the tramway company for working in connection with its trolley lines.

The company's present steam power station has a normal capacity of 3200 kw, and contains three 800-kw steam-driven generators and two 400-kw steam-driven generators. The power plant is as complete as it is possible to make it, and the company has every facility for economical operation.

RECENT WORK OF THE AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION

As authorized at the Philadelphia meeting, the executive committee of the American Street and Interurban Railway Association has established a permanent office in New York City, in charge of Bernard V. Swenson, secretary and treasurer. Quarters have been selected on the sixth floor of 60 Wall Street, a location which is in the center of the financial district and close to the engineering district. For these reasons it will be convenient for street railway men visiting the city. The telephone number is 5882 John. At these quarters Mr.

Swenson is organizing the department of information outlined in the address of the president, and is also engaged in preparing for publication the report of the association. Two subjects have been given special attention at the office of the association since its establishment. One is the question of municipal ownership, on which the secretary has been compiling data. The other is the subject of fire insurance. It will be remembered that the American Street Railway Association has a standing committee on car wiring, which consisted last year of W. A. Pearson, chairman; Richard McCulloch, of St. Louis; C. B. King, of Detroit; Henry M. Ballard, of Boston, and E. A. Sturgis, of Worcester. This committee met last year with a committee on behalf of the Underwriters' National Electrical Association and representatives of the General Electric and Westinghouse companies, and formulated the rules for car wiring which were published in the STREET RAILWAY JOURNAL for July 16, 1904. During the past year, the resignations of Messrs. Pearson and Ballard have been received, and in their places the president has appointed M. G. Starrett, of New York, and John Lindall, of Boston. In view of the completeness with which the committee did its work last year, no formal meeting of the committee will probably be called this fall and no changes are proposed in the rules for car wiring already published, except a short paragraph in the section relating to car heaters. This amendment and the general subject of a national insurance code will be considered at a meeting of the Underwriters' National Electrical Association which is to be held Dec. 6 at the auditorium of the New York Edison Company on Duane Street, New York City. The Underwriters' National Electrical Association, it will be remembered, is the body which is in charge of the broad subject of a national insurance code, and of which the committee on car wiring, referred to, reports. The association is composed of representatives from the American Street and Interurban Railway Association, American Institute of Electrical Engineers, American Society of Mechanical Engineers, National Electric Light Association, National Institute of Architects, Underwriters' National Electrical Association and other bodies. Frank T. Sloan, insurance engineer of the Brooklyn Rapid Transit Company, has been appointed as the delegate of the American Street and Interurban Railway Association at the conference, and Secretary Swenson has also been invited to attend as a guest.

LONDON LETTER

(*From Our Regular Correspondent.*)

The London County Council, after considerable opposition, has finally adopted the recommendation of the highways committee to promote a bill in Parliament next session for the supply of electrical energy in bulk to London. This bill will be, as may be naturally supposed, in opposition to the administrative and county bill which was promoted last session by a Northern syndicate, of which Mr. Merz was the leading spirit. The latter bill, as will be remembered, failed to reach its third reading before the end of the Parliamentary session, and will doubtless be brought forward again the next session. In addition to these two schemes, three other bills will be promoted in Parliament, practically with similar aims. First of these three is a group of borough councils, including those of Hackney, Stepney, Bethnal Green, Shoreditch, Islington, Deptford, Bermondsey, the urban councils of Leyton and Walthamstow, and the Corporation of West Ham, which propose to combine for the purpose of producing and selling electricity in bulk. The fourth is a combination of the electric lighting companies which propose to extend their present works, and the fifth is a combination of railway companies for the production of electrical energy for sale to themselves or to whatever boroughs may desire to purchase. Next year's session will therefore be a lively one electrically, and at this moment it is absolutely impossible to foresee what the result will be. As regards the London County Council proposal, a serious note of warning has been made by Lord Welby and others on behalf of the finance committee as to the financial position of the London County Council, as some of the more conservative of the officials believe that the London County Council has involved itself in sufficient expenditure without adding the huge expenditure necessary for the installation of an enormous electricity scheme of this kind.

Mr. Baker, chairman of the highways committee of the London County Council, stated that it is hoped to have the new system of tramway cars, which are to run in the subway which has been constructed under the new streets, Aldwych and Kingsway, which were recently opened for public use by the King, in service by the end of the year. These tramways are to run from the Strand in this subway to a point in Southampton Row a little beyond Holborn, where they will come to the surface and continue to the Angel, Islington. As only single-deck tram cars will be used in connection with this system, owing to the size of the subway, the highways committee is suggesting the use of trailers, which are at present forbidden by the board of trade, which will be approached with a view to obtaining special permission for this particular portion of their system. The London County Council has also recently invited tenders in connection with the reconstruction of the old lines of the North Metropolitan Company, which are at present being operated by horse traffic. The work will begin early next year and will probably be finished by the end of 1906. Already certain contracts have been placed, more notably that for the steel rails, which contract has been given to Bolckow, Vaughan & Company, of Middlesbrough. The committe has asked the Council to approve of estimates in connection with this portion of their work totalling more than £800,000.

Another scheme for the general distribution of electric current in London has also recently been published, the plan being to build a generating station on the banks of the Ouse in Huntingdonshire, where arrangements can be made for an excellent supply of cheap coal. The current would be transmitted to London by means of high-pressure cables at a pressure of about 15,000 volts, and distributed in the metropolis by means of sub-stations. The company that is to be formed will have a capital of about £2,000,000, but so far no details are available.

The new car building and repair shops of the Manchester Corportation Tramways, at Hyde Road, were recently formally opened by the Lord Mayor. The members of the tramways committee with their guests assembled at the tramways office in Piccadilly and went on a car to the new works. These adjoin the large carshed opened about two years ago. Before the erection of the new works the land upon which they stand was used for the storage of the large quantities of permanent way materials necessary for the construction and repair of the 150 miles of tramway track within the city and suburban districts. The works are said to be thoroughly modern and up to date. On the one side there are the woodworking and car body shops, and on the other side the mechanical and electrical shops. The main avenue is 50 ft. wide, and is provided with a traveling crane for lifting and transporting car bodies and trucks. The woodworking side contains the machine shop, the cabinet-makers' shop, the general car body repairing and building shop, and the paint shop. On the mechanical and electrical side are the smithy, the brass foundry, the machine shop, the truck shop and the electric shop. The area of land taken up is about 4 acres, 2½ acres of which are under roofs, and the total cost of the works and equipment has been £54,200.

England will very soon have the distinction of three towns equipped with the surface contact system, each of the towns having adopted a different system from the others. The first of the towns, as is well known, is Wolverhampton, where the Lorain system has been in successful operation for some years. Torquay, one of the beautiful English watering places on the south coast, adopted the Dolter system some time ago, and the work is now well along toward completion, and had it not been for disputes between the Dolter Electric Traction Company and the Corporation as to the provision of the necessary power for operating these tramways, they might have been in service by this time. The Dolter system is perhaps best known in France, but it is understood that a great many important improvements have been made, especially in the contact boxes, over anything which the company had previously installed in that country. The other system, which is also approaching completion, is that in the city of Lincoln, where the Griffiths-Bedell system has been adopted. The work has been progressing on this installation for several months, and it is now only a question of a very short time before the cars will be in operation. Electrical engineers, and tramway engineers in particular, are looking forward with great interests to the results of these two systems, so that they may be compared with the results of the Lorain system, which are now pretty well known, and with the results of any ordinary overhead trolley installation.

We referred last month to the extension of the Bournemouth Tramways to Christchurch, which system of tramways also extends in the other direction to Poole. There has recently been brought forward a proposal to build an electric tramway system from Bournemouth, though not by the Corporation, to Swanage via Camford Cliffs, Poole Harbor mouth and Studland. The district is a very beautiful one, and has, to a very large extent, been totally unopen by means of any communication to the tourist or traveler. The difficulty of access to Studland has been, of course, the barrier of Poole Harbor mouth, but if this difficulty can be overcome by means of a bridge, a most delightful sea front would become accessible. The proposal for providing the connecting link between North and South Haven includes the erection of a conveyor bridge, a few of which are now in successful operation in various parts of the world. The cars would be transported from one side to the other by means of the conveyor, and the only difficulty that appears in the way now is the difference of opinion between the Poole Harbor Commissioners, the Poole Corporation and the promotors, as to the necessary height of the bridge above high water and the necessary width of the clear span of waterway.

A deputation to the Manchester tramways committee from the Oldham Corporation has submitted a proposal that a through service of cars be established between Piccadilly (Manchester) and Waterhead (Oldham). Each corporation would provide and run its proper proportion of rolling stock, the whole of the earnings on the Manchester lines would be handed over to the Manchester Corporation, and the whole of the earnings on the Oldham lines handed over to the Oldham Corporation. The general manager, Mr. McElroy, was instructed to confer with the manager of the Oldham Corporation Tramways with a view to the preparation of a detailed scheme for the consideration of the two committees.

At Falkirk a system of electric tramways has been completed, officially inspected and opened to the general public. The service is to be a five minutes' one under ordinary circumstances. The system supplies a populous and scattered district, comprising Falkirk, Bainsford, Carron, Stenhousemuir, Larbert and Camelon. The car houses are between Camelon and Larbert, and from thence the track passes through Camelon, across the Forth and Clyde Canal to Falkirk, through Newmarket Street, Vicar Street and Graham's Road, across the Forth and Clyde Canal again, through Bainsford on to Carron and Stenhousemuir, returning via Larbert and the Stirling highway. The track is a single one, with double lines where necessary. The electric power is supplied by the Scottish Central Electric Power Supply Company from the power station at Bonnybridge to a sub-station close to the car sheds at Carmuirs. The cars are all double-decked and each measures 28 ft. 6 ins. x 6 ft. 6 ins. Each car is driven by two motors of 60-hp combined, and is provided with lifeguard, folding steps, etc. The accommodation is 22 inside and 26 outside. Messrs. Bruce, Peebles & Company (Ltd.), Edinburgh, installed the system, the cost of which was estimated to be £60,000.

Recently the Perth tramways, as reconstructed and electrified by the Corporation, were formally inaugurated. Along with Lord Provost Love, the magistrates and members of the Town Council a large number of influential citizens were invited to the opening ceremony. The company were driven to the electric station, where Lord Provost Love called upon Councillor Wotherspoon, convener of the electricity committee, to explain the arrangements. Mr. Wotherspoon then gave a brief description of the plant, which includes switchboard, engine and dynamo, and stated that they had provided power to drive more than forty cars. Mrs. Wotherspoon then started the engine. Mr. Lauder, on behalf of the engineers and contractors, presented Mrs. Wotherspoon with a silver bowl as a memento of the occasion. Ex-Dean of Guild MacNab, convener of the reconstruction committee, turned on the current. Mrs. Love, wife of the Lord Provost, who started the cars, was presented by the engineers and contractors with two silver vases as a memento of the occasion. The proceedings were watched by a large number of the general citizens. The system, which is 6 miles in length, has cost between £80,000 and £90,000, which sum includes the purchase price, £21,800, for the old system.

The linking-up of the Wolverhampton tramways with the lines of the British Electric Traction Company, whereby Wolverhampton is looking forward to inter-communication with Bilston, Dudley and other towns, appears likely to become an established fact. A car has been brought from Dudley and fitted up with the necessary mechanical appliances at the depot in Cleveland Road, while several of the Lorain cars are, in turn, being fitted up with the standard trolley to qualify them for the other system.

A. C. S.

PARIS LETTER

(From Our Regular Correspondent.)

It may not be generally known that in France, State subsidies for promising tramway and light railway schemes are still obtainable. The law authorizing these subventions was passed in 1880, and when the yearly budget is passed the sum which the Minister of Public Works then requests for each year is credited. In 1904 the sum of 1,000,000fr. ($200,000) was authorized for such subventions, and of this sum about a half was spent, a sign of the small number of new enterprises then being promoted. For the present year, however, although 1,000,000fr. was again authorized when the budget was passed in March last, the sum has been exceeded, and the Minister of Public Works and the Minister of Finance have deposited at the Chamber of Deputies a supplementary law authorizing the expenditure of the 500,000fr. not so used in 1904, on tramway and light railways at present being promoted, this making a total State subvention for 1905 of nearly 1,500,000fr. for this class of enterprise.

There has not yet been installed in France any single-phase tramway or railway system beyond the experimental line in the south of Paris, about 1000 yds. in length. In the Auxerre district, however, where a rather extensive light railway scheme has been authorized, plans are being made for the installation of single-phase equipments, and there is considerable discussion of the details of the concession and conditions under which the operating company will be permitted to accept the single-phase system. The Departmental Council, whose duty it is in this case to give the concession of the lines, is endeavoring to make rather stringent regulations, especially concerning the public safety, which is considered to be rather carefully guarded in France, in the face of the new enterprises. Among other conditions for the concession, will probably be included a proviso that, if at the end of one year the single-phase lines do not give satisfaction, they shall be either replaced by the direct-current system, or single-phase system with a low voltage, comparable to the usual direct-current 550-volt distribution. In view of the successful introduction of single-phase motors outside of France, the system has met with favor and, unless legislation or other onorous conditions interfere with the natural expansion of light railways on this system, it will probably be adopted in several interurban and departmental schemes at present under consideration where direct-current lines would scarcely pay the outlay on the necessary network.

The Paris-Metropolitan Railway authorities have now officially stated that the southern part of line No. 2 will be opened for service about the end of January. This line consists of both underground and overhead construction, and it is the construction of two bridges over the Seine which has so long delayed exploitation, although the nature of the foundations in the section passing through the catacombs (Montparnasse district) in any event would have made immediate service inadvisable directly the tunnels and viaducts were completed.

Some time ago the conversion of existing steam tramway lines between Paris and St. Germain was authorized, and the trolley lines were expected soon to replace the cumbrous locomotives still in use. Difficulties of a financial nature, however, have prevented the execution of the work, and this has given rise to a recent protest on the part of the Minister of Public Works.

Nothing definite is officially known regarding the solution to be adopted by the Paris Municipality in respect to the tramway situation in Paris, which is notoriously far from satisfactory, especially as regards some of the newer lines built since 1900. An amalgamation of several of the more important lines would appear to be the best solution, but there are many local difficulties in the way of its realization. Some of the financial papers here state that a group of capitalists is considering the proposal made in this respect to build a large central power station for supplying current to the various tramway installations, one or two of which are about to make additions to their equipment.

Some experimental high-speed suburban cars are receiving their equipment at the Tempelhof works. The equipments are arranged for single-phase alternating currents at 6000 volts, stepped down on the car itself to 750 volts, and to 300 volts near stopping places. The motors are built for 115-hp and a speed of 50 km per hour is expected. The cars are similar to those destined for the Hamburg-Altona route, and tests are about to be made on the equipments, which it is said will also be adopted for the neighborhood of Berlin.

In Algiers, where there is already an extensive tramway system, the Town Councils are somewhat closely connected with the undertakings, although they do not go to the length of municipal ownership. The town of Constantine has just voted a subvention of 350,000fr toward a light railway, uniting Bugeaud with Bone. The former place is a well-known pleasure resort of Algerians.

CALIFORNIA MIDLAND RAILWAY COMPANY

John Martin and E. J. de Sabla, Jr., of San Francisco, have incorporated the California Midland Railway Company, with a capital stock of $3,000,000, the purpose of the corporation being to construct an electric railway connecting the towns of Marysville, Nevada City and Auburn. Mr. Martin has been actively engaged for some months with the preliminary arrangements of the proposed new road, which have progressed so far that it is announced construction operations will be in progress within a few days. The road has been surveyed over an easy grade, and practically all of the rights of way have been obtained. Much of the right of way has been obtained by a citizens' committee of Marysville. Marysville is keenly anxious to see the road constructed, and the citizens' committee has prevailed upon many property owners to grant free rights of way over their lands. The committee expects to have the entire right of way completed in the near future. Mr. Martin already controls the electric line between Grass Valley and Nevada City, which will be operated as part of the new system connecting Marysville and Auburn. The new road will be operated by electric power, to be furnished by the California Gas & Electric Corporation, which is controlled by Martin and de Sabla.

NEW CAR SHOPS IN ST. LOUIS

The United Railways Company, of St. Louis, has made announcement of plans for the construction of its new car shops on part of the land recently purchased between Park, Grand, Vista and Spring Avenues. Six separate bays will be built over an area of 400 ft. x 350 ft., space to the east being left for the construction of four additional bays when needed. Each bay will have its own separate fire wall, and steam railway tracks will be run into all of them to permit of the direct delivery of carload lots of lumber and other material. The buildings will be for woodworking and repairing, and will include a planing mill and paint shop, the latter to replace the present paint shop at Jefferson and Gravois avenues. The bays will be equipped with the most modern machinery for woodworking, and electric motors will be used exclusively for driving.

The company is undecided as to the future disposition of its property at Jefferson and Gravois Avenues. The paint shop there is an old car house, and if the company uses that corner, it will be necessary to tear the wooden structure down and erect a new building. Work on the new buildings will begin in the early spring and they will be ready for occupancy in June or July, employing about 200 men. The grading of the land will be done during the winter. The bays will be single story structures, and besides the steam railway tracks, the company will run its tracks into them, so that cars needing repairs can be turned into the buildings.

SUBWAY SERVICE IN PHILADELPHIA FOR HOLIDAY TRAFFIC

President Parsons, Vice-President Widener and Chief Engineer Twining, of the Philadelphia Rapid Transit Company, after inspecting the Market Street subway a few days ago, are reported to have announced that orders had been given to work night and day in order that cars can be run underground from Fifteenth Street west by Dec. 15. The company hopes to operate cars in the subway for the relief of the Christman congestion. Ordinary surface cars will be used for the time being and will be added to the Market Street and the Lancaster Avenue lines. The management of the company is of the opinon that these extra cars, which will run at uninterrupted high speed between Fifteenth, Nineteenth and Thirtieth Streets, will do much toward handling the crowd that rides west of Broad Street. The cars will stop at Nineteenth Street on their east and west trips. Temporary waiting rooms will be furnished and every means taken to insure the comfort of subway passengers. The entrances to the temporary station at the starting point will be on the north and south sides of Market Street between Fifteenth and Sixteenth Streets. The entire station, which will be the largest in the subway, will not be completed until the work of building the loop around City Hall is well under way. Only the finishing touches remain to be put on the subway proper. The tracks are down, laid in a solid bed of concrete. In a trip through the subway recently the officers found the air to be pure and fresh and there was an entire absence of odors of any kind. The underground drainage system is in working order and the light is good. The temperature was only 1 deg. lower than on the surface. This indicates that the air supply is constant and ample. It is hoped to make the first test run on Dec. 10.

PENNSYLVANIA COMPANY BUYS ELECTRIC RAILWAY

A controlling interest in the Allentown & Reading Traction Company, operating 34 miles of electric railway from Allentown to Temple by way of Kuntztown, has been bought by the Pennsylvania Railroad Company. The Pennsylvania, it is understood, will come to Allentown by this route, the Berks County terminal of which is a few miles from Reading and the Pennsylvania Schuylkill Valley branch. The electric railway parallels the East Penn branch of the Reading Railway. The company was chartered April 25, 1903, with a capital of $250,000. The cost of the road and equipment was $951,000.

AN ELECTRIC RAILWAY ON PRIVATE WAY BETWEEN BUFFALO AND NIAGARA FALLS

The International Railway Company proposes to build another electric railway between Buffalo and Niagara Falls. It has made application to the city of Niagara Falls to extend two streets there to meet its right of way of the new line. The present electric railway, which was originally the Buffalo & Niagara Falls Electric Railway Company, and was later absorbed by the International Traction Company, is built on a public highway. It is the idea to build the new line on a right of way entirely private, and in that way a faster schedule between Buffalo and Niagara Falls will be made possible. The present time between the two cities is an hour and a quarter. It was shortened to an hour with express cars a year ago, but they were not found to be satisfactory. The private right of way for the new line has not been entirely secured, but it is understood part of the new tracks will be laid on the Buffalo & Lockport right of way, which is the old Erie's line from Buffalo to North Tonawanda. From there to Niagara Falls land will have to be acquired. The building of the new line does not mean that the present route will be abandoned. The new one will be used for higher speed equipment, and when it is finished it will be possible to go from Buffalo to Niagara Falls by electric railway in 40 minutes.

DELAWARE & HUDSON PURCHASES ALBANY SYSTEM

The Delaware & Hudson Railroad has purchased another street railway property. Its latest acquisition is the United Traction Company, operating 86 miles of line in Albany, Troy and Cohoes and between those cities. The purchase is to be financed by the issue of $5,000,000 of 4 per cent preferred stock and $2,500,000 of 3¾ per cent debentures of a company, the securities of which will be guaranteed by the Delaware & Hudson Company. Speyer & Company have bought these securities. The $5,000,000 of stock of the United Traction Company, which is to be purchased at 150, may be deposited under this offer up to and including Nov. 28. The new securities will only be issued in the proportion in which the stock of the United Traction Company is deposited. The Delaware & Hudson's purchase of the United Traction Company of Albany follows its recent purchase of the Schenectady Railway, which runs from Albany to Schenectady. This line was formerly owned by the General Electric Company.

A NEW WOODWORKING CATALOGUE

In bringing out the fourth edition of its catalogue, the American Woodworking Machinery Company, of New York, has presented to users of woodworking machinery what is undoubtedly the finest and most elaborate catalogue ever published on this subject. Even a hasty glance through this publication will show that the scope of this company's work is so great as to cover practically every kind of machine needed for woodworking purposes. Quite a number of the machines shown in this book have been illustrated and described in the Street Railway Journal, but no railway management can form an adequate idea of the great variety of the American Working Machinery Company's apparatus for car woodwork without carefully examining this splendid catalogue. Where so much is given it is useless to single out particular devices, but it may be of interest to note that excellent descriptions are given of numerous types of resaws, saws, rippers, saw tables, timber sizers, planers, matchers, single and double surfacers, molders, shapers, borers, lathes, sanders, grinders, veneer presses, carvers, etc. The book contains fully 320 pages, 9 ins. x 12 ins., and is handsomely bound in gold-stamped cloth.

BALL OF ROCHESTER EMPLOYEES

On Tuesday evening, Nov. 14, the Rochester Railway Employees' Benefit Association held its sixth annual ball in Mirror Hall, Powers' Hotel. Three hundred couples attended and enjoyed a programme of twenty numbers. The cover of the programme was quite an innovation, differing radically from the conventional order of dance. A motorman and conductor in uniform were shown at the top of the cover, between which, tastefully arranged, one was informed that the sixth annual ball of the Rochester Railway Employees' Association is being held in Mirror Hall, Tuesday, Nov. 14, 1905. Directly beneath this heading appeared a half-tone engraving of the handsome double-truck private car "Genesee" of the Rochester Railway Company, with an illuminated dash sign bearing the words "Mirror Hall" and the car number, 1905. The car has been brought to a stop in front of a canopy at the entrance of the hall, and the motorman and the conductor are represented as cupids, the conductor being in the act of welcoming a lady and her escort, who are alighting from his car at the end of their destination, to the hall. The committees in charge of the dance were composed of the men and officials employed in the different departments of the company. The ball was voted the most successful one ever held, not only from a social standpoint, but from a financial one as well, the treasury of the association being enriched by about $525.

ELECTRIC TRAMWAY IN ROTTERDAM

Electricity as motive power for tramcars was used for the first time in Rotterdam Sept. 19, when the motive power of the tram line Honingerdyk-Parklaan was changed. This line runs through Rotterdam from east to west, and is 3.22 miles long.

The work of equipping the old Rotterdam horse car lines, which have been bought by the Rotterdamsche Electrische Tram-weg Matschepy (Rotterdam Electric Tramway Co.), with electricity, has been prosecuted for some time, and other lines could now be operated if the motive power was obtainable. The power is, however, in accordance with the company's contract with the city of Rotterdam to be furnished by the latter, and the plant at present owned by the municipality can only furnish motive power for twenty to twenty-five cars. A large electric plant is now being built for the city, but will not be finished before July, 1906.

A NEW USE FOR THE GASOLINE CAR

The Dayton "Journal," published at one end of the Appleyard properties in Ohio, besieged General Manager Stebbins of those properties for some months to run a car out of Dayton about 3 a. m. so as to permit the delivery of papers along the line of the road. As it was impracticable for Mr. Stebbins to comply with this request because of the discontinuance of service during the early morning hours, he suggested that the paper buy a gasoline motor car for use in this service. This the paper did, and a service is given that is satisfactory as regards newspaper requirements.

At 2:45 a. m. the car is placed on the tracks of the People's Railway at Jefferson and Second Streets, where it is loaded for the trip by boys with carts who hustle the papers from the "Journal's" circulation department to the car. Springfield is loaded first, then Urbana, Xenia, Yellow Springs, Goes, West Liberty, New Carlisle, Mail, Medway, New Carlisle, Osborn, Fairfield and Harshman in order named, so that the man in charge can handle without confusion as the car speeds on the run. Between 3:10 and 3.30 the car is backed down to Third Street and switched to the tracks of the City Railway Company, which are used to Springfield Street, where the D. S. & U. line begins. There the driver speeds up for the first stop, at Dead Man's Crossing viaduct. The pilot gets his orders from the despatcher at Medway, which are generally a "clear track to Springfield," and the car speeds to Harshman, where the first bundle is thrown to the waiting agent. Then the car, without a stop, drives to Osborn, where the second stop of the run is made. Then several stations are passed and, after a hard climb on Masonic Hill, the car arrives at the Fountain, where Crew Manager Minear with his fifteen carrier boys, who handle the Springfield papers, meet the car. Then begins a hustle of bundles. Urbana, Yellow Springs, Goes station are loaded on waiting traction cars. West Liberty, Bellefontaine and other bundles are hustled to the depot, while the pilot is reporting the safe arrival to the despatcher at Medway, after which the return trip is begun.

The speed shown by the car is remarkabe. One stretch of 6 miles has been made several times in 7 minutes, and the best time to Springfield, with three stops, is 48 minutes.

WESTINGHOUSE MANAGERS' MEETING

The annual convention of the district managers of the Westinghouse Electric & Manufacturing Company was held, Nov. 13-16, at the general offices of the company at East Pittsburg, R. L. Warner, New England manager of the company, acting as chairman of the meetings.

At the opening session addresses were delivered by E. M. Herr, first vice-president of the company; Frank H. Taylor, second vice-president, and by other officials. During the four days of the convention papers on topics of general interest were read by many of the officials and managers and by representatives of allied companies. On Wednesday evening, Nov. 15, the delegates and representatives of the local Westinghouse Companies were entertained at the Hotel Schenley by E. M. Herr.

At no time in the history of the company have the managers spoken with more enthusiasm of the business conditions in their respective territories. Speaking on the prospects for export business, Mr. Coster, manager of the export department, said: "The outlook for foreign trade has never been brighter in this country than at present. The superiority of American machinery, as compared with European manufacture, is being demonstrated every day, and in these markets where the Germans and English have heretofore enjoyed a monopoly, America is now gradually obtaining the lion's share of the business." Various district managers from different parts of the United States also made a number of glowing predictions concerning the business of the company for the coming year.

NEW IOWA ROAD

A. E. Park, of Des Moines, Ia., who has been promoting the construction of an electric railway from Des Moines to Winterset, Macksburg and Creston, during the past year, has finally reached that point where the actual fulfillment of his plans is assured. At a meeting of those interested in the project, held at the Elliott Hotel in Des Moines Nov. 23, 1905, articles of incorporation were adopted, officers elected and, in a measure, plans were completed which assure the construction of the line during the coming year. It has been decided to name the company the Des Moines, Winterset & Creston Interurban Railway Company. Headquarters have been established at Des Moines. The company proposes to build from Des Moines to Winterset, thence to Macksburg and from there to Creston. Two surveys for a route have been made. It is understood that the company will enter Des Moines over the Valley Junction line of the Interurban Railway Company and the Ingersoll Street line of the Des Moines City Railway Company. The new line will be constructed south from Valley Junction and will be about 44 miles long from Valley Junction to Creston, and 49 miles from Des Moines to Creston. A. E. Park, who has been promoting this line, has gone about it in a new way and has thus taken longer to get things in shape to form an organization. His plan has been to educate the people through the territory where is was proposed to build the line to the benefits of the road, and thus gain their confidence and co-operation. He has taken several months to do this, addressing public meetings, giving figures and statistics as to the cost of the road, its probable business, and also showing the value of such a road to the community through which it passes. He has also endeavored to interest the moneyed men of the cities and country, and in fact stated that he would make no attempt to organize until he secured a certain number of business men and capitalists in Des Moines, Winterset and Creston to take an active part in the enterprise. The officers of the company are: President, W. D. Skinner, vice-president and general manager of the Hawkeye Insurance Company, of Des Moines; secretary, Milo Ward, secretary of the Des Moines Commercial Club; treasurer, S. D. Alexander, vice-president of the First National Bank of Winterset and a wealthy land owner; general manager, A. E. Park, of Des Moines; general counsel, Nathan E. Coffin, of Des Moines. The members of the board of directors are: Charles A. Ainley, president of the Des Moines Fire Insurance Company; E. B. Steere, with the Bodman Shoe Company, of Des Moines; C. H. Philpot, vice-president of the Des Moines Fire Insurance Company; William E. Ballard, proprietor of the Munger Hotel; Ben F. Elbert and F. E. Thompson, representing Marshall Field; J. H. Wilson and J. H. Mack, owners of the First National Bank at Macksburg, and wealthy land owners; Martin Rowe, of Macksburg; John Ramsbottom and A. S. Linn, farmers south of Macksburg; Richard Brown, city attorney of Creston, and Charles A. Gover, of Omaha, banker and capitalist, and also the officers named above.

EQUIPMENT FOR JAPAN

The Yokohama Electric Tramway Company, Yokohama, Japan, has closed a contract with the Japanese engineering and contracting firm of Takata & Company, Tokio, for some additional rolling stock, and orders have been placed in this country, through Takata & Company's New York office, 10 Wall Street. Six No. 21-E Brill trucks, having a gage of 54 ins.; wheel base, 6 ft.; diameter of wheel, 30 ins.; axles, 3¾ ins., have been contracted for. Upon these trucks will be mounted 18-ft. closed car bodies, the length over platform being 25 ft. and the width from out to out of sills 6 ft. These car bodies will be built in Japan, and the trucks will be arranged to take Sterling brakes which have been ordered from the Sterling-Meaker Company by Takata & Company. The order to the Brill Company includes, in addition to the trucks, 14 pairs of wheels and exles which are to be supplied as spares. The motor equipments for these trucks have been ordered from the Westinghouse Electric & Manufacturing Company, as follows: Six double-motor equipments, each equipment to consist of two Westinghouse 12-A, 25-hp railway motors, the motors to be nose-suspension, and will be complete with suitable gears, gear cases, pinions, etc. Each equipment will be supplied with two Westinghouse No. 211 electric brake controllers, and will also be supplied with double trolleys, with 14-ft. poles, the distance between trolley wires being 18 ins. The order to Westinghouse also covers spare commutators, armatures, tralley poles, brushes, gears, pinions, etc. For the trucks of these cars, Takata & Company have ordered from the W. T. Van Dorn Company, through its representative in New York, Ervin G. Long, 6 pairs of Van Dorn automatic draw bars No. 5, with ball joint, suitable for pulling a trailer weighing 20 tons.. Takata & Company have also ordered from the Ohio Brass Company necessary headlights, switches, gongs, etc., for use on the cars. This apparatus forms an addition to the equipment which Takata & Company supplied some time ago to the Yokohama Electric Tramway Company, and duplicates the previous installation.

NEW PUBLICATIONS

Government Regulation of Railway Rates. By Hugo Richard Meyer. Published by the Macmillan Company, New York. 486 pages. Price $1.50 net.

This is a live treatise on a timely subject by an author who has a well-established reputation as an authority upon the subject on which he writes. Prof. Meyer points out the evils which would result from a close regulation of railway rates by the Government, and justifies his conclusions by a strong array of facts and figures. Prof. Meyer is among those economists who are opposed to municipal ownership of street railways, and the same clear logic which combatted the theory of State or municipal ownership in the series of leaflets which he issued on that subject in the fall and winter of 1903-04, in Denver, is displayed in his discussion of the rate question on steam railroads.

High-Tension Power Transmission. A series of papers and discussions presented at the meetings of the American Institute of Electrical Engineers, under the auspices of the committee on high-tension transmission. Republished by the McGraw Publishing Company, New York. 466 pages. Price $3.00 net.

The rapid progress in electrical inventions has made it necessary for the student of the subject of high-tension transmission to turn to the proceedings of the scientific bodies of the country rather than to single treatises. The proceedings of the American Institute of Electrical Engineers have been particularly rich in this respect; in fact, there are few phases of high-tension transmission which have not been discussed at its meetings; for this reason the collection of these papers into one volume was suggested, and this plan, it is thought, will render the facts contained therein much more available than they otherwise would be.

Alternating-Current Machinery. By Prof. William Esty. Published by the American School of Correspondence. 412 pages. Illustrated. Price $3.75.

This book, like the other publications of the publishers, is designed especially for the busy worker in the field, and no mathematics are employed beyond trigonometry. The theory and principles of design of the alternator are first considered, after which the synchronous motor, transformer, rotary converter, etc., are taken up in detail. Graphical methods are used largely in place of analytical ones, and by means of examples scattered through the book to illustrate his meaning, the author has succeeded in making a most readable and easily understood treatise.

A description of the Städtische Strassenbahn, Frankfort-on-Main, Germany, published by the Frankfort Municipal Street Railway; 99 pages, 12½ ins. x 9½ ins.; illustrated. Price 15 marks.

Originally this book was published in honor of the Verein Deutscher Strassenbahn und Kleinbahn Verwaltungen (German Society of Street & Interurban Railway Managements) on the occasion of its tenth annual convention held at Frankfort-on-Main. The text and illustrations were prepared entirely by the officials of the railway, and for this reason alone the book is unique, since every department of railway operation is treated in the most practical manner. In all there are ten chapters, covering the following subjects in order: History, management and personnel, hours and wages of employees, ameliorating institution for employees, schedules, mail transportation, fares and free tickets, rolling stock and shops, including some interesting repair shop kinks, one of which is illustrated in another column of this issue of the Street Railway Journal, transmission system, economies in the use of current, and a description of the overhead construction. The work is splendidly bound, printed and illustrated, and forms an excellent description of modern German street railway practice in cities of medium size.

Telephony, Part VI.; Switchboards and the Central Office. By Author Vaughan Abbott. Published by the McGraw Publishing Company, New York. 271 pages. Illustrated. Price $1.50.

This book concludes the valuable series written by the author by a treatment of the most vital part of the central telephone system. Central office practice has seen several revolutions during the past ten years; first, from the series-multiple board to the branch terminal, and then to the common battery automatic signal board. The author discusses the auxiliaries, such as the power plant, as well as the boards themselves, and gives a chapter on "traffic," in which he discusses rates and similar subjects.

Tibet and Turkestan. By Oscar T. Crosby, F. R. G. S. Published by G. P. Putnam's Sons, New York. 321 pages. Illustrated. Price $2.50 net.

To those who were associated with the author in his pioneer electric railway work, or who are acquainted with the success which attended his efforts in developing the electric railway motor and in studying train resistance at high speeds, this book will be particularly interesting. The same energy which characterized Mr. Crosby's electric railway experiments has followed his important work as an explorer. His trip through Russian and Chinese Turkestan and across the western corner of Tibet, though attended with considerable personal risk, was productive of important geographical discoveries, and an account of it is most readable.

PERSONAL MENTION

MR. THOMAS DAVIS, for several years chief engineer of the central power station, Boston Elevated Railway Company, and late of Pittsburg, Pa., has been appointed superintendent of power stations of the Boston Elevated Railway Company.

MR. C. B. KING, of Detroit, has been appointed manager of the London Electric Street Railway, of London, Ont., to succeed Mr. C. E. A. Carr, who has become connected with the Helena Railway Company, of Helena, Mont.

MR. FRED GRIFFITH, superintendent of the Hamilton Street Railway Company, of Hamilton, Ont., has been appointed to a position in the office of the Cataract Power Company, and Mr. D. N. Milles has been chosen as his successor with the Hamilton Company.

MR. SIDNEY SPROUT, electrical engineer of the Ocean Shore Railway Company, of San Francisco, has gone to Chicago, where he will consult with the engineering firm of Sargent & Lundy regarding some of the details of the power house equipment for the new road.

MR. W. W. WHEATLY, president and general manager of the Mexico City Electric Railway Company, which controls all the street railway lines in the city of Mexico, is on a visit to the United States in the interest of the properties of which he is in charge. Mr. Wheatly is stopping at the Astor, New York.

MR. H. T. EDGAR, for the past four and one-half years vice-president and manager of the El Paso Electric Railway Company and the International Light & Power Company, both of El Paso, Tex., has resigned to accept the position of second vice-president and manager of the Northern Texas Traction Company, of Fort Worth, Tex., which operates the local lines in Fort Worth and the interurban between Fort Worth and Dallas. All the properties mentioned are under the general management of Stone & Webster, of Boston.

TABLE OF OPERATING STATISTICS

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	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Available for Dividends
AKRON, O. Northern Ohio Tr. & Light Co	1 m., Oct. '05	84,577	46,897	37,680	22,967	14,713
	1 " " '04	78,013	42 839	35,174	22 467	12,707
	10" " '05	801,091	427,907	373,185	230,270	142,916
	10" " '04	747,727	406,522	341,205	226,128	115,077
AURORA, ILL. Elgin, Aurora & Southern Tr. Co	1 m., Sept. '05	43,809	23,623	20,187	9,333	10,853
	1 " " '04	38,886	21,432	17,454	9,333	8,121
	3 " " '05	140,794	70,506	70,288	27 839	42,449
	3 " " '04	127,259	63,887	63,372	27,839	35,533
BINGHAMTON, N. Y. Binghamton Ry. Co.	1 m., Oct. '05	22,728	12,262	10,467	7,282	3,185
	1 " " '04	19,431	11,572	7,859	6,867	992
	4 " " '05	110,583	51,978	58,605	28,847	29,758
	4 " " '04	98,248	48,763	49,485	27,808	21,677
CHICAGO, ILL. Aurora, Elgin & Chicago Ry. Co	1 m., Sept. '05	63,770	31,628	32,143	------	------
	1 " " '04	46,786	22,868	23,918	------	------
	3 " " '05	209,974	97,674	112,300	------	------
	3 " " '04	158,857	76,129	82,728	------	------
Chicago & Milwaukee Elec. R. R. Co	1 m., Oct. '05	62,028	23,030	38,998	------	------
	1 " " '04	55,625	17,812	37,813	------	------
	10" " '05	473,891	195,872	278,018	------	------
	10" " '04	379,902	143,556	236,346	------	------
CINCINNATI, O. Cincinnati Northern Tr. Co	1 m., Sept. '05	51,910	------	------	------	------
	1 " " 04	47,581	------	------	------	------
	4 " " '05	206,512	------	------	------	------
	4 " " '04	197,404	------	------	------	------
CLEVELAND, O. Cleveland, Painesville & Eastern R.R. Co	1 m., Oct. '05	21,872	* 12 183	9 688	6,658	3,030
	1 " " '04	19,758	* 11,844	7,915	6,683	1,231
	10" " '05	207,190	* 119,196	87,995	67 373	20,622
	10" " '04	191,948	* 114,002	77,946	66,973	10,973
Cleveland & Southwestern Traction Co.	1 m., Oct. '05	48,728	26,343	22,386	------	------
	1 " " '04	44,171	24,150	20,022	------	------
	10" " '05	449 432	261,806	187,626	------	------
	10" " '04	397,243	248,289	148,954	------	------
DETROIT, MICH. Detroit United Ry	1 m., Oct. '05	447,462	* 282,039	165,423	92,388	73,035
	1 " " '04	401,837	* 237,085	164,752	88,585	76,167
	10" " '05	4,305,992	*2551475	1,754,517	921,574	832,943
	10" " '04	3,819,289	*2311791	1,507,498	891,655	615,843
DULUTH, MINN. Duluth St. Ry. Co	1 m., Oct. '05	57 506	27,906	29 600	17,388	12,212
	1 " " '04	51,642	26.077	25 565	16,514	9,051
	10" " '05	547,179	281 308	265,871	170,178	95,693
	10" " '04	513,536	272,377	241,159	164,984	76,175
FINDLAY, O. Toledo, Bowling Green & Southern Tr. Co	1 m., Oct. '05	26,766	12,927	13,839	5,879	7,960
	4 " " '05	112,418	55,385	57,033	23,516	33,517
GALVESTON, TEX. Galveston Electric Co.	1 m., Sept. '05	24,699	15,208	9,491	4,167	5,324
	1 " " '04	24,264	------	------	------	------
	5 " " '05	125,544	74,526	51,018	20,833	30,185
	5 " " '04	119,780	------	------	------	------
HANCOCK, MICH. Houghton County St. Ry. Co	1 m., Sept. '05	20,338	11,203	9,135	3,713	5,422
	1 " " '04	18,451	9,498	8,953	3,388	4,565
	12" " '05	170,196	169,112	1,084	42,588	† 41,503
	12" " '04	192,079	131,530	60,548	37,874	22,674
HOUSTON, TEX. Houston Electric Co.	1 m., Sept. '05	45,432	24,402	21,031	9,042	11,989
	1 " " '04	33,616	19,404	14 212	8,318	5,893
	12" " '05	492,070	294,400	197 670	103,522	94,149
	12" " '04	334,211	319,364	14,847	95,806	† 80,959
MILWAUKEE, WIS. Milwaukee El. Ry. & Lt. Co	1 m., Oct. '05	280,536	128,763	151,773	80,076	71,697
	1 " " '04	280,386	130,197	150,189	78,790	71,398
	10" " '05	2,669,333	1,285,404	1,383,929	769,217	614,711
	10" " '04	2,656,481	1,323,307	1,333,174	756,734	576 440
Milwaukee Lt., Ht. & Tr. Co	1 m., Oct. '05	50,475	19,845	30,629	21,331	9,299
	1 " " '04	38,727	17,155	21,572	17,670	3,902
	10" " '05	514,702	214,140	200,562	210,097	90,465
	10" " '04	387,462	183,041	204,421	168,016	36,404
MINNEAPOLIS, MINN. Twin City R. T. Co	1 m., Sept. '05	454,062	176,032	278,030	103,208	174,822
	1 " " '04	373,944	166,017	207,926	91,842	116,085
	9 " " '05	3,482,688	1,578,150	1,904,538	897 008	1,007,529
	9 " " '04	3,208,172	1,510,168	1,698,004	817,133	880,871
MONTREAL, CAN. Montreal St. Ry. Co.	1 m., Oct. '05	249,789	141 681	108,107	21,063	87,045
	1 " " '04	222,276	121,637	100,639	18,947	81,692
	12" Sept. '05	2,707,474	1,650,566	1,056,908	------	------
	12" " '04	2,463,823	1,510,996	952,827	------	------
OAKLAND, CAL. Oakland Traction Consolidated	1 m., Sept. '05	127,291	62,776	64,516	33,776	30,739
	1 " " '04	111,053	56,227	54,827	26,525	28,301
	9 " " '05	1,057,212	543,692	513,520	289,126	2 4.394
	9 " " '04	925,421	479,717	445,704	238,974	206,731
San Francisco, Oakland & San Jose Ry. Co.	1 m., Sept. '05	45,751	21,590	24,161	13,425	10,735
	1 " " '04	40,408	16,371	24,038	10, 75	13.763
	9 " " '05	392 059	171,358	220,701	119 564	101,137
	9 " " '04	297,959	131,371	166,588	77,640	88,948
OLEAN, N. Y. Olean St. Ry. Co	1 m., Sept. '05	11,332	6,058	5,275	2,570	2,704
	1 " " '04	9,492	5 080	4,412	2,631	1,781
	3 " " '05	38,160	17,776	20,384	8,157	12,226
	3 " " '04	32,841	16,157	16,685	7,894	8,791
PEEKSKILL, N. Y. Peekskill Lighting & R R. Co	1 m., Sept. '05	11,453	*5,668	5,786	------	------
	1 " " '04	10,843	------	------	------	------
	3 " " '05	35,945	*17,688	18,258	------	------
	3 " " '04	33,116	------	------	------	------
PHILADELPHIA, PA. American Rys. Co.	1 m., Oct. '05	132,498	------	------	------	------
	1 " " '04	115,382	------	------	------	------
	4 " " '05	597,987	------	------	------	------
	4 " " '04	530,453	------	------	------	------
ROCHESTER, N. Y. Rochester Ry. Co.	1 m., Oct '05	152,571	78,628	73,943	28,848	45,095
	1 " " '04	127,104	70,320	56,784	27,036	29,748
	10" " '05	1,470,765	777,387	693,379	277,320	416,059
	10" " '04	1,238,207	678,973	559,233	266,246	292,986
SAN FRANCISCO, CAL. United Railroads of San Francisco	1 m., Sept. '05	614,055	------	------	------	------
	1 " " '04	617,642	------	------	------	------
	9 " " '05	5,187,343	------	------	------	------
	9 " " '04	4,911,994	------	------	------	------
SAVANNAH, GA. Savannah Electric Co.	1 m., Sept. '05	48,721	29,044	19,678	10,561	9,117
	1 " " '04	46,843	26,099	20,744	10,613	10,131
	12" " '05	574,022	336,383	237,639	126,791	110,848
	12 " " '04	535,579	303,742	231,837	125,678	106,159
SEATTLE, WASH. Seattle Electric Co.	1 m., Sept. '05	222,588	140,892	81,696	23 594	58,102
	1 " " '04	196,295	134,167	62,128	25,771	36,357
	12" " '05	2,482,012	1,657,115	824,897	297,451	527,446
	12" " 04	2,266,785	1,582,927	683,859	281,894	401,965
SYRACUSE, N. Y. Syracuse Rapid Transit Ry. Co.	1 m., Oct. '05	83,727	46,073	37,654	20,495	17,160
	1 " " '04	71 828	41,133	30,695	20,338	10,357
	4 " " '05	336,375	185,120	151,255	81,775	69,480
	4 " " '04	291,2[illegible]5	162,[illegible]42	128,593	81,129	47,464
TERRE HAUTE, IND. Terre Haute Tr. & Lt. Co	1 m.. Sept. '05	54,988	30,715	24,273	10,829	13,443
	1 " " '04	52,149	28,707	23,442	9,664	13,778
	1 " " '05	604,687	394,953	209,734	118,334	91,400
	1 " " '04	552,070	367,136	184,934	112,539	72,394
YOUNGSTOWN, O. Youngstown-Sharon Ry. & Lt. Co	1 m., Sept. '05	44,968	*22,062	22,906	------	------
	1 " " '04	37,194	------	------	------	------
	12" " '05	395,547	*212,095	183,452	------	------
	12" " '04	340,099	------	------	------	------

Street Railway Journal

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Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

Of this issue of the Street Railway Journal 8000 copies are printed. Total circulation for 1905 to date, 400,350 copies, an average of 8170 copies per week.

The Location of Smoking Compartments on Interurban Roads

The novel arrangement of smoking compartments on interurban cars, suggested by a correspondent in our issue of Nov. 18, has elicited two interesting replies. In both, the writers express themselves as preferring the ordinary plan, and in the letter from Mr. Bacon this week some very convincing arguments are given as to the desirability of placing the compartment in one end of the car, as usual. The chief reason for one or two separate smoking compartments in the center of the car is that with a double-ended car passengers who enter from the rear platform will not have to pass through this compartment when it is at the rear of the car. The objections to the arrangement, however, are considerable, and we do not believe that there is any serious objection to allowing passengers on interurban lines to enter and leave the car by the front platform when the conditions of the road permit.

Heating and Lighting Interurban Cars

The superintendent of transportation of a large interurban system which parallels steam railroads recently called attention to the importance of interurban roads giving more attention to the details of heating and lighting cars on long runs during the winter. His complaint is that interurban roads operating over long stretches of open country at high speeds have not got far enough away from street railway practice yet in the matter of heating, and the voltage is frequently so variable as to make it difficult to read continuously with comfort on account of the variation in light. We believe, as a rule, interurban cars are fairly well provided for in the matter of heat, although in extremely cold weather it may be possible that interurban cars of lighter construction and with windows not tightly fitted allow so much leakage of air around the windows as to make them hard to heat. At any rate, it is well to see that cars are provided with ample radiating surface from hot-water or electric heaters, and that windows can be made tight during the coldest weather. It may even be advisable to put on storm sash in some places, as is now done on two important city railway systems of this country. Cold cars cannot fail to be a source of much loss of revenue to an interurban road in the winter, as nothing is more discouraging to the prospective traveler than a poorly heated car.

The lighting of an interurban car is a matter entirely up to the electrical engineer, and the directors should authorize purchases of feed wire. It is to be regretted that the drop in voltage midway between sub-stations when two cars are near each other is frequently so excessive as to cause very annoying variations in the light. Of course, this annoyance is only one of the bad results of insufficient feed wire. As to loss of power and loss of time due to slow speed, it is even more important. It is all very well to say that such conditions ought not to exist. The fact is that they do exist in a great many places and need looking after.

Maxims on Courtesy

It is often said that politeness costs nothing, and in any corporation which enters so intimately into the daily life of the general public as do street railway companies there is every reason why the representatives of the company should make every effort to treat all passengers with courtesy. In fact, with the improvement of street transportation in other directions there is a notable tendency on the part of all companies to hold their employees more strictly accountable to the exercise of this virtue and to impress upon them its necessity. We realize that the employee is not always the recipient of that politeness which is required of him by the management, and we have every sympathy for the man on the back platform who is expected never to lose his temper, but must return a mild answer to irascible complaints of matters for which he is often not responsible. Nevertheless, he may enjoy the satisfaction that this policy is not only much more desirable, but a much more dignified one for him personally to pursue, and the company which instructs its employees along these lines will raise itself very much in the esteem of its patrons. It is growing to be a common practice for railway companies to print on the margins of its general rule books or time-tables some maxims on the subject of politeness, so as to keep this point always in the mind of the trainmen. An instance of this kind is the general rule book of the Chicago City Railway Company, from which the following sentences are quoted: "Cars are run to accommodate patrons." "Use special courtesy to old people." "Do not run by would-be passengers." "Give passengers a safe and pleasant trip." "It is our duty to please our patrons." "Obligingly direct the passengers." "Make all requests in a civil manner." "Cultivate the good will of all passengers." "Do not give offense in making change." "Do not run away from transfer points." "Always be attentive and patient." "Do not quarrel with passengers." "Be civil and polite to passengers."

Handling Unusual Crowds

The sanguinary football season just closing has given the usual desperate task to the street railway fraternity. Managers have learned much about handling extraordinary rushes during the last few years, and the situation is steadily improved, but the fact remains that at any very big assemblage there is a tremendous problem in transportation to be solved. Ordinary congestion of traffic comes from the desire of everybody to have rapid transit at the same time of day. These extraordinary strains upon street car facilities are merely an exaggeration of the same situation. At a football game or a circus many thousand people want to arrive at a given point within less than half an hour, and the thing is well-nigh impossible of accomplishment. For instance, suppose that a crowd of 20,000 is to be handled. Assume sixty passengers per car and just figure what can be done at any practicable headway. To accommodate the throng with even scant standing room requires 333 cars. Even if one could despatch these at the rate of one every 10 seconds, it would take 55 minutes to get the throng under way, let alone the running time for the cars. At 20-second headway very nearly 2 hours would be required merely to get the last carful going. And this assumes no material delay from picking up passengers and that everyone gets aboard without causing a jam that delays the cars. By way of increasing the difficulty many roads are a little short of feeder copper, and the tremendous call for energy along a single line is hard to meet without considerably reduced voltage, and when a long procession of cars gets even momentarily stalled by something on the track ahead it takes a long time to get going again, and far longer to get up any speed. Considering the difficulties of the situation, it is little short of marvelous that the transportation companies can do the work at all, let alone doing it as well as they actually manage it.

The logic of the situation requires active co-operation between the road and the public. The principal thing is to give ample notice of all special arrangements which have to be made and to clear the route as far as possible. Happy is the company that can reach the scene of action over several routes. In case of such events in Boston like the annual Yale-Harvard football game, the battleground is fortunately reachable by several lines, so that the situation is somewhat mitigated. At the Yale-Princeton game in New Haven, and in fact in most similar instances, the conditions are less favorable. Over a single line one may be able to get 8000 to 10,000 people under way in an hour, but even this cannot be done unless the track ahead can be kept moderately clear. Any blockade is fatal, and even the delay caused by a switch or cross line holds up the entire procession. A car crossing the line when the cars have been started on headway of 20 seconds or so is morally certain to bring a large group of cars to a full stop, from which it takes half a minute or more to recover. After this has happended a few times, the cars, no matter what their nominal headway, have closed up into a compact mass, and then every delay counts for still more. It would seem like a wise step to deflect crossing traffic into another route if possible and to make modification enough in the general schedules for the time being to clear the tracks a bit. Another possible ameliorating step is to send out cars in groups with a little extra headway between each group. Of course, this causes a slight delay at the start, but it is more than likely to be made up by keeping an enormous procession of cars from being closed up so closely as to cause a protracted blockade. It is a troublous business at the very best, presupposing an indefinitely large car equipment and no shortage of power.

Standardization of Parts

While it sometimes seems to those interested that the standardization of anything pertaining to electric railway rolling stock is next to impossible because of the extremely varied conditions, as well as the varying ideas of men engaged in the business, it is none too soon to begin a work of this kind. At the time the American Railway Mechanical and Electrical Association was organized it was generally understood that one of the things toward which this association was working was a standardization of parts. The association has been so busy with other matters that nothing had been done in regard to standardization of parts until at the last convention, when the matter came up for discussion. There then developed a strong sentiment that it was time for the association to begin to name certain standard sizes for a few detailed parts, and from them, as necessity seemed to require, to standardize other more numerous parts. It is, of course, out of the question to adopt a standard which will cover all equipment as on the steam railroads. The most that can be done is to name a number of standards suited to different weights of cars or sizes of motors. For example, in the matter of axles, there is now an endless variety of combinations of sizes. Cars of the same weight do not, by any means, have similar axles. It would be a decided advantage if a series of axle sizes were made standard, so that instead of forty or fifty different axles we would have four or five. Out of these four or five, a selection could be made to suit the weight of the car. Standardization is desirable in connection with numerous other parts of a car. While, as said at the convention, it is not desirable to attempt any standardization of the motor equipments themselves, there are many parts going into the construction of a motor which should be standardized, and this would result in great reduction in the number of repair parts that must be kept in stock in any storeroom. These things are sure to come in time, and it is none too soon to begin now in some of the directions where this reform can be most easily made. By the time these parts can be standardized there will be numerous others for which there is a great need of standardization.

The Sorrows of Municipal Ownership

Mayor Dunne is a man of many woes. After being placed in office by a wave of popular excitement, he has sorrowfully waked to the realization that his constituents did not quite know what they wanted and were not pleased with any explanation of their desires which he had to offer them. It has been a case of the morning after, with a vengeance. To begin with, the Mayor with somewhat misguided enthusiasm called into consultation a hard-headed, unsentimental Scotsman, who knew municipal ownership at first hand. Mr. Dalrymple came, investigated and departed. He doubtless gave the Mayor some very valuable, if unpalatable, advice, and incidentally acquired a thorough appreciation of those phases of American political life which are most nearly concerned with municipal ownership. In Scotland this expression denotes the operation of a public utility by the civic authorities for the public benefit. Does anyone dare to say that it was intended to mean just this and nothing more in Chicago politics? The Mayor was very chary about taking the lid off the report made by Mr. Dalrymple, and what leaked out was of a character to give a Chicago politician nervous prostration. For Mr. Dalrymple openly intimated that a municipal tramway service must be kept out of politics. This is the very rock on which the municipal ownership scow has split over and over again at the beginning of its malodorous voyage.

Analyze as we may the philosophy of public ownership of public utilities, whenever the populace rises under its self-appointed leaders to demand its "rights," in the background looms the Temple of Graft, and above the sonorous calls for "justice" rises in the distance a shriek for loot. Any public enterprise that is conducted without the fear of practical politics and upon a strictly business basis will succeed just as an honestly conducted private enterprise would, and on the other hand, any private business that is conducted on the basis of favoritism and graft will generally fail. There is no mystery about the matter. There is certain work to be done, and if it is conducted on a strictly business basis, with every man giving an honest day's work for an honest day's wages, it will be well and economically done. If it is carried out on the basis of a rake-off all around and a soft snap for all comers it will end in failure. Mayor Dunne, however honest his impulses, was called to face a condition which he could not ameliorate. He has failed dismally in attempting to devise a scheme of municipal ownership which should be at once acceptable to honest men and to grafters. He has no need to charge up his failure to corrupt influence or to the "capitalistic press," for its sources lie deeper. The latest phase of the situation is that the compromise over which the companies and the transportation committee of the Council have been working all summer has finally been reached, and an extended digest of the agreement, which covers both the Chicago City Railway Company and the Union Traction Company, is published elsewhere in this issue.

We trust that the experience of Chicago in the slough of the municipal ownership idea will carry a lesson to any other cities which may be now on the brink, debating the advisability of making a plunge. If it had not been for the tremendous interests involved we suspect that many advocates of private ownership would have been glad to have seen municipal ownership tried in Chicago. It is fortunate, however, for all concerned that more sensible counsels prevailed. The fact is that the project was never more in Chicago than a political issue with which to hoodwink credulous voters. The citizens have now learned more about the subject than they originally knew, and as an issue in that city municipal ownership is practically dead. It is one thing to resolve that the tramways should be owned by the city and quite another to formulate a sane and logical plan for acquiring and operating them. As we noted recently, the Civic Federation has undertaken to investigate public ownership through a committee, and when the report is at hand Mr. Dunne, in the retirement of private life, and others who are interested in the subject, may receive some enlightenment. The subject is a very large one, and light upon it is badly needed. We have a strong suspicion that the searchlight of this committee will disclose some things which the advocates of public ownership will not hasten to applaud. Any enterprise, the success of which depends upon purity in politics, is at least open to the possibility of disaster.

Night Work in the Shops

An unexpected visit to their shops after 12 or 1 o'clock at night by many master mechanics would reveal a condition of affairs they little expected was in existence. Instead of being at their work, the car inspectors and cleaners might be found stretched out on the car seats asleep. The lonesomeness of night is largely responsible for such a state of affairs when they occur. It causes the night foreman to feel closely in league with his fellow workmen and he does not deny them a few hours sleep at the expense of the company. Probably the men have caught him sleeping a few times, and ever afterward, for fear of exposure, he is compelled to let them impose on him. At any rate, in many small shops, all the night men, from foreman down, get in several hours of sleep while on duty. If censured they will probably offer the excuse that they hurry with their work, get it finished and then have nothing more to do until the cars are sent out in the morning. Usually an inspection of the cars will show this statement to be true and that they have literally hurried with their work. The interiors may reveal the fact that the brush and broom have passed through them lightly. Brake-shoes, motor brushes, clearance of armatures and loose nuts and bolts likewise indicate that the motor and truck inspector has slighted his duty.

If the work is so heavy that the desired amount of sleep cannot be obtained by the crew, the men and their foreman may combine in an appeal for additional force on the plea that they are overworked. The shop superintendent is usually at their mercy. Not knowing the true condition of affairs, his natural sympathy for men compelled to work at nights leads him to provide the addition desired. An occasional quiet trip of investigation in the early morning, either by the shop superintendent himself or his assistant, will in many instances give good returns for the trouble.

In general, however, we believe as little work should be done at night as is absolutely necessary. When the schedule requires the use of all the cars on hand, the inspection and cleaning must be done at night. But where the road has several extra cars, much of it can be accomplished during the day. That the work can be done more satisfactorily at this time needs no argument. A car that appears clean under lamplight may have quite a different appearance in natural light. If more inspection work were carried on during the day no doubt the expense of repairs would be greatly lessened. It stands to reason that a wide awake man with the assistance of daylight will do work more satisfactory than one half asleep and who must feel rather than see what he is doing.

THE LEITH CORPORATION TRAMWAYS

The authorities of Leith, in Scotland, purchased last year from the Edinburgh Street Tramways Company the horse tramways in Leith. These tramways were the portion of the Edinburgh Street Tramways Company's property in the burgh of Leith. The greater part of this company's lines were originally in Edinburgh, but about the year 1892 the corporation of Edinburgh purchased the lines in that city, and about 1896 converted them for cable traction. Since that time there has been a break in traffic at Pilrig Street, the boundary between Edinburgh and Leith, and passengers have had to change from the cable into the horse cars.

LARGE PIECE OF SPECIAL WORK IN LEITH

After the Leith Corporation had purchased by agreement the horse tramways in Leith, it approached the Edinburgh Corporation with a proposal to equip electrically the cable line from the boundary up to Princess Street to obviate the break in traffic at the boundary and so get the advantage of through running. This would have been a very great advantage to the inhabitants of both Edinburgh and Leith, as well as to the railway systems themselves, as it would render the half mile on each side of the boundary productive, which is not the case when passengers have to change cars. The Edinburgh Corporation, however, would not entertain the idea, and the break in traffic therefore remains. Under these circumstances the Leith Corporation resolved to reconstruct the lines within its own burgh and to make an extension for overhead electric traction, and appointed James More, Jun. M. Inst. C. E., the engineer for the scheme.

The total length of line purchased was about 5 miles of route, and with the extension the total route miles are 6½, which are all double line, except at certain curves and one short length in a narrow street where double track was not feasible. The track is generally laid along the middle of the roadway. There are, however, two routes where the double track is laid with the nearest rail 5 ft. from the curb. These are the routes along the road from Commercial Street to Newhaven, where the north side of the road adjoins the railway or sea wall of the Forth, and also on the road adjoining the Leith Links or public common.

PERMANENT WAY

The rails, which are 7 ins. in height, are of a special section, as shown herewith. The weight is 106.7 lbs. per yard, and the standard length is 45 ft. The rails are connected by the Dicker joint, in which the outside plate is mortised into and comes up flush with the rail head. The joint plates are 24 ins. long and are fastened with six 1-in. diameter steel bolts with lock nuts. Tie-bars are used every 6 ft. They are of the ordinary flat-bar type and have two bolt ends, with two nuts and washers at each end.

The excavation was made 14 ins. deep to allow for the depth of the rail, 1 in. of packing and 6 ins. of concrete. The latter is composed of macadam to pass through a 2-in. ring with the fine shivers left in, sharp pit sand and Portland cement, in the proportion of macadam shivers five parts and sand and cement one part. The packing is composed of crushed granite and Portland cement in the proportion of three parts of crushed granite to one of cement by measure. The packing was done before the concrete was quite set and only damped slightly. After it had been beaten in tightly under the rails it was watered from a can with a hose.

The paving is in some routes granite and in some whinstone. The paving blocks are 6 ins. x 4 ins. They are bedded on cement bedding of sharp pit sand and cement, three to one proportion. This bedding was only damped immediately before laying the setts, and these were racked and rammed immediately. The joints of the paving were racked with clean broken whinstone passed through a ½-in. sieve and stopped in a ¼-in. sieve. The grouting was of pitch, properly tempered with oil.

VIEW ON NEWHAVEN ROAD, SHOWING SIDE BRACKET POLE CONSTRUCTION

The switches and crossings are of Hadfield's "Era" manganese steel, and all the special junctions were put together at Hadfield's works with most satisfactory results. They are of the leg design, enabling standard fish-plates to be used throughout. The junction at the foot of Leith Walk is a particularly difficult and rigid piece of work, which was put together in a remarkably short time. The excavation was started and the entire junction finished with all the lines in working order in twelve days. Hadfield rail drains are put in wherever necessary.

Under each pair of fish-plates two No. 0000 B. & S. Forest City flexible protected bonds are used. The two rails of each track and the two tracks are bonded by stranded bonds of the Forest City make at 120-ft. centers.

OVERHEAD EQUIPMENT

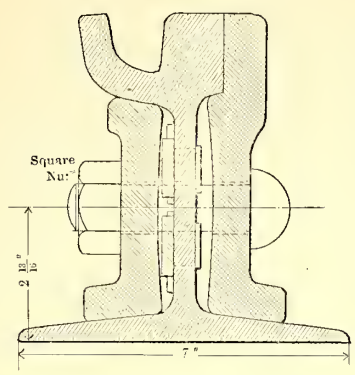
The poles used are the Mannesmann solid drawn, seamless, one-piece, stepped type. There are three different sizes of poles, the length of the steps being the same in all, namely: Lower step, 17 ft.; middle step, 7 ft., and upper step, 7 ft. The steps are of equal diameter throughout their length and are not tapered. They are as follows:

	Lower Step Dia. Ins.	Lower Step Thickness	Middle Step Dia. Ins.	Middle Step Thickness	Upper Step Dia. Ins.	Upper Step Thickness
No. 1 size	7½	5/16	6½	5/16	5½	5/16
No. 2 size	8½	13/32	7½	13/32	6½	13/32
No. 3 size	9½	7/16	8½	7/16	7½	7/16

The usual tests were applied to a proportion of these poles at the works, and they gave most satisfactory results. The thickness is good as regards uniformity. They are particularly straight throughout the entire length, and the finish and "skin" is exceptionally good compared with the usual pole or tube for this work.

Three different types of pole are in use, viz., center, side bracket and span, to suit local circumstances. The scroll work is of wrought iron, and in the side bracket and span poles the clamps are of cast malleable iron. In the center poles the top clamps are of mild steel forged. At the feeder poles a vertical slot 6⅜ ins. x 1⅜ ins. is cut to admit the fixing of a cast-iron inlet bend to carry in the line cables.

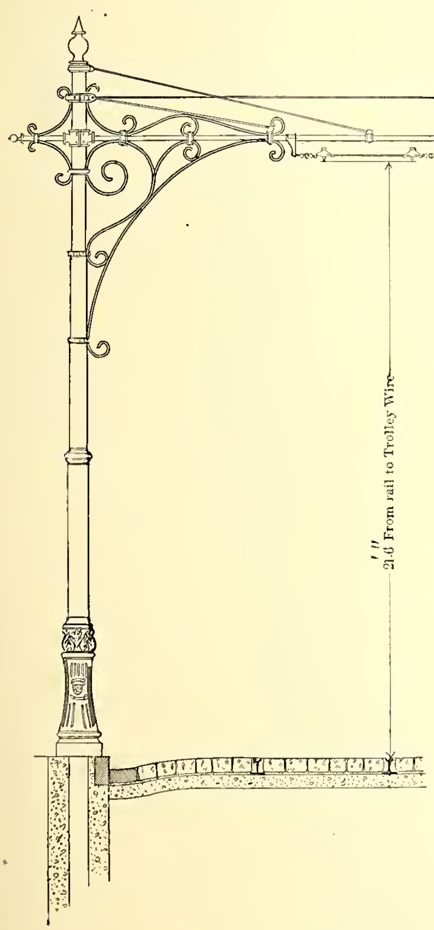
The position of the trolley wire in relation to that of the track varies laterally. Where center poles are used each of the wires are 2 ft. 6 ins. inside of the middle line of each track. Where side bracket and span poles carry the wires they vary from the middle of the track to a maximum of 6 ft. outside. The height of the trolley wire from the rails is normally 21 ft. 6 ins. at the ears. It varies from this, of course, at the bridges, etc. Flexible bow-string suspension is used throughout with a strand 7/12 S. W. G. galvanized steel wire. The trolley wire is of the grooved section 0000 S. W. G. sectional area. It is to the usual specification as to tensile strength and conductivity, and was supplied by the British Insulated & Helsby Cable Company.



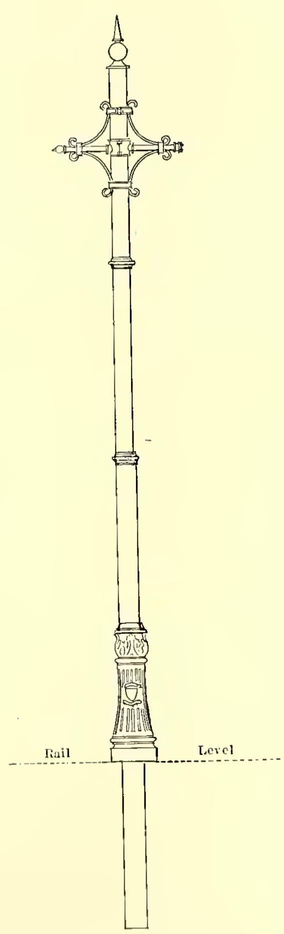
SECTION AT JOINT OF STANDARD 106.7-LB. GROOVED RAIL NOW USED IN LEITH

The ears are of the mechanical type, with a main and clamping member to clip and hold the trolley wire by the groove. The clamping is done by snap-head slotted screw studs of steel. The ears used on the straight line are 18 ins. long with six studs; on easy angles or curves, 24-in. ears are used with eight studs, and on all curves less than 200 ft. radius, 36-in. ears are used with twelve studs.

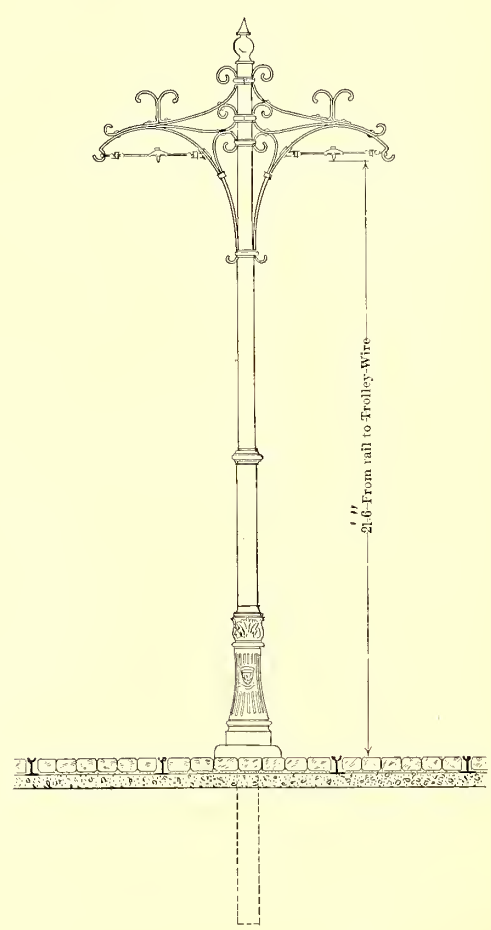
The section insulators are of the Hewer type, with a lignum vitæ insulating strip, and are most satisfactory in every respect. All overhead fittings, ears, hangers, pull-offs, frogs, crossings, section insulators, etc., were supplied by S. Dixon



SIDE BRACKET POLE



SPAN WIRE POLE



DOUBLE BRACKET CENTER POLE

& Son, Ltd., Leeds. Johns-Manville insulating material is used, excepting in the section insulators, which is Ætna, and 3/4-in. suspension bolts are used in all hangers. The guard wire is the usual stranded 7/16 S. W. G. galvanized steel wire, which is earthed at every fourth pole.

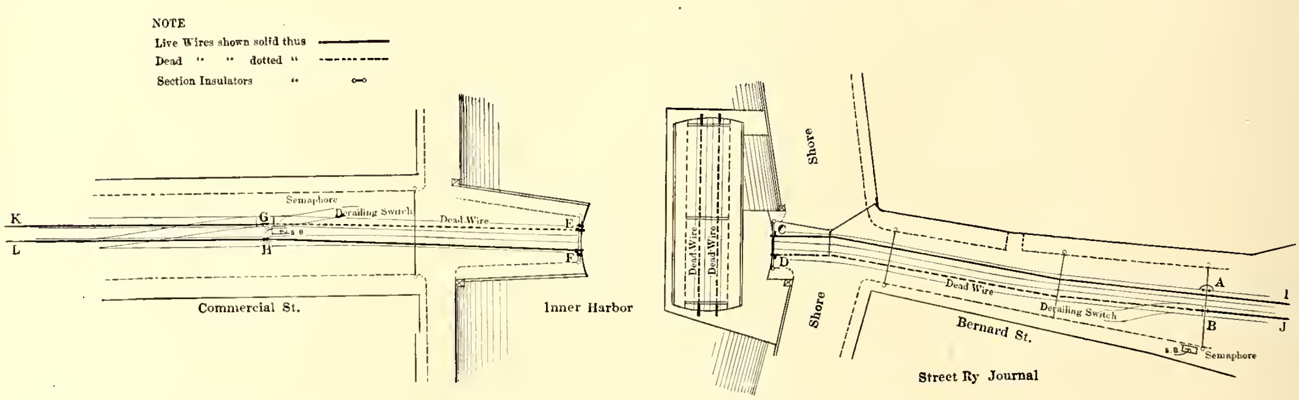
Eight sets of Turner's switch or point controllers, manufactured by S. Dixon & Son, Ltd., of Leeds, are in use and are giving very satisfactory results. Six are employed for the purpose only of moving the tongues of the track switches. Two others are used for operating signal arms and derailing switches on each side of the Bernard Street swing bridge, which will be mentioned later. They are also applied for signals to block three single line curves, so that the motormen may know when a car coming in the opposite direction has entered the single line at the other end.

The feeders are paper-insulated, lead-covered, armored cables laid in wooden troughs and run in with pitch. There are, of course, positive and negative or return cables, and they vary in sectional area from 1 sq. in. to 0.15 sq. in. The largest return cable is 1 sq. in. in area, and the positive feeder has an area of 0.5 sq. in. There is also the usual three-core cable for telephone and pilot wires. The power is supplied to the tramways from the Corporation Electric Light Station, which is most conveniently situated as regards the layout of the system. The price per kw-hour agreed upon is 1¼ d. (2.5 cents) at the tramway 500-volt circuit.

BERNARD STREET SWING BRIDGE

The tramways cross a swing bridge over the inner harbor. The total length of the swinging portion of the bridge from heel to toe is about 98 ft., with a clear span of 40 ft. Three light lattice work arches or trestles have been erected to carry the trolley wire, which is No. 00 S. W. G. and of the grooved section. A plan of the bridge is shown on this page. Before being swung the bridge has a vertical tilting motion. The heel end at C and D drops about 4½ ins., and the toe end E and F rises a proportionate distance. This tilting action allows the bridge to come down on to the turntable, and it is then ready for swinging. There are no gates to close against the traffic when the bridge is open, but derailing switches and signals are used, which are automatically worked by the tilting of the bridge before it is swung.

SWING BRIDGE ON BERNARD STREET, SHOWING METHOD OF MAKING CONNECTIONS

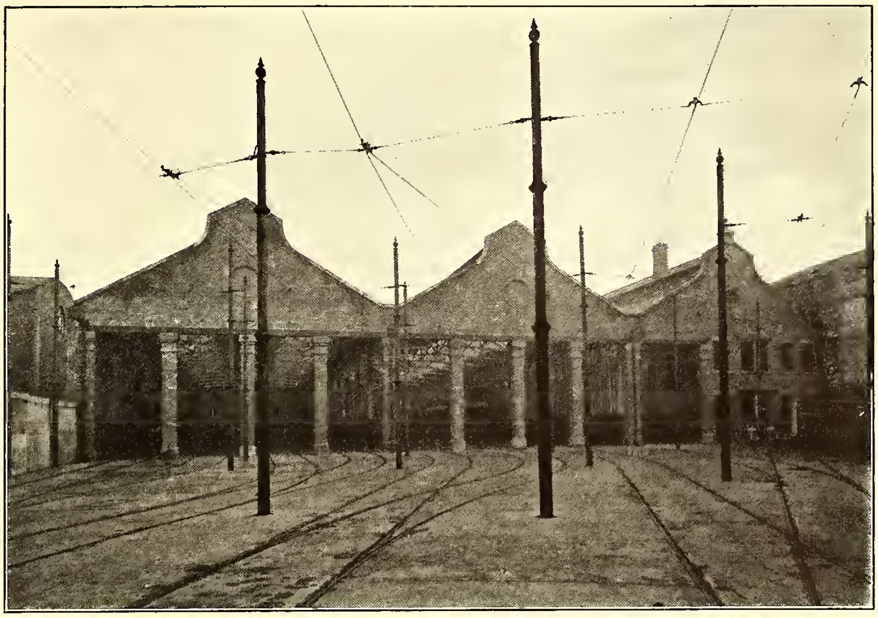


PLAN OF BERNARD STREET BRIDGE

As will be seen from the diagram, when the bridge is closed the approaching length of trolley wire in Commercial Street is fed from the section box A in Bernard Street through the two vertical knife switches E and C on the bridge. The approaching trolley wire B D in Bernard Street is fed from the section box H in Commercial Street through the two vertical knife switches F and D on the bridge. The tilting action of the bridge before swinging opens the switches E F and C D on the bridge trolley wire, thus cutting out the current from the approaching lines on both sides B D in Bernard Street and G E in Commercial Street. By the same tilting motion of the bridge two of the Turner point controllers are brought into operation, and these actuate the semaphore arms and derailing switches at points *G* in Commercial Street and *B* in Bernard Street. The whole bridge equipment, safety signals, derailing switches, etc., were carried out by S. Dixon & Son, Ltd., of Leeds, under the personal superintendence of W. H. Turner, their chief engineer and the inventor of the automatic point controller.

CAR DEPOT

The car shed will house about forty-eight cars and the repair shop seven cars. There are ten sidings in the car shed, all with repairing pits under for practically their full length. Rails are laid in the bottoms of these repairing pits, on which run small bogies or trucks. These have a lifting jack for the purpose of carrying any part of the motor equipment from under the car. These trucks can then be run on to a transfer table in the pit at the end of the car shed along the gable into the repair shop, and vice versa. This saves a considerable amount of handling and the transfer table does not encroach on the storage capacity of the car shed. It is entirely under the overhang of the cars from the wheel to the fender or buffing bar. The trolley wiring of the car shed and repair shop is all suspended on span wires and no troughing is used. The floor of the shed has been laid with granolithic, as is also the entire yard to the entrance gates in Leith Walk.



CAR HOUSE EXTERIOR

INTERIOR OF CAR HOUSE

CARS

The number and types of the cars are as follows: Ordinary double deck, thirty, and covered top double deck, six, making thirty-six cars in all. The contract was equally divided between the British Thomson-Houston Company and the Brush Electrical Engineering Company, each supplying fifteen ordinary double-deck cars and three covered top cars.

Two types of cars were supplied by the British Thomson-Houston Company, of Rugby, and differ from those supplied by the Brush Company. The bodies and trucks were made at Preston at the United Electric Car Works. The over all length of the bodies is 27 ft. 6 ins.; the over all width, 6 ft. 9 ins., and the height from the rail to the trolley plank, 9 ft. 7 ins. on the double-deck cars and 15 ft. 8 ins. on the covered top cars. Both have four side windows. The seating capacity of the double-deck cars is twenty-two inside and thirty-six outside, a total of fifty-eight; and of the covered top cars, twenty-two inside and thirty-four outside, a total of fifty-six.

The trucks are Brill 21-E type with wrought-iron center wheel with steel tires 31¾ ins. diameter, made by John Baker & Company, of Rotherdam. Ordinary ratchet spindle hand brakes are fitted, with a block to each wheel, and also Tidswell life guards. The wheel base is 6 ft.

The equipment consists of two motors, GE 54 type, with four-turn armatures, two controllers of the B-18 type, with rheostatic brake of five notches, with the necessary resistances, circuit breaker, fuse, lightning arrester and trolley earth indicator, etc. On the ordinary double-deck cars there are eighteen 16-cp incandescent lights, and on the covered top cars, twenty-two lights. The covered top cars have sash side windows and sliding panels on the roof similar to those at Liverpool. The system is also supplied with one training car, which is equipped with B. T. H. type GE 54 motors and B-18 controllers, and one water cart and sweeper combined, equipped with GE 58 motors and B-18 controllers. The equipments for all the cars are double-motor equipments.

The cars supplied by the Brush Company were made at the company's works, Loughborough. The over all length of the bodies is 28 ft.; the width, 6 ft. 9 ins., and the height to trolley plank on the ordinary double-deck car, 9 ft. 10⅝ ins., and of the covered top car, 15 ft. 8 ins. from the rail. The seating capacity of the double-deck cars is twenty-two inside and thirty-four outside, a total of fifty-six; and of the covered top cars, twenty-two inside and thirty-two outside, a total of fifty-four.

The wheel base is 6 ft. and the trucks are the Brush AA type. The wheels and brakes are the same as those already described, but the cars are fitted with Hudson & Bowring life guards.

The motors are of the Brush 1002-B type, with turn armatures. The controllers are of this company's 3-A rheostatic braking style, with five brake notches and the necessary resistance, circuit breaker, fuse, Garton lightning arrester and trolley earth indicator. The ordinary double-deck cars have eighteen 16-cp lights and the covered top cars 22-cp.

VIEW ON CRAIGHALL ROAD, SHOWING CURVE AND CENTER POLE CONSTRUCTION

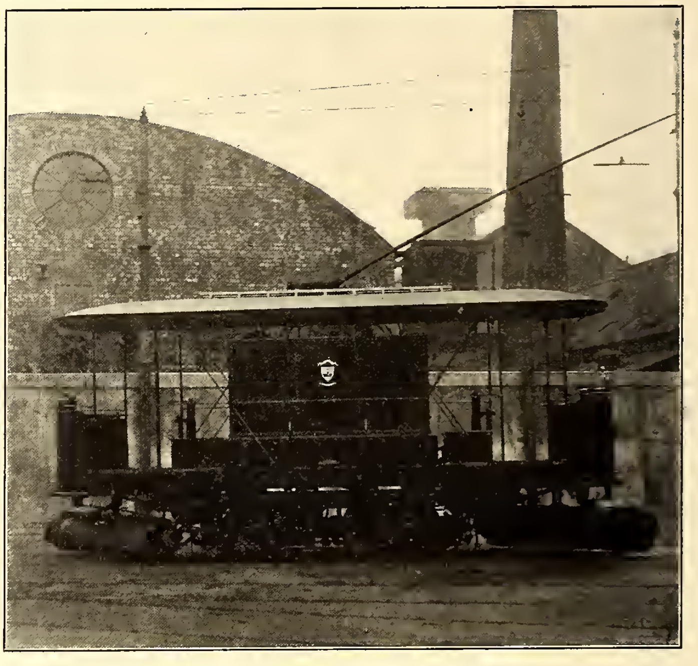
The sprinkler and sweeper car is also shown. The tank has a capacity of 1000 gals. of water. It has two GE 58 motors with six-turn armatures, two B. T. H. B-18 controllers and the other necessary B. T. H. equipment. It is fitted with two revolving brooms, snow plow and sprinkler. The body and truck was made by the United Electric Car Works, Preston, and the electrical equipment was supplied by the British Thomson-Houston Company, Rugby.

GENERAL

The permanent way, overhead equipment and the car shed were all constructed by the corporation. The permanent way under the superintendence of J. R. Findlay, burgh surveyor. The car shed work was supervised by George Simpson, burgh architect, and the overhead equipment by A. Peden Rutherford, A. M. I. E. E., burgh electrical engineer. Mr. Rutherford also carried out all the work for the tramways in his electric light power station, including boilers, engines, switchboard, etc.

IMPROVEMENTS AT FORT WORTH

Improvements made to the property of the Northern Texas Traction Company extend to all departments of the company, and have been referred to previously in the STREET RAILWAY JOURNAL. An improvement recently completed is the extension of the Hemphill line to the Fort Worth Iron & Steel Works, a distance of about 5700 ft. In addition to this the company has renewed 4200 ft. of the old line, using 56-lb. T-rail for the entire distance of 9900 ft. The track construction consists of the above 56-lb. rail, 6-ft. x 8-in. x 8-in. burnetized ties, 2-ft. centers, and the usual span construction, using burnetized poles 12-in. butt, 7-in. top. The span construction consists of 5-16-in. cable span wire with ½-in. x 10-in. eye-bolt, each span insulated by cutting in wood strain 12 ft. from each pole. The trolley is 00 and feeder 0000, all furnished by Roebling's Sons Company, of Trenton, N. J. The General Railway Supply Company, of Pittsburg, furnished the caps, cones and ears, and also 10-in. concealed bonds for bonding of the track. The company has also ordered 200 tons of 60-lb. T-rail and 30 tons of 70-lb. high T-rail from the Cambria Steel Company, of Johnstown, Pa., and 80 tons of 80-lb. 7-in. high T-rail from the Lorain Steel Company, of Lorain, Ohio. The 60-lb. T-rail and the 7-in. high section rail is for extensions in the city of Fort Worth into the populous Third Ward district, some 2 miles in extent. The 70-lb. rail is for improvements on the interurban between Fort Worth and Dallas. The trolley and feed for this extension has also been purchased from Roebling's Sons, and the overhead material of like character as the Hemphill Street extension, from the General Railway Supply Company, of Pittsburg. On the interurban the company is replacing the old 4-in. mechanical trolley clip with a 9-in. clinch ear, furnished by the General Company, of Pittsburg.



COMBINED SWEEPER AND SPRINKLER

T-RAIL FOR PAVED STREETS IN KANSAS CITY

The Kansas City Railway & Light Company has adopted 80-lb. standard A. S. C. E. section T-rail for brick paved streets, and is using that rail on track laid in such streets this year. No more girder rail will be used in the city. A special shape of brick is used for the flangeway. The track is laid on broken stone with concrete around, but not under the ties. The paved brick is laid directly on the concrete without any sand cushion.

MEETING OF THE OHIO INTERURBAN RAILWAY ASSOCIATION

The Ohio Interurban Railway Association held its November meeting at the Tod House, Youngstown, on Nov. 23. The meeting was called for this busy iron manufacturing city, which lies in the northeast corner of the State, in order to interest managers of interurban roads in that district, who heretofore have never attended meetings of the association, and in this it was successful. The attendance was about forty, including a number of operators from that district who were proposed for membership. Future meetings will probably be held either in Dayton or Columbus, as these points are most conveniently situated for bringing out a large attendance.

President E. C. Spring announced that the plan of the appointment of a permanent secretary and the formation of a publication and publicity bureau was meeting with considerable encouragement, but that it could not be definitely acted upon until more roads had been conferred with, and he said that he hoped to interest the Indiana roads in this proposition. He asked that all roads reply to his communication on this subject by Dec. 15, so that some action might be taken at the meeting to be held at the Chittenden Hotel, Columbus, Dec. 21.

Plans are being made for a magnificent banquet and gathering at the annual meeting to be held Jan. 25 at the Algonquin Hotel, Dayton. Prominent traction and public men from all over the country will be invited. Committees on entertainment and reception were appointed from among members in the Dayton district. A nominating committee, composed of Robert Dittenhaver, Toledo; F. G. Green, Springfield; F. D. Carpenter, Lima; J. O. Wilson, Cleveland, and J. R. Harrigan, Newark, was appointed to select a ticket of officers for the coming year.

INTERLINE TICKETS

J. H. Merrill, chairman of the transportation committee, announced that since the last meeting the Richmond Street & Interurban Railway, the Indianapolis, Columbus & Southern Railway and the Kokomo, Marion & Western Railway had agreed to adopt the interchangeable coupon book of the Ohio Interurban Railway Association. A communication was also received from the Muncie, Hartford & Fort Wayne Railway indicating its intention of joining the agreement. This increases the number of Indiana roads in the agreement to ten, and the total number to thirty-five. The bureau has issued 3000 card bulletins advertising the names of the roads. These will be sent to the various roads, and each manager was asked to have a number of them framed and placed in hotels and ticket offices in his district.

The subject of a revision of the present form of interline ticket was first discussed. It will be remembered that at the Dayton meeting a year ago the association adopted the so-called skeleton form of interline ticket. The ticket contains a contract, an agent's stub, together with coupons for the various roads over which the ticket is sold. This ticket is now used by many of the roads in Ohio and Indiana. Theodore Stebbins, of the Appleyard system, who introduced the subject, said that while this form of interline ticket was satisfactory under certain conditions, it incurred considerable work for the agent, and there were many errors through ignorance and careless work on the part of agents. In large terminal cities it is found difficult to secure satisfactory service because the system is slow. In Columbus, for instance, seven roads all have cars leaving on the hour, and at that time the agents are rushed with work of selling local tickets and answering questions, and it is frequently impossible for them to fill out a lot of interline tickets and do the work properly. He suggested a form of multiple destination ticket used by some steam roads, in which the agent folds the coupons and punches the routes and destinations with one operation. Such tickets are good from the point stamped on the back over routes and to the destination indicated by punch marks. He said he thought well of this plan until he conferred the evening before with F. J. J. Sloat, of the Cincinnati Northern, who, he said, had a still better plan.

Mr. Sloat said that while the skeleton form of ticket at present in use was largely used by steam roads, he felt that the interurbans must work out some improvement. The traction lines are called upon to handle a much greater volume of short-haul business and must handle it in quicker time than the steam roads; and usually they have 50 per cent to 75 per cent smaller force to handle it with. He thought interurban roads had too many varieties of tickets; his 50-mile road had about 175, the Lake Shore Electric 350, the Appleyard lines over 400, etc. To secure low prices, they bought tickets in big lots and frequently have large stocks of tickets that are never used. To eliminate many varieties of card tickets and to simplify the issuing of interline tickets, he suggested the use of a device similar to one recently adopted by a number of interurban roads for issuing cash-fare receipts. This is known as the "Closed System," and by its use the receipt is issued in duplicate, the duplicate section remaining in a locked box, so that it is impossible for the conductors to manipulate the receipts. Having no visible record of cash collections, the conductor settles on balances, deducting his change and turning in the balance to the auditor, who compares it with the receipt stubs remaining in the box. It has been the experience of all roads using the device that the overages exceed the shortages by from $3 to $5 per month for each conductor. He felt satisfied this plan could be used in ticket offices for selling tickets. On the individual road it would necessitate four or perhaps six varieties of boxes and tickets, viz.: single-trip full fare, round-trip full fare, single-trip half fare, round trip half fare, with perhaps two other varieties for special excursions. These tickets could be distinguished by different colors. The same variety of box could be worked out to take care of interline business. On interline routes frequently used, such as Dayton to Indianapolis, or Cincinnati to Toledo, the coupons and stations could be printed out, while on interline routes not frequently used, he thought it possible to work out a multiple destination ticket, the agent filling in the route and the final destination. A Cincinnati-Toledo form, for instance, would have all the names of the stations on this route printed out. These names would be in duplicate, side by side, with rates of fare arranged in the same manner in the upper portion of the ticket. Pointers or notchers on the ticket box would move vertically between the rows of figures and names of the points between which the ticket was sold, and the amount would be notched in the ticket, the duplicate record remaining in the box. On the right-hand side of this ticket would be a set of coupons for the conductors of the roads over which the ticket was routed. He thought this would be a great advantage over card tickets, which are not issued in duplicate. Railroads find that conductors frequently hold out card tickets and sell them over again to passengers or to ticket scalpers, and in some cases even work up a collusion with the ticket agent to sell them over again. An Ohio interurban road suffered from this scheme a short time ago. It would prevent selling half-fare tickets to adults and would enable passengers to settle disputes against conductors, because the receipt portion of the ticket would remain in the passenger's hands, each conductor simply lifting his proper coupon.

F. W. Coen, of the Lake Shore Electric Railway, said that the present form of interline ticket was largely used by all steam roads, and he believed that if it could be improved upon, the steam people would have worked it out long ago. He thought the most important objection to Mr. Sloat's scheme was that in order to use the ticket issuing box and notchers it would be necessary to use very thin paper. He thought that a ticket which was to be handled by passengers and conductors a number of times would necessarily be a long ticket, and it should be on good heavy paper, so that it would not become torn and mutilated. He did not see that Mr. Sloat's plan provided for a contract or a time limit on the coupons, which he thought was important in order that the collecting road might know what the issuing road had issued.

A. L. Nereamer, of the Columbus, Delaware & Marion Railway, said he had been a passenger traffic man on steam roads for fifteen years and had seen many experiments with so-called multiple destination and routeing tickets. At one time many roads adopted what was known as the Wameldorf ticket, but after six months it was abandoned as too complicated, as it forced conductors and ticket agents to become practically expert rate clerks. It did not work on steam roads, and was much less liable to on electric roads, where ticket agents and conductors are usually of an inferior class. He thought that with Mr. Sloat's ticket the coupons would necessarily be so small that conductors would be apt to lose them. Also, there was nothing on any of the coupons to show that a man might be going to an intermediate point, the coupon simply showing that the party rode over that road. For example, a ticket sold in Cincinnati by the Cincinnati Northern for Worthington, on the Columbus, Delaware & Marion, would contain coupons for the Cincinnati Northern, the Dayton, Springfield & Urbana, the Columbus, London & Springfield and the Columbus, Delaware & Marion, but there was nothing on the coupon to show that the passenger should be carried only to Worthington and not through to Marion. The receipt portion showed these features all right, but not the coupons, so that neither a man checking the car, nor the auditor of the Columbus, Delaware & Marion could tell that the passenger had a ticket for Worthington only. Consequently, the auditor of the Columbus, Delaware & Marion would have to wait until the end of the month until he heard from the auditor of the Cincinnati Northern before it could be determined how far that passenger was entitled to ride. He said that in any interline arrangement to which his road was a party he wanted to know immediately where a passenger came from and where he got off, and the first and the last coupons at least should show these features. Without casting any reflections against electric road managers, whom he believed were all honest, he had been taught by a long steam road experience to require full explanations from the other fellow. One big steam system had been boycotted by other roads because it had a trick of selling tickets to one point and reporting on another. Another road had sold large quantities of mileage at a discount and then went to the hands of a receiver, and the receiver repudiated the claims of other roads. He thought the interline business on the electric roads could be worked out so that everything would be above board, and so that the collecting road could know the full transaction without waiting until the end of the month.

Mr. Sloat thought that the advantage of giving the passenger a receipt and retaining an exact duplicate in the office of the selling company more than compensated for the disadvantages mentioned. He thought it an easy matter to hold the earnings in suspense for a month if an accurate copy of the transaction was received at the end of that time.

Mr. Nereamer wanted something that could be checked and watched daily. With the plan described, he said a passenger could buy a short-haul ticket, slip the conductor a quarter to carry him through, and it would be impossible for anyone checking the car to prove anything against the man until the other company reported.

Mr. Coen said the coupons could be printed with the names of all the stations on each road and the agent punch the points "from" and "to" on each coupon. Certain Chicago roads do this.

Mr. Sloat took up Mr. Nereamer's point about checking, and said he thought it impossible to accurately check cars where 200 or 300 passengers got on and off in 50-mile run. He said that men were frequently charged with more than they really did. As for checking ticket collections against agents' reports, he thought that few roads carried this out, although many pretended to do so. This ticket would be an absolute check, because each section would bear the same number and would fit together, showing the amount paid and the points between which the passenger rode. It would be a check on cash fares, local tickets and interline tickets. He admitted the present proposed form might have some objections, but he thought that the general scheme of selling tickets by means of the "closed system" presented food for a great deal of thought. He was very anxious to secure a satisfactory ticket immediately, because his road will soon commence selling long-distance interline tickets.

On motion, the chair appointed F. J. J. Sloat, Theodore Stebbins and J. H. Merrill as a committee to work out an improvement on the present form of interline ticket.

STEEL-TIRED WHEELS

W. E. Rolston, master mechanic of the Dayton & Troy Electric Railway, introduced the subject of steel-tired wheels. He said they had been using these wheels four years. They have secured an average of 200,000 miles to 250,000 miles with 2½-in. tires, and they are now putting on some 39-in. wheels with 3½-in. tires on which they expect to get 400,000 miles. On the first equipments they allowed them to run 97,500 miles and then turned off 7-16 in. At present they believe they get greater economy by turning off less and doing it oftener. On some they are now running 40,000 miles and turning off ⅜ in., and on others 60,000 miles, turning ½ in. They have not fully decided which is the better plan. Their wheel has 1⅛-in. throat, 1-in. deep flange and 3⅛-in. tread. Their road has numerous curves and cars run at a speed of 60 m.p.h. on limited runs. He believes a chilled wheel unsafe for such service. Troubles with flat wheels have been practically eliminated, as flat spots work themselves out instead of growing worse. They have reduced the cost of turning by using the best imported steel tools. The cost per pair of wheels is about $1.10, employing a 20-cent per hour man. He strongly recommended steel-tired wheels for city service, and they are using them on some of their small city cars. One city road he mentioned saved 30 per cent on its wheel account.

W. C. Elmersdorf, master mechanic of the Youngstown & Sharon Railway, said their first steel wheels had cast-iron centers and they came loose. Now they are using a steel center with steel tire, and it is giving good service. They have used some of them 127,000 miles and turned off ½ in., and they are good for 60,000 miles more. He has had very good success with rolled-steel wheels and favors them because the flat spots roll out, and they cost less than steel-tired wheels. He had some wheels rolled from solid ingots which have made 60,000 miles and show hardly any wear.

W. H. Abbott, of Roberts & Abbott, Cleveland, said there was a great difference in rolled-steel wheels. He had used some which were made from low carbon steel and which had soft spots and did not wear uniformly. Others were more satisfactory. Larger wheels seemed to stand up better than small ones. He found that if these wheels were allowed to run too low the flanges became sharp and wore out quickly. They should not be run more than 50,000 miles without returning. He described a rolled forged-steel wheel made by the Schoen Company, of Pittsburg, which gave excellent results.

F J. J. Sloat said he had used steel-tired wheels, but still favored cast-iron wheels. He said he had to get four times the mileage to equalize the cost, and he could not do it. He thought that if tracks and special work were designed with plenty of throat or flange room there would be no trouble with chipped flanges.

J. A. Paul, superintendent of the Youngstown & Sharon Railway, comparing steel-tired with rolled-steel wheels, said he had fitted a car with the former on one truck and the latter on the other. At 80,000 miles the steel-tired wheels had to be turned, while the rolled-steel showed little or no wear. This was a wheel rolled from a solid ingot. The material seemed to be as hard at the center as on the tread. Cast-iron wheels were out of the question for their service, as they were ready for the scrap heap at 37,000 miles.

Theodore Stebbins, of the Appleyard system, found steel-tired wheels much safer and in the end less expensive than cast iron. They are using them exclusively.

J. D. Cunningham, of the National Car Wheel Company, said that out of thirty interurbans in Ohio, thirteen were using steel-tired wheels. This included nearly all the roads using heavy cars and operating at speeds above 40 m.p.h. He spoke of one road which is using a special cast-iron wheel composed largely of charcoal iron reannealed, and said these wheels would wear nearly as long as steel-tired wheels. He said the great trouble was that roads demanded cast-iron wheels so cheap that they could not use the proper material and care, and he admitted many of them broke down with 35,000 miles, but said that better grades of cast-iron wheels would show 100,000 miles.

Mr. Rolston said that proper care of trucks made a great difference in the wear of wheels. A rigid bolster increases wear on tires, especially on crooked roads. He has placed oiling devices on bolster plates and side plates and believes it increases the life of wheels 20 per cent to 30 per cent.

F. W. Coen, of the Lake Shore Electric Railway, said cast-iron wheels were more economical, but steel-tired wheels were undoubtedly safer. They run over 11 miles of city tracks over which they have no control, and cast-iron wheels become badly chipped. They use a 7/8-in. flange with 1 1/8-in. throat 3 1/2 ins. thick. They are using a spoked steel-tired wheel having a special shrunk-on fastening, made by the Woodworth & Engert Company, and have never had a loose tire.

Mr. Paul said they had fitted a car with roller bearing center and side bearings with which the flange wear had been reduced to a minimum.

Mr. Abbott reported good results with the use of wheel truing brake-shoes instead of turning steel-tired wheels.

RECORDING AND OTHER INSTRUMENTS

W. H. Abbott, of the Roberts & Abbott Company, then gave an interesting talk on the use of "Recording and Other Instruments." He divided his subject into steam and electrical, and the electrical into portable and stationary. The use of portable instruments has been neglected in the past, but its importance is becoming recognized. A high-tension voltmeter was very important. No matter how carefuly a system was designed, there were liable to be accidents, or changes in the system, which made it necessary to determine the voltage in any particular district or point. Low-voltage instruments were also necessary for the same reason. A millivolt-meter was also a necessity for testing joints, armatures, fields, etc. In connection with owning such instruments it was necessary to employ skilled men to use them; men who understand what readings mean and how to correct defects after they have been discovered. Every road should have portable wattmeters to test out cars. Cars frequently take 50 per cent more current than they should without showing it. Controller connections and leads should be tested after repairs. Car house men should also have ohmmeters to measure resistance of field coils and armature coils. Frequently coils which appear uniform take unequal current. Fields burn out, insulation breaks down and commutators spark because the parts were not properly tested when they were put together. These are among the instruments which are needed the most but used the least. Every road loses current at joints, and joint testers in the hands of competent men will save a great deal of coal and improve the service. Car wattmeters should be placed on cars at regular intervals, and green as well as experienced motormen should be instructed how to feed properly and shown how much current they are using or wasting. The majority of power station switchboards are lavishly equipped with instruments, many of which are never used. Some of them ought to be taken down and given to the men on the road. A wattmeter on a switchboard is of no value unless the output is balanced against the amount of coal used or the car mileage. Every house should be equipped with coal scales or the cost of current cannot be accurately determined. Recording watt and voltmeters are very nice, but they are seldom made us of, and are not nearly as valuable as meters for the shop and line men. Recording pressure gages are desirable for boiler rooms where only one or two men are employed. Thermometers are coming into use and are necessary where superheated steam is used. Recording thermometers are desirable in large plants, but are not needed in small ones. Recording water gages will tell if firemen are not careful, but are not necessary. Water meters are desirable, but it is hard to find an accurate one, hot-water meters especially. The Venture meter is fairly accurate, but it is not integrating and does not show the number of feet consumed per day. A water meter is useless unless a record is also kept of the coal weight. A draft gage is little used, but very convenient. It will frequently show why certain boilers are doing better than others because of weather conditions and position of boilers.

Mr. Rolston, of the Dayton & Troy, said they used a number of portable instruments for testing work in the shops, showing condition of cars and instructing men in the use of controller. They use wattmeters in station and have daily records of power consumption, car mileage, coal and water. Free use of meters in the station enables them to locate trouble promptly and gives a close check on expenses.

Mr. Sloat, of the Cincinnati Northern, said they used wattmeters on cars and took readings on the same car on different trips for a week or ten days. In the matter of acceleration, he thought it necessary to accelerate rapidly in order to make time. Cars in Cincinnati apparently have but two points, yet the car-mile expense is comparatively small.

This led up to a discussion of the use of automatic devices for preventing rapid acceleration, and the general sentiment was against their use. Several serious accidents were attributed to them.

Theodore Stebbins, of the Appleyard lines, had a good word for such devices. He said they saved a great deal of current if properly handled by experienced men, but should not be placed with green men. He thought that every car should be equipped with meters, showing the current used, and meters should be read frequently. If a car was using more than another on the same service it should be pulled off and the trouble located. In lighting practice they put meters on every customer if he even uses 50 cents worth a month, while our cars consume thousands of dollars worth of current, and usually all we know is the amount of the coal bill for the month. He thought that stations should keep accurate record of coal, and asked about accepting coal companies' weights. He said these weights were usually 5 per cent to 7 per cent short. This opened up an interesting line of discussion. One manager said they charged off 8 per cent, another 10 per cent, and one unfortunate said 15 per cent.

Mr. Nereamer, of the Columbus, Delaware & Marion, said the only safe way was to take the railroad company's weights, which are usually about 1000 lbs. to the car less than the coal company's weights.

J. M. Walker, of the Pennsylvania & Mahoning Valley Railway, said they kept a coal sheet showing the amount used each month. Fuel is carried in an outside storage with usually about 500 tons on hand, and the amount is determined by cross sectioning the pile. They use a plan showing the cross section, and by stretching a rope over the pile and allowing 40 cu. ft. per ton an accurate record is made each month.

Mr. Sloat said he had a statement each month showing coal on hand, consumed and coal received, and he used the railroad weights as a basis.

Mr. Stebbins said he had his bins partitioned off and had each shipment put into a separate bin. He kept a record of what went into each bin and how much was taken out, and checked the coal man's figures against the engineer's figures. He thought the only satisfactory way was to buy a track scale.

Mr. Coen said that for a time they kept the coal company's weights, and one day struck a balance which showed they had $2,000 worth on hand, when as a matter of fact they did not have any. He thought the best plan was to figure coal in dollars without regard to weight.

CHARGES FOR CARS ON FOREIGN ROADS

The question of charges for cars on foreign roads, which was discussed a year ago, but never satisfactorily settled, was brought up again.

Mr. Sloat proposed a schedule of rates which allowed for different weights of cars and different sizes of motors. On his road it cost 13½ cents per car-mile to operate, interest bringing it up 17 cents. He allows the foreign company 2½ cents to 3 cents per car-mile, according to size of car, furnishes the pilot and pays the crew. After deducting his expenses and paying the car mileage, he proposes to keep at least $12 for his profit.

Mr. Stebbins said they had chartered car rates and charged the foreign company these rates, allowing them $5 for the use of the car while on their road. If this was not satisfactory they pro rated with the other road on the mileage basis. In fact, they had no fixed plan.

F. W. Coen said the roads in the Cleveland district had a flat rate of 30 cents per car-mile. "We assume the liability and pay the pilot, and they pay their own crew." In the cities of Toledo and Cleveland there is a terminal charge of $7.50. Mr. Coen thought this matter ought to be settled and agreed upon immediately. "Steam road managers know that if they want to run over the tracks of another company it will cost 50 cents per mile. We don't know anything about it. If we want to send a car over another road we have to telephone and find out. Some charge on the mileage basis, others on an operative basis, some on per capita basis, and others want a flat rate, regardless of circumstances. Often we could do business with another road, but its rates are prohibitory."

Nothing was done about the matter.

REASONABLE TENDER FOR FARES

Mr. Nereamer asked, "What is a reasonable payment in tender of fare?" They have a 10-cent haul and men frequently tender $20 bills. In one instance a conductor took the money and gave the man an order on the general office for his change, which caused the man considerable trouble. His general counsel says that California has a law specifying $5, and New York State $2.50. Ohio statutes say nothing on the point.

Mr. Spring said one of his men had put a man off in a rather strenuous manner because he had no change for a $20 bill, and the act cost the company $250. The court did not decide on the debated point.

Mr. Sloat said he had a notice posted in cars stating that conductors carried $2 change. In one case several men made a practice of bluffing conductors with large bills, and he broke up the game by loading several conductors with small change. He said the courts of some States had decided that making change was a matter of accommodation and that a company was not obliged to make change.

Mr. Paul, of the Youngstown & Sharon, said that the courts of Illinois had so held, and he thought if a person presented an unreasonably large bill he could be put off.

It was voted to bring this matter to the attention of the legislative committee and ask that a suitable law be framed in Ohio.

The meeting adjourned at 5 p. m. and the majority of the members accepted the invitation of Secretary Rogers and Superintendent Paul, of the Youngstown & Sharon Railway, to make a short inspection trip over this road. A very handsome freight and passenger station was first visited and then a run was made to the Pennsylvania State line, where the car house and shops were inspected. The property is a modern high-speed road, having excellent equipment and comparing favorably with roads in the central part of the State. The trip was made in a fine new car recently furnished by the Niles Car & Manufacturing Company, a feature of which was a square smoking compartment. Another notable feature was the two varieties of alarm signals with which all cars were provided—a ratchet gong, resembling a fire department gong, for city service, and an organ whistle, which closely resembles a Mississippi River steamboat whistle, for country service. The latter was made by the Crosby Steam Gage & Valve Company, of New York, and it made a great hit with members from the southern part of the State.

MEETING OF THE NEW ENGLAND STREET RAILWAY CLUB

At the regular monthly meeting of the New England Street Railway Club, held at the American House, Boston, Nov. 23, W. S. Bartholomew, of Chicago, Western manager of the Westinghouse Air Brake Company, read an instructive paper upon air brakes for electric cars. After pointing out the economy of operation, saving of time in maintaining schedules and increased safety resulting from the use of air brakes, Mr. Bartholomew emphasized the tendency of interurban roads toward the use of medium sized cars in trains rather than toward very large and heavy single units, which are uneconomical to operate during hours of light traffic, more or less awkward of access on account of the height of the floors above the pavement, too long for 35-ft. and 40-ft. radius curves, and are burdened by having wheel treads and flanges unsuited to urban track. Further, the better handling of heavy currents by multiple-unit control apparatus located beneath the car instead of on the platforms, tends toward the operation of cars in trains. The fitting of the train length to the traffic requirements is another point of importance.

Discussing various methods of operation, from single car equipments to motors and trailers in different combinations, the speaker showed that a single standard air brake schedule could not be used for all these separate conditions and then considered the general requirements of electric car braking. Some of the objections to the use of standard steam railroad automatic air brakes on electric roads are found in the facts that the applications on electric cars are so frequent that not enough time elapses to permit the proper recharging of the auxiliary reservoirs; that the graduated release of the brakes is absolutely necessary in electric cars for smooth stops; and that a prompt response of the brakes in application or reapplication after a release is very essential.

Mr. Bartholomew then considered in detail the variations of air brake equipment which would be recommended in different methods of car operation, bringing out a number of new features and systems which have been developed by the Westinghouse engineers for the purpose of meeting all the conditions possible in commercial service. A summary of these equipments follows:

Schedule SM.

Straight Air Equipment.—Suited to single car operation under almost all conditions. With very heavy cars at speeds of

50 m.p.h. to 65 m.p.h. and upward, it is necessary to have an additional braking effort to stop the armature rotation at these speeds. It should also be possible in such cases to immediately apply the maximum braking pressure in emergencies and to reduce it as the car slows down and the coefficient of friction between the wheels and shoes becomes larger.

Schedule SME.

Straight Air Equipment with Automatic Emergency Application.—Suited to motor-trailer service where trailer is little used. Small triple valve on each vehicle operates to apply the brakes if a hose pipe ruptures or if the emergency brake valve position is taken. Prevents the motorman from using an excessive amount of air and has increased factor of safety on account of automatic feature.

Schedule AMS.

Automatic Air Brake System with straight air release of the brakes from the brake cylinder of the head car. Provision for rapid repetition of applications without danger of depleting auxiliary reservoir pressure. Suited to operation of two-car trains where trailer is hauled continuously behind motor car. Advantage over straight air in that brake applications are made practically simultaneously on each car. Braking effort on motor car slightly exceeds that on trailer, to give a smooth stop. Equipment gives the high factor of safety of automatic brakes and very smooth operation. Generally preferable to Schedule SME.

Schedule AMT.

Automatic System with a graduated release of the brakes at the triple valve. Suited to short multiple-unit trains or motor-trailer trains of two and three cars. Equipped to prevent train line overcharge and give quick brake response at all times. Furnished with either single or double hose lines, the latter being preferable when pneumatic doors, etc., are operated, to give reserve pipe line in case of pump failure.

Schedules AMQ and AMR.

These are both automatic systems, suited to any length of train. They are equipped for the division of pump labor, with independent compressors and brake valves on each car. Adapted specially to four or more car multiple-unit service. These schedules represent the most advanced type of purely pneumatic brakes, and comprise in a single equipment the features of graduated release, quick recharge of auxiliary reservoirs, quick serial service application, no overcharging of brake pipe, prompt response of triple valve after full release, independent operation of all compressors in train, and a single hose pipe. The production of these characteristics in one equipment is a marvelous achievement in engineering design. On the Metropolitan West Side Elevated, Chicago, 418 cars have been equipped with these schedules, as well as 175 Long Island Railroad cars on the electric division and trains on the New York and Boston elevated roads.

Schedule ET.

Automatic system suited to locomotive train operation. Particular features are independent control of the locomotive brakes, a holding position to retain locomotive brakes when releasing train brakes and maintained pressure in the locomotive brake cylinder at whatever point desired. Also has quick recharge and graduated release, as in Schedule AMT; the regular Westinghouse quick-action triple valves, and a new quick-service feature in the triple valves, which is an arrangement of ports in the triple valve to secure the use of brake-pipe pressure to aid in raising the brake-cylinder pressure and reduce the time of serial action throughout the train at least one-half.

Electro-Pneumatic System No. 3.

The latest development in air brakes. Consists briefly in the application of multiple-unit train-control principles to the previous automatic brake schedules. Suited especially to electrically-operated roads running trains of varying length. Brake valves fitted with electric tops, electro-pneumatic application and release magnets, and electric jumpers and sockets for carrying a two-line electric circuit through the train, constitute the main features. The equipment refines the application and graduation of the release of the brakes beyond previous mechanical results, and secures instantaneous and uniform results on each car, regardless of the train length. The pneumatic side of the equipment is left intact, and is complete and in reserve at all times, ready for immediate use. The electric contacts being in full release position of brake valve, the triples are in release position and the auxiliary reservoir fully charged with the triple-valve exhaust open to the atmosphere.

The first movement of the brake-valve handle electrically closes the valves in the exhaust pipes. This is electric lap position. The next movement opens the electro-pneumatic valves, which permit auxiliary reservoir pressure to flow into the brake cylinder through the triple-valve exhaust pipes, applying the brakes. If the brake-valve handle is brought back to lap, the pressure is still held on the shoes, as the atmospheric exhaust valve does not open until full release is reached. The graduations of release are made by moving the brake-valve handle to the starting point, and these graduations of release and application can be made with any frequency and degree of fineness desired. The air consumption is about half that with ordinary automatic brakes, and there is no time element in the serial action from car to car. The use of air cannot be sufficiently rapid to get ahead of the maintenance of pressure through the train pipe, and experience has shown that the auxiliary reservoir pressure remains practically constant. The equipment gives practically straight air on each vehicle, a deceleration curve that is practically a straight line, and requires no waste of air to secure a brake application. It is specially suited to the abilities of inexperienced motormen, gives exceedingly smooth and uniform stops, and points the way toward automatic deceleration apparatus, without the use of any judgment on the part of the motorman. Its forthcoming adoption in important electric railway service seems an assured fact, and, coupled with the pneumatic features, the electric schedule appears equal to every commercial electric railway, not to mention its availability in steam railroad service.

HAND REVERSE FOR TYPE M CONTROL AT KANSAS CITY

The fifty-four cars which were used on the Intramural Railway at the Louisiana Purchase Exposition and were after the Exposition purchased by the Kansas City Railway & Light Company have been in service in Kansas City for some time. These cars were equipped with type M multiple-unit controllers of the General Electric Company. These controllers, it will be remembered, are provided with reversing switches, which are electrically operated, which makes it impossible to throw the reversing switch in case the trolley is off the wire. As experience in the operation of these cars on the hills in Kansas City has demonstrated that it is desirable to be able to throw the reverse switch when the trolley comes off the wire, so as to secure the braking effect of the motors acting as generators. These cars with the type M control have been equipped at the company's shops with a system of levers connecting the reverse switch under the car, with handles on the platforms, whereby a motorman can throw the reverse switch by hand if a car starts to run away with the trolley off.

The Winona Interurban Railway Company, of Goshen, Ind., has awarded a contract for a complete electrical equipment, including generators and motors, to the Allis-Chalmers Company. The line connects Goshen with Warsaw and Winona Lake, and is about 30 miles in length.

CORRESPONDENCE

THE LOCATION OF TOILET AND SMOKING COMPARTMENTS ON INTERURBAN CARS

Edgewater, N. J., Nov. 29, 1905.

EDITORS STREET RAILWAY JOURNAL:

I have noticed the novel plan of an interurban car suggested by Mr. Gonzenbach in your issue of Nov. 18, but question the advisability of making two separate smoking compartments in the center of the car instead of the usual end compartment. It is true that the arrangement proposed secures the one decided advantage of not obliging passengers to pass through the smoking compartment when this compartment is in the rear of the car, which is the case 50 per cent of the time. Nevertheless, except in very severe weather, a large majority of passengers might be allowed to enter and leave the car by the front platform—that is, providing the conditions of the road will permit and the motormen are properly instructed.

On the other hand, the arrangement proposed by Mr. Gonzenbach has several distinct disadvantages from an operating standpoint. Those which occur to me are as follows: The conductor will be seriously hampered in the handling of his passengers, as he will not have as clear a view of his entire car. With ordinary traffic he will not be able to collect his fares as quickly, which is a most important factor when a car is passing from one zone to another; neither will he be able to locate passengers boarding cars with as much accuracy, as the car, relatively speaking, is divided into four sections. Again, it would not be desirable to have the conductor practically isolated from his car, as he would have to be when it became necessary for him to go into one of these compartments to make fare collections. It would also require double the care to attend to the doors, which are almost invariably left open by passengers. The different stations and streets could not as easily be announced by the conductor in each of these compartments, and this fact might put many passengers to inconvenience by being carried beyond their point of destination.

With the usual arrangement, in which the smoking compartment is separated from the rest of the car by glazed doors, and when the car is crowded, I have frequently observed women occupying the smoking compartment to a considerable extent. I do not think that this same condition would prevail in a car built according to Mr. Gonzenbach's design, for women would not care to ride in such a cramped compartment. I might add that I do not believe that the center smoking compartment with the side seat would be as popular even with the smoker as the regular cross-seat smoking compartment.

F. W. BACON.

ELECTRICAL EQUIPMENT FOR THE SIMPLON TUNNEL

It has been authoritatively stated that Ganz & Company have received the contract for the electrical equipment of the Simplon line between Switzerland and Italy, and that the system to be used is three-phase at 15 cycles and 3000 volts on the trolley wires. As is well known, this line connects the southeastern portion of Switzerland with the northern part of Italy, and saves considerable distance between Berne and Paris over the St. Gothard route. It involved the construction of a tunnel about 16½ miles in length, the longest railway tunnel in the world. The line is to be operated by both the Italian and Swiss Governments, and the latter has accepted the offer of the former to place part of the locomotive equipment supplied by Ganz & Company for the Valtellina Railway at the disposal of the Swiss Government for the operation of the Simplon tunnel.

It is thought that the Simplon line will be open for traffic about May 1, 1906.

THE QUESTION BOX

Now that the annual conventions are over, and in response to numerous requests, it has been decided to introduce again an open Question Box in the columns of the STREET RAILWAY JOURNAL. The Box will appear from time to time as the answers on hand may warrant. An urgent invitation is extended to every reader of the paper to send in answers to any of the questions or discussions on any of the topics presented, and the editors bespeak the assistance and co-operation of all in increasing the value of the Question Box. It is realized that it requires something of an effort for a busy man to find the time necessary to write out answers to questions, but it is believed the profit and assistance derived from reading the opinions and experiences of others will be compensation for the time and trouble incident to sending in one's own answers. In other words, the STREET RAILWAY JOURNAL offers the facilities during fifty-two weeks in the year for a free and open exchange of ideas, opinions and experiences on the thousand and one problems that are constantly arising in electric railway work.

The following is the first batch of questions in the new series. Any reader who can answer any of them is urged to send in his answers promptly to the Editor of the Question Box, STREET RAILWAY JOURNAL, 114 Liberty Street, New York City:

MANAGEMENT

INCREASING WINTER TRAFFIC

A 1.—A number of methods for creating traffic during the summer months have been tried with success. What can be done in this same direction during the winter months? What schemes for encouraging travel in winter, such as ice skating, inducing theater traffic, etc., have you tried or have in contemplation?

THE SNOW PROBLEM

A 2.—What special plans are you making for fighting and handling snow this coming winter? What particular changes are you making in your snow-fighting methods or apparatus, based upon your previous experience?

A 3.—Should the responsibility of keeping curves, crossings, switches and special work clear from ice and snow during snow storms be placed in charge of the track department, or should the snow-plow crews attend to this matter?

TRANSPORTATION

SCHEDULES

B 1.—In what form do you make up your schedules for operating purposes? (Please send copies of typical schedules with full information.)

B 2.—How do you determine if your schedule is suitable for the traffic on any particular line? Do you obtain records of passengers carried per car at different intervals, and if so, how do you obtain these records, and are readings taken at different points along the line? Ideas and suggestions on the theory and practice of making schedules are wanted and needed.

B 3.—What methods do you take to inform crews regarding the details of the schedules, and how do you insure that employees know and understand the schedules?

B 4.—What steps do you take for suiting the schedules to the weather and other changeable influences? For instance, suppose a given schedule has been decided upon for a park line for a pleasant Saturday afternoon and it begins to rain early in the afternoon. What is your system for calling in the cars that are not needed, in order to save useless mileage? In other words, how do you bend the service given to suit the probable traffic, and how do you secure flexibility and promptness in changing quickly from one schedule to another?

MECHANICAL

AVOIDING BREAK-DOWNS IN STREETS

C 1.—What percentage of the total cars in service on your road during the average day have to be pulled in from service owing to defects or break-downs developing while the car is on the street? What are you doing to reduce the number of cars that have to be taken from service on this account?

BRAKE-SHOES

C 2.—What are you doing with the brake-shoe question? What type of shoe are you now using, and what mileage are you getting? What have you done to reduce the cost of brake-shoes per 1000 miles?

CAR PAINTING

C 3.—What is your general system of car painting? How have you been able to reduce the cost of painting cars? (Suggestions on car painting and itemized statements of labor, material and costs of car painting are requested in this connection.)

DIGGERS

C 4.—Do you know of any satisfactory "home-made" or other device to be attached to each car for cleaning the groove of girder rails? (Please give description with sketch or photograph.)

THE POWER HOUSE

CYLINDER LUBRICATION

D 1.—Have you had any experience in using graphite for engine cylinder lubrication? What have been the results of your observations or experience in this connection?

STATION ECONOMY

D 2.—What economy are you getting at your power house, expressed in pounds of coal per kw-hour? (In this connection please describe briefly your station equipment and state what kind of coal you are using.)

D 3.—What have you found to be the comparative economy, including operation and maintenance, of automatic stokers and hand firing?

D 4.—Can you put your finger on one or two particular things you have done at your power house that have appreciably reduced the cost of producing power per kw-hour? You will be conferring a favor on the industry by telling about them.

LINE

SLEET ON WIRE

E 1.—What is the best method of overcoming trouble caused by sleet on the trolley wire?

LINE CAR

E 2.—Please give description, with photograph or drawing if possible, of your line repair car, or cars, including particularly any novel or especially desirable features.

TOOLS IN LINE CAR

E 3.—Please give a list of tools it is your practice to carry on the line repair car, or wagon, in order to enable the crew to do everything in the ordinary run of line repair work.

TRACK

TESTING BONDS

F 1.—How do you test your rail-bonds?

F 2.—What is the best method of keeping records of individual rail-bond tests?

SANDING

F 3.—What is the character of sand you use for sanding track?

F 4.—Is it a good idea to mix salt with the sand in winter?

F 5.—How do you dry your sand? (Please send description of drying apparatus, with sketch or photograph if possible.)

WRINKLES

F 6.—What means, machines, devices or special rigged cars are you using for expediting or cheapening the work of the track department? (Please send description and sketch or photoghaph if possible.)

CAUTIONING EMPLOYEES FOR CHRISTMAS TRAVEL

As one means of keeping employees in close touch with the management, James Gunn, superintendent of the Toronto Railway Company, has adopted the policy of issuing at frequent intervals and on special occasions general bulletins to the men. Although these notices are printed in large type in the form of placards or posters at the car houses, they are in reality open letters from the superintendent to the operating force, explaining some particular phase of the work or directing attention to some especially timely topic.

For instance, early in December the accompanying bulletin was issued in anticipation of the Christmas season, calling the attention of conductors and motormen to the more than ordinarily heavy traffic expected, and emphasizing the necessity

CHRISTMAS SEASON, 1905

Notice to Motormen and Conductors

During the present month it is expected that the traffic will be more than ordinarily heavy.

A great number of visitors will be coming into and going out of the city.

Women with children and parcels of all descriptions will be travelling on the cars.

The ordinary vehicular traffic at this season of the year is also very greatly increased.

MOTORMEN

Are therefore warned to take every care, and use every precaution against accidents.

Take no risks, and use every means in your power to insure safety to the passengers and the public.

Give any assistance you can to passengers, but do not neglect your own duties in order to do so.

CONDUCTORS

Be prompt in the collection of fares, and do not fail to collect for all children properly chargeable, and see that you carry a proper supply of coppers for change.

Call "FARES, PLEASE" and your streets in a distinct voice.

Give all the assistance possible to your passengers, especially to women with children or parcels, or aged and infirm people.

Exercise every precaution against accidents; never give bell until your passengers are safely on or off and take all other steps necessary to insure against casualties of any description.

BY ORDER,

JAMES GUNN,
Superintendent.

December, 1905.

SPECIAL BULLETIN CAUTIONING EMPLOYEES OF THE TORONTO RAILWAY COMPANY REGARDING THE HANDLING OF CHRISTMAS TRAFFIC

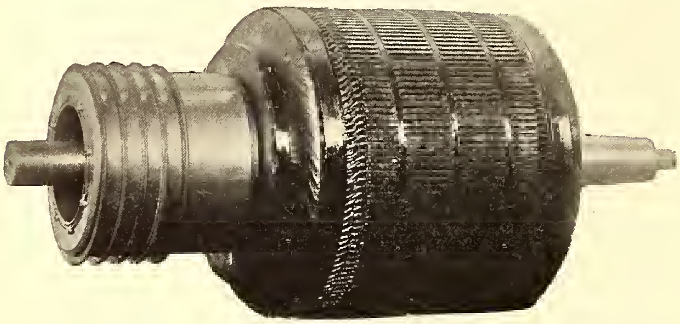
for extraordinary care and attention in the performance of duties at this season of the year.

INSPECTION OF PHILADELPHIA SUBWAY

Members of the Engineers' Club of Philadelphia, and engineers from New York, Baltimore and other cities inspected the Market Street subway in Philadelphia, as guests of the Philadelphia Rapid Transit Company, on Dec. 2. The visitors spent two hours in thoroughly inspecting that section of the underground passage between Fifteenth and Twenty-Fourth Streets, which is nearing completion. The tour of inspection was made under the direction of Chief Engineer William S. Twining, of the Rapid Transit Company, assisted by several members of his staff. They were Charles M. Mills, principal assistant engineer; Stephen Harris and J. D. Jacques, assistant engineers, and Frank R. Fisher, resident engineer. E. E. Smith, president of the contracting company building the subway, also assisted in piloting the visitors. The visiting engineers assembled at the portal of the subway at Twenty-Third and Market Streets at 3:30 p. m. President Silas G. Comfort, of the Engineers' Club, introduced the guests to Chief Engineer Twining, after which the visitors were divided into squads of twenty-five and taken in charge by traction company engineers. The section of track between the bridge over the Schuylkill River and the portal was first viewed, after which the trip through the subway was begun.

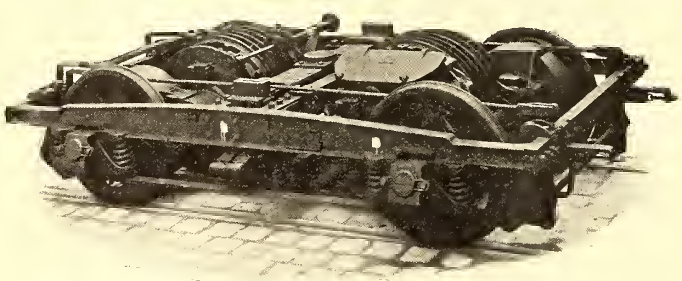
THE FIRST GANZ THREE-PHASE RAILWAY IN AMERICA

An electric railway, which will use three-phase alternating current, is now being equipped between London and Port Stanley, Ontario, Can., and it is expected one part of the line will be ready for service in about two months. This railway, besides being the first example here of the Ganz three-phase



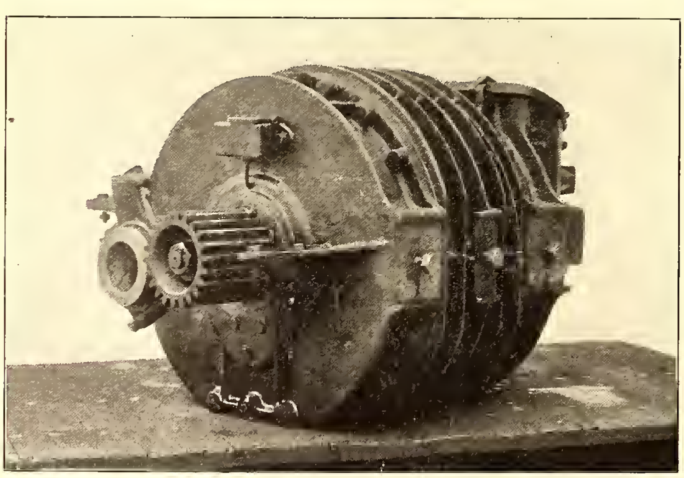
ROTOR OF THREE-PHASE, D. C. MOTOR, SHOWING SLIDING CONTACT RINGS AT COMMUTATOR END

system, has another special feature which will be of special interest. The length of line now under constuction is 27 miles, split into two sections of 18 miles and 9 miles, to be run with three-phase current. Between these two sections there is a third one of about 2 miles, belonging to the St. Thomas City



TRUCK CARRYING TWO THREE-PHASE, D. C. MOTORS

Railway, and run by direct current. The cars of the interurban road will run over the direct-current section too, being furnished with a special equipment permitting this. The armature of this motor is shown in one of the accompanying illustrations. The stator has a three-phase winding arranged in such a way



COMPLETE THREE-PHASE, D. C. MOTOR AND PINION

that it may be fed with 1000 volts alternating current or 500 volts direct current. The rotor has a commutator and four sliding contact rings, it being a two-phase armature when running with alternating current.

The line will be equipped with motor cars, each having two of these motors, of an aggregate rated horse-power of 130. The series-parallel control will be used for direct-current work, and the single-cascade control for alternating-current running. The trains to be hauled will weigh 35 tons and run at a maximum speed of 30 m.p.h. The line has several very heavy and long grades up to 5 per cent. The transmission voltage distribution is 10,000 volts, three-phase.

This railway represents a novel application of the Ganz system, as it is a combination of alternating current and direct current that will enable the interurban road to enter the cities, passing over the street railway lines. It is expected that the railway company will soon extend its line east as far as Hamilton, a distance of 85 miles, using the same system. The Ganz system is exploited in Canada by Bruce Peebles & Company, Ltd., of Edinburgh; and in the United States, Mexico, etc., by the Railway Electric Power Company, of New York.

AUTO-CAR FOR DISTRIBUTING NEWSPAPERS FROM DAYTON

For years past the news companies and great metropolitan dailies have followed the custom of sending out the first or "country" edition to the surrounding communities by means of early morning express trains. Of course, in large cities, such as Boston, New York, Philadelphia and Chicago, there is little difficulty in securing transportation facilities during the early morning, but in the smaller cities the newspapers are greatly handicapped in their efforts to secure a large out-of-town circulation owing to the more infrequent service of both the steam and electric railways.

Some three months ago the management of the Dayton "Journal" thought it could overcome this difficulty by running a regular automobile. Several trips were made to the neighboring town of Springfield, but the pace set was too fast for the automobile and the roads too slippery; besides there were too many break-downs, and it was realized that in rainy and stormy weather the trip would be a failure. Finally the management decided to try an Oldsmobile auto-car of the type used by track inspectors. The car, as delivered, came simply with a seat and the platform. A carriage maker put on a substantial

TRACTION NEWSPAPER CAR READY TO BE PLACED ON THE RAILS

frame with a glass front, awnings and other fittings; track sanders and a headlight were installed, and then the converted vehicle was placed in charge of one of the motormen of the Dayton, Springfield & Urban Traction Company. This motorman has learned to operate the car and to look after ordinary repairs, etc. A short account of the first trip of the car was published last week, but it is thought that some views and a description of its equipment would be of interest.

The car can be changed into a regular automobile by putting on wheels with rubber tires and slightly changing the mechanism. This car, of course, has no steering gear, as none is necessary. Its general appearance is evident from the accompanying illustrations, which show the car just after it has been taken from the garage to start on its trip. Heretofore the car has been pushed over the pavement for a few rods until it reached the street railway tracks, but in the future it will be

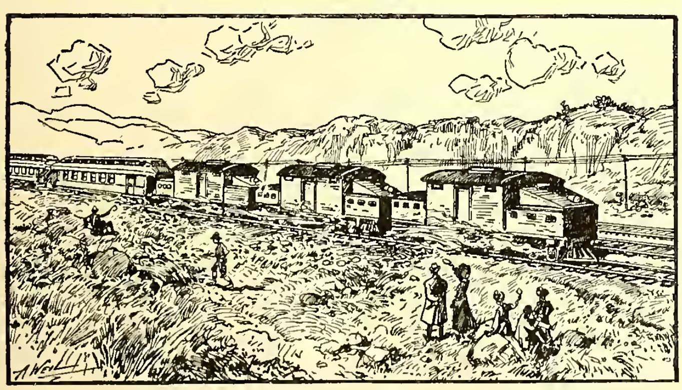
REAR VIEW OF THE FIRST TRACTION NEWSPAPER CAR

kept in the traction company's car house and will be run on the car track within half a block of the "Journal" office.

The auto-car thus far has been a great success. There are nine traction lines in Dayton, but as there is no union traction depot as yet the first cars do not leave until 6 in the morning because they have to be kept in the car houses outside of the city. By taking 3000 papers out at 3 a. m. each morning, the Dayton "Journal" is enabled to beat the Cincinnati and Columbus papers from one to three hours in fifteen to twenty cities and towns. This result would be impossible if the ordinary electric or steam cars were used.

ANOTHER CONTRIBUTION ON THE NEW HAVEN ELECTRIFICATION

The accompanying drawing appeared in an issue of the Boston "Journal" of last week as a three-column engraving to

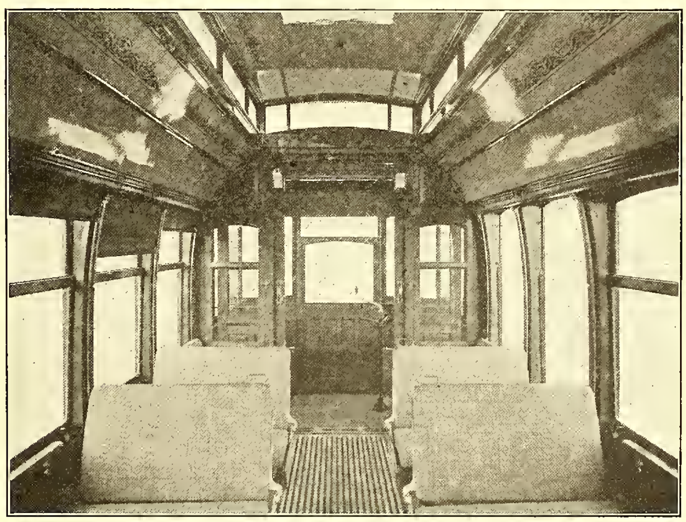


A NEWSPAPER ARTIST'S CONCEPTION OF A FOUR-HOUR TRAIN BETWEEN NEW YORK AND BOSTON

illustrate the appearance of an "electric train on the New York, New Haven & Hartford Railroad running from New York to Boston in four hours." According to this usually veracious paper, the new locomotives, for which orders have been placed already, and with which the entire New Haven system is to be equipped, have a draw-bar pull of "250 tons" when traveling at a rate of from 70 m.p.h. to 90 m.p.h., and several of these new locomotives are already at work between New Haven and New York. The artist declares that the train is depicted as running from New York to Boston, and this undoubtedly explains to his mind, as a patriotic Bostonian, the neglect of the engineer to stop long enough to cool down the hot boxes, which are plainly visible on the locomotives. Unfortunately, the artist neglected to indicate any third rail, overhead conductor or collecting devices of any kind, or even to state whether the motors now running between New York and New Haven are direct or alternating current, so that the public still remains in ignorance upon these much-debated questions.

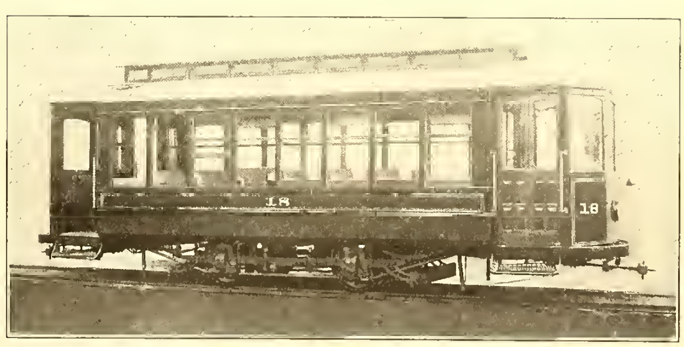
SINGLE-TRUCK SEMI-CONVERTIBLE CARS FOR ASHEVILLE, N. C.

Asheville, the famous health resort in the western part of North Carolina, in the Blue Ridge Mountains, was one of the first places in the country to have an electric railway system. The first electric cars were operated there on Jan. 21, 1889. The system was installed by the Sprague Electric Railway & Motor Company, and the line was at that time 2 miles in length. The system now has about 15 miles of track, and the equip-



INTERIOR VIEW OF THE ASHEVILLE SINGLE-TRUCK CAR, SHOWING THE CROSS-SEATING IN THE MIDDLE OF THE CAR AND THE LONGITUDINAL SEATS NEAR THE DOORS

ment has kept pace with the times in every respect. About two years ago the company placed in operation several convertible cars of the Brill patented type, which have proved highly satisfactory. The J. G. Brill Company has lately delivered a number of semi-convertible single-truck cars, one of which is illustrated. These cars include the "grooveless-post"



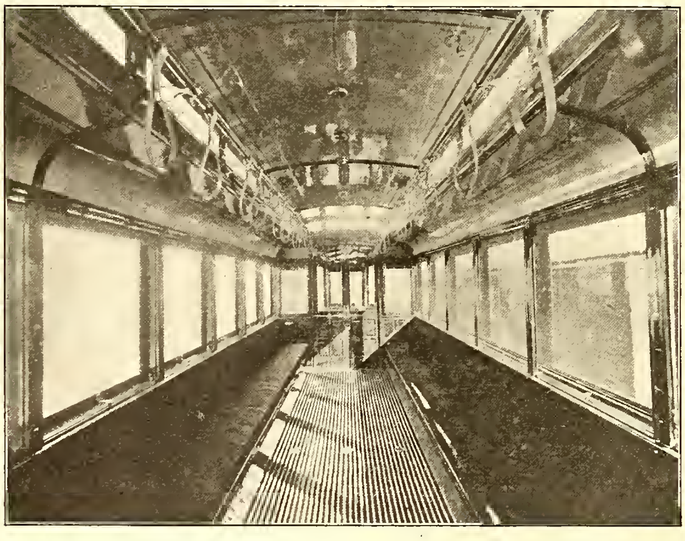
SINGLE-TRUCK, SEMI-CONVERTIBLE CAR OPERATED BY THE ASHEVILLE ELECTRIC COMPANY

window system. The interior illustration shows the appearance of the posts to good advantage. By close observation it will be seen that there are no grooves in the posts and that the only cutting necessary is for the sash lock stops, four of which are provided in each post. The window openings measure 3 ft. 6⅜ ins. from the window sill to the center of the arch, under the letter board; from floor to top of window sill the distance is 25 ins. The trap in the door head is lowered to show the mutually operating door device. The seats, which are of the Brill manufacture, have push-over backs and tilting cushions. They are 35 ins. long. As the seat ends are introduced between the posts and against the side linings, a maximum interior width is obtained for seats and aisle, the aisle being 22 ins. wide. The interior finish of cars is of cherry in natural color.

The length of the cars, measured over the bodies, is 20 ft. 8 ins., and over the vestibules, 29 ft. 8 ins., and over the bumpers, 31 ft. 4 ins.; width over sills, 7 ft. 8½ ins., and over posts at belt, 8 ft.; sweep of posts, 1¾ ins.; centers of posts, 2 ft. 5 ins.; height from track to under side of side sills, 2 ft. 6⅝ ins.; from under side of sills over monitor deck, 8 ft. 11¼ ins.; from track to platform step, 15¼ ins.; from step to platform, 13 ins., and from platform to car floor, 6⅜ ins.; width of door opening in the body ends, 40 ins.; height of doors, 6 ft. 4⅞ ins. The cars are mounted on No. 21-E trucks, having 7-ft. 6-in. wheel base, 33-in. wheels and 4-in. axles. The weight of car and trucks, without motors, is 17,800 lbs.

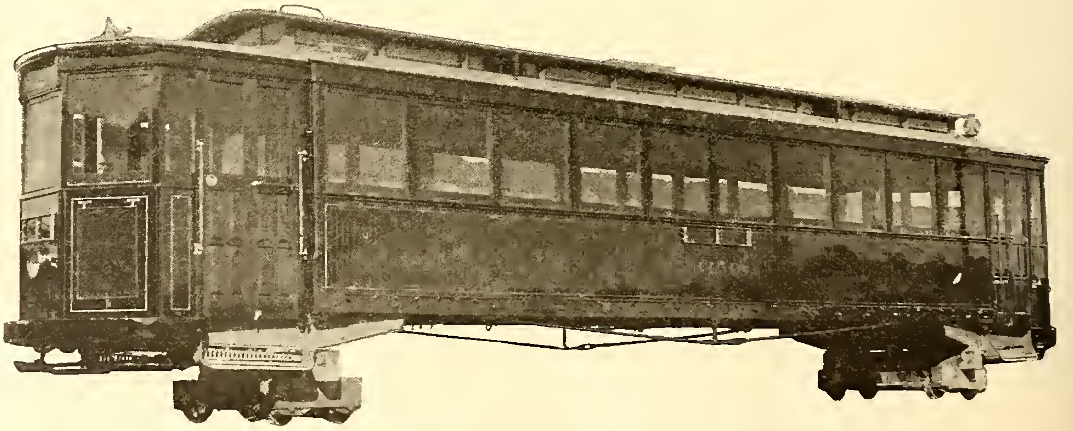
NEW VESTIBULED CARS FOR PITTSBURG RAILWAYS

The Pittsburg Railways is now receiving from the St. Louis Car Company 100 fine vestibuled cars for city service of the type shown in the accompanying illustrations. The principal dimensions of these cars are as follows: Length



LONGITUDINAL SEATING IN NEW VESTIBULED CARS FOR PITTSBURG

over the body, 30 ft. 8 ins.; length over all, 44 ft. 6 ins.; width over all, 7 ft. 10 ins., and height from the underside of the sill to the top of the roof, 8 ft. 6 ins. The track gage on which these cars will be used is 5 ft. 2½ ins. The truck center is 18 ft. 6 ins. All of the cars have an interior finish of cherry, natural color. To allow extra large capacity, the seats, which are covered with green plush, have been placed longitudinally.



ONE OF THE NEW PITTSBURG CARS BEFORE BEING MOUNTED ON ITS TRUCKS

The side sills are made of yellow pine, 5 ins. x 8 ins., reinforced with a steel angle, 4 ins. x 6 ins., the entire length from the end sill to the end sills. The center sills are of yellow pine, 4 ins. x 6¾ ins., extending from the end sill to the end sill, and securely bolted to the end sills by heavy steel angles. The end sills are of oak, 4½ ins. x 10 ins., reinforced by a steel plate placed on the outside of the end sill, ⅝ in. thick x 10 ins. wide. The platforms are supported by two oak sills plated with steel, ½ in. thick x 8 ins. wide, and securely bolted. The center of the platform is supported by two angles, 4 ins. x 4 ins. x ½ in., extending from crown to end sills, then bent up and continued along the center sills through the body bolsters. The bolsters are constructed of trussed steel plates, 9 ins. wide.

The side windows of these cars are arranged to drop. Vestibules are at each end, with three drop sash in the ends and folding doors on each side hung on pin hinges, made removable so that folding gates can be used during the summer months. One of the St. Louis Car Company's illuminated signs is placed above the center vestibule window.

All of the cars are equipped with radial draw-bars, Pittsburg Railway Company's standard enameled signs, the car manufacturer's sand boxes, and arranged for double trucks with 4-ft. wheel base and two motors per car.

IMPROVEMENTS AT BUFFALO

The International Railway Company, of Buffalo, is completing extensive additions to its Cold Springs shops. The new buildings will give much needed increased facilities for handling the general repair work on the cars, as well as additional storage and operating capacity. The shops are being laid out with the idea of enabling the company to build its own cars in the future, and the intention is to turn out about two cars complete each month.

The International Railway Company has just ordered 100 cars from the J. G. Brill Company. This new rolling stock is to be of the same type as the Main Street cars formerly designed and built at the company's Cold Springs shops. The cars will have 6-ft. platforms and seat forty-four people. Each will be equipped with Brill No. 27 trucks and four motors.

T. W. Wilson, general manager of the company, states that with this order for new cars the company has decided to change the color scheme of all the cars on the Buffalo division. The present standard color is a dark wine, somewhat similar to a Pennsylvania red, but hereafter all cars will be painted an olive green, with small yellow stripes for the decorative effects. It has been found that the wine color does not wear satisfactorily and requires almost constant varnishing in order to hold its finish. The olive green has been selected as standard after considerable experimenting and correspondence with other roads throughout the country, the results of the inquiries seeming to indicate that of all the colors for car painting the greens stand in highest favor among electric railway managers on account of the wearing qualities and the capacity for retaining the finish with a reasonable amount of varnishing.

NEW CONTROLLER SYSTEM

A new system of car control, by which the main controller is carried under the car and its movements are directed by a master controller on either platform or from the platform of the front car of a train, has recently been invented by Charles A. Mudge, of New York. The general wiring diagram of the system is shown in Fig. 1, in which *CB* is the master controller, which is developed in the usual way, at the upper right-hand corner of the diagram. *MC* is the main controller, which is revolved by means of a shaft, rack and pinion by a solenoid *MM* operating in oil. *MR* is called a "combiner," and is also operated from the same shaft. It is shown developed, and is used for connecting the motors in circuit, for reversing them and for changing them from series to parallel combination. Fig. 2 shows the solenoid or master magnet enlarged.

To operate the car the small handle on the master controller *CB* is first turned into position for "ahead" or "back" running. This turns the combiner *MR* to a position for the proper connection of the motors. The small magnet, shown in the developed master controller at the right, becomes energized and draws the finger *C* opposite it away from its contact strip until the combiner is in its proper position. The control current is then broken at the combiner, allowing the finger *C* to fall down and make contact with its strip on the master controller cylinder, giving potential to the fifth finger. The function of this magnet in the master controller is that of a safety device, as it prevents the operation of the motor current controlling devices until the motors are properly connected for either forward or reverse running. The combiner never interrupts the motor currents, consequently it does not need a blow-out.

The large handle *H* of the master controller is now operated through the four running positions 1, 2, 3 and 4.

Position 1 closes a release valve *V* in the master magnet *MM*. At position 2 the master magnet advances far enough

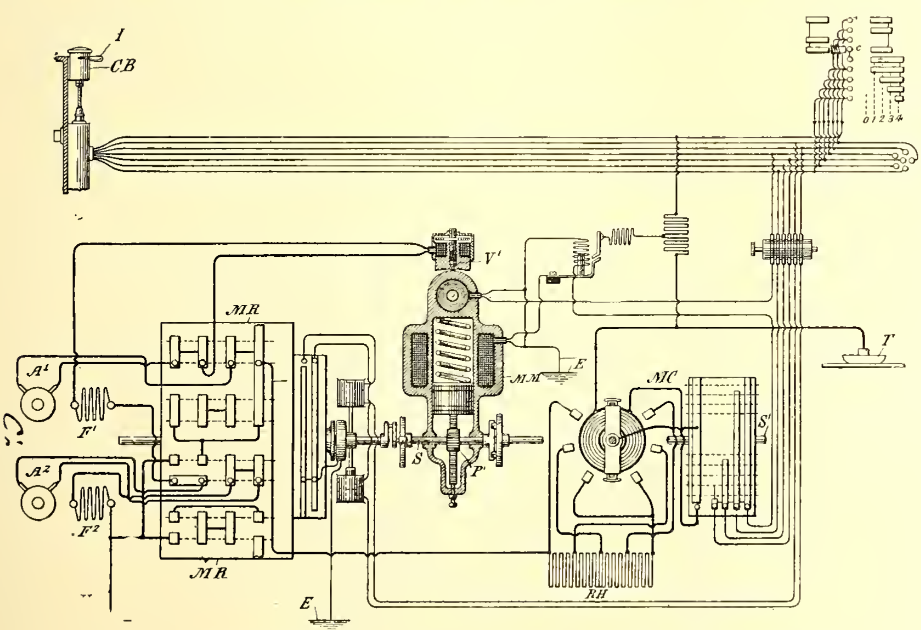


FIG. 1.—GENERAL WIRING DIAGRAM OF NEW CONTROLLER SYSTEM

to turn the main controller *MC* to step 1, which cuts all of the main resistance *RH* in the motor circuit. At position 3 the contact arm of the main controller advances to the fifth contact, having cut out gradually the resistance in the motor circuit, until in this position all resistance is out and the motors are in series combination.

At position 4 the main controller first cuts in the main resistance again, reducing the current, after which the motor circuit is opened, and the combiner is thrown to parallel combination. The master magnet turns the controller quickly into the parallel position, giving the same current value, and hence the same torque per motor which the previous series positions had; then the different parallel positions are passed through until all the resistance is cut out and the motors are running at full potential.

The rapidity with which the resistance is cut out of circuit is determined by the speed of the piston in the master magnet, which in turn depends upon the flow of the liquid through the small regulating valve *V'*. (See Fig. 2.) This valve is gov-

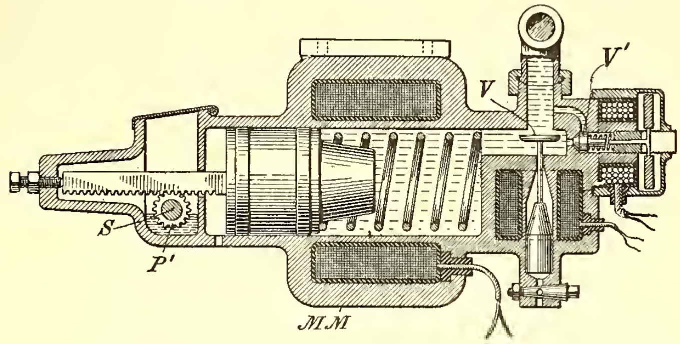


FIG. 2.—CROSS-SECTION OF MASTER MAGNET, SHOWING VALVE WHICH REGULATES THE RAPIDITY WITH WHICH RESISTANCE IS CUT OUT OF CIRCUIT

erned by the current in the motor circuit, and closes when this current becomes too great and opens when it becomes too small or ceases. It thus regulates the flow of the liquid through the valve, and thereby the rapidity with which the resistance in the motor circuit is cut out. As it operates automatically, the current in the motor circuit is kept at a predetermined value, thus giving a constant torque during acceleration.

To run on any desired resistance step other than those obtained by turning the master controller handle to position 2, 3 or 4, this handle is returned to position 1 when this step has been reached. This arrests the further movement of the master magnet and holds it in this position.

If the current to the motors should cease for any reason, as, for instance, by the blowing of a fuse, opening of a circuit breaker, etc., the master magnet, main controller and combiner return immediately to the "off" position, interrupting all circuits the same as if the master controller had been turned to its "off" position. This is effected by the release valve *V* in the master magnet opening, since the magnet holding it shut becomes de-energized. When the motor current is re-established again, the apparatus returns automatically to the position corresponding to the speed of the car at the time of such re-establishment, if the motorman, in the meantime, has not turned the master controller out of the position it was in when the current was interrupted.

The claims made for the system are more platform space, removal of working currents from the platform, adaptation to light multiple-unit service, simpler car wiring and reduction in cables, elimination of grounded controller frames and automatic acceleration. The German patents on this system are owned by the Allgemeine Elektricitäts Gesellschaft.

President Rhodes, of the City & County Contract Company, of New York, which is building the New York, Westchester & Boston Railway, is to let contracts for sixteen steel bridges.

IMPROVED SELECTIVE SIGNALING SYSTEM

The despatcher's selective semaphore signal system used by the Boston & Worcester Street Railway and manufactured by the Blake Signal & Manufacturing Company, of Boston, has been improved in several particulars since its first description in the Street Railway Journal of June 4, 1904. It may be remembered that this system makes it possible for the despatcher to summon quickly the crew of any car which is on

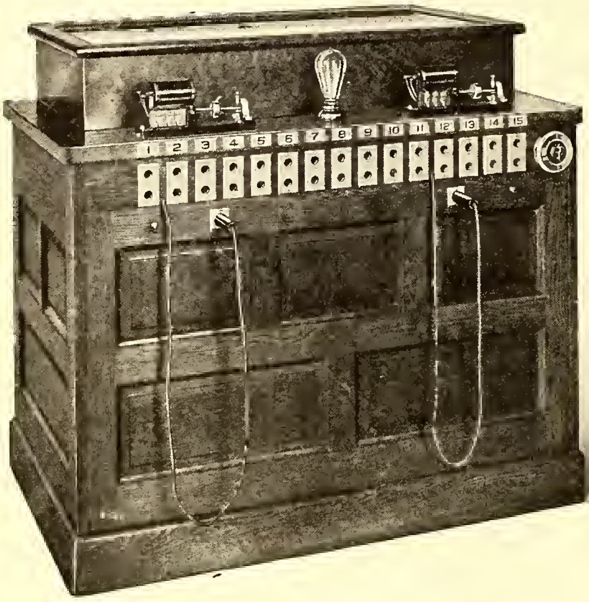


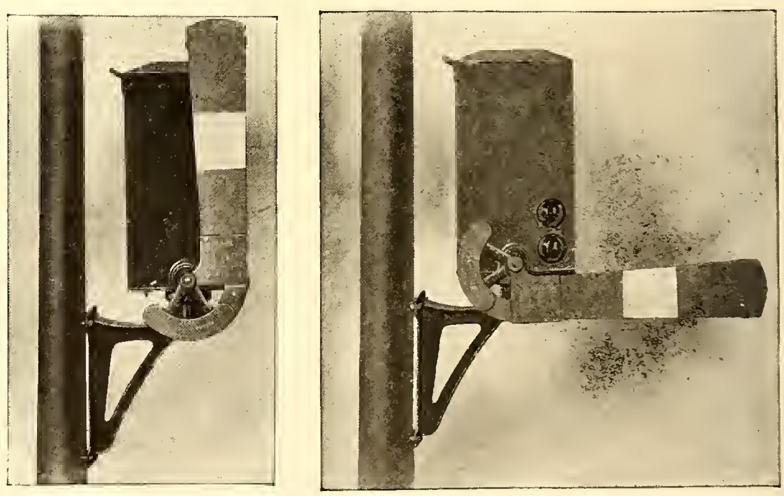
FIG. 1.—DESPATCHER'S SIGNALING DESK

the road by a system or selective signals actuated from a special desk in his office.

For the despatcher's office equipment, instead of using a constant-speed motor driving a shaft on which different toothed discs were placed, which opened and closed the circuit and sent impulses over the line for actuating the various signals, a desk-like box (Fig. 1) containing fifteen pendulums of different lengths is now used. Each of these pendulums corresponds in length to a pendulum in one of the line signals, and is latched back out of the perpendicular position. When the despatcher wishes to set, say, No. 9 signal, he inserts a plug similar to that of a telephone into No. 9 hole. This releases the No. 9 pendulum, and also connects the line with the 500-volt current which is brought to the despatcher's desk. As the pendulum swings, it opens and closes the signal line circuit, sending impulses over the line, synchronous with its vibration. These impulses act upon the electromagnets, and through them upon the pendulums of all the signals which are in series upon the single line wire. The impulses, however, are only synchronous with and therefore cumulative in their effect upon the pendulum of No. 9 signal, which has a pendulum of just the same length as the No. 9 pendulum in the despatcher's office. At the end of thirteen seconds this line signal pendulum swings through an arc wide enough to trip a lock and drop the semaphore arm. When the semaphore arm has reached the horizontal position it closes the local signal lamp circuit, and also closes a circuit to ground, which causes the relay on the despatcher's desk to draw up and give him an indication that the signal has been set. The question of varying voltage is provided for by three relays located on the despatcher's desk, which cut in and cut out resistance automatically as the voltage which is supplied to the signal line at the despatcher's office rises or falls. The advantage of this method over the constant-speed motor is obvious, since it is absolutely positive, and the signal desired to be set must be set, irrespective of varying voltage.

The line signals are practically the same as before, each containing an electromagnet and pendulum, the pendulum in each signal differing in length from those in the other signals and corresponding in length to one of the pendulums in the despatcher's office. There have been, however, improvements made in the detail of the signals, such as using a simple form of universal joint between the signal base and bracket, which permits the signal to be readily leveled for varying angles of set or other irregularities in trolley line poles. The electromagnet coils also have been electrically strengthened to a break-down test of over 10,000 volts, and a simple form of lightning arrester added so that troubles from lightning, so far as the signal mechanism is concerned, have been practically eliminated. These changes and improvements have increased the reliability of the signals, which had already proved unusually efficient and reliable in constant and active service, and have also reduced the already small cost of maintenance.

The following points will especially appeal to all signal and operating railway men: When properly set up and adjusted, it is physically impossible for any other signal than the one desired to operate. There is a positive indication to the despatcher showing that the semaphore arm has been set in the horizontal position, and until the arm has reached an angle of about 45 degs. it is a physical impossibility for him to get this indication, and the danger of a false indication is thus eliminated. The power for operating the signal is obtained entirely through the despatcher's office, and there is no local circuit at each signal other than the signal lamp circuit. There are no electrical contacts in series with the operating magnets at the various signals. The signal line is electrically continuous throughout, from the despatcher's office to the return circuit at the end of the line. If one signal lamp burns out, a second lamp is automatically cut in circuit. This second lamp is an interrupted circuit and gives a flashing light, so that any crew can report same and a new lamp can be put in the following day. This detail removes the necessity of having a daily inspection of all lamps, as well as danger from a new lamp being defective and burning out a very short while after it has been put in. The widely varying voltage of trolley lines is taken care of by relays which draw up at different voltages, and cut in or cut out resistance as the voltage which is supplied at the despatcher's office rises or falls. With this system it is possible to take care of voltage variations between 300 volts and 700 volts.



FIGS. 2 AND 3.—SHOWING SEMAPHORE ARM IN CLEAR AND STOP POSITIONS, RESPECTIVELY

Fig. 2 shows the semaphore arm in vertical or clear position, and Fig. 3 in the horizontal or "stop" position.

LEGAL DEPARTMENT*

LEGISLATIVE ALTERATION OF CORPORATE CHARTERS AND FRANCHISES

One of the most famous landmarks in American jurisprudence is the decision of the Supreme Court of the United States in what is known as the Dartmouth College case (4 Wheat., 518). The charter of Dartmouth College had been granted in Colonial times, and after the Revolution the Legislature of the State of New Hampshire assumed to pass acts dealing with the management and property rights of that institution, which infringed upon certain provisions of such charter. The authority of the Legislature was questioned upon the ground that the charter of the corporation constituted a contract and that the Constitution of the United States forbade any State to pass a law impairing the obligation of a contract. After protracted litigation the Supreme Court of the United States upheld the contention of the college. This determination that a corporate charter constituted an inviolable contract led to the custom in all the States of the Union of prescribing, either expressly in particular charters or by constitutional or legislative provisions applying to corporate charters generally, that the State shall have the right from time to time to modify or repeal them. Such reserved authority, while proving in the main of benefit to the public, has, incidentally and in extreme cases, produced hardship and injustice.

Vested rights, or what substantially amounted to vested rights, have been impugned through changes in the powers and liabilities of corporations and in the relations and privileges of stockholders. The courts have quite generally upheld the right to modify or amend even in the face of considerable individual oppression, not, however, without some dissent and considerable protest. A recent example was in the decision of the Appellate Division of the New York Supreme Court, First Department, in Hinckley vs. Schwarzchild & Sulzberger Company (95 N. Y. Supp., 357). It was held that a statute of New York (Chap. 354, Laws 1901), dispensing with the previous requirement of unanimous consent for the issuance of preferred stock in a corporation (Laws 1892, chap. 354), and allowing such issuance on a two-thirds vote of the stockholders, applies to pre-existing corporations, impairs no contract or vested right of a protesting minority shareholder, and is a valid exercise of the power reserved by the constitution (art. VIII., sec. 1) to alter or repeal charters of corporations. It was further held that the rights of a minority holder of stock, bought in 1893, are controlled by the statute of 1901, which takes away the power which he previously had of preventing the issue of preferred stock.

It seems quite clear from the attitude of the judges in that case that they made the decision through the force of what they considered controlling authority, and that if the question had been an original one it would have been decided the other way.

It is true that a few courts have sought to limit the power to alter on repeal. In Zabriskie vs. Hackensack Ry. (18 N. J. Eq., 178), for example, a New Jersey court held that, while the Legislature may, within limitations, prescribe alterations thought to be necessary for the public good, it may not validate changes in the contract among the stockholders without their unanimous consent. There are other decisions on the general line that the power to alter or repeal exists solely for public benefit, and that changes will not be permitted if they disadvantageously affect the contract of the stockholders, unless some obvious public end is promoted. (See, for example, Blatchford vs. Ross, 54 Barb., 42; State vs. Greer, 78 Mo., 188.)

As a general rule, however, a broad power of amendment is recognized, and the possibility of its exercise should be constantly kept in view by corporate officers and shareholders. An illustration of exercise of the authority as to a street railroad franchise was offered in Marshalltown Light, Power & Ry. Co. vs. City of Marshalltown, in the Supreme Court of Iowa (103 N. W., 1006). A statute of that State provides that the articles of incorporation, by-laws, rules and regulations of domestic corporations shall at all times be subject to legislative control, and that every franchise obtained by such corporations may be subjected to conditions imposed on the enjoyment thereof whenever the General Assembly shall deem it necessary for the public good. It was held that a section of the statute law, providing that all street railway companies shall be required to make, reconstruct and repair all paving between the rails of their tracks and 1 ft. outside thereof at their own expense, is not repugnant to the constitutional inhibition against the impairment of the obligation of a contract merely because it was made applicable to a corporation that had been granted a franchise, prior to its enactment, purporting to exempt from liability for street paving.

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CHARTERS, FRANCHISES AND ORDINANCES.

CALIFORNIA.—Nuisances—Public Nuisances—Abatement by Individual—Experience of Special Injury—Pleadings—Instructions.

1. Civ. Code, sec. 3479, declares anything which unlawfully obstructs the free passage or use of a public street a nuisance. Sec. 3480 defines a public nuisance as one affecting an entire community or any considerable number of persons. Sec. 3493 provides that a private person may sue for a public nuisance only if it is specially injurious to himself. Plaintiff was the owner of a lot abutting on a city street, and defendant street railroad, in violation of its franchise, constructed its track away from the center of the street and over on plaintiff's side thereof, so that it came within about 4 ft. of the sidewalk. The maintenance of the track in this position was claimed by plaintiff to deprive her and her tenants of the use of the street, to obstruct the use of the sidewalk, to obstruct access to plaintiff's property, to endanger the safety of plaintiff, her family and tenants, and to depreciate the rental value of plaintiff's property. Held, that the injury claimed by plaintiff to result from the obstruction of the street was not different in kind from that suffered by the public at large, and she was not entitled to have the same abated as a public nuisance specially injurious to her.

2. A complaint, alleging the existence of a nuisance consisting of the obstruction of a street in front of plaintiff's premises by the tracks of a street railroad, and further alleging that it had depreciated the rental value of plaintiff's property in a certain sum, and praying that the tracks be adjudged to be a nuisance and that they be abated, and demanding damages equal to the depreciation in the rental value of the premises, could not be held to be one for compensation for damaging private property, within the rule that authorizes an abutting owner to sue for damages suffered through the occupation of a street by a railroad, but was one for the abatement of a nuisance.—(Reynolds vs. Presidio & F. R. Co., 81 Pac. Rep., 1118.)

ILLINOIS.—Dedication—Streets—Defective Plat—Sales Under Plat—Effect—Adverse Possession—Evidence—Deed—Description—Sufficiency — Property Conveyed — Erasures—Appeal—Freehold Involved—Constitutional Question—Street Railroads —Franchise to Individuals—Ordinance—Amendment—Petition to Council—Assignment—Injunction—Construction of Street Railroad—Pleading—Street Railroads—Petition—Franchise—Commercial Railroad—Use of Streets—Eminent Domain.

1. Rev. St. 1845, chap. 25, sec. 17, provides that whenever any person wishes to lay out a town, or an addition or subdivision of outlots, he shall cause the same to be surveyed and a plat or map thereof made by the county surveyor, and that it shall be acknowledged by the owner. Held, that where a plat was certified by a deputy county surveyor instead of the county surveyor, and was not certified to have been laid out by the owner, but merely by his agent, the plat was invalid as a statutory dedication of streets shown thereon.

2. Where a plat of a city addition was insufficient to create a statutory dedication of the fee in the streets shown thereon, the title remained in the dedicator until he sold lots by reference to the plat, when the title to the soil in front of the lots to the center of the street passed to the grantees.

3. Where plaintiff acquired title to a lot in question by warranty deed, and occupied the same as his homestead thereunder as color of title for seventeen years, and paid all taxes assessed thereon for fifteen years, he had title to the land by limitations.

4. Where a deed recited that it was made on a certain date between G., of the city of Chicago, county of Cook and State of Illinois, of the first part, and H., of West Aurora, in the county

of Kane and State of Illinois, of the second part, and described a parcel of land lying in sections 21 and 22 of township 38 north, of range 8 east, of the third principal meridian, and known as "Gale's Addition to West Aurora," it was not objectionable for failure of the description to state the State or county in which the premises conveyed lay.

5. Where a deed conveyed the whole of a city addition, except lot 8 in block 10 and lot 12 in block 13, it conveyed lot 9 in block 19 of such addition.

6. Where a second deed was executed in the place of a quit claim, and a warranty deed form was used for the purpose, the mere erasure of such words as were necessary in order to make the deed correspond with the original quit claim deed was immaterial.

7. Where an original bill averred that complainant was the owner in fee of a certain city lot, and that such ownership extended to the center of W. Street in front of such premises, subject only to the use of the public as a public highway, and defendant denied that complainant was the owner in fee of any part of W. Street described in the bill, but averred that the fee in such street was in the city, a freehold was directly involved in the litigation, warranting a direct appeal to the Supreme Court.

8. Where a bill to restrain defendant's construction of a railway in a street in front of complainant's premises alleged that complainant was the owner of the fee to the center of the street, and that defendants were about to construct a commercial railroad without affording complainants compensation and in violation of complainant's constitutional rights, the bill presented a constitutional question, warranting a direct appeal to the Supreme Court.

9. Under Sess. Laws 1899, p. 331, providing that any company which has been or shall be incorporated under the general laws of the State to construct, maintain or operate any street railroad may enter on and appropriate any property necessary for the construction and operation of its road, and City and Village Act, art. 5, sec. 63, par. 90 (1 Starr and C. Ann. St. 1896, 2d Ed., p. 712), providing that the City Council shall have no power to grant the use of or right to lay down any railroad tracks in any street of the city to any railroad company, whether incorporated under general or special law of the State, except on petition of property owners, etc., an ordinance granting a street railway franchise to individuals was void.

10. Where, after the passage of void ordinance granting a street railway franchise to individuals, the City Council passed another ordinance amending the former ordinance, but complete in itself, granting to a certain corporation, its successors and assigns, a franchise to use the streets for a certain electric railroad, such latter ordinance was not invalid because passed as an amendment to a void act.

11. Where a petition by property owners for the passage of an ordinance granting a street railway franchise as required by City and Village Act, art. 5, sec. 63, par. 90 (1 Starr and C. Ann. St. 1896, 2d Ed., p. 712), was for the grant to certain individuals, their representatives and assigns, and not to defendant corporation, and an ordinance granting such franchise to such individuals was void, an assignment of their rights thereunder to a subsequent corporation did not operate as an assignment of the petition, so as to entitle the City Council to pass another ordinance thereunder granting a new franchise to the corporation.

12. Where, in a suit to restrain the construction of a railroad in a street in front of plaintiff's property, the bill alleged that there was on file in the city clerk's office a petition from abutting owners filed prior to the enactment of the first franchise by the City Council to four named persons, a copy of which was attached to the bill, and that no other or different petition of voters had been filed with the Council authorizing the enactment of an amending franchise ordinance, the fact that the latter ordinance recited that it had been petitioned for by the owners of the land representing more than one-half of the frontage of each and every mile of streets sought to be used by the traction company, etc., did not justify a conclusion on demurrer to the bill that the amendatory ordinance had been petitioned for.

13. Where a petition of abutting owners for the grant of a street railroad franchise prayed that such grant should be for a term of forty years from the passage of the ordinance, an ordinance granting authority to a traction company for a term of thirty-eight years from the passage thereof did not conform to the petition.

14. Where an electric street railway company was organized under the railroad law, as distinguished from the street railroad act, and by the terms of its charter was authorized to operate through several counties and transport passengers, their ordinary baggage, United States mail, express and milk, it was a commercial railroad, and was not entitled to lay its tracks in a street, the fee of which was in the abutting owners, without condemning a right to do so.—(Wilder vs. Aurora, De K. & R. Electric Traction Co., 75 N. W. Rep., 194.)

ILLINOIS.—Eminent Domain—Railroads—Land Owned by Railroad—Use in Business—Question of Fact—Evidence—Parallel Lines—Constitutional Provision—Appeal.

1. Petitioner in condemnation proceedings sought to condemn two tracts of land. The owner interposed a motion to dismiss the petition as to both. The motion was sustained as to the first, and judgment dismissing the petition as to that tract was entered, while the motion as to the second tract was overruled, and a judgment fixing the amount of damages was rendered. The petitioner appealed from the judgment of dismissal. Held, that the owner was not entitled to assign as cross errors that the court erred in overruling the motion as to the first tract.

2. A railroad company, after having acquired a 25-ft. right of way, on which it operates a railroad track, may condemn land of another railroad company for an additional right of way up to the statutory limit of 100 ft. in width, on which it may lay as many tracks as it sees fit.

3. The condemnation of such tract for the purpose of laying an additional track, to be operated, in conjunction with the existing track, as a double-track railroad, does not violate Const. 1870, art. 11, sec. 11, forbidding a railroad from owning a parallel or competing line.

4. A railroad company which purchased from another company a right of way 25 ft. in width, on which a railroad track was constructed, has the power to locate an additional track on land adjacent to the right of way, and may for that purpose condemn an additional strip.

5. A railroad company cannot condemn longitudinally the right of way of another railroad company of the width of 100 ft., authorized by the statute, but may condemn a strip adjoining the statutory right of way.

6. In proceedings by a railroad company to condemn land belonging to another railroad company, the question whether the strip sought to be taken is necessary for the present or immediate future uses of the railroad company owning it, in connection with the business of operating its railroad, so as not to be subject to condemnation, is a question of fact.

7. In proceedings by a railroad company to condemn land for a right of way belonging to another railroad company, evidence examined, and held that the land sought to be taken was not necessary for the present or immediate future uses of the latter railroad in connection with the business of operating its railroad, and was subject to condemnation.—(Chicago & M. Electric R. Co. vs. Chicago & N. W. Ry. Co., 71 N. E. Rep., 1017.)

ILLINOIS.—Eminent Domain—Evidence of Value—Benefits—Rebuttal Evidence—Jury—Second Venire—Appeal—Harmless Error—Eminent Domain—Award.

1. In a suit to condemn land for a railroad right of way then in possession of a traction company, which had constructed and placed in operation its line of railway over the same, evidence that the best use to which the land in its then condition was adapted was for railroad purposes, and the value of the land for such purposes, was admissible; defendants being entitled to the highest fair cash market value of the land actually taken, for the best use for which it was adapted.

2. Where, in a suit to condemn land for a railroad right of way, located at a distance from any populous center, it was claimed that land not taken was valuable as a factory site, evidence that the building of the road would be a benefit and not an injury to such factory site was admissible, though the witnesses were unable to estimate the benefit in money.

3. Where, in a proceeding to condemn land for a railroad right of way, located at a distance from any populous center, defendants claimed that the land was especially valuable for factory sites, and at the time the case was tried a line of electric railroad was operated over the land, the maintenance of such road should be taken into consideration in estimating damages and benefits to land not taken.

4. Where land at a distance from a populous center was sought to be condemned for a railroad right of way, on which an electric railroad was then being operated, and defendants, on the same day the condemnation petition was filed, subdivided the land, which was agricultural, and filed a plat for record, showing the railroad track, and the lots could only be bought and sold with the expectancy that they would be along the car track, so as to render them accessible, the plat of such subdivision was properly admitted in evidence.

5. Where, in a suit to condemn land for a railroad right of way, defendants claimed that the taking of the land would deprive them of switch track connections with a railroad, and in support thereof offered evidence that the railroad officials refused to connect a

switch with the main line at a distance less than 3000 ft. west of a tunnel, no part of which could be on the railroad's right of way, plaintiff was entitled to show in rebuttal that fifteen years prior a switch had been placed on the right of way of the railroad company, eonnecting with the main line 1762 ft. west of the tunnel, for the purpose of shipping clay on a part of the land not taken.

6. Hurd's Rev. St. 1903, p. 909, chap. 47, sec. 3, provides that, if a petition to condemn land be presented to a judge in vacation, he shall note thereon the day of presentation and the day when he will hear the same, and shall order the issuance of summons to eaeh resident defendant, and the publication. Sec. 6 requires the court, at the time of issuing the summons or making publication, to write the names of sixty-four disinterested freeholders on separate slips of paper, and, in the presence of two disinterested freeholders, select twelve persons to serve as jurors; and sec. 7 declares that, if a panel be not full, the judge hearing the petition shall designate by name the necessary number of persons of proper qualifications to serve as jurors. Held, that since a condemnation proceeding is a proceeding in court, whether instituted in vacation or interm time, where the judge before whom the petition was first presented was unable to preside at the trial, and a challenge to the array was sustained, it was the duty of the judge to issue a new venire in the same manner as the first one had been issued.

7. Where, in condemnation proceedings, after challenge to the array of jurors had been sustained, the presiding judge erroneously designated twelve persons, by name, to act as jurors, instead of issuing a new venire, but defendants did not claim that the jury before whom the case was tried after a challenge to the array had been denied were prejudiced against them, or that they were not qualified, the error was harmless.

8. In proceedings to condemn land for a railroad right of way, facts held insufficient to show that the damages awarded were grossly inadequate.—(Hartshorn et al. vs. Illinois Valley Ry. Co., 75 N. E. Rep., 122.)

NEW YORK.—Street Railroads—Franchise—Conflicting Grants—City Council—Powers—Statutes—Consent—Conditions.

1. In the absence of statutory restriction, a City Council has power to grant a right to construct a street railroad over substantially the same route as that embraced within the franchise of another corporation.

2. Railroad Law, Section 102 (Laws 1892, p. 1405, c. 676), provides that no street surface railroad corporation shall construct, extend, or operate its road or tracks in that portion of any street, avenue, road, or highway in which a street surface railroad is or shall be lawfully constructed, except for necessary crossings, without first obtaining the consent of the corporation owning or maintaining the same. Held, that the consent of an existing railroad to the use of streets occupied by it by a competing company was not a condition precedent to the right of such competing company to obtain the consent of local authorities to the use of such streets.—Electric City Ry. Co. vs. City of Niagara Falls et al., 95 N. Y. Sup., 73.)

NEW YORK.—Street Railroads—Paving—Taxing Power—Exemptions—Contract—Immunity From Paving Streets—Gratuity—Revocation—Rights of Lessee.

1. Laws 1890, p. 1112, c. 565, Section 98, as amended by Laws 1892, p. 1404, c. 676, requiring street surface railroad companies to pay for paving between their tracks, is an exercise of the taxing power of the Legislature.

2. An exemption from taxation will not be sustained unless the intent of the Legislature clearly appears.

3. Railroad Law 1850, p. 211, c. 140, required the consent of a municipality for the construction of a street railroad. Held, that a municipality had no power to contract away or limit the taking or police powers of the Legislature under such act.

4. The Rochester & Brighton Railroad Company, incorporated in 1868 under the railroad law of 1850, acquired by purchase at foreclosure sale the franchise of a prior company organized under the same act. Held, that the immunity from contribution to the expense of new pavements in the city of Rochester, conferred by Laws 1869, p. 54, c. 34, on such railway company, was not a contract right of which the company could not be deprived by subsequent legislation.

5. The immunity from contribution to expense of new pavements in the city of Rochester, conferred by Laws 1869, p. 54, c. 34, on a street railway company, being without consideration, was a mere gratuity, revocable at the pleasure of the Legislature.

6. Laws 1884, p. 309, c. 252, Section 9, the provisions of which were re-enacted in the general railroad law (Laws 1890, p. 1112, e. 565, Section 98, a amended by Laws 1892, p. 1404, c. 676), imposed on all street surfaee railroads operating in cities the cost of repavement. Held, that a contention by the lessee of the railroad in the eity of Rochester, exempt, under Laws 1869, p. 54, e. 34, from contribution for new pavements, that such law did not apply to streets in which the lessor had construeted its lines before its enactment, and that as to these a contract of immunity existed, the obligation of which could not be impaired by subsequent legislation, is untenable.

7. Where a street railway company was, by statute, exempt from the expense of repaving between its tracks, the right to an exemption did not pass to the lessee, it being personal under the statute (Laws 1869, p. 54, c. 34), providing that "said company," not "said company, its successors and assigns," shall not be required to bear such expense."—(City of Rochester vs. Rochester Ry. Co., 74 N. E. Rep., 953.)

NEW YORK.—Street Railroads—Consent to Construction—Statutory Provisions.

Railroad Law, Laws 1890, p. 1108, chap. 565, sec. 91, provides that a street surface railroad shall not be built unless the consent of the owners of one-half of the assessed value of the property "bounded on" the street shall have been obtained. Property relied on toward making up the one-half of the value of the property abutting on a street on which a railroad was contemplated consisted of an entire block fronting on the street and extending 800 ft. to a street in the rear. The block was improved and used for an academy, and was assessed as a single tract. Held, that the manner of assessing the property did not deprive the court of the power to determine what part of it should be deemed as "bounded on" the street, and in determining the voting power of the tract it should neither be taken as a whole nor regarded as a tract fronting on the street and extending back 100 ft., but the court should make such an apportionment of the value thereof as would result in giving justice to the railroad company and an objecting property owner.—(Fox et al. vs. New York City Interborough Ry. Co., 95 N. Y. Sup., 252.)

PENNSYLVANIA.—Street Railroads—Leases—Forfeiture—Return of Property—Set-Off—Equitable and Legal Rights.

1. A consolidated electric railway company, composed of several independent companies, leased its lines to defendant; the lease providing that defendant, in addition to rentals, should expend $100,000 for improvements within two years, so that at all times the roads and rolling stock should be at least of equal efficiency and value as at the date of the lease; and at the termination of the lease defendant agreed to return the property to the consolidated companies in as good condition and repair as it was at the date of the lease, together with all the improvements, additions, betterments, enlargements, and extensions which were made during the lease. Held, that on defendant's insolvency and cancellation of the lease, the receivers were bound to return equipment to each subordinate company equal in value and efficiency to that which was received, and not merely equipment equal in value and efficiency to that received under the lease as a whole.

2. The excessive value of equipment returned to one of such companies could not be set off against the claim of another company for return to it of cars of equal value and efficiency.

3. Where a lease of the lines of a consolidated street railway company to defendant provided for a return of equipment, on cancellation of the lease, to each company, of equal value to that received by the lessee, the lessor's claim for return of specific cars on behalf of certain of the consolidated companies on termination of the lease by the insolvency of the lessee was an equitable right enforceable against property in the hands of its receivers by petition for surrender of specified cars; but the lessor's claim, under a betterment clause in the lease, for a share of cars purchased by the lessee which had not been appropriated to such lines, was a legal claim, allowable only as a claim against the proceeds of a sale of all of the insolvent's property by the receivers.—(Johnson vs. Lehigh Valley Traction Co., 138 Fed. Rep., 601.)

SOUTH CAROLINA.—Carriers—Expulsion of Passenger.

Where a passenger entered a special street car chartered by a particular person, and tendered the amount of his passage, and kept his seat with the knowledge and consent of the conductor, who intended to transport him to his destination, the carrier thereupon waived the right to insist that he was not a passenger, and was liable for his subsequent expulsion.—(McCarter vs. Greenville Traction Co., 51 S. E. Rep., 545.)

TENNESSEE.—Condemnation Proceedings—Parties—Lessees—Appeal—Assignment of Errors—Cross-Examination of Witness—Determination of Value—Condemnation Proceedings—Determination of Value—Rental Value—Damages—Determination—Examination of Witnesses—Condemnation Proceedings—Value of Property—Lease as Criterion—Rebuttal—Reopening of Evidence in Chief—Value of Property—Admissibility of Evidence—Appeal—Review—Questions Considered—Exclusion of Evidence—Evidence of Value—Competency of Witness.

1. In condemnation proceedings a lessee of the land is a necessary party.

2. On appeal in condemnation proceedings, an assignment that the court committed error in permitting a lease to one of the defendants to be used as an absolute criterion for value could not be entertained because too general.

3. Where, in condemnation proceedings, a witness testified that the property in question was worth a specified sum, it was proper on cross-examination to permit him to be asked what he would consider the fair cash value of the property in view of the fact that it was leased for a certain sum per year; the witness having also previously stated that a fair rental value would be 6 per cent of the value of the property.

4. In condemnation proceedings the rental value of the property is one consideration to be looked to in determining the value.

5. Where a judgment of condemnation was passed, the question as to whether one of defendants, who claimed an interest under a lease, was entitled to any damages, was not examinable at a subsequent term, when the court has under consideration merely the question of the amount of damages.

6. Where counsel stated that he did not hope to obtain anything by certain cross-examination that he was about to enter upon. there was no error in refusing to permit him to go on with it.

7. In condemnation proceedings it was error not to permit petitioner to show that a lease of the property held by one of the defendants was not obtained with a view to use and enjoyment of the property, but as a means of speculation in the expected condemnation proceedings, and hence that it should not be taken as a spontaneous expression of value.

8. Where it appeared on the examination of a witness in rebuttal that, if the examination were allowed to proceed, the court would again have to go at large into testimony in chief, it was proper to refuse to permit the examination to so proceed.

9. In condemnation proceedings it was error to refuse to allow petitioner to show the price for which other lots in the neighborhood of the lot in question sold within a reasonable time prior to the taking of the land involved.

10. Assignments of error on the court's refusal to allow witnesses to answer cannot be considered where it does not appear what the witness would have stated.

11. The rule that an assignment of error on the court's refusal to allow a witness to answer cannot be considered where it does not appear what the witness would have stated, does not apply where the trial court rules out an entire line of competent evidence, or where he holds that a witness is incompetent, and refused to hear him at all.

12. Where, in condemnation proceedings, a witness testified that he had knowledge of two rental contracts of neighboring lots within a short time before the taking, and that, though he had no specific information of any other contract in the neighborhood, he was acquainted with property there, and had had many years' experience as a real estate agent, it was error not to permit him to testify concerning the rental value of the property involved.—(Union Railway Co. vs. Hunton, et al., 88 S. W. Rep., 182.)

TEXAS.—Contracts—Penalty—Liquidated Damages—Construction of Contract—Intention of Parties—Instructions—Harmless Error.

1. The question whether money contracted to be paid on the nonperformance of a covenant is as liquidated damages, or as a penalty to be controlled by an assessment by a jury, is to be determined by the intent of the parties.

2. Where a contract provides for the payment of a certain sum as liquidated damages on non-performance of a specific act, which may produce damages of an uncertain character, and no language is used that such damages shall be considered only as a penalty, the same is to be regarded as liquidated damages.

3. A street railroad company, in consideration of $3,481.07 paid to it by the owner of property fronting on its line, agreed that during one-half of the period named in the company's charter the road should be maintained and operated during its entire length, and that, in the event of the road's failure to do so, it would pay the property owner the sum of $3,481.07, with interest. Held, that the sum specified in the agreement was not a penalty, but liquidated damages, which the property owner was entitled to recover on a breach by the railroad.

4. Where a street railroad company agreed with a property owner on its line to operate the line for half of the period of the company's charter, which was for fifty years, it meant that the road was to be operated continuously from the time of the contract until the expiration of twenty-five years, and did not mean that it should be operated any twenty-five years of the fifty covered by the charter.

5. Where a contract provided that, in a suit thereon, reasonable attorney's fees might be awarded, an instruction that the jury might find 10 per cent on the amount recovered, though erroneous, because there had been no evidence that such an amount was reasonable, was harmless, where it was admitted by the parties that the amount awarded was reasonable.—(Santa Fe St. Ry. Co. et al. vs. Schutz, 83 S. W. Rep., 39.)

LIABILITY FOR NEGLIGENCE

ALABAMA.—Carriers—Collision—Injury to Passenger—Evidence—Complaints of Pain—Demonstrative Evidence—Witnesses—Cross-Examination — Evidence — Opinions — Speed of Car — Trial—Direction of Verdict—Appeal—Harmless Error—Damages—Instructions—Physician's Services.

1. Under a complaint ascribing plaintiff's injuries to the wanton negligence of defendant's employees in charge of a street car on which plaintiff was a passenger, and alleging that such negligence consisted in their causing a car to cross a railroad crossing without stopping, knowing that a train was approaching and that there would probably be a collision, etc., evidence that the street car was at the time crowded with passengers, and "that there were many people on the car," was admissible as supporting the alleged probability and defendant's appreciation that passengers would be injured by the collision.

2. In an action for injuries, complaints of pain and suffering on the part of the person alleged to have been injured are admissible as original evidence tending to prove the existence of the condition or sensation complained of.

3. In an action for injuries to a passenger, it was not error to permit plaintiff to walk as best he could before the jury.

4. Where, in an action for personal injuries, it appeared that defendant's attorney had sent witness (a physician) to examine plaintiff, witness was properly asked on cross-examination what defendant's attorney said to him, at the time he sent him to see plaintiff, for the purpose of showing bias favorable to defendant.

5. In an action for injuries to a passenger by a collision between a street car and a railroad train, an answer to a question as to the rate of speed at which the car approached the railroad crossing that it would be hard for the witness to judge because the car had just started and could not have been running very fast, was properly stricken for vagueness and as a conclusion of fact from another fact.

6. Where, in an action for injuries to a passenger in a collision between a street car on which he was riding and a railroad train, the jury could come to but one conclusion on the evidence, and that was that plaintiff was injured through the negligence of defendant's employees in bringing the car in collision with a railroad engine, the court properly directed the jury to find a verdict for plaintiff, if they believed the evidence.

7. Where, in an action for injuries to a passenger, the court properly gave the affirmative charge on the case generally in favor of plaintiff, the court's refusal to charge in favor of defendant on one of the counts of the complaint, averring simple negligence of the conductor of the street car on which plaintiff was riding, if error, was harmless.

8. In an action for injuries, an instruction that the jury were the sole judges of the damages to be awarded was proper; it being assumed that they would look to the evidence of the injury in making their assessments.

9. In an action for injuries to a passenger, the fact that some items which made up the total of his physician's bill were not recoverable in the action furnished no justification for a request to charge that the jury were not entitled to take into consideration the doctor's bill testified to in assessing plaintiff's damages.—(Birmingham Ry., Light & Power Co. vs. Rutledge, 39 S. Rep., 338.)

ALABAMA.—Corporations—Consolidation—Corporate Debts—Actions—Effect of Consolidation—Carriers—Injuries to Passenger—Evidence—Res Gestæ—Expressions of Pain—Expert Testimony—Cause of Disease—Trial—Affirmative Charge—Instructions—Applicability to Issues—Assumption of Facts.

1. Code 1896, Section 1204, relative to the consolidation of corporations, and providing that the consolidated corporation shall be entitled to the property and rights of the uniting corporations, and liable to the debts and obligations of each of them, applies to every successive consolidation, and makes the final consolidated corporation liable for the debts of the original constituent companies.

2. Code 1896, Sections 1202-1204, provide for the consolidation of corporations. The latter section authorizes the adoption of the name and charter of either corporation as the name and charter of the consolidated corporation, and declares the consolidated corporation entitled to all the property of the constituent corporations, and liable for the debts of each of them, and provides that suits pending for or against either of the original corporations as the time of the consolidation are not abated, but shall proceed in the name of the consolidated corporation. A street railway caused the death of a passenger, and subsequently consolidated with another

corporation under the name of the latter. Afterward, and, for aught appearing to the contrary, after suit brought on account of the death, the consolidated corporation again consolidated with a third corporation; the new consolidated company retaining the name of the original consolidation. Held, that the rights of the parties in the pending suit were in no wise affected by the last consolidation, but the suit would proceed as though it had not occurred.

3. In an action against a street railroad for negligently causing the death of a passenger, evidence that the place where the injury occurred was one which had, by the custom of the railroad, become a stopping place for receiving and discharging passengers, was competent.

4. In an action for wrongful death, evidence of complaint and expressions of pain and suffering, made by plaintiff's intestate during his lifetime, and after receiving the injuries which resulted in his death, was competent.

5. A medical expert may give his opinion as to whether, in a hypothetical case based on the facts and circumstances in evidence, resulting cerebral meningitis would have been caused by the injuries shown by the evidence.

6. The general affirmative charge should not be given whenever there is a material conflict in the evidence, or when the evidence reasonably affords inferences adverse to the right of recovery by the party asking the charge.

7. In an action for wrongful death, the complaint contained two counts; the first being predicted on simple negligence, and the second on intentional or wanton misconduct. Defendant pleaded the general issue, and filed two special pleas, separately setting up contributory negligence. No demurrer was interposed to the special pleas as constituting an insufficient defense to the second count, but issue was taken, but issue was taken thereon as pleaded. Held, that a charge authorizing a recovery, although plaintiff's intestate was guilty of negligence, if defendant's negligence amounted to wantonness or willfullness, was erroneous.

8. In an action against a street railroad for the death of a passenger, charges to find for plaintiff, "if the jury believe from the evidence" that the sole cause of the injury was a sudden jerk of the car, and plaintiff's intestate acted only as an ordinarily prudent person would have acted, and that, "if the jury believe from the evidence" that at the time of the injury the conductor was looking at plaintiff's intestate and knew that he was in the act of alighting, and nevertheless rang the bell for the motorman to proceed, then the conductor was guilty of wanton negligence, were not subject to the objection of assuming the facts stated therein.—(Birmingham Ry., Light & Power Co. vs. Enslen, 39 S. Rep., 74.)

CALIFORNIA.—Carriers—Street Car—Duty to Stop for Passenger—Contributory Negligence—Burden of Proof—Contributory Negligence.

1. Where a passenger on a street car arose from her seat and stepped onto the step while the car was standing still, and either the motorman or conductor observed such act, it was sufficient notice of her desire to alight.

2. Where, while a street car was standing, a passenger stepped onto the step of the car, and while there it moved suddenly forward, owing to the negligence of the conductor, whereby the passenger was injured, she was not guilty of contributory negligence, unless an ordinarily prudent person would not so have done.

3. Where a passenger on a street car, while it was standing, stepped down onto the step, with a view of leaving the car, and while in the act of alighting the operatives caused the car to start, so as to injure her, the facts showed a prima facie case of negligence.

4. A passenger on a street car cannot recover for injuries sustained in consequence of her voluntarily alighting from the car when it was in motion.—(Joyce vs. Los Angeles Ry. Co., 82 Pac. Rep., 204.)

CALIFORNIA.—Appeal — Decisions Reviewable — Discretionary Rulings—Relief from Default—Denial of New Trial—Preparation of Statement—Relief from Default—Orders—Finality—Reconsideration—Master and Servant—Superiors in Service—Scope of Authority—Injuries to Servant—Negligence of Master—Availability to Servant—Contributory Negligence—Non-Suit—When Granted.

1. Whether or not the circumstances of a particular case are such that a mistake or inadvertence of a party should be excused is a question for the court to which application for relief against a default is made, and the Supreme Court will not interfere with the exercise of the dicretion of the lower court unless a clear abuse of discretion is apparent, especially where the discretion is exercised in favor of granting such relief.

2. Defendant's motion for a new trial was submitted May 23 and denied July 21. The order of denial appeared in a daily newspaper, which contained court news, and to which defendant's attorneys subscribed, but which the attorney having the matter in charge failed to read on the day the order appeared therein, as he was busily engaged in other matters. Neither of defendant's attorneys had actual notice that the order had been made until Aug. 1, and on the next day notice of motion for an order relieving defendant from its default in failing to prepare and serve its statement and for extension of time to so do was given, and on Aug. 4 the motion was heard and granted. Held, that the inadvertence or neglect of defendant's attorneys was excusable, and it was not an abuse of discretion to grant the motion.

3. Where defendant failed to prepare and serve a statement within ten days after the denial of its motion for new trial, it was competent for the court to relieve defendant from its default if excusable; and the granting of such relief was not premature, although no "order" had been made against defendant in the matter.

4. The court on Aug. 4 entered an order relieving defendant from its default in failing to file its statement within ten days after the denial of motion for new trial. On Dec. 13 the engrossed statement was presented, and the court refused to settle the same for the ostensible reason that it was not served within the time prescribed by law, but the theory of the court's action was that the former order might be held premature. Thereupon defendant gave notice of a motion for relief on the ground of inadvertence and excusable neglect, and on Dec. 15 the court granted the motion and settled the statement. Held that, conceding that the order of Dec. 15 was beyond the power of the court, as it had finally disposed of the matter on the 13th, yet the order of the 13th was objectionable for the same reason in that the matter was settled by the order of Aug. 4, and the latter order would be regarded as finally relieving defendant from its default.

5. An order of a railroad that a roadmaster should be in charge of all work in connection with handling gravel, and that trainmen on gravel trains should obey his orders, did not render a motorman on a gravel train subject to the orders of the roadmaster in moving and managing the train, where it was thoroughly understood by both the roadmaster and the motorman that the order gave the former authority over the train only in the matter of construction and repair, as to where it was to be taken, etc., and the motorman was the sole responsible party in operating the train and taking precautions against collisions with other trains.

6. Negligence on the part of a railroad in allowing two trains to make a trip without orders from some one knowing where all trains were, and leaving it to the motorman of one train to determine how the two trains should pass each other, the road having but a single track, was not available to support a recovery for injuries to the motorman, whose special duty it was to know the position of the other train, and to avoid collision with it.

7. A motorman of a work train, whose duty it was to look out for another train, was guilty of contributory negligence in case of a collision with the other train, if he failed to look at the bulletin board on which the movements of the other train were posted, or, having looked, failed to remember the location of such train.

8. The motorman of a work train, who knew, or should have known, of the proximity of another train approaching his train in an opposite direction, and who nevertheless ran his train into and through a fog so dense that he could not see more than 200 ft., without taking the precaution of ringing his gong or complying with the instructions of the railroad to send a flagman ahead of his train, in consequence of which the trains collided, was guilty of contributory negligence in law.

9. In an action for the death of a servant, where the evidence shows that the servant was guilty of contributory negligence in law, a non-suit should be granted.—(Vinson et al. vs. Los Angeles Pac. R. Co., 82 Pac. Rep., 53.)

DELAWARE.—Carriers—Street Railroads—Passengers—Duty in Taking On or Letting Off Passengers—Duty of Passengers—Personal Injury—Burden of Proof—Negligence—Evidence—Damages—Personal Injury—Amount of Verdict—Evidence—Preponderance.

1. A person who, in attempting to board a street car that had stopped at the usual place for cars to stop to take on passengers, took hold of the hand rail with one hand and had one foot on the platform step, was a passenger.

2. A street railway company, in taking on or letting off passengers, must stop its cars at its usual stopping places and wait a reasonable time for passengers to get on or off, and must exercise reasonable care to secure the safety of the passengers.

3. A passenger attempting to board or alight from a street car must see that the car has stopped so that he may safely get on or off, and must exercise reasonable care to avoid danger.

4. A passenger, suing for a personal injury negligently inflicted, must show by a preponderance of the evidence that the negligence which caused the injury is the negligence alleged.

5. A person attempted to board a street car that had stopped at

a usual place for stopping cars to take on passengers by taking hold of the hand rail and placing one foot on the platform step, when the car suddenly started up, throwing him on the ground. Held to authorize a finding that the company was guilty of actionable negligence.

6. A verdict for plaintiff in a personal injury action should be for such sum as will compensate him for the injuries sustained, including therein his pain, suffering and disability resulting therefrom.

7. It is the duty of the jury to reconcile conflicting evidence, if possible, and, when that cannot be done, to render a verdict for the side on which the evidence preponderates.—(Waller vs. Wilmington City Ry. Co., 61 Atl. Rep., 874.)

FLORIDA.—Imputed Negligence—Injury to Child—Trial—Instruction—Street Railroads—Injury to Child—Negligence—Trial—Instructions—Appeal—Review—New Trial.

1. The contributory negligence of parents in permitting a child, a boy four years and one month old, to go without a caretaker upon the streets of a city upon which electric cars are operated, cannot be imputed to the child in an action by him against the corporation operating the electric cars for damages resulting to him from the negligent operation of an electric car.

2. An instruction calculated to mislead the jury is properly refused.

3. Where the motorman of an electric car, being operated upon the streets of a city, should and must have seen a child of tender years, unattended, in dangerous proximity to the track upon which the car was being operated, it was his duty to use means "strictly commensurate with the demands and exigencies of the occasion" to prevent injuring such child, the burden of proof being upon the electric car company to show that such means were used; and under such circumstances, if such proof is not satisfactorily made, the company is negligent and liable for damages.

4. If there are several important issues in a case, it is not proper to single out one of them in an instruction, in such a way as might impress the jury that such issue was the controlling one, and thus mislead the jury; and such an instruction is properly refused.

5. Where the bill of exceptions does not show any exception to the ruling of the trial judge denying a motion for a new trial, this court cannot consider the merits of such motion.—(Jacksonville Electric Co. vs. Adams, 39 S. Rep., 183.)

GEORGIA.—Carriers—Street Railroads—Instructions—Negligence.

1. A charge that it is the duty of a street car company to select a reasonably safe place for landing passengers, wherever it may stop a car for that purpose, states a sound legal proposition, and is not open to the criticism that it impliedly instructs the jury that a failure to perform such duty would be negligence per se.

2. On the trial of an action against a railway company for personal injuries, it is error for the trial judge to instruct the jury that a given state of facts would be sufficient to establish negligence on the part of the defendant; these facts not being such as would in law, per se, constitute negligence. The fact that the Supreme Court, in passing upon demurrers to the petition in the same case, when formerly under review, stated that certain acts or their omission would constitute negligence and render the defendant liable, does not ma[illegible] it proper for the trial judge to make such statement in charging [illegible]e jury.

3. One of the charge[illegible]cepted to was somewhat argumentative, and presented with too much stress plaintiff's contention of fact.—(Macon Ry. & Light Co. vs. Vining, 51 S. E. Rep., 719.)

GEORGIA.—Appeal—Prejudicial Error—Instructions—Evidence to Sustain—Punitive Damages—Assessment—Evidence—Absence of Witness—Excuse—Damages—Personal Injuries—Expert Witness—Competency—Damages—Instructions—Earning Capacity—Witness—Competency of Wife—Evidence—Opinions of Non-Experts—Bodily Condition.

1. In an action to recover damages for a personal injury it is error requiring a new trial for the court to instruct the jury as to the right of a plaintiff to recover punitive damages, where the tort complained of is accompanied by aggravating circumstances, when the evidence does not warrant a charge on this subject.

2. In order for the jury to assess punitive damages in such an action, it is not necessary that they should be claimed eo nomine, but it is enough that the facts alleged and proved be such as to warrant the assessment.

3. It is competent for a party to account for the absence of an eyewitness to the occurrence under investigation, that the jury may not draw any unfavorable inferences from the failure to produce and examine the witness.

4. Where the person injured is a dentist, testimony as to his capacity and efficiency in his chosen profession prior to his injury is relevant as bearing directly upon the measure of damages.

5. One who is the graduate of a college where anatomy and physiology are taught, and who is engaged in the practice of osteopathy, and has gained experience in the treatment of nervous disorders, may be examined as an expert witness, upon these facts being made to appear, notwithstanding he is not a licensed physician and does not administer drugs to his patients.

6. That the jury may clearly understand their duty with respect to reducing to its present cash value the gross amount which they may find to fairly represent the loss in earning capacity which the injured party has sustained, the court, in charging upon this subject, should make choice of language which is not calculated to confuse the jury because of inaccuracy of expression.

7. The wife of the injured party is not, because of the marital relation existing between them, and the policy of the law to preserve inviolate confidential communications between husband and wife, incompetent to testify as to the nature of the injury received by him, and its effect upon his physical condition, when there is nothing to indicate that her knowledge on the subject was gained because of any confidence which he reposed in her as his wife.

8. The wife may testify to symptoms which she observed indicating that her husband suffered from headache, but she should not be permitted to generalize or state any bare conclusion based upon her observation of others who had headache, she not professing to be an expert.—(Macon Railway & Light Co. vs. Mason, 51 S. E. Rep., 569.)

GEORGIA.—Pleading—Amendment—New Cause of Action—Carriers—Injury to Passenger—Pleading—Amendment—New Cause of Action—Appeal—Harmless Error—Amendment—Refusal of Non-Suit—Instructions—Presumption of Negligence—Appeal—Refusal of New Trial.

1. Where an action was based on the allegation that a passenger on a car of an electric railway, at the direction of the conductor, was required to change cars, and while passing from one car to another she was injured by the negligent conduct of the defendant's agents and servants in connection with such change, an amendment which alleged an additional act of negligence forming part of the same transaction did not set up a new and distinct cause of action.

2. Such an amendment, which alleged that "said jerk of said car was caused by the defendant's servants and agents in charge of said car," was not subject to objection on the ground that it did not connect the alleged negligence with the defendant.

3. If a car is at rest temporarily, and a passenger is lawfully leaving it, or passing from it to another car, under the direction of the conductor, and while this is in progress a sudden and violent jerk or movement of the car is caused by the company's agents, resulting in injury to the passenger, it is not necessary to allege in detail by what particular means they caused the jerk to occur.

4. While an independent act of negligence not connected with, contributing to, or causing the injury to a passenger is immaterial, and an amendment alleging such an act is demurrable, yet where the amendment, taken in connection with the declaration, sufficiently shows that the act alleged in it formed a part of the conduct of the defendant's agents from which the injury was alleged to have resulted, there was no error in overruling a demurrer thereto.

5. Where the evidence for the plaintiff in an action for damages tended to show that the injury occurred on the same line of railroad, but at a point some 350 or 450 yards distant from the place where it was alleged in the declaration to have happened, an amendment for the purpose of correcting the allegation so as to make it conform to the evidence, but still referring to the same transaction, and not to a different occurrence, did not add a new and distinct cause of action, and was not objectionable on that ground.

6. If any objection could properly have been made to the allowance of such an amendment, it furnishes no cause for a reversal, where, upon further evidence being introduced, which tended to show that the injury in fact occurred at the point originally alleged, the amendment was withdrawn.

7. If a motion for a non-suit should have been granted at the time when it was refused, yet, if the evidence afterwards introduced supplied the deficiency, no reversal will result from such refusal.

8. Where the presiding judge, at one part of the charge on the subject of the presumption arising from proof of injury from the running of the cars of a railroad company, or the acts of persons in its employment, did not limit such presumption to the specific acts of negligence alleged, but in his general charge did clearly and specifically confine the jury to the consideration of such specifications of negligence, this furnishes no ground for a new trial.

9. If a car containing passengers is stopped while in transit, and the passengers are directed by the conductor to change to another car, which is on a track parallel to the first, and if, while they are so doing, the employees of the company put out the lights of the

first ear, and cause it to jerk suddenly, resulting in injury to a passenger who is in the act of making the change, this would be an injury resulting from the running of the cars of the eompany, within the meaning of the statute, and would also be a damage done by a person in the employment and service of the company, so as to raise the statutory presumption of negligence against it.

10. None of the other grounds of the motion for a new trial in this case require a reversal.—(Georgia Ry. & Electric Co. vs. Reeves, 51 S. E. Rep., 611.)

ILLINOIS.—Limitation of Actions—Amendment—New Cause of Action—Negligence—Care Required—Street Railroads—Collision with Traveler—Contributory Negligence—Question for Jury—Instructions—Care Required of Traveler.

1. In an action for death, the original declaration alleged that the negligence was that defendant so carelessly operated a car that it ran against deceased and knocked him off his bicycle, and he was thereby so seriously injured that he died; and thereafter an additional count was presented, stating that defendant so negligently ran the car that, as a direct result, deceased was brought in collision with the car and knocked off his bicycle, and so seriously injured that he died. Held, that the negligence charged in the original eount and that charged in the additional count were the same, and hence a plea of limitations to the additional count was properly overruled.

2. The law does not demand that one in a place of danger shall exercise the highest degree of self-possession, coolness and skill, but only such as an ordinarily prudent and careful person would exercise in like situation and under like circumstances.

3. In an action for death owing to a collision between defendant's car and the bicycle which deceased was riding, held that the question of contributory negligence was one for the jury.

4. Where a pleading charged that defendant's servants negligently placed deceased in a position of great peril, whereby, while exercising ordinary care, he received his injuries, it was for the jury to determine, whether under the influence of sudden fear, he so eonducted himself as to incur the imputation of contributory negligence.

5. In an action for death owing to the negligence of defendant railroad company, the court instructed that the plaintiff could not recover unless deceased was in the exercise of ordinary care (meaning thereby that he was required to exercise such care for his own safety not only at the time of the injury, but during the time and circumstances preceding the injury), and that, if deceased failed to exercise care for his own safety in going into the position he was in when injured, the jury should find for defendant, the same as if plaintiff had failed to exercise care at the precise instant of the injury. Held that, in view of such instruction, another instruction—that ordinary care is that which an ordinarily prudent person, situated as the deceased was before and at the time of the accident, would exercise for his own safety—was not erroneous on the theory that it assumed that plaintiff was not guilty of contributory negligence in being in the position in which he found himself at the time of the injury.—(South Chicago City Ry. Co. vs. Kinnare, 75 N. W. Rep., 179.)

KENTUCKY.—Street Railroads—Collisions With Cars—Injuries to Traveler—Contributory Negligence—Instructions—Trial—Death by Wrongful Act—Instructions—Street Railroads—Injury to Traveler—Evidence—Instructions—Evidence—Experiments.

1. Where there was contributory negligence on the part of a traveler injured in a collision with a street car, there can be no reeovery unless his peril was, or could by ordinary care have been, discovered by the servants in charge of the car, and the injury avoided by the exercise of ordinary care.

2. An instruction, in an action against a street railroad company for injuries to a traveler by collision with a street car, that if the injury, though occasioned by contributory negligence, could have been avoided by the motorman by the exercise of ordinary care, plaintiff is entitled to recover, is erroneous, because it eliminates the question whether the motorman knew, or might by exercise of ordinary care have known, of the traveler's peril.

3. An instruction, in an action for death by wrongful act, that in considering the damages the jury might consider the amount that decedent was earning prior to his death and all circumstances touching his capacity to earn, was erroneous, as giving prominence to certain evidence in the case.

4. Where, in an action against a street railway company for the death of a traveler by collision with a street car, defendant's evidence showed that the car was close to the wagon in which deeedent was riding while it was on the side of the car track, that the driver turned on the track, and that it was impossible for the motorman to prevent the eollision, the refusal to charge that the motorman was under no obligation to stop his car as long as the wagon was in a place of safety, and that he had a right to presume that the wagon would remain in a place of safety until some indication was given that it would get into a place of danger, and that if the motorman used ordinary care to prevent the collision as soon as he discovered, or could have discovered by ordinary care, that plaintiff was in peril, plaintiff could not recover, was erroneous.

5. In an action against a street railway company for the death of a traveler in a collision with a car, evidence of experiments made with another horse than that driven at the time of the accident, for the purpose of determining the time it took to turn and cross the tracks, was inadmissible.—(Louisville Ry. Co. vs. Hoskins' Adm'r., 88 S. W. Rep., 1087.)

MASSACHUSETTS.—Master and Servant—Inspection of Appliances—Cars Belonging to Third Person—Ways, Works and Machinery.

1. Where defendant maintained a coal shed into which a railroad company ran cars on a spur track to be unloaded by defendant's employees, defendant owed its employees no duty to inspect the cars.

2. The cars were not a part of the ways, works and machinery of the defendant, so as to make it liable for a defect therein, under Rev. Laws, chap. 106, sec. 71, cl. 1.—(Dunn vs. Boston & N. St. Ry., 75 N. E. Rep., 75.)

MASSACHUSETTS. — Electricity — Street Railroads — Trolley Wires—Electric Shock—Evidence—Negligence—Sufficiency—Contributory Negligence—Evidence—Electric Light Companies Rules—Violation by Linemen—Appliances to Prevent Injury—Evidence—Appeal—Exceptions—Waiver.

1. Evidence in an action for the death of plaintiff's intestate and for his conscious suffering examined, and held to support a finding that the death and suffering complained of were caused by an electric current which came from the company's trolley wire, authorizing a recovery, if the company was negligent and the intestate free from contributory negligence.

2. Evidence in an action against a street railway company for the death and conscious suffering of plaintiff's intestate, by reason of an electric shock while engaged in putting a cross-arm to a pole of a light company, examined, and held to support a finding of actionable negligence on the part of the street railway company for failing to prevent its trolley wire from coming in contact with a light wire and charging it with an electric current.

3. Evidence in an action against a street railway company for the death and conscious suffering of plaintiff's intestate, by reason of an electric shock from the company's trolley wire coming in contact with a light wire near which he was working, examined, and held to show freedom from contributory negligence.

4. A violation by a lineman of a rule of a light company employing him that linemen should treat every light wire as a live wire is not conclusive evidence of negligence, but only a circumstance to be considered with others.

5. In an action against a street railway company for the death of a lineman employed by a light company, by reason of receiving an electric shock coming from a trolley wire on coming in contact with a light wire, evidence of the existence of an appliance, known as a "guard wire," in common use for the purpose of preventing trolley wires from coming in contact with other wires, was admissible.

6. Exceptions not argued are deemed waived.—(Mahan vs. Newton & B. St. Ry. Co., 73 N. E. Rep., 59.)

NEW YORK.—Railroads—Injuries to Person on Track—Right of Person Intending to Board Train—Custom of Company—Person's Reliance Thereon—Evidence of Contributory Negligence—Contributory Negligence—Evidence—Question for Jury.

1. A person, crossing at grade the tracks of a street surface railroad company to reach a station to take a train, need not exercise the care of a traveler on a highway crossing or a trespasser; but he is warranted in concluding that he will not be put in jeopardy by an approaching train accustomed to stop at the station before reaching the crossing.

2. Where it was the uniform custom of all trains to stop before coming to a certain point, a person crossing the track at that point is justified in assuming that a train passing the point with unabated speed will give warning of such a course, and the omission to give any warning may be considered on the question of his negligence in attempting to cross.

3. Evidence, in an action against a street surface railroad company for injuries sustained by a pedestrian crossing its tracks to reach a station to take a train, held to warrant a finding that the trains in stopping at the station never reached the point of crossing, thereby warranting a finding of freedom from contributory negligence.—(Cranch vs. Brooklyn Heights R. Co., 95 N. Y. Sup., 169.)

FINANCIAL INTELLIGENCE

WALL STREET, Dec. 6, 1905.

The Money Market

A decidedly firmer tone developed in the money market during the past week, the chief influence being a larger demand for accommodation resulting by the increased activity in stock speculation, and a further substantial reduction in the surplus reserve of the clearing house banks. Early in the week the market was influenced to some extent by the calling of loans preparatory to the Dec. 1 interest and dividend disbursements, and later by the continued heavy losses sustained by the banks on sub-treasury operations. From 5 per cent, the ruling rate at the opening of the week, call money advanced to 25 per cent, equaling the previous high record for the year. The time money market, however, underwent no material change as a result of the sharp advance in demand money rates. On the contrary, lenders reported a very fair demand, while offerings both by local and foreign houses were liberal at 6 per cent for sixty days, 5½ per cent for three and four months, and 5¼ per cent for six months. Commercial paper was extremely quiet. Dealers reported a scant supply of the choice names, merchants, as a rule, depending upon collections, which are reported good throughout the country, or obtaining all necessary requirements from their respective banks. The bulk of the buying was for out-of-town institutions. Sterling exchange has ruled considerably lower, the market being influenced by a more liberal supply of bills drawn against cotton shipments, and by the offerings of loan bills, the proceeds of which were employed in the local money market. Silver bullion continues in good demand and firm in price both at home and at London. The bank statement published on last Saturday showed an increase in loans of $11,594,000, which was not surprising in view of the activity and strength in the local securities market. Cash decreased $4,593,000, due largely to the shipments of gold to Mexico as a result of the sharp rise in silver, and to the transfer of currency through the sub-treasury to San Francisco. The reserve required was $1,998,725 more than in the preceding week which, added to the loss in cash, resulted in a decrease in the surplus reserve of $6,591,725. The surplus now amounts to $2,565,375, as against $8,539,075 in the corresponding week of 1904; $6,305,300 in 1903, $9,973,750 in 1902; $6,607,675 in 1901, and $5,701,125 in 1900. The European markets have ruled easier, despite the disorder throughout Russia, and rates for money and discounts at all the principal centers displayed increasing ease. The easier tendency abroad was due largely to the statement made by the French Premier that there was enough money belonging to Russia outside of that country to pay the interest on all the Russian obligations for the next two years. This statement was also largely accountable for the sharp recovery in Russian bonds at the end of the week. At the close there was nothing in the situation to warrant the belief in a materially lower money market until after the turn of the year. Thus far this week the banks have lost to the sub-treasury nearly $1,900,000, exclusive of $5,000,000 gold transferred to San Francisco. In addition, the return flow of currency to this city has been temporarily checked. Preparations must also be made for January interest and dividend disbursements, which promise to break all previous records.

The Stock Market

A great deal of irregularity marked the course of prices on the Stock Exchange during the past week, but for the most part the trend of values was upward, this having been particularly true of some of the industrial properties, a number of which made spectacular, if not sensational, advances. In this category Tennessee Coal & Iron, National Lead and the Republic Iron & Steel issues were very conspicuous, and while there was no actual announcements to account for the phenomenal gains made by these stocks, it was the general opinion that special reasons existed for the same apart from the continued great prosperity of all manufacturing industries throughout the country. This afforded a splendid opportunity for the stock manipulators, and they were not slow to take advantage of it. The street would have much preferred that the active demand for stocks which prevailed during the greater portion of the week had been for the standard railway shares and the higher grade industrials, rather than for the class of stocks above referred to. The heavy buying and sky-rocketing movements in these shares were not at all confidence inspiring, hence, to a considerable extent, the irregularity that pervaded the general list. However, there were other factors that served in greater or less measure to give an uncertain tone to the market as a whole as well as to check extensive operation for the bull account. Chief among these was the tremendous slump in Russian Government bonds abroad, with the consequent unsettlement of all the foreign securities markets, which, of course, was the direct outgrowth of the deplorable condition of affairs in Russia, threatening the very existence of that government. Next in importance as a deterrent to bullish operations was the continued firmness in the local money market, partly resulting from another considerable loss in surplus reserves by the New York banks, as disclosed in their statements of Saturday last. Added to these matters were the formal announcement of the St. Paul's intention to build to the Pacific Coast, serious depression in the shares of the Rock Island Company, with attendant unfavorable rumors concerning the next dividend on the preferred stock; unpleasant reports with reference to the Cincinnati, Hamilton & Dayton, which eventuated in the appointment of a receiver for that property and the Pere Marquette, and finally, doubts as to the exact nature of the President's Message to Congress. Fears on this score, however, proved to be entirely unfounded, as the document in question was far more conservative than the street had any reason to expect, and this was reflected in a much firmer tone to the market all around in the final dealings. Other matters which tended to create a more bullish sentiment toward the close of the week were the heavy over-subscription to the new Japanese loan, the declaration of an extra dividend of 10 per cent by the Delaware, Lackawanna & Western, the further evidence of the remarkable activity in the copper mining industry as shown by the fact that all the large companies have disposed of their product for several months ahead, and estimates that the earnings of the United States Steel Corporation for the current quarter will be in the neighborhood of $35,000,000, thereby making a new record for that particular period.

Generally speaking, the local traction shares were inclined to heaviness during the week, and in one instance, that of Brooklyn Rapid Transit, quite an active selling movement developed. There was, however, nothing of a tangible character to account for the comparative weakness of these shares, and the entire movement was set down to realization of profits by members of the pool existing in that stock.

Philadelphia

Trading in the local traction issues was upon a much smaller scale to-day, but values generally showed firmness, despite the irregularity in prices in other quarters of the securities market. Philadelphia Rapid Transit was the active feature, and was the only stock to show any substantial change in price. In the early dealings it showed firmness with sales at 33⅛, but toward the close there was fairly heavy selling, said to be for New York interests, which carried the price off to 31¼, which was the closing figure. Upwards of 9000 shares were dealt in. Although the statement of earnings for the month of November has not been made public, it is understood that the increase will be in excess of $100,000. Philadelphia Company was comparatively quiet but steady, about 2500 shares selling at 51⅞ and 51⅝, while odd lots of the preferred brought 49¾ and 49½. Union Traction was in fairly good demand, 3500 shares changing hands at 62½ to 62⅝. Philadelphia Traction was decidedly firm, several hundred shares being traded in at from 100¼ to 101. Consolidated Traction moved up a point, upwards of 150 shares selling at from 82 to 83. American Railway opened at 53¼ and later sold at 52¼ ex the quarterly dividend. Other transactions included Indianapolis Street Railway at 121; Railways General at 6 to 6⅛; United Traction of Pittsburg at 50⅝; 50 United Companies of New Jersey at 271¼, and Rochester Railway & Light at 120.

Baltimore

Very little activity developed in the traction issues during the past week. The demand for these issues was extremely quiet, but at the same time there was no pressure to sell. The United Railway issues displayed decided firmness, despite the default in the interest due Dec. 1 on the income bonds. Upwards of $75,000 of the 4 per cents changed hands at 92 and 92½, while $35,000 of the incomes brought 65⅝ and 65½. The stock was practically neglected, a small lot of the free stock bringing 15, while a few odd lots of the deposited stock brought 15 and 15¾. Macon Railway & Light 5s brought 100 and 100¼ for $5,000. Other sales included $2,000 Norfolk Railway & Light 5s at 95, and $2,000 United Railway of St. Louis 4s at 81.

Other Traction Securities

The Chicago market was dull, with trading confined almost entirely to the elevated issues. Northwestern Elevated common advanced from 23⅝ to 24⅞ on purchases of about 500 shares, while the preferred, after declining from 64¼ to 63, recovered to 64. Chicago & Oak Park common brought 6⅛ to 6⅜. Metropolitan sold at 28½ and the preferred changed hands at 70⅞ to 71. South Side Elevated brought 96⅞. Twenty-five shares of West Chicago sold at 55. The Boston market was moderately active and generally firm. Boston Elevated advanced a point to 153 on transactions amounting to 74 shares. Massachusetts Electric early in the week sold at 13½, and on rather active buying the price rose to 15½. The preferred sold at 57 to 59¾. About 850 shares of the common and about 600 of the preferred stock were traded in. West End common sold at 98¼ and 98. Other sales were Boston & Suburban preferred at 63, Boston & Worcester common at 27 to 26½, 1000 preferred stock at from 72½ to 74½. In the New York curb market, dealings in Interborough were quite active, but were attended with considerable irregularity. From 211½ at the opening, the price ran off to 210, but later it advanced sharply to 213. In the final dealings there was a reaction of 2 points to 211 in sympathy with the recession in the other traction issues. New Orleans Railway common sold at 37⅜ for 200 shares, while the preferred was bid up sharply at the close, 500 shares changing hands at 82⅞ to 84½. Other sales included 17 shares of American Light & Traction preferred at 117.

Cincinnati, Newport & Covington common continues the most active issue at Cincinnati. Over 3000 shares sold with an advance from 49 to 50. The preferred advanced to 97¼; both gains being due to indications of increased dividends. The first 5 per cent bonds sold at 110¼, a fractional advance. Cincinnati Street Railway dropped a fraction to 145½. Cincinnati, Dayton & Toledo sold at 25¾, a fractional decline. Its 5 per cent bonds were stationary, at 98¼.

Northern Ohio Traction & Light continues to gain in Cleveland on prospects of a dividend, several hundred shares selling with an advance from 28½ to 29½. Lake Shore Electric common made an advance of two points, from 13½ to 15½, and early this week sold at 16. The old preferred sold at 68 and the new preferred at 58. Aurora, Elgin & Chicago common sold at 30½ and 31, and the preferred at 89¾ and 90. Toledo Railways & Light sold at 32¾. Cleveland Electric at 81¼ to 82. Much interest is being displayed in the underwriting of the Washington, Baltimore & Annapolis proposition, and there were several transactions last week on the curb at 7 points premium.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Nov. 29	Dec. 6
American Railways	52¼	*52⅛
Boston Elevated	152	152½
Brooklyn Rapid Transit	87⅞	85
Chicago City	200	200
Chicago Union Traction (common)	10½	10¾
Chicago Union Traction (preferred)	—	—
Cleveland Electric	—	83
Consolidated Traction of New Jersey	—	81
Consolidated Traction of New Jersey 5s	—	108
Detroit United	92¾	92¾
Interborough Rapid Transit	210	211
International Traction (common)	36	35½
International Traction (preferred) 4s	75½	75½
Manhattan Railway	163	163
Massachusetts Electric Cos. (common)	14½	15
Massachusetts Electric Cos. (preferred)	58½	59
Metropolitan Elevated, Chicago (common)	28	28
Metropolitan Elevated, Chicago (preferred)	70	70
Metropolitan Street	118⅝	117¾
Metropolitan Securities	71¾	72¼
New Orleans Railways (common), W. I.	37	37
New Orleans Railways (preferred), W. I.	84½	84
New Orleans Railways, 4½s	90½	90¾
North American	100	100
North Jersey Street Railway	26	25½
Philadelphia Company (common)	51⅞	52⅛
Philadelphia Rapid Transit	31½	31¼
Philadelphia Traction	100	100½
Public Service Corporation 5 per cent notes	95	95
Public Service Corporation certificates	65	65
South Side Elevated (Chicago)	96	96
Third Avenue	121	122
Twin City, Minneapolis (common)	114	114
Union Traction (Philadelphia)	62½	62½
West End (common)	97½	97½
West End (preferred)	114	113½

* Ex-dividend W. I., when issued.

Iron and Steel

The "Iron Age" says that while there is less excitement in the iron and steel trades, the volume of work coming out continues extremely heavy. No better indication of this could be furnished than by the fact that the bookings of the United States Steel Corporation during November were slightly above 51,000 tons a day, as compared with a little more than 50,000 tons in October. When it is considered that an even much larger tonnage was booked in September, the record month, and that the daily capacity of the works of the corporation is 34,000 tons, the volume of current consumption will be appreciated. Rail makers again report heavy orders, and prices for light rails have been again advanced $1 per ton, and are thus getting more in line with the standard section. Some heavy work is coming to the structural mills. It is estimated that there has been contracts for thus far about 50,000 tons of foreign structural material, which includes some sales of Belgium mills. There have been some further large contracts for rolling stock, and reports are current that one of the large systems has been forced to turn to foreign makers for equipment in order to get reasonable delivery.

RUMOR OF OTHER PURCHASES IN NEW YORK BY THE DELAWARE & HUDSON RAILROAD

The purchase of the property of the United Traction Company, of Albany, by the Delaware & Hudson Railroad interests has caused the rumor to be revived that the Albany & Hudson Railway is soon to be taken over. This is a third-rail line between Albany and Hudson, and crosses the Boston & Albany near Niverville. Besides the third-rail system the investments of the road include the street railway system of Hudson and the gas and electric plants in Rensselaer and Hudson. One of those interested in the company is Horace E. Andrews, of Cleveland, a member of the Andrews-Vanderbilt syndicate, operating the Vanderbilt electric railway interests in Central New York. Just what his holdings are in the company is not generally known. The fact remains, however, that with this property formally in control of the Vanderbilt or Delaware & Hudson interests, the chain of electric railway lines in New York would be complete from Hudson almost to Rochester.

CHANGE IN CONTROL OF SAN FRANCISCO PROPERTY

At a meeting of the directors of the United Railroads of San Francisco, held on Thursday, Nov. 23, President Holland announced that the control of the United Railways Investment Company, which owns the stock of the United Railroads of San Francisco, having been acquired by other interests, he and Brown Brothers & Company will retire from participation in the management of the company Jan. 1. In retiring they leave the property in excellent condition, both physically and financially, and its prospects of the best, and wish to congratulate the board on its efficient and successful conduct of the company's affairs. Upon receipt of this advice the board unanimously adopted the following resolution:

Whereas, Mr. Arthur Holland has notified this board that he intends to resign the presidency of the company by the close of the year, against the earnest wish of the directors and of the stockholders; and,

Whereas, His administrative ability has during the four years of his management placed the United Railroads of San Francisco among the best properties of the country; and,

Whereas, His personal qualities have endeared him to the company's directors and officers;

Now, Therefore, Resolved, That the directors of the United Railroads of San Francisco appreciate the faithful and efficient service rendered to the company by Mr. Holland and by Brown Brothers & Company, and accept the president's resignation with great regret that he will not reconsider and withdraw it.

THE CHICAGO FRANCHISE QUESTION

The long debated subject of the extension of the franchises of the Chicago street railway companies bids fair to be settled very soon. To rehearse briefly the recent history on Sept. 27, the Chicago City Railway Company submitted to the transportation committee of the City Council a proposition upon which it was willing to accept a 20-year franchise and abandon its claims under the so-called 99-year act. This proposition, the salient features of which were published in the STREET RAILWAY JOURNAL for Oct. 7, was submitted by the transportation committee to its expert, Bion J. Arnold, and was made the subject of a report by him, which was printed in full in the STREET RAILWAY JOURNAL for Nov. 25. The Chicago Union Traction Company was not mentioned in the original proposition or report, but it was understood that that company would accept the same conditions which proved satisfactory to the City Company.

The transportation committee formally considered the proposition and Arnold report on Nov. 27, and suggested certain changes in the proposition, which were accepted by the company. The most important of these changes was the increase of the percentages of the gross earnings to be paid by the company to the city. In the original proposition these percentages were 3 per cent for three years; 5 per cent for the next two years; 7 per cent for the next ten years and 10 per cent for the last five years. In the compromise each percentage was increased 1.08 points. Upon the basis of the estimates of gross receipts made by Mr. Arnold this will increase the payments made by the City Company to the city $5,284,245.

An abstract of the ordinance as applicable to the Union Traction Company and its allied companies follows, although it will be understood that the Chicago City Railway ordinance is the same, except so far as the routes covered.

SEC. 1. Authorizes the West Chicago Street Railroad Company, the Chicago West Division Railway Company, the Chicago Passenger Railway Company, the West Chicago Street Railroad Tunnel Company, the Chicago Union Traction Company, the receivers of the Chicago Union Traction Company and the receivers of the West Chicago Street Railroad Company to maintain and operate for twenty years a system of street railways in streets designated.

Sec. 2. The company shall proceed at once to put in first-class condition, by reconstruction, its entire plant and equipment, and to complete the work within five years from the date of the ordinance. All the new cars specified (new equipment everywhere except the electric cars recently bought) must be placed in service within three years from the passage of the ordinance.

Sec. 3. The company shall operate all its street railways by electricity. The overhead trolley may be used everywhere unless the test of the underground trolley to be made by the Chicago City Railway Company for two years in the downtown district shall prove to be practicable and satisfactory, in which event all lines in the south side of the city north of Polk Street must be equipped with the underground system.

Sec. 5. Poles of the company may be used by the city to carry signal, telephone, telegraph and electric light wires and lamps. The transmission wires of the city for such purposes shall be placed on the poles under the direction of the company's engineer, without expense to the company, but the maintenance of the poles is to be by the company.

Sec. 7. All transmission and feeder wires carrying a current of more than 1000 volts shall be laid underground, and all transmission and feeder wires east of the west line of Halsted Street shall be laid underground.

Sec. 8. All electric work shall comply strictly with the city ordinances for such work, and shall be done under the supervision and subject to the approval of the city electrician. All other construction work shall be under the supervision and subject to the approval of the Commissioner of Public Works. Before excavating in any street the company must obtain a permit for the work, and after the restoration of the street to its former condition the company shall maintain it for one year.

Sec. 9. All tracks must conform to the grade of the streets in which they are laid and must be laid on wooden, steel or concrete ties. New tracks in streets paved or about to be paved with asphalt, granite, brick, creosoted block or other similar material shall be laid with "trilby" rails weighing not less than 85 lbs. to the yard, with a difference of height between lip and tread of not more than 6-32 in.

Sec. 10. Snow and ice must be removed from the portion of the street occupied by the company's rails by the company. In removing snow and ice the company may pile the same temporarily on the street outside its tracks, but must remove it within a reasonable time, to be fixed by the Mayor and the Commissioner of Public Works. Paving, repaving and repairing by the company, in accordance with the ordinance, are to be done by the company upon the order of the Commissioner of Public Works.

Sec. 11. All cars for the passengers "hereafter built or purchased" are to be "of the best and most approved finish, style and design, to have center aisles, to be without running footboards along the sides, to have cross seats facing forward (except that longitudinal seats each for not more than four passengers may be used at the ends of the car). All closed cars shall be vestibuled and supplied with electric button devices so that passengers may, without inconvenience, signify their desire to leave the car. The cars must conform to detailed specifications and "at all times be kept clean and in good repair," and they shall be well ventilated and lighted. They must be kept heated to 50 degs. F., "as nearly as possible," and bear "appropriate and conspicuous" signs upon the sides and ends. Every electric car shall be "in charge and under the control of two competent men, a motorman and a conductor, and shall be operated singly, except when otherwise expressly authorized by the City Council."

Sec. 12. The company is permitted to operate funeral cars and separate cars for the mails, and for the carriage of parcels and packages. Cars for parcels and packages may be operated only between 8 P. M. and 5 A. M., unless otherwise authorized by the City Council. The Council reserves the right to regulate the rates to be charged by the company for the carriage of parcels and packages.

Sec. 13. On the order of the Mayor and Commissioner of Public Works, street sweepings, garbage and other refuse shall be removed by the company, for reasonable compensation. Arbitrators are to fix the compensation in case the company and the city's officers do not agree. Suitable and convenient dumping grounds are to be provided by the city for the street sweepings and garbage, and the company is to be permitted to connect its tracks with such grounds.

Sec. 16. The company must remove all unused tracks that exist now or may hereafter exist. Failure to operate cars for passengers at least once each way within every hour of the day, between 6 a. m. and 8 p. m., shall be considered a cessation of the use of the tracks, unless the operation of cars is interfered with by "unavoidable accidents, labor strikes, or litigation brought without connivance of the company."

Sec. 17. Provides for a 5-cent fare for each passenger over 12 years of age, and a 3-cent fare for each passenger over 7 and under 12 years of age. Children under 7 years of age, accompanied by parent or guardian, shall be carried free. Transfers are to be given and accepted so that a passenger may ride, in one general direction, from any one point in the city to any other point in the city, reached by the company's lines, for a single fare. The company need not give a transfer when the passenger can reach his destination by means of a through car. Transfers are to be good for thirty minutes.

Sec. 18.—Transfers are to be given between the lines of the Chicago Union Traction Company and the Chicago City Railway Company as though both lines were owned by the same company, except that this privilege shall not apply east of Clinton Street and north of Twelfth Street.

Sec. 19. Through lines of street cars are to be operated as shown in "exhibit C" accompanying the ordinance, and are specified in the section to be established in Halsted Street, Western Avenue, Kedzie Avenue and Ashland Avenue. The through lines are to be operated "if and so long as the traffic warrants as to each of them," and any of them may be discontinued if the city shall so order.

Sec. 20. The company is to pay into the treasury of the city on the fifteenth day of each January the following percentages of its gross receipts: For each of the first three years, 4.08 per cent; for each of the next two years, 6.08 per cent; for each of the next ten years, 8.08 per cent, and for each of the next five remaining years, 11.08 per cent. All franchise taxes, including so-called taxes on capital stock, paid to taxing bodies in the State of Illinois, are to be deducted from the amount so paid, each year, as are all license fees and franchise taxes and all other taxes, except those upon the tangible property of the company. At any time the city may compute the percentages of gross receipts into a reduction of fares.

Sec. 21. The company is to indemnify and save harmless forever the city from and against all damages, judgments, decrees, costs and expenses growing out of the exercise by the company of the privileges in the ordinance. A penal bond of $250,000 is to be given by the company to the city to this end.

Sec. 22. A report on the gross receipts of the year ending on the previous 31st day of December is to be filed by the company with the City Comptroller by Feb. 28 of each year. The Comptroller may at all times verify the reports by examination of the books of the company, and may also examine the books at any time during the year in which an appraisement is to be made of the value of the company's property.

Sec. 23. By the acceptance of the ordinance the company obligates itself and expressly agrees to comply with all its terms and conditions. It further agrees that if it shall make default "in the due observance or performance of any of the agreements or conditions" of the ordinance throughout a period of six months, exclusive of delays due to unavoidable accidents, labor strikes or the orders or judgments of any court of competent jurisdiction entered in any suit brought without its connivance, after written notice thereof to it from the city, the city may declare the grant and all the rights and privileges of the company forfeited.

Sec. 25. New construction of street railways may be ordered by the City Council, not to exceed 3 miles of double track or 6 miles of single track per year, during the life of the grant. There must be no existing parallel track nearer than one-half mile, and at least an average of 150 families must reside in each mile, within one-fourth of a mile of the street or public way in which the new track is to be laid. No such extensions shall be required during the period of reconstruction, within the last year of the term of the grant, or after the city has given notice of its intention to purchase the lines.

Sec. 26. Municipal ownership. At the end of the first ten years the city may elect to purchase the property of the company; it may so elect at the end of the first thirteen years, or again at the end of the first sixteen years from the date of the grant. Such purchase may be for municipal operation only. The city is to pay the then cash value of all the real and personal property of the company, and also the then fair cash value of all the then unexpired rights of the company in the street, under franchises existing at and prior to the passage. If the city elects to purchase, it must give the company a written notice to that effect at least one year, and not more than two years, prior to the time the purchase is to be made. The purchase price is to be determined by appraisement, one appraiser to be appointed by the city, another by the company and the third by the two thus selected. The third appraiser is not to be a resident of Illinois. Should either the city or the company fail to appoint an appraiser and give notice thereof, as provided, or should the two appraisers first appointed fail to agree upon the third appraiser within thirty days, either party, by giving a written notice of ten days to the other party, may apply to the chief justice of the Supreme Court of Illinois and two judges, not residents of Illinois, of the Circuit Court of the United States for the circuit of which the Northern District of Illinois shall be a part, and any appraiser appointed by them, or any two of them, shall have the same powers and duties as an appraiser appointed by either the city or the company. The appraisers shall determine the fair cash value of the tangible property and unexpired franchises of the company (exclusive of this franchise), and the city may acquire title to the property on payment of this price to the company. If the city shall fail to pay or deposit the appraised price within one year after the announcement of the appraised value the appraisement shall become null and void. Should the city fail to take the property it must pay all the expenses of the appraisement; otherwise the expenses are to be divided equally between the city and the company. The right of the city to acquire the property is expressly limited to purposes of municipal ownership, and the lines may not be leased to another company or operated otherwise than by the city, if taken over, during the twenty years of the grant.

Sec. 27. During the term of the grant the company shall not remove its principal office beyond the limits of the city. The street railway property or any of the rights secured under this ordinance shall not be pledged as security for the payment of notes, bonds or other evidences of indebtedness maturing later than twenty years from the passage of this ordinance, the intention being that at the end of the term of the grant the company will be able to give a clear title to all its property, tangible or intangible, to the city.

Sec. 28. At the end of the grant the city or its licensee shall have the right to purchase all the property of the company at its then fair cash value. A written notice of its intention so to purchase must be given by the city or its licensee at least one year and not more than two years before the expiration of the grant. The purchase price shall be determined by appraisers selected as provided in Sec. 26. No franchise value to be considered in this appraisal. The city, in paying for the property, may deduct the then face amount of all indebtedness then secured by mortgage against the company and take the property subject to the mortgage indebtedness. If the city shall give notice of its intention to purchase, or to cause to be purchased, the property of the companies at the end of the twenty years' period, such notice shall constitute a contract obligating the city either to buy at the appraised price or to require the licensee to by at the appraised price.

Sec. 29. The city intends by this ordinance to create conditions that at the end of the twenty years of the grant will result in either purchase by itself of the company's street railway system or purchase of the system by the city's licensee. If the city shall neither exercise its reserved right to buy the company's system nor cause its licensee to make such a purchase, but shall make a new grant to the company, the then fair cash value of the company's tangible property shall be taken as the value of the then investment of the company, regardless of franchise values or the market values of the company's stocks and bonds.

Sec. 30. Contains a general waiver of the ninety-nine-year rights by the companies, to apply at the end of the twenty years' period. Should the city prior to the end of the twenty years acquire the property of the companies by condemnation proceedings or appraisement, just compensation for the then value of the ninety-nine-year rights shall be allowed "precisely as if this waiver and surrender had not been made."

Sec. 31. The company shall lower the tunnels under the Chicago River at Washington Street and near Van Buren Street so that the summits of their crowns shall be 26 ft. below Chicago datum. This work is to begin immediately on the passage of the ordinance, and to be finished on compliance with the act of Congress relating thereto (tunnels not to obstruct navigation after April 15, 1906). All work on the tunnels is to be done with the approval of the Commissioner of Public Works. In appraising the company's property under the terms of Secs. 26, 27 and 28 of the ordinance, the Van Buren Street tunnel and the reconstruction work on the Washington Street tunnel shall be considered part of the railway system. During reconstruction and repair of the tunnels the company shall have permission to operate the cars and trains now using the tunnels over the bridges and on the South Side terminals, by electricity instead of cable.

The local transportation committee on Dec. 4 reported this franchise extension ordinance to the Council, with the recommendation that it be passed by the Council, and thereafter lie on the table until the qualified voters of the city have opportunity to express their wishes in respect to it at next spring's election. The committee also reported out Mayor Dunne's plan providing for an issue of Mueller law certificates to pay for a municipal street railway system. This latter was reported with the recommendation that it be placed on the ballot at next spring's election in accordance with the public policy act, which will require the filing of a petition signed by 25 per cent of the voters. This will give the people a chance to say which they prefer. The ordinance was deferred one week by the Council and ordered published. Judging from the general tone of the Council it is likely to pass next week.

In their report to the Council the local transportation committee said:

The one immediate need of the people of Chicago is a first-class unified street railway service covering the entire city. To some it has seemed impossible to secure such a service without resorting, at whatever cost of time and money, to public ownership and operation. We have had presented to us one plan after another guaranteed to bring about municipal ownership, fragmentary at first, to become complete in some remote and wholly indefinite future. Each of these plans was framed without regard to legal limitations. Each promises additional confusion and further disruption of the present wholly inadequate street railway service. No one of them offers even the hope of a complete and unified service within a period which its sponsor dares to predict. It is a vice of each of them that its adoption would not settle the problem of local transportation or give promise of any early improvement of the service. No one of them has ever been presented to the voters or even received their indirect approval.

We are not impressed by the contention that the election of the present Mayor, upon a platform expressly promising immediate purchase or condemnation of the tangible properties and existing franchises of the present companies and nothing more, meant the indorsement by the people of the various schemes which he has sought to substitute for that programme.

Your committee, after a prolonged study of the situation, has been unable to find any means for the immediate and complete solution of the street railway problem except through negotiations with the existing companies. They have extensive rights in the streets which all concede, and greater claims which have led to protracted litigation still undetermined. We deem it sound business policy once for all to terminate all existing grants expiring at different times, and disputed claims of real importance, by the substitution of comprehensive contracts securing reconstruction of the roads and unified service with a single fare throughout the city, and giving the city as soon as possible entire freedom of action in respect to local transportation.

The accompanying ordinances secure to the city all for which the people have so long contended. We believe that they reach the limit of concession by the companies; and that the choice lies between their acceptance and prolonged litigation with the continuance of intolerable service. Every public interest will be advanced by their passage.

The negotiations for the railway companies have been mainly in the personal charge of President Mitten, of the Chicago City Railway Company. He has been assisted in this work by Ford, Bacon & Davis, who have been acting as special experts on this problem.

A PECULIAR SUIT AT LAW

A peculiar case at law is the one in which A. R. Knowles received a verdict in the District Court of Tarrant County, Texas, for $10,000 against the St. Louis, San Francisco & Texas Railway Company, and in which the Northern Texas Traction Company received a verdict in its favor.

On the morning of Feb. 1, 1905, a collision occurred at 6:30 o'clock between a car of the Northern Texas Traction Company and a freight train of the St. Louis, San Francisco & Texas Railway Company, at a point about a mile north of the court house in Fort Worth, this point being within the corporate limits of the city of North Fort Worth, which joins the city of Fort Worth on the north. The street car was coming south, towards and into the city of Fort Worth, from a point near the packing houses in North Fort Worth, leaving this point near the packing house at 6:18 a. m., and arriving at the point of collision about 6:30 a. m. The train consisted of two cattle cars and one box car in front of the engine of the regularly made-up freight train, and had started on its way from Fort Worth to Sherman, pushing the three cars in front of the engine for the purpose of making delivery of the two cattle cars to the Fort Worth Belt Railway Company, and of the box car to the Cotton Belt Railway Company, at points near and just beyond the point of collision.

The main question in the case was, whether the railroad company or the traction company was liable to the plaintiff for the injuries which were inflicted upon him. The street car company contended that it exercised all proper precaution in the operation of its car at the time of the collision, and before the collision; that is, that the car was stopped, and that those in charge of the car looked and listened for the approach of the train, before crossing or attempting to cross the track of the railroad company; that they did not hear any train, and saw no light or signal of any kind, to warn them of the approach of the train, and that having exercised these precautions, they had a right to presume and did presume that the railway company would give the necessary and statutory signals, and that indulging in these presumptions they proceeded and went upon the track of the railroad company, and that, therefore, the collision was without fault upon the part of the street car company. The Northern Texas Company further contended that the pushing of three cars in front of a reuglarly made-up freight train, starting on its journey from one city to another, and delaying to act in a switching capacity, was improper and constituted negligence upon the part of the railroad company, and that no whistle was blown, no bell rung, and no lights displayed by the railroad employees, although it was very early in the morning, and cloudy and foggy.

The railroad company admitted that the bell was not rung nor the whistles blown as required by law. Its contention was that it had the head brakeman on the forward end of the forward car which was being pushed, and that he did display his light to give warning of the approach of the train. The railroad company also contended that the street car did not stop, and that the street car employees did not look and listen for the approach of the train.

The plaintiff, A. R. Knowles, was a passenger on the street car at the time of the collision. He received a verdict as before stated against the railroad company for $10,000, and a verdict was rendered in favor of the street car company by the jury. The railroad company has filed a motion for a new trial, and will appeal the case to the Court of Civil Appeals.

W. C. Forbess, claim agent for the Northern Texas Traction Company, did very effective work in the way of digging up evidence for the case and was complimented by the company's attorneys, Messrs. Capps & Carty, of Fort Worth.

CHICAGO AND MILWAUKEE CONNECTED

The last link in the chain of interurban roads connecting Chicago and Milwaukee was completed Dec. 2 by the opening of the Chicago & Milwaukee Electric Railroad Company's line between Zion City, Ill., and Kenosha, Wis. The company has operated for a number of years from Evanston to Waukegan, and last summer opened that part of the line between Waukegan and Zion City. Notice was recently given in these columns of the purchase of the Kenosha Electric Railway from Bion J. Arnold, its owner, by A. C. Frost, president of the Chicago & Milwaukee Electric Railroad Company. The latter company by this purchase secures a right of way clear through Kenosha to its northern city limits, where it connects with the cars of the Milwaukee Light, Heat & Traction Company, running to Milwaukee. The trip from Chicago to Milwaukee can now be made over the electric lines for $1.25, and the round-trip for $2.15, or less than half the steam railroad fare. The time required from the center of one city to the center of the other is about 5 hours. The time from Evanston to Kenosha over the Chicago & Milwaukee Electric Railroad Company's lines is 1 hour and 45 minutes. This company now has 60 miles of road, almost all of which is double track, and part of which has four tracks. A sub-station has been built at Kenosha, to supply power at the north end of the line. A new power house, designed to contain 25,000 hp in steam turbines, is to be built on the beach at Waukegan, replacing the present power house at Highwood. At the southern end of the line, from Evanston to Fort Sheridan, a service at 10 minutes headway is now given. Between Fort Sheridan and Waukegan the headway is 20 minutes, and between Waukegan and Kenosha the headway is 1 hour, which will be reduced to 40 minutes after Jan. 1.

The opening of the line was celebrated by a banquet at Kenosha Dec. 2, at which the company entertained the mayors and aldermen of the villages through which the road passes and county officials. The guests were taken to Kenosha by three special trains. The banquet was served under the direction of the company's steward, who has regular charge of the café service at Ravinia Park and Fort Sheridan Park.

NEW YORK, NEW HAVEN & HARTFORD GETS OTHER PROPERTIES

The New York, New Haven & Hartford Railroad has added to its already extensive street railway interests in Western Massachusetts by acquiring control of the Woronoco Street Railway, of Westfield, and the Western Massachusetts Street Railway, which has franchises for a line from Westfield to Lee. A part of its line is built. When completed the road, with the Woronoco line, will form a connecting link between the Springfield Street Railway on the east and the Berkshire Street Railway on the west, both consolidated properties. Stockholders of the Woronoco Street Railway will receive $175 a share for their stock, or they may take in exchange Consolidated 4 per cent bonds at $180. The company is capitalized at $250,000, and has 17 miles of track, running to Springfield and Holyoke. The Western Massachusetts Railway is practically a branch of the Woronoco, and has 12 miles of track, extending from Westfield to Huntington. It holds unexpired franchises in Chester, Becket and Lee, where connections will be made with the Berkshire line. If, as is stated, the Consolidated intends to put on through trolleys between Springfield and Pittsfield, as soon as the necessary road is built, the line will be in direct competition for passenger traffic with the Boston & Albany division of the New York Central.

The first electrical section of the West Shore Railroad will be opened to trolley traffic on Dec. 15, when cars of the Utica & Mohawk Valley Railway will be run between Frankfort and Herkimer, a distance of 2 miles. This makes possible the reduction of running time between Utica and Little Falls from 1 hour and 20 minutes to 1 hour or less. Ilion and Mohawk villages refused to permit the double-tracking of existing trolley lines, and in consequence the through cars practically go around each.

MR. CONNETTE ON THE QUESTION OF EXPRESS

E. G. Connette, general manager of the Worcester Consolidated Street Railway Company, was the speaker at the first of the winter smoke talks of the Worcester Board of Trade, given a few evenings ago. Mr. Connette's subject was "Evolution of Transportation Methods." It was the first opportunity that the business interests of the city have had publicly to meet Mr. Connette, and there was a large attendance present of those who realize the bearing that the careful management of the street railway lines has upon the fortunes of a city.

In presenting Mr. Connette the presiding officer called attention briefly to his achievements in the street railway field, referring more particularly to the excellent record made by him in the rehabilitation and management of the Syracuse Rapid Transit Street Railway Company. He then formally introduced the speaker. Mr. Connette, in his speech, reviewed very briefly the industry from its beginning, hastening on to the subject of handling express, which had to do with local interests. On this subject he said so much that is of general interest that it seems advisable to quote from his own remarks. He said in part:

"The subject of freight should interest the Board of Trade of the city of Worcester, because this city is in the midst of a large number of hamlets, villages and small cities, all of which are connected with electric lines diverging from the city of Worcester, and a convenient, quick express electric service, operated over all interurban lines leading out of Worcester to these clusters of population, will stimulate and enlarge the business of the city of Worcester.

"The Board of Trade is doubtless familiar with the fact that wagon trains are still being operated between Worcester and the suburban towns and villages, the antique methods of years ago.

"Some may question the development of express service because they confound the word 'express' with the word 'freight.' I desire to draw a distinction between the question of handling freight and handling express matter.

"I would not for a moment advocate, as a representative of the street railway company or as a citizen, the hauling of freight cars through the streets of Worcester, but the handling of express cars, which are built on the same plans and along the same lines as passenger cars, operated under the same conditions, with no additional burden on the streets whatsoever, is a different proposition.

"The operation of an electric express radiating from the city of Worcester to the contiguous clusters of population which surround the city within a radius of 30 miles, would stimulate and increase the volume of business which is now done by the members of the Board of Trade.

"At the present time Worcester is still enjoying the antique methods of handling a large portion of its business by wagon trains between the city and the continguous villages and towns, and the shipment of stuff by steam railroad trains. With an electric express service, where two or three trips are made daily on the interurban electric lines, it would bring the business in close connection with this city, and the same results will be obtained as have been obtained in other States; that is, a large increase in the volume of business, and the express service would in time be as indispensable as the telephone.

"You may say that I am merely talking for the interests of the street railway; from one point of view I am, because if an electric express service was started by the street railway company, it would, of course, expect to handle the business with some profit, but the subject is certainly of mutual interest, so far as that is concerned to the farmer, merchant and manufacturer, and the man who has anything to buy or sell is as much interested in increasing his volume of business as the street railway company.

"There are several obstacles to be overcome before the service could be put into operation by the street railway company, and it occurs to me that the subject is one which should receive the cooperation and support of the Board of Trade of this city."

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED NOV. 21, 1905

804,914. Car Fender. George Allen, Franklin, Pa. App. filed July 8, 1905. A rectangular frame having a tightly stretched net is swiveled vertically in front of the car, and may be swung into an angular position so as to deflect an object upon the track to one side or the other of the car.

804,933. Beam Strut. Nathan H. Davis, Philadelphia, Pa. App. filed April 14, 1905. The strut is made with an eye at one end to engage the usual tension rod, and has a two-part hook at the other end, one-half of which is removable, and which may be bolted to the integral half so as to grasp the web of the T-beam forming the compression member. The structure is designed brake beams.

805,059. Automatic Switching Device. Joseph A. De Ford, Logansport, Ind. App. filed May 1, 1905. A pivotal shoe between the track rails is engaged by a depressible roller upon the car to throw the switch point to its alternate position in case its setting is not right.

805,062. Guard for Third Rails. Augustus A. Hickerson, Reynoldsburg, and William H. Phalor, Shepard, Ohio. App. filed Feb. 6, 1905. A wooden housing for the third rail having a pitch roof or cover, and having means for securing the usual feed wires to its rear wall. Has a front guard plate, which is removable.

805,124. Sleet Cutter for Third Rails. Ervin A. Dunbar, Wheaton, and Walter H. Rogers, Warrenville, Ill. App. filed March 18, 1905. A double series of toothed discs or cutters are revolubly supported in bearings upon a hanger generally similar to that of the ordinary third-rail contact-shoe.

805,166. Electric Rail. Louis Steinberger, New York, N. Y. App. filed Jan. 3, 1905. The current carrying part of the third rail is m-shaped in cross-section, and is dove-tailed into the upper surface of a supporting rail, a sheet of insulating material being included between the two. Heat coils are provided for melting the sleet in cold weather.

805,193. Body Bolster. Thomas M. Gallagher, Old Orchard, Mo. App. filed April 4, 1905. Relates to the detail construction of the compression plate for the bolster of a bogie truck. The compression plate is made with round ends, which engage a correspondingly curved recess in the bolster so as to constitute an interlocking engagement.

805,223. Bolster. Peter H. Murphy, St. Louis, Mo. App. filed May 27, 1905. An I-beam is provided with transverse pins through opposite ends of its web, which engage eyes upon the tension rods. The usual struts are cast in such a form as to interlock with the flanges of the I-beams.

805,311. Fender. John L. Matthews, Hyde Park, Mass. App. filed Aug. 1, 1905. A fender comprising a rear section and a front section pivotally connected therewith, said rear section including a spring frame and the front section having a front buffer element composed of soft rubber.

805,326. Car Vestibule. John P. Sjoberg and Ernst L. Forsgren, New York, N. Y. App. filed July 31, 1905. The vestibule is made with a polyganol front having plane glass windows, which are designed to slide transversely. In order to permit the windows to move around the angles of the polyganol front, the windows are swiveled to their supporting rollers.

805,329. Brake Mechanism. Cassius D. Thomas, Moberly, Mo. App. filed Nov. 1, 1904. Has a pair of direct-brake levers and a pair of indirect-brake levers operated by a lever which fulcrums upon the direct levers.

805,364. Brake Rigging. William F. Kiessel, Altoona, Pa. App. filed August 23, 1905. Has a pair of horizontally disposed rocking levers, and the two pairs of brake-shoes are respectively cross-connected to the ends of these levers so as to be simultaneously tightened.

805,400. Ice Remover for Trolley Wires. Montraville A. Wood, Chicago, Ill. App. filed March 23, 1905. An endless elastic band having a plurality of cutters thereon, is engaged around the usual trolley wheel when there is any ice or sleet upon the wire.

805,427. Wheel. Henry H. Porter, Chicago, Ill. App. filed Nov. 21, 1905. The wheel flange is independent of the body part of the wheel, and may be held concentric therewith when the vehicle is running upon a car track, or may be moved to rotate on a slightly higher axis when the vehicle is running on a flat surface, such as a roadway.

UNITED STATES PATENTS ISSUED NOV. 28, 1905

805,568. Trolley Base. Henry R. Lockhart, Westmount, Can. App. filed July 23, 1904. Provides a trolley base having universal movement and arranged to permit the trolley pole to swing on a bearing parallel to the roof of the car lengthwise.

805,572. Trolley Wheel. Alexander H. Mathesius, Brooklyn, N. Y. App. filed May 24, 1900. To prevent slipping of the trolley wheel and abrasion of the trolley wire the wheel and wire are provided with corresponding straight transverse contact lines. The flanges of the wheel are revoluble independently of the tread portion, so as to compensate for the different surface speed.

805,627. Guard-Rail Clamp. Jasper Butcher and James L. Thomas, Gainesville, Tex. App. filed July 21, 1905. The guard rail is held in properly spaced relation to the track rail by a pair of clamping hooks, the rails being pressed thereagainst by wedges attached to threaded tie hooks.

805,638. Rail Joint. Henry Driehous, Hendricks, Pa. App. filed March 30, 1905. A clamping plate is bent so as to embrace the base of the rail and the web portion thereof, the surfaces engaging the base being inclined or wedge shaped, so as to be tightened on the rail when the plate is pressed into position.

805,644. Rail Brake. Benjamin V. Gilmore, Redhouse Sholes, W. Va. App. filed May 15, 1905. A frame having depending flanged edges is adapted to be placed over the usual track rail, and has a clamping shoe for engaging the rail under the influence of a circular wedge operated by a lever arm.

805,684. Machine for Moving Snow. Owen Sullivan, Belmond, Ia. App. filed March 22, 1905. A funnel-shaped casing or scoop is attached to the front of a car, and has a revolving wheel with radial arms for impelling the snow toward its upper or narrow end. A centrifugal blower is effective to finally dispose of the snow.

805,690. Spike Lock. Harry S. Waterman, East Tawas, Mich. App. filed May 15, 1905. A plate with an opening for the usual spike, having an inclined prong which prevents the withdrawal of the spike when it is engaged.

805,773. Railway Switch. Lewis L. Biglow, Sultan, Wash. App. filed Nov. 9, 1904. The car has a pair of depending oppositely flanged rollers which can be moved down to engage a wedge-shaped cam rail, so as to move the same and throw the switch point.

805,802. Car Seat. Frederick Kohout, St. Louis, Mo. App. filed Dec. 5, 1903. The usual parallel rods which support the back of a reversible car seat, have bails rigidly secured thereto, which swing into position to form foot rests appropriate to the position of the seats.

805,831. Rail Joint. John E. Alexander, Covington, Va. App. filed June 22, 1905. The rail ends set within a suitably recessed base plate with inclined corrugated surfaces opposite the webs of the rails. Correspondingly corrugated wedges engage these surfaces for holding the rails in position.

805,849. Car Replacer. Henry K. Gilbert, Chicago, Ill. App. filed Nov. 1, 1904. A pair of steel castings with sharp prongs or teeth on their lower surfaces are adapted to engage the ties, and have specially formed curved upper surfaces adapted to replace the car wheels.

805,902. Track Rail and Rail-Joint connection. Charles W. Clark, Chama, New Mexico. App. filed May 23, 1905. The rail ends are made hollow and dove-tail onto a specially formed splicing member.

805,905. Railway Rail-Joint. John T. Evans, New York, N. Y. App. filed July 14, 1904. The base of the rail is made with longitudinal grooves which engage corresponding ribs or flanges upon the fish-plates, so as to produce interlocking engagement.

805,921. Steel Car Side Structure. Charles A. Lindstrom, Alleghany, Pa. App. filed Dec. 19, 1904. Steel structure for hopper gondola cars, having side plates with exterior stiffening beams riveted thereto, and extending vertically from points beneath a horizontal top rail.

805,928. Guard Rail. William H. Moore, Waveland, Ind. App. filed Aug. 29, 1905. The guard rail comprises a specially made casting with lateral lugs, which serve to space it properly from the track rail. Ordinary bolts are used to clamp the two together.

805,940. Car Truck Frame and Pedestal. Ransom C. Wright, Philadelphia, Pa. App. filed Aug. 31, 1904. Ordinary I-beams are used for the side frames of the truck, and have castings riveted thereto which form the guides for the usual journal boxes.

805,999. Locomotive. Hugh Reid, Springburn, and David M. Ramsey, Mount Florida, Scotland. App. filed July 1, 1904. An electric locomotive of the type having a boiler, engine and generator set within the car body. The sides of the car are fitted with radiating tubes, which serve as a condenser so as to permit the use of condensing engines.

806,022. Car Truck. John Taylor, Troy, N. Y. App. filed Aug. 31, 1905. The guide plates for the journal boxes have wedge surfaces on their supporting faces so that they may be adjusted for wear of the journal boxes by a longitudinal movement. The plates are held in position by ordinary bolts.

806,023. Rail-Joint. George W. Thurman, Cache, Oklahoma Territory. App. filed Dec. 27, 1904. The webs of the rails are cut away at the rail-joints and the fish-plates have ribs which enter the cut-away portions, so as to permit a slight longitudinal movement to allow for expansion and contraction. The fish-plates are held together by bolts in the usual way.

806,035. Electric Signaling and Electropneumatic Train Control System. John A. Whyte, Toronto, Can. App. filed Sept. 2, 1904. A pair of trolley conductors are specially laid, adjacent to the usual track rails, and a signal circuit completed when two trains occupy the same block, is effective to notify the engineers by means of electropneumatic apparatus within the engine cab.

LARGE BRAKE ORDER FOR BROOKLYN

The Brooklyn Rapid Transit Company has just placed an order for 300 Peacock brakes to equip the 150 cars which have been built by the J. G. Brill Company and the Laconia Car Company, and which were described in the STREET RAILWAY JOURNAL of Nov. 18. This order makes over 700 Peacock brakes purchased by the Brooklyn Rapid Transit Company within the last six months.

PERSONAL MENTION

MR. JAMES CAHILL, a former division superintendent of the old Brooklyn City Railroad Company and an employee for forty years, is dead.

MR. CHARLES D. NOYES has been elected secretary of the Groton & Stonington Street Railway Company, of Stonington, Conn., to succeed Congressman-Elect Edwin W. Higgins, resigned.

MR. J. B. WHITEHEAD, assistant purchasing agent of the Public Service Corporation of New Jersey, with offices in Newark, has been appointed purchasing agent of the Lehigh Coal & Navigation Company, with headquarters in Philadelphia.

MR. ROBERT P. PORTER, of New York, former head of the United States Census Office, has been awarded a silver medal by the Society of Arts, of London, for his paper, "London Electric Railways," read at the sessions of the society held in 1904 and 1905.

MR. FRANK S. TODD, who has been connected with the J. G. Brill works as car finisher, has accepted a position as foreman car builder with the International Railway Company, of Buffalo. Mr. Todd has also had considerable experience in car building with the American Car & Foundry Company at Berwick, Pa., with the Philadelphia Rapid Transit Company, and with other companies.

MR. R. G. OLIVER, who has been master mechanic of the Dauphin Street shop of the Philadelphia Rapid Transit Company, has been appointed master mechanic of both the Dauphin Street and the Kensington shops of the company. Mr. Frank Wampler, who has been master mechanic of the Kensington shops, has resigned to take an important position with the Public Service Corporation of New Jersey.

MR. W. B. GRAHAM has resigned as superintendent of surface lines of the Brooklyn Rapid Transit Company, and that position has been abolished. Mr. W. O. Wood, who has heretofore been superintendent of elevated lines of the company, has been appointed assistant general superintendent of the company, and Mr. L. V. Smith, who has been Mr. Wood's assistant, has been appointed superintendent of elevated lines.

MR. JAMES E. McVEY, a prominent attorney of Youngstown and secretary and general counsel of the Pennsylvania & Mahoning Valley Railway, died at his home in that city last week. Mr. McVey was associated with the Youngstown railways for a number of years, and was largely instrumental in effecting the recent consolidation of the Mahoning Valley and Youngstown & Sharon properties. His funeral was attended by a large number of traction men from Eastern Ohio and Northwestern Pennsylvania.

MR. WILLIAM DARBEE, who for the past four years has been general superintendent of the Connecticut Railway & Lighting Company, with headquarters at Bridgeport, has resigned from the company, and has assumed the position of engineer of the newly-created Commission of Gas and Electricity of New York State. Mr. Darbee was educated at the Brooklyn Polytechnic Institute and Stevens Institute, and was with the Brooklyn Rapid Transit before coming to the Connecticut Railway & Lighting Company.

MR. HENRY N. ROCKWELL, of Yonkers, has been appointed by Gov. Higgins, of New York, as the fifth member of the State Board of Railroad Commissioners. Mr. Rockwell is conductor of the second Empire State Express on the New York Central & Hudson River Railroad, and has been in active railroad service for more than forty years. His appointment completes the membership of the commission, which was increased from three to five by the Tully law, passed at the last session of the Legislature. The term of office is five years.

MR. HORACE ANDREWS, president of the Cleveland Electric Railway and active head of the Vanderbilt-Andrews-New York Central syndicate, it is reported on good authority, has been invited by Mr. Charles T. Yerkes, who is now in this country, to accept the presidency and management of the London Underground Railway. Daily newspapers quoted Mr. Andrews as stating that he had received such a proposition, and that he was still considering it. Mr. Andrews informs the STREET RAILWAY JOURNAL that he did not authorize such a statement, and that he must decline to be quoted about the matter. Close friends of Mr. Andrews intimate that he will hardly accept the position, as his New York Central plans offer greater possibilities for development than could anything offered abroad.

MR. D. H. LAVENBERG has resigned as general manager of the Toledo & Indiana Railway, with headquarters at Delta, Ohio, and has been suceeded by Mr. E. E. Darrow, until recently chief engineer of the Toledo, Bowling Green & Southern Traction Company. Mr. Darrow has been suceeded by Mr. Charles Kilgore, of Cincinnati. Mr. Lavenberg was formerly general manager of the Northern Texas Traction Company and before that was division superintendent of the Lake Shore Electric Railway. He has been in the railroad business for many years, and has been particularly successful in the development of freight business.

MR. JOSEPH SACHS, whose name has been intimately associated with the enclosed fuse development, has resigned from Johns-Pratt Company, of Hartford, Conn., and the Arknot Company, of Hartford, Conn., has been organized, with Mr. Sachs as president, to do a general business in small electrical appliances and accessories, including devices such as those with which Mr. Sachs' name has been connected for several years. The company expects to have a complete line of National Electric Code standard enclosed fuse appliances ready for the market in the near future, as well as a number of allied specialties.

MR. I. A. McCORMACK, manager of Harlem line of the New York Central Railroad out of New York, has had his jurisdiction extended from Mott Haven to High Bridge on the Hudson division, and to Wakefield (Woodlawn) on the Harlem division, with title of general superintendent of electric division; having charge of the passenger train operation heretofore under the direction of the division superintendent. The direction of freight train and station operation, freight car distribution, and the despatching and recording of train movement between the points specified remain under the direction of the respective division superintendents.

MR. RANDALL MORGAN, of Philadelphia, with Mr. W. Kelsey Schoepf, of Cincinnati; Mr. H. J. McGowan and Mr. James Murdock, of Indianapolis, and others of the co-called Widener-Elkins syndicate, last week made a trip of inspection over a number of Ohio and Indiana properties in which they are interested. A considerable portion of the trip was made in the private car "Martha" of the Indiana Union Traction Company. They visited Cleveland and held a conference with Mayor Tom L. Johnson. This gives rise to the report that they are negotiating for the Cleveland city properties, and that they desired to sound Mayor Johnson as to the future of his 3-cent fare campaign before going into the proposition more fully.

MR. W. J. SHERWOOD, who has served as chief clerk of the general superintendent's office of the Brooklyn Rapid Transit Company under three general superintendents, has resigned from the company to become assistant to President and General Manager W. W. Wheatly, of the Mexican Electric Tramways, Ltd., which operate the street railway lines in the City of Mexico and its suburbs. Beginning his railroad work in the office of the train despatcher of the New York Central Railroad some twelve years ago, Mr. Sherwood became connected with the Brooklyn Rapid Transit Company in 1895, and has been with that corporation continuously, with the exception of a short period with the Public Service Corporation of New Jersey. Mr. Sherwood will sail Dec. 14 for Mexico with Mr. Wheatly and Mr. Paul H. Evans, engineer and purchasing agent of the company, who are now in New York.

MR. BLAKE A. MAPLEDORAM has resigned as vice-president and general manager of the Northern Texas Traction Company to become connected with the Washington, Baltimore & Annapolis Railway, now under construction between Baltimore and Washington. At the time of the sale of the Northern Texas property to the Stone & Webster syndicate, Mr. Bishop, the former president, asked for Mr. Mapledoram's release, as he wanted Mr. Mapledoram to be associated with him in the construction of the Baltimore-Washington-Annapolis railway. With that understanding, arrangements were satisfactorily made with Messrs. Stone & Webster, and Mr. Mapledoram left the Northern Texas Traction Company after straightening up some personal matters in Fort Worth. The retirement of Mr. Mapledoram from the management of the traction company was sincerely regretted by the employees of that line. As a slight token of appreciation of the respect they have for him, practically all the employees of the Fort Worth, the Interurban and the Oak Cliff lines congregated at Lake Erie a few evenings ago, and Mr. Mapledoram was with them. A smoker was spread, and during the evening, on behalf of the employees of the company, W. M. Short presented to Mr. Mapledoram a handsome silver loving cup and a most elaborate solid silver electric light desk stand, which came as a complete surprise. Mention has already been made in the STREET RAILWAY JOURNAL of the appointment of Mr. H. T. Edgar, of El Paso, Tex., as the sucessor of Mr. Mapledoram.

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Of this issue of the Street Railway Journal 8000 copies are printed. Total circulation for 1905 to date, 408.350 copies, an average of 8167 copies per week.

Quarterly Meetings of the New York State Association

The announcement made elsewhere in this issue that the New York State Street Railway Association intends to hold regular quarterly single-day meetings, in addition to its annual convention, records a step in the right direction. In good work accomplished, this association has always enjoyed an enviable reputation. Its annual meetings have always been well attended, and the papers and discussions form a library of exceedingly valuable information. The institution of single-day meetings or conferences to be held every three months, each conference to be devoted to some departmental topic, will be received with enthusiasm, and gives promise that the educational and research work so skilfully accomplished by this association in the past will be continued in a broader and higher degree.

Not the least welcome part of the announcement is the promise that the entire day selected for the conference will be devoted wholly to serious work. There are to be no exhibits, no supply-men, no entertainments, and nothing to detract from the main issues before the meeting. The elimination of the slightest tendency toward turning the meetings into "junkets" will meet the approval and support of the entire membership. The invitation so cordially extended to non-member companies, located not only in New York State, but outside the State as well, to send representatives to these quarterly conferences is an earnest of the intention and desire of the present officers and executive committee to increase and enhance the valuable educational and research work upon which the association has built so excellent a reputation in the past.

Interurban Railway Building in the East

It is a well-known fact that the center of typical interurban railway construction up to the present time has been in the Central States, especially in Ohio, Indiana and Michigan. Ohio was the first State to build an interurban road and railways of this class, and they were for a long time a practically unique feature of its transportation system. At present, however, Indiana and Michigan have also developed interurban systems which rival those of Ohio in importance, while Wisconsin, Illinois, Missouri and other States in the Mississippi Valley are rapidly following the lead set them by their neighbors. It is a striking fact that the further we travel East the more different do we find conditions. The roads in the States mentioned have in nearly every instance been projected as interurban lines and have been built on their own right of way and intended for high speed. In New England, on the other hand, the interurban lines are of quite a different character from those encountered in the West. High speeds are not attempted, as a rule, the tracks are for the most part built on the highway, and nearly all of the lines are the outgrowth of local systems, and simply link together the tramways in neighboring towns and villages. Following along this line of thought, we note that the rolling stock of the Western roads is, on an average, far heavier and higher powered than the cars found on Eastern systems. In other words, if a score of typical electric railway systems of the Middle West be compared with a similar number in the East, it will be found that the average schedule speed of the Western trains is far above that prevailing in the East.

This difference is undoubtedly largely due to two advantages almost universally enjoyed by the Western properties. The initial cost of the private right of way and of track construction has been less, and the cars have been able to make long runs between stops. It is not altogether reasonable to believe that these are dominant sectional factors, although the level prairie land has undoubtedly stimulated railroad construction, both steam and electric, in the district mentioned. In fact, a perusal of the leading article in this issue will indicate the possibilities of constructing and operating high-speed electric railways through a country much more rugged than is found in the Middle West. The road here described connects two of the important cities of New York State, and is said to be one of the heaviest and most substantial electric railways in the United States. To carry through this work in the time allotted, it was necessary to gather together a plant such as would be used in the construction of a heavy steam railroad, and the article above referred to has been prepared with a view to bringing to the surface, pictorially, as far as possible, the methods followed. The builders of this road are credited with having constructed the first high-speed electric road in the United States, that between Buffalo and Niagara Falls, and as they have been engaged in work of this character for the past fifteen years, the methods in force on this contract may safely be said to represent the most advanced means of bringing about the results depicted.

A Little More Single-Phase

We are very glad to present this week an account of the new single-phase road at Glen Cove, L. I. As the only single-phase road in the vicinity of New York and a typical installation of its kind, it should be inspected with interest by every one interested in the subject. As an example, it possesses the advantage of being a pure single-phase equipment, uncomplicated by the requirements of connections with direct-current lines. The wiring diagram shows the simplicity of the connections admirably. Considering the gradations of voltage secured, the result is really remarkable, and bears out the promise of the system from a theoretical standpoint. The fact that the whole equipment goes easily upon an ordinary single-truck car is very gratifying, as showing the ease with which the change can be made. Although the efficiency of the equipment is not given, the nature of the voltage control is such as to bespeak small losses up to the motor. In the motor itself the losses are doubtless larger than in a d. c. motor, but if the facilities for cooling are good, as is quite certainly the case, the added loss need not be a source of much worry, since the distribution efficiency is far greater than could be hoped for on any d. c. system. We note that the same device in primary distribution used in various other cases is here employed, the transmission proper being three-phase to save copper and generator capacity, while the phases are utilized independently in the feeding system. This is not uncommon in three-phase systems used for lighting, and there is no reason why it should not work sufficiently well here. The construction is also of interest as using the now well-known catenary form for both cross and longitudinal spans.

The operative qualities of this new system will be watched very attentively. At the present time, however, enough experience has accumulated on the foreign single-phase roads to justify considerable confidence in the performance of this one. In fact, since frequencies up to 40 cycles have been used on Continental roads, apparently with entire success, an installation at 25 cycles may be assumed to be on a pretty safe basis. Of course, the questions of first cost and depreciation cannot be left out of account. As with every new thing, costs are apt to run high at first, and upkeep is likely to be greater than after the details have been worked over, in the light of practical experience. Nevertheless, there seems to be no good reason to apprehend anything serious as regards a straightforward proposition like the present. We are glad that this road has been put through on the single-phase basis, for it is an exhibit that cannot fail to be of value and interest. There are many lines without any connections that may hamper them in the choice of a system, and it is on these that single-phase working gives its greatest immediate prospect of usefulness. When the single-phase locomotives of the New York, New Haven & Hartford Railroad go into service we shall, of course, have a demonstration on a far larger scale. The importance of alternate-current working does not, however, turn upon the success or failure of this great work. There is, especially on roads of considerable length and light traffic, an acute need for improvement in the distributing system. If the single-phase system fulfils the promise it has thus far given, it will have a very wide sphere of usefulness in the propagation of light electric roads of the kind which we have often indicated as useful. For such work even a single motor equipment would often be sufficient, thus still further simplifying the car wiring.

There are not a few rather extensive electric road systems now in existence that are distributing current over a large and lightly loaded network in a highly inefficient manner. They have fully appreciated the impracticability of using a complete direct-current distribution, but have not felt justified in jumping into a complete alternating-current system. The result is that they are to-day generating and transmitting current long distances, and, in addition, supporting a series of sub-stations and feeding systems, with a very heavy loss of energy. To these the Glen Cove road may prove a very useful object lesson. In cases where one has to deal with large urban systems, the situation is different, since these stand committed to direct-current apparatus upon a large scale, to replace which would cost a very considerable amount. But such cases are really in a minority. The average road, if one may use the term, has only a moderate number of cars, and as time goes on it is likely to require the transmission of power. For such, the change to alternating current is not so difficult a matter, and whenever a transmission system has already been inaugurated a change is still easier. These single-phase roads have not yet been in operation long enough to permit a judicial opinion of their merits, but enough is now evident to show that they are very promising, certainly within a fairly wide field of usefulness. Railway engineers have been very conservative in their view of the situation, but things have now reached a point where they are no longer justified in turning down alternating-current traction as impracticable. Experimental it is, to be sure, although not in the offensive sense of the word. They are experimental as series-parallel control was experimental in the earlier days of its use, and it seems hardly possible, in face of what has already been accomplished, that there should be any retrogression. Alternating-current traction we certainly have with us in spite of all dubious opinions, and we hope that this nearby road will receive the attention it deserves from Eastern engineers. They must take the matter seriously now, however strongly they may favor standard apparatus.

Car Lighting

We have often wished that some ingenious person would turn his efforts toward providing suitable lamps and fixtures for street car lighting. As lighting is at present conducted it affords opportunity for very great improvements, both in amount and in distribution. Most artificial lighting is faulty, not from bad judgment, but from no judgment at all. It has just merely happened without any responsibility on the part of anyone. Now, in street car lighting the energy usually spent is by no means negligible, being a very perceptible percentage of that required to operate the car, and if there is not to be considerable actual loss, that energy must be spent very judiciously indeed. A street car considered merely as a room is small with, say, 200 sq. ft. to 250 sq. ft. of space only, and an unusually low ceiling. As to the walls, they are not particularly favorable, being, as a whole, rather poor reflecting surfaces. All in all, it is apparent that while no very great amount of energy is required for lighting, it must be very wisely distributed if good results are to be obtained. The fundamental principle in a case like this is to use rather small units carefully placed. One does not want an effect of brilliancy in a car so much as the ability to see easily. As to the unit to be employed, we incline to the opinion that the 8-cp lamp is the thing made for a modest voltage, so as to secure a sturdy filament. Such lamps with ground globes give a light easy to distribute and never so bright as to be painful.

The matter of suitable fixtures for such lights is also a neglected matter. A socket stuck somewhere and a lamp screwed into it does not settle the question. For a space like a street car the lamp with a reflector behind it, either silvered on the bulb or added to the socket, is emphatically the thing to use. For the walls are poor reflectors and about half the light is wasted if no reflectors are used. A small unobtrusive diffusing reflector just behind a small lamp bulb will work wonders either in street car or any other case of lighting. It gives much light and consumes little energy. And the main point is that it directs the light where it is needed, down into the car. A line of compact reflector fixtures would meet a widely felt want in general illumination as well as in street car service. It is in street car lighting, however, that a wise combination of lamp and reflector will do admirable work. To put it mildly, it is possible to light the average street car better than it is lighted now at an expenditure of about one-half the energy customarily used. Some progress has already been made, we have been pleased to note, but there is still plenty of room for improvement, particularly in the complete abolition of clear globes within the car. Used as they must be in the contracted space, they are abominations, and what is even worse, ineffective abominations.

Designing the Bottom Framing and Brake Apparatus Together

Only a few years ago the draftsman, when designing a car body, often made no provisions at all for the wiring of the motor circuits. The car body was completed in the factory before any thought was given the wiring. Then the electrician was compelled to run his wires wherever possible, and considerations of appearance could be given very little thought. We are glad that methods of car construction in this particular have changed somewhat, and now a little thought on the part of the draftsman enables him to make proper provisions for the motor wiring without in any way interfering with the strength or appearance of the design. The result is that the cables under the car are put up in a more permanent and better appearing manner than heretofore.

But the draftsman could to advantage give consideration to other features of the bottom framing that would materially increase the appearance of the car and often decrease the expenses of maintenance. We refer particularly to the design of the framing with regard to the brake and other apparatus to be hung to it. Were the dimensions of the air tanks, brake levers and parts of the controller equipment, if a multiple-unit system is employed, taken into account when the longitudinal sills and bridgings are spaced, many intermediate hangers, usually of very awkward design, would be avoided in securing the different pieces of apparatus in position. The avoidance of these would not only give a better and more workmanlike appearance to the under portion of the car, but the apparatus would be bolted in position more securely, there being fewer nuts and bolts to work loose.

We do not mean to recommend that in order to conform to the dimensions of the apparatus that the sills or bridgings be placed so far out of their proper position as to weaken the design in any manner. The primary object of the designer should always be to obtain the greatest strength with the material used, and the accommodation of the apparatus ought in all cases to be secondary. But we believe there are many times when it is immaterial, so far as the strength of the design is concerned, whether a sill or bridging is placed 1 in. or 2 ins. on either side of a specified position, and in such a case a consideration of the dimensions of the apparatus to be hung, and a consequent placing of the timbers to conform with these dimensions, would result in such improvement in the design of the car as a whole as to many times compensate for the extra time spent.

We have personally had occasion to examine cars where the bottom framing and the apparatus were designed in harmony, and to our minds the appearance alone of the underside of the car, when contrasted with that of a car where the apparatus has been hung in any way and by any means possible, is in itself a sufficient incentive to give considerable attention to this one point.

Pilots on Interurban Cars

In designing interurban cars a question which is sometimes difficult to decide upon is the proper design of a pilot. When a car is to be operated always at the front end of train and in one direction only, the problem is much simplified. The pilot may extend out as far beyond the bumper as desired. Moreover, no provisions need be made for the train line of the air-brake system passing from one car to the other, or for coupling the cars. A good form of pilot to be used in this case is one built much on the style of those employed on steam locomotives.

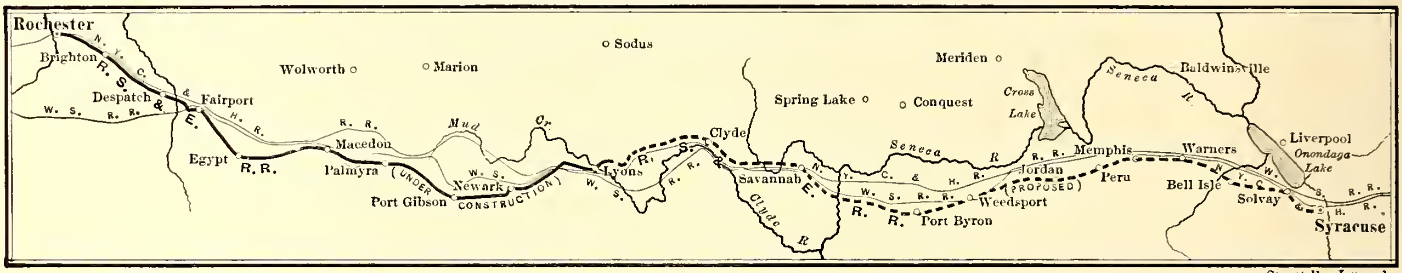
The lower portion should drop to within 10 ins. or 12 ins. of the rail, and even lower if there is no danger of the extending end striking obstacles when rounding curves. The nose should protrude well forward of the bumper in order to give a good angle along each side. Such a pilot not only adds a businesslike appearance to the car, but if built strong enough it may remove many obstructions from the rail that might otherwise cause derailment.

Where cars are to be operated in trains, as, for example, multiple-unit equipments, much of the usefulness of the pilot must be sacrificed in a design that will meet several added requirements. The nose cannot extend beyond the bumper, for otherwise the noses of two pilots would come in contact with each other when two cars were coupled up. Setting the pilot back under the bumper in this manner necessarily limits the slope of its sides, and consequently curtails to a great extent its usefulness.

Another requirement to be met in the design of pilots for such cars is that provision shall be made through the middle of the pilot for the hose connections of the air pipes. This usually takes away the nose and leaves an almost flat face across the front. Such a form is of more service in meeting the requirements of the law than for actually removing obstructions.

CONSTRUCTION WORK ON THE ROCHESTER, SYRACUSE & EASTERN RAILROAD

The Rochester, Syracuse & Eastern Railroad is designed ultimately to provide a double-track, high-speed, interurban electric road between Syracuse and Rochester, a distance of 80 miles, following in a general way the main line of the West Shore Railroad through this territory, but located to furnish better service to the towns and villages lying between the termini. The section now under construction is from Lyons, west to Rochester, a distance of approximately 36 miles. Leaving Lyons, the road proceeds westerly and crosses the New York Central and West Shore Railroad tracks at a point 2 miles east of Newark over a bridge approximately 630 ft. long. From this bridge the line runs practically due west through the towns of Newark, Port Gibson, Palmyra, Macedon, Egypt, Fairport, Despatch, Brighton and into the city of Rochester, where connection will be made with the local street railway system of that city.



MAP OF ROCHESTER, SYRACUSE & EASTERN RAILROAD

The plans provide for a heavier type of construction than has been previously attempted in the East, and the road, when finished, will approach more nearly in general design and construction the later examples of modern high-speed electric railway construction work which have been carried out to an advanced degree in the Middle West.

TEARING UP STREET SURFACE WITH ROOTER PLOWS

Between Lyons and Rochester the grading has been extremely heavy for an electric road, involving the moving on an average of nearly 25,000 cu. yds. of material per mile (exclusive of the work in cities). This is a considerably heavier grading than was involved in building many of the steam roads east of the Mississippi, consequently the plant and methods employed in grading and track laying represent a new departure in electric railroad construction in this part of the country.

For the main part, the road is very free from grades. The sharpest curves in villages are 50 ft. radius, and outside of villages the maximum degree of curvature is 6 degs. The majority of curves are under 4 degs. The track is laid with 70-lb. A. S. C. E. section T-rail, with continuous joints, in the country, and on village streets with 90-lb. A. S. C. E. section T-rail. The line is located entirely on private right of way, except in villages, and for the entire distance double track is laid on 12-ft. centers. On top of the finished grade a minimum of 6 ins. of gravel or stone ballast is spread. The ties are 6-in. x 8-in. x 8-ft. long leaf Southern pine.

In view of the unusually heavy construction and the modern methods followed in building the road, many of the details of construction are of interest. J. G. White & Company, of New York, are carrying out the contract for grading, track laying and overhead work, and in so doing have employed many ideas original in engineering practice.

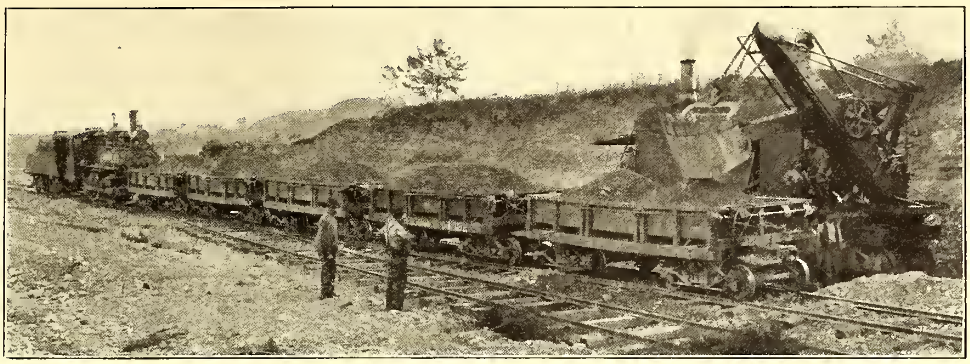
On the lighter sections of the line grading was done with wheel scrapers and wagons, but on the heavier sections four steam shovels were utilized. Gravel for ballast was obtained from pits along the line of the railway, but in some cases it was found necessary to utilize gravel from pits several miles from the right of way. This necessitated the construction of several temporary construction tracks a mile or two in length. The heavy cuts having been worked out with steam shovels, the shovels were transferred to the gravel pits and used for loading gravel cars, which were run in trains of four to six cars, as shown by one of the illustrations on page 1049. With a steam shovel the average time for loading a 10-yd. car was 3 minutes, making 15 to 20 minutes to load the entire train, this being sufficient ballast for approximately ¼ mile of single track.

In following up the construction work, the idea has been to lay one track on the graded bed at the earliest possible moment, half-tieing—that is, omitting every other tie. This makes it possible to utilize steam-propelled construction trains for all of the subsequent work, including ballasting, surfacing, aligning, and for all-tieing.

EXCAVATING ON MAIN STREET, PALMYRA, N. Y.

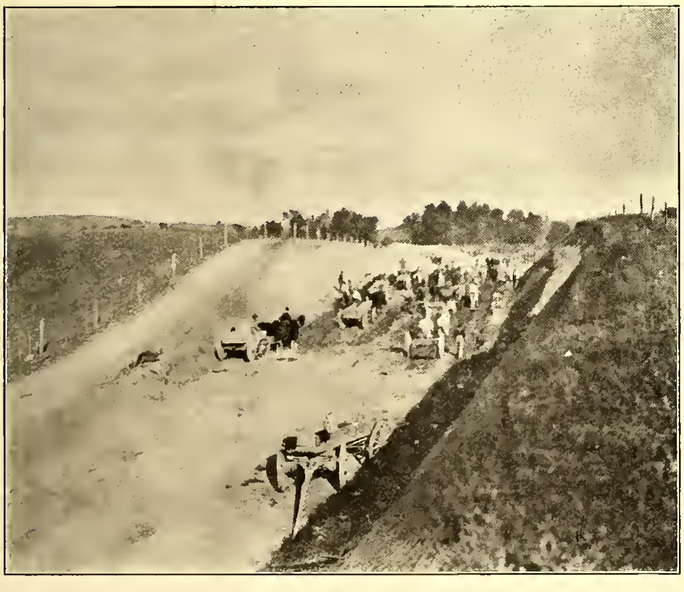
In this work there have been employed two 19-ton saddle-tank American locomotives, one 30-ton American locomotive, one 30-ton American switching locomotive, and three 35-ton locomotives of the New York, New Haven & Hartford type. The car equipment for construction work comprises ten 10-yd. center-dump ballast cars, twenty-one 6-yd. side-dump ballast cars, and in addition there are eight 30-ton flat cars used for distributing ties, rails, poles and other material.

The construction plant also includes a miscellaneous collection of boilers, pumps, concrete mixers, etc. A very essential part of the equipment has been the Sheffield gasoline motor car, made by Fairbanks, Morse & Company. This car will seat four persons, and can cover 25 m.p.h. It has been of the utmost convenience and value in general supervision and inspection work and in general affording facilities for getting about over the different sections of track. This problem of rapid transportation for superintendents on railway work covering a large territory, has always been a perplexing one, and the development of satisfactory forms of self-contained power cars is being watched with interest by those having to do with the building of long lines. In this same connection, J. G. White & Company, in some of their other contracts, are making use of automobiles for accomplishing the same results. On the Lyons and Rochester contract, timekeepers have been supplied with saddle horses, and make their daily rounds from gang to gang on horseback. The engravings, reproduced from recent photographs, convey a good idea not only of the details of construction that are being followed, but also show the various portions of the plant and construction force at work. One of the pictures on this page shows a steam shovel working in the ballast pit at Palmyra. As there is a grade running each way from this pit but five cars can be used at once. With the steam shovel the time of loading averages 3 minutes to each car, and the economy of using steam-driven loading apparatus in this connection is very apparent.



METHOD OF LOADING AND HAULING GRAVEL FOR BALLAST

Another of the pictures represents the track force at work back-tieing. As before stated, it is the practice to lay the first track in skeleton form on the rough grade. The second track



WORKING OUT 13,000-YD. CUT WITH TEAMS

is then laid in full from material and construction trains operated on the first track, after which the balance of the ties for the first track are distributed and placed. The ties are hauled from the Palmyra yard on flat cars, as indicated, and are distributed while the train is in motion, a man throwing off the ties under the direction of the foreman, who walks and counts the number of ties required. Ties are distributed at the rate of about 100 per minute, or sufficient for 3 miles or 4 miles of track per hour. This method of distributing material introduces many economies in time and labor. The illustration on page 1051 shows a track gang back-tieing and spiking down the rails. This gang consists of about forty-five men and can lay from 3500 ft. to 4500 ft. of the first track per day. A back tieing gang of forty men, filling in the same track, averages 3000 ft. per day, and with fifty-five men over 7000 ft. per day have been laid. The method of procedure is as follows: A double car load of rails—that is, two flat cars coupled together, carrying from sixty to eighty 60-ft. 70-lb. rails, is pushed by

EXCAVATING IN 54,000-CU. YD. CUT NEAR PALMYRA

the locomotive. To the rear of the locomotive are coupled three or four cars loaded with about 900 ties. In laying the first track at the front, two teams are used to snake the rails ahead, and two teams with three wagons distribute the ties. In this way the gang is kept continually loading ties on two

GRADING WITH TEAMS. THE TIMEKEEPERS ARE MOUNTED ON HORSEBACK

wagons, which are ready for the team when it returns from distributing the previous load.

BONDING

In village streets the track is bonded at each joint with one protected compressed terminal 300,000-circ.-mil copper bond

10 ins. long. On work outside the villages each joint is bonded with the short type C bond of the Lord Electric Company's manufacture, soldered to the head of the rail. The track is cross bonded every 600 ft. with No. 0000 B. & S. solid copper wire, fastened with channel pins; the cross bonds extend across both tracks.

STRUCTURES

On the line between Rochester and Lyons there are several concrete arch culverts, ranging from 6-ft. to 20-ft. span, and several steel structures. In designing all culverts and bridges the live load has been assumed as a train of cars, each car weighing 60 tons, and measuring 60 ft. in length, with 45 ft. between centers of trucks.

UNLOADING TIES FROM CONSTRUCTION TRAIN

The more important steel structures are as follows:

Crossing of New York Central & Hudson River Railroad (Auburn branch) at Brighton, consisting of 100-ft. through flat girder span, with 400-ft. steel trestle approach on each side, with spans 30 ft. center to center. The total length of this bridge is 900 ft.

The 55-ft. plate girder deck structure over Irondequoit Creek.

The 60-ft. plate girder through span bridge over Penfield Road and Thomas Creek.

A 100-ft. span through riveted truss over Ganargua Creek.

The 286-ft. skew span through pin connected truss over the Erie Canal at Fairport.

Crossing over the New York Central & Hudson River Railroad and West Shore Railroad tracks about 2 miles east of Newark, at a place called Blue Cut. This structure consists of one span (245.7 ft. long on the center line) pin connected through truss, one 75-ft. span girder deck and ten spans of 30 ft. each, the latter being steel trestle approaches. The main span is a half skew structure, the two trusses being respectively 234 ft. 1 in. and 257 ft. 4 ins. center to center of end pins. The additional length of one side is accounted for by the insertion of an extra panel, this design having been found necessary to meet requirements imposed by certain property locations. The main abutments are 52 ft. in length and 6 ft. 6 ins. wide at the base, and batters to 44 ft. in length and 5 ft. in width at the top. The pedestals supporting the viaduct spans are 4 ft. square on top and of different heights on account of the variation in the elevation of the ground.

The crossing over Ganargua Creek and the Erie Canal at Lyons, consisting of a 400-ft. steel trestle approach, 170-ft. span and 150-ft. span through pin connected trusses.

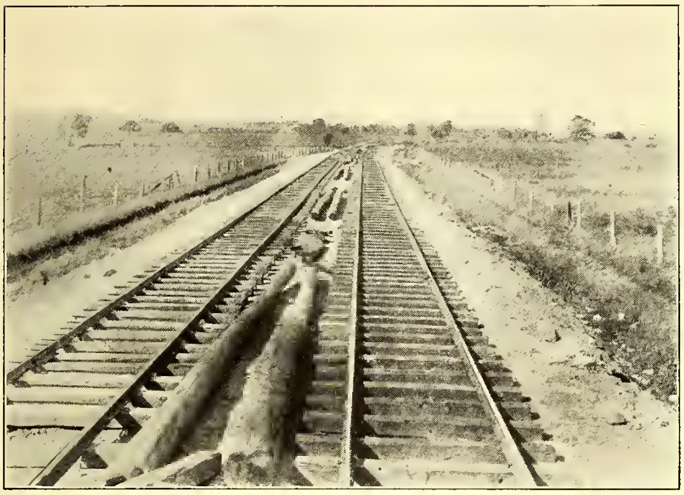
The concrete for all bridge piers, culverts and abutments is mixed by hand, as this was found to be more economical than machine mixing, on account of the comparatively small masses of concrete required at each location. However, in village streets, where concrete was used for paving and foundations, McKelvey mixers driven by gasoline engines were used. Concrete was used as a floor in some of the bridge spans up to 25 ft. The Owego Bridge Company manufactured and erected three of the smaller bridges, and the American Bridge Company supplied the balance of the structures. The illustrations show a few of the typical culverts, spans and bridges.

VITRIFIED BRICK PAVEMENT

In city and village streets where paving is required, the company has adopted vitrified brick as standard, some of the details of which are unique. The bricks are required to be of the best quality, sound, hard-burned paving brick. All bricks except in special cases to be square and straight, with sharp or slightly beveled edges. Their specific gravity must not be less than 2.0, and they must not absorb more than 3 per cent of their weight of water after an immersion of two days. The bricks are laid (see section) upon a cushion of sand resting upon concrete foundation. This foundation is formed of concrete composed of one part Portland cement, four parts sand and eight parts crushed stone or clean screened gravel. The foundation is 5 ins. in depth, extending from the under to the upper surface of the ties. In placing this concrete, the following method was adopted: Concrete was mixed by hand, a gang of sixteen men being employed, of which six wheeled the material to the mixing board, where four gave it a preliminary mixing. It was then thrown into a McKelvey mixer, where water was added to the proper consistency. The mixer, driven by a gasoline engine and mounted upon wheels, could be moved along the track, so that the concrete was deposited practically where wanted and spread with hoes. Upon this bed is spread 1 in. of mortar, consisting of one part Portland cement and four parts sand. Four men were used to mix and spread the neat cement. The mortar was applied before the concrete was set, so as to form a perfect bond. The cushion bed is laid on the concrete foundation after the concrete has become thor-

ONE TRACK GIVEN FIRST LIFT, OTHER UNBALLASTED oughly set and dried, and consists of a ½-in. layer of clean, coarse, sharp sand. Along the inside of each rail there is placed a brick of special design, which forms a groove or flangeway for the wheels of the cars.

The construction on sharp curves around street corners consists of the center rail laid without groove and the inner rail with machine-fitted guard rail. The rail is 90-lb. A. S. C. E.



DISTRIBUTING POLES, CROSS-ARMS AND PINS ALONG ROUTE

standard section; the T-rail and the special work was supplied by the Pennsylvania Steel Company.

After the foundation and cushion have been prepared as described, the paving bricks are laid in the following manner: The pavement is constructed of a single layer of bricks laid on edge, end to end at right angles to the lines of rail on tangents. The courses are kept true and parallel in laying with the backs of the bricks close together, sides and ends touching and breaking joints at least 3 ins. with the bricks in the adjoining course. The bricks are set perpendicular to the grade of the

TYPICAL TANGENT BEFORE BALLASTING

street and to a height of ¼ in. to ½ in. above the top of the rail to allow for settlement when tamped.

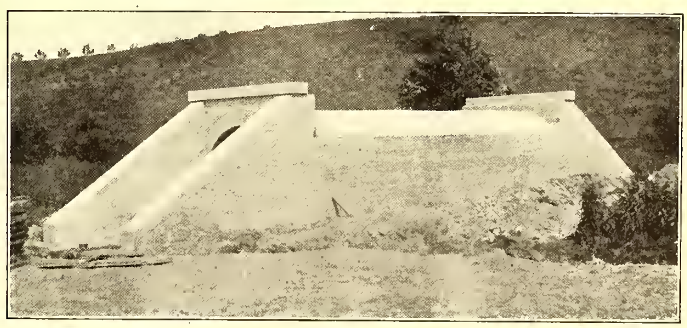
The space between the head and the base of all track rails next the pavement is filled with mortar, composed of one part Portland cement and four parts sand. After the bricks have been laid, the pavement is thoroughly rammed with a 90-lb. paver rammer. After ramming, the joints are filled with a Portland cement or grout, composed of one part sand and one part cement, together with a sufficient quantity of water. The grout is pounded and swept to and fro upon the pavement until each joint is filled flush with the surface. Wet sand is then spread over the entire pavement to a depth of ½ in., and kept wet until the pavement is thoroughly seasoned, after which it is removed. Brick pavement of this character has been laid in Palmyra, Newark, Lyons and Macedon, aggregating about 22,500 yds.

OVERHEAD CONSTRUCTION

In view of the heavy and permanent standards adopted in the overhead work, it is believed that a somewhat detailed description is justified. Span construction is used throughout. The poles are of juniper wood, and are from 35 ft. to 50 ft.

TRACK GANG SPIKING DOWN RAILS ON SECOND TRACK

long, with 8-in. tops. On tangents poles are spaced 80 ft., and on curves they are placed with consideration to the radius of the curve, but in no case closer than 50 ft. on any curve, except in villages, where they are located at such points as not to interfere with driveways, entrances to properties and intersecting streets. Poles are set 6 ft. in the ground, and are thoroughly tamped with the most suitable of the excavated material. The poles are set approximately 8 ft. from the center of the nearest track, with sufficient rake away from the track to properly resist the pull of the span wires. In villages the poles are set back of the gutter line or curb. Poles are back-guyed to fluke anchors at frequent intervals, and on many sections at every third pole. The head guys consist of ⅜-in. galvanized

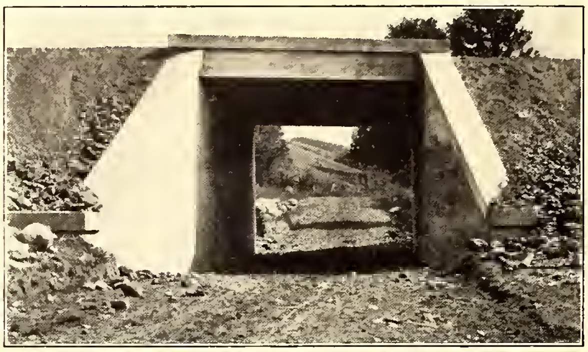


A 10-FT. CONCRETE CULVERT NEAR NEWARK, N. Y.

mild Siemens-Martin steel wrapped around the top of the pole and around the butt of the adjoining pole, or are attached to Crouse-Hinds Electric Company's guy anchors 5 ft. long with a ⅞-in. shank. The cross spans are ⅜-in. mild Siemens-Martin steel strand wire attached to pole by ⅝-in. x 16-in. galvanized eye-bolts with square nut and washers. Each trolley wire is anchored every half mile, using the Mayer & Englund, J. G. White type, three-way swivel tap to strain yoke, attached to the trolley wire midway between poles. The swivel taps are guyed with 5-16-in. galvanized mild Siemens-Martin strand wire wrapped around the top of the pole nearest the strain yoke; a strain insulator is cut in at the trolley end of each anchor wire. The poles to which the trolley anchors are attached are head-guyed with the butts of the adjoining poles.

Straight line hangers of the West End type, and curved cap and cone hangers with ¾-in. stud are used. All trolley ears are the Detroit trolley clamp type, galvanized; the clamps are hammered in place before screws are finally tightened, and the screw threads are indented with a prick punch to prevent them from loosening after the final tightening.

A No. 0000 B. & S. grooved copper trolley wire is strung over each track; adjoining lengths are connected with copper connections. The trolley wire is erected at a height of 19 ft. above the tops of the rails at the hangers, and the sag between hangers, 80 ft. apart, does not exceed the equivalent of 6 ins. at 60 degs. F. at the time of erection. The feeder system is strung on one set of poles, and consists of two 500,000-circ.-mil bare copper cables, except through villages, where insulated feeders have been used. The feeder cross-arms are of long leaf yellow pine, 3¼ ins. x 4½ ins. x 5 ft., painted with carbolinium, and bored for 4½-in. pins. They are fastened to the pole with a ⅝-in. x 15-in. galvanized bolt having 4-in. thread, square nut and two galvanized washers. The arms are braced with standard galvanized iron braces, 1¼ ins. x ¼ in. x 26 ins., which are attached to the cross-arm by a ⅜-in. x 4-in. galvanized iron carriage bolt, and to the pole by a ½-in. x 3½-in. galvanized lag screw. The pins on straight line work and on slight curves are of locust, dipped in carbolinium, and on sharp curves, where under unusual strain, they are of dropped-forged iron.



20-FT. SPAN CONCRETE STRUCTURE. DECK OF I-BEAMS IN CONCRETE. SIDE WINGS ARE ARRANGED TO AVOID FORMING A BLIND CURVE

The feeder wire insulators on straight line work and on slight curves are standard glass cable top for 500,000 circ. mil to fit 1½-in. pins. On sharp curves, where iron pins are used, they are of composition side grooved design. The feed-wire splicer joints are of solid cast type, soldered.

GASOLINE ENGINE-DRIVEN PORTABLE MIXER USED IN WORK IN VILLAGE STREETS

Feed taps are made every 1000 ft., using No. 000 B. & S. stranded copper wire. Feed taps are wrapped and soldered to the feeder and passed through the eye of the strain insulator, taking the place of a regular span wire at the point where the feed taps are put in. The feed taps are attached to the trolley wire by a Syracuse type feed-in yoke.

HIGH-TENSION LINE

The high-tension lines have been built for 33,000 volts. Duplicate transmission circuits have been installed throughout, one on each line of poles. The regular surface circuits consist of three No. 2 B. & S. bare copper wires arranged in a triangle, the two base wires being 60 ins. apart; the apex wire is mounted on a short auxiliary cross-arm at the top of the pole and set off center to give the insulator ample clearance from the pole. This method of mounting the apex insulator was adopted after due consideration to the more usual methods of carrying the top wire was given.

A 35-FT. SPAN NEAR NEWARK, N. Y.

The chief objection to placing the insulator directly on top of the pole was considered to be the likelihood of water working down around the insulator pin and causing premature decay in the pole top. The duplicate circuit for emergency service is mounted on the other line of poles, and in this case the wires are spaced 36 ins. instead of 60 ins.

The high-tension wires forming each circuit are transposed at long intervals, it being considered that a certain amount of transposition was desirable on account of the unequal sided triangle, caused by the offset of the top wire. The high-tension circuits are shunted around all towns and villages on separate pole lines; the high-tension cross-arms are of long leaf yellow pine, painted with carbolinium, and fitted with two 14-in. locust pins with 2-in. shanks. The pins are boiled in linseed oil before using. The arms are fastened to the poles by a ⅝-in. x 13-in. galvanized bolt with square nut and two galvanized washers, and the circuit having the 36-in. spacing between wires; the cross-arms are 4 ins. x 5 ins. x 4 ft. x 4 ft., braced with two 1¼-in. x 3-6-in. x 20-in. standard galvanized iron bracers.

On the circuit having 60-in. spacing, the cross-arms are 4 ins. x 5 ins. x 6 ft., braced with two 1½-in. x 1¼-in. x 26-in. standard galvanized iron braces. The braces are fastened to the cross-arms by ⅜-in. x 5-in. galvanized iron carriage bolts, and to the pole by a ½-in. x 3½-in. galvanized iron lag screw. A sketch of the pole tops is given in this connection.

The insulators are of the umbrella type, consisting of two pieces of brown glazed porcelain cemented together. The insulators were required to be capable of withstanding without injury, when mounted on suitable iron or wooden pins, a tension of 100 lbs., applied along the line of conductor at right angles to the axis of the pin. The insulators were also to stand a tension of not less than 500 lbs., applied axially between the pin and top of insulator. The specifications require that the insulator shall stand for five minutes without injury or arcing over, a high potential test of 60,000 volts, this puncture test to be applied by inverting the insulator in a conducting liquid extending to the center of the groove, filling the pin hole with the liquid up to the depth of the thread, and applying the pressure between the liquids.

TELEPHONE AND SIGNAL LINES.

The telephone and signal wires are carried on a line of poles on the opposite side of the track from that on which the feeder wires are strung. They consist of six No. 10 bare copper wires carried on cross-arms, similar in all respects to the feeder cross-arms, except that they are 8 ft. long and braced with two 1½-in. x ¼-in. x 36-in. galvanized iron braces. Standard pony glass insulators are used in erecting telephone and signal wires, except that every 500 ft. transposition glass insulators are used. Transpositions are made on the telephone lines only. The telephone and signal wires are tied to the insulators by No. 10 copper wire. All splices in telephone and signal wires are made with McIntyre sleeves.

STRINGING WIRES

The feeder, trolley and transmission wires are being strung from a flat car drawn by a steam locomotive. The car is provided with three reels, and in the case of the high-tension lines the three wires are strung simultaneously. It is the practice to run out about six pole lengths of the wires at a time. The wire is run out on the ground and a man is then sent up each pole, and by means of small hand block tackle the wires are drawn up and laid temporarily on the cross-arms. This part of the work is done at night, on account of the fact that the track must be kept clear during the day for the use of construction and work trains. During the day the gang goes back over the section that has been strung during the previous night and places the insulators on the arms. The wires are then drawn tight by a steam locomotive and attached to the insulators.

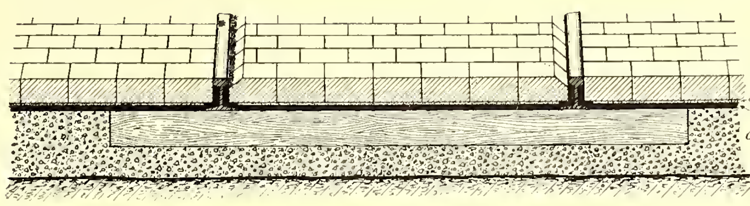
The wire gang consists of fourteen men and a foreman, and with this force about 3 miles of high-tension line is strung per day; the same distance of feeder and about 2½ miles of trolley can be placed in position in a day. The same car is used to string trolley wires and feeders. In stringing trolley wires, the wire over each track is run out at the same time.

CONCRETING TRACK FOR BRICK PAVEMENT; MIXING MORTAR BY HAND AND SURFACING

POWER HOUSE AND SUB-STATIONS

The central power generating station is located at Lyons, which will be virtually the half-way point when the entire system between Rochester and Syracuse has been completed. Power will be generated by Westinghouse-Parsons turbines at 3300 volts, two-phase, and will be stepped up to 33,000 volts, 25 cycles, three-phase for transmission purposes. The system has been laid out as a three-phase transmission with transforming and converting sub-stations to supply direct current to direct-current motors on the cars. The entire arrangement has been designed, however, with the idea in view that eventually the road will be operated with single-phase motors on the cars and the sub-stations will be abondoned.

The transformers during direct-current operation will, of course, be connected two-phase on the primary and three-phase on the secondary side. At first the primary installation at Lyons will consist of two 1500-kw Westinghouse-Parsons turbo-generating units. The boiler equipment includes six 360-hp Heine boilers fitted with Heine superheaters, but double-connected, so that superheated steam or saturated steam at 150 degs. F. can be supplied to the turbines. The power station was designed by Sheaf & Jaastad, of Boston.

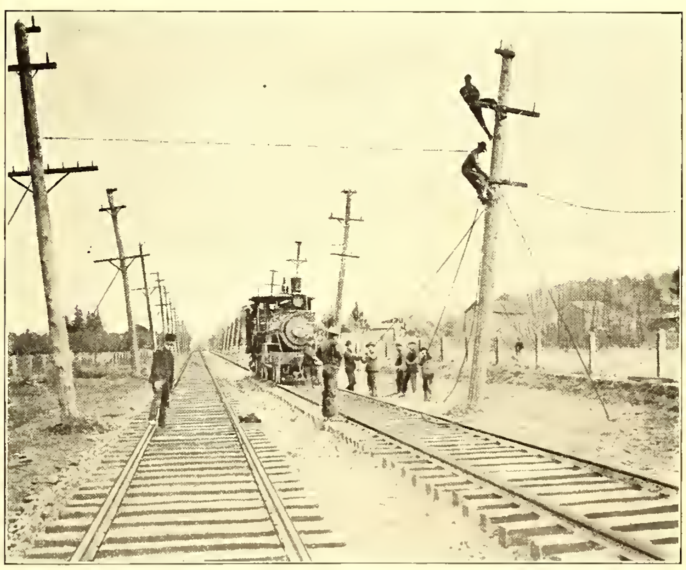


SECTION OF RAIL IN PAVED STREET

There will be three sub-stations on the line from Lyons to Rochester. These will be located respectively at Port Gibson, Macedon and Despatch. The sub-station at Port Gibson will contain two 400-kw rotaries; at Despatch, two 500-kw rotaries, and at Macedon, two 400-kw rotaries.

ROLLING STOCK

It is expected that the schedules will call for a speed of 50 m.p.h. on levels, and each car will be equipped with four Westinghouse No. 119 motors, rated at 110-hp each, giving a total of 440-hp per car. At the present writing ten cars have been ordered, eight from the Niles Car Company and two from the Kuhlman Car Company. The cars will be 53 ft. over all and will be equipped with Westinghouse multiple-unit control and Westinghouse air brakes.

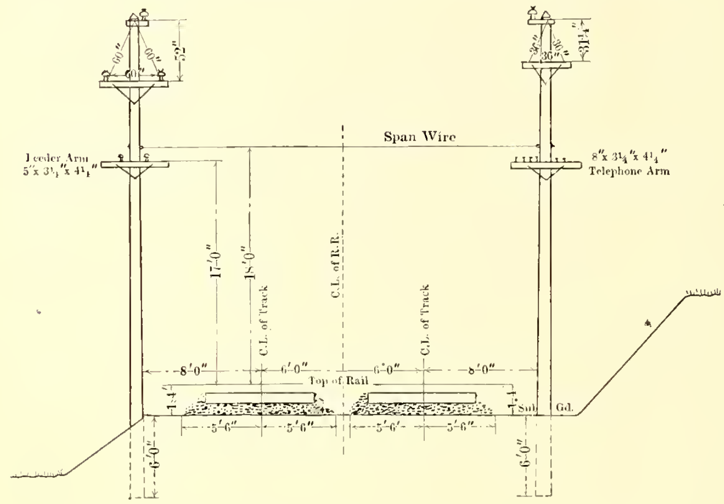


PULLING FEEDERS UP TAUT BY LOCOMOTIVE

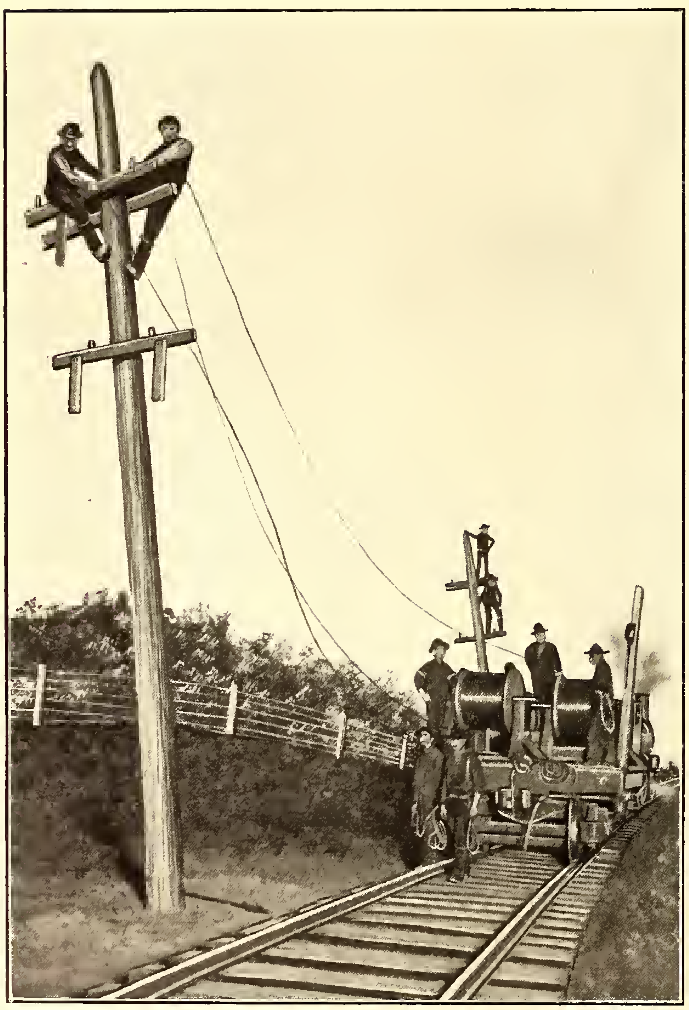
CONTRACTS

The Syracuse Railroad Construction Company was awarded the contract for the entire work of building the Rochester, Syracuse & Eastern Railroad. Contracts for the grading were sub-let to Fred T. Ley & Company, of Springfield, Mass.; John Shields Construction Company, of New York, and J. G. White & Company, of New York.

J. G. White & Company was also awarded the entire contract for track laying and overhead work from Rochester to



SECTION OF OVERHEAD LINE ON RIGHT OF WAY

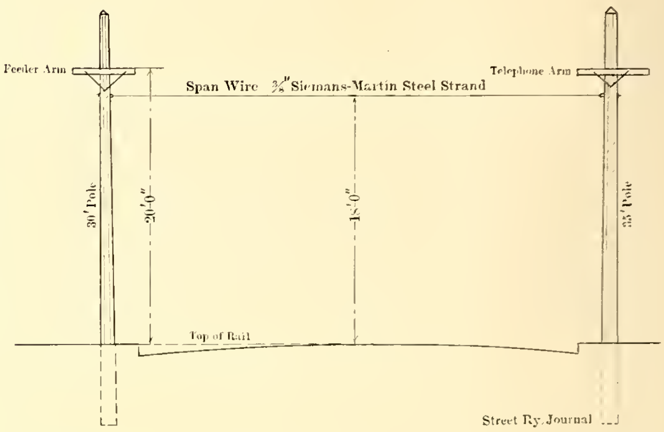


STRINGING HIGH-TENSION TRANSMISSION WIRES BY LOCOMOTIVE

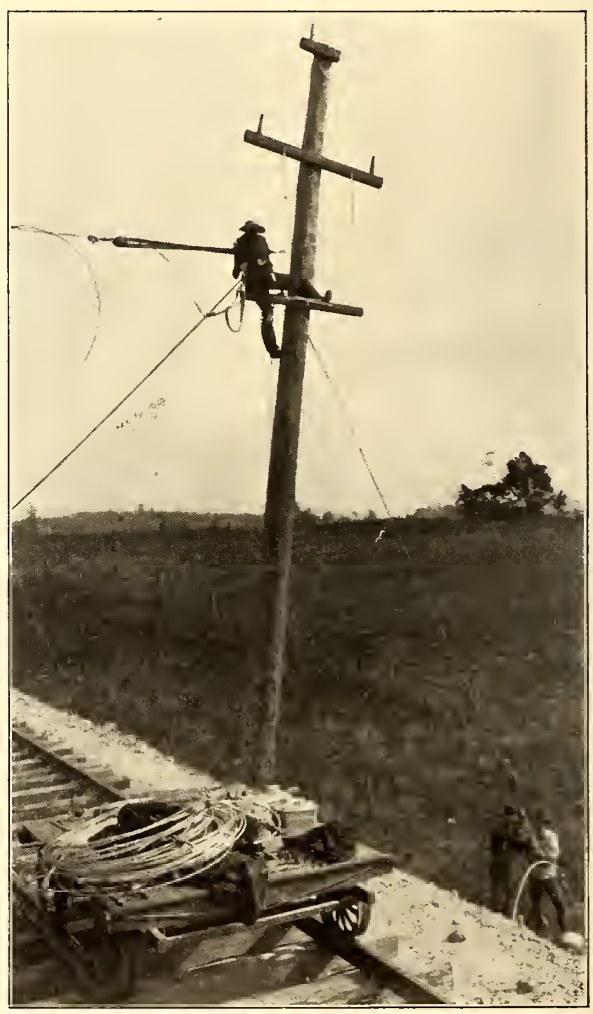
Lyons. The engineering was done by the Syracuse Railroad Construction Company's engineers. For the photographs and much of the data used in the foregoing article acknowledgment is made to J. G. White & Company and to Thomas H. Mather, chief engineer of the Syracuse Railroad Construction Company.

IMPROVED NEW BEDFORD-FALL RIVER SERVICE

The Union Street Railway Company, of New Bedford, Mass., is double-tracking its line between New Bedford and Fall River. The new work involves the construction of 14 miles



STANDARD OVERHEAD CONSTRUCTION IN CITY STREETS



FASTENING GUY ANCHORS AND PULLING UP SPAN WIRE

of track, of which 9 miles is already completed. The old single-track line between the two cities permitted only a 15-minute headway, but upon the completion of the double-tracking this will be cut down to 10 minutes. The line runs alongside of the State highway and gives a local service. It is expected that the running time also will be reduced from 75 mins. to 55 mins.

A SHORT SINGLE-PHASE RAILWAY ON LONG ISLAND

An urban railway system which has recently been installed by the Long Island Railroad Company at Glen Cove, L. I., possesses many points of more than passing interest when considered in connection with present developments in the electric railway field. The railway is intended to convey passengers from Sea Cliff and Glen Cove stations on the Long Island Railroad to the neighboring steamboat landings on Long Island Sound.

The principal interest in the railway system resides not in the magnitude of the undertaking, since the total length of track now completed and under construction is only about 5 miles, but in the means employed for supplying power to the rolling stock. The present system had its beginning in a small direct-current railway which was owned by the Long Island Railroad Company, which purchased the necessary power for operation from a local electric company. When the Long Island Railroad Company established a generating station at Long Island City it was ascertained that power could be transmitted from this station over the intervening distance of about 27 miles, and there used by single-phase motors more advantageously than it could be purchased and used by d. c. motors.

A CURVE ALONG THE SEA CLIFF-GLEN COVE SINGLE-PHASE LINE

The power is transmitted directly at the station pressure of 11,000 volts over two No. 1 bare copper wires placed on a wooden pole line extending from the Belmont Park sub-station of the Long Island electric railway system to a transforming sub-station located adjacent to the passenger station of the Long Island Railroad at Glen Cove. The transforming sub-station equipment consists of two 200-kw, oil-cooled, 11,000-volt to 2200-volt, 25-cycle transformers, and the necessary switching and protecting devices. The high-potential lines enter through the center of double-glass windows and, passing through spiral choke coils, terminate in oil switches which are connected in the primary circuit of the transformers. The oil switches are enclosed in separate cement compartments and are operated by a system of levers, the handle for which is placed on a separate panel adjacent to the 2200-volt switchboard. The 11,000-volt circuits are in no wise connected to the switchboard, and the 2200-volt circuits are represented in the front of the board only after having passed through current and potential transformers. A bank of low-equivalent lightning arresters serves to protect each line entering the building.

No attendants are required at the sub-station. In the event of the primary switches being opened from any cause, an electric bell in the adjacent passenger station notifies the agent, who can conveniently close the switch. Although only one of the phases of the three-phase generating system at present supplies power to the railway, the sub-station equipment is designed for three-phase operation. All switches, lightning arresters and switchboards are of the three-phase type, two-thirds of the equipment being used at present. With future extensions, a third transmission wire will be erected and a third transformer will be installed, so that power can be obtained from all three of the phases.

SINGLE-PHASE CAR RUNNING THROUGH GLEN COVE

At the present time four cars have been equipped. Two of these cars are of the single-truck type, and each weighs 14 tons; while each of the other cars is supplied with double trucks, and weighs 17 tons. The single-truck cars are of the semi-convertible type, were supplied by the J. G. Brill Company and are mounted on that company's No. 21-E truck. One of the double-truck cars is also of the semi-convertible type, similar to the ones just described, while the other is of the open type.

The driving equipment of each car consists of two 50-hp 300-volt, 25-cycle Westinghouse single-phase, compensated series motors, operated always in parallel and subjected to potential control. Very little sparking is produced even under the severest starting conditions, and the arcing is not destructive in nature. The four brush studs are mounted on an annular ring, which is arranged to be rotated through 360 degs. when desirable, so that all brushes can be inspected from the top opening in the frame of the motor. The brush studs are connected in two pairs to two copper bus rings which are joined to flexible leads, which pass through the frame by way of substantial insulating bushings, after the compensating stator winding has been included in the armature circuit. All of the bearings of the motor are provided with boxes in which waste is placed, and lubrication is obtained by the use of heavy machine oil.

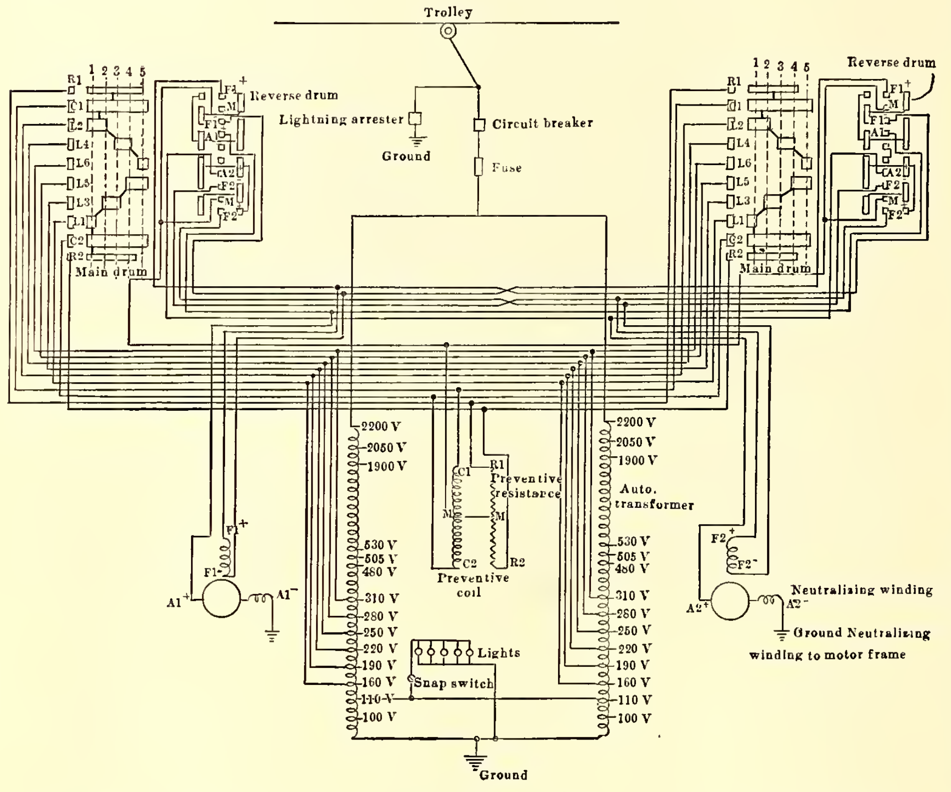
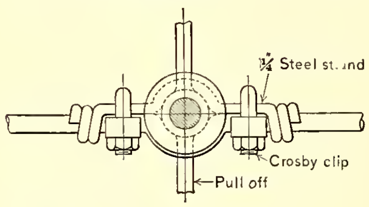
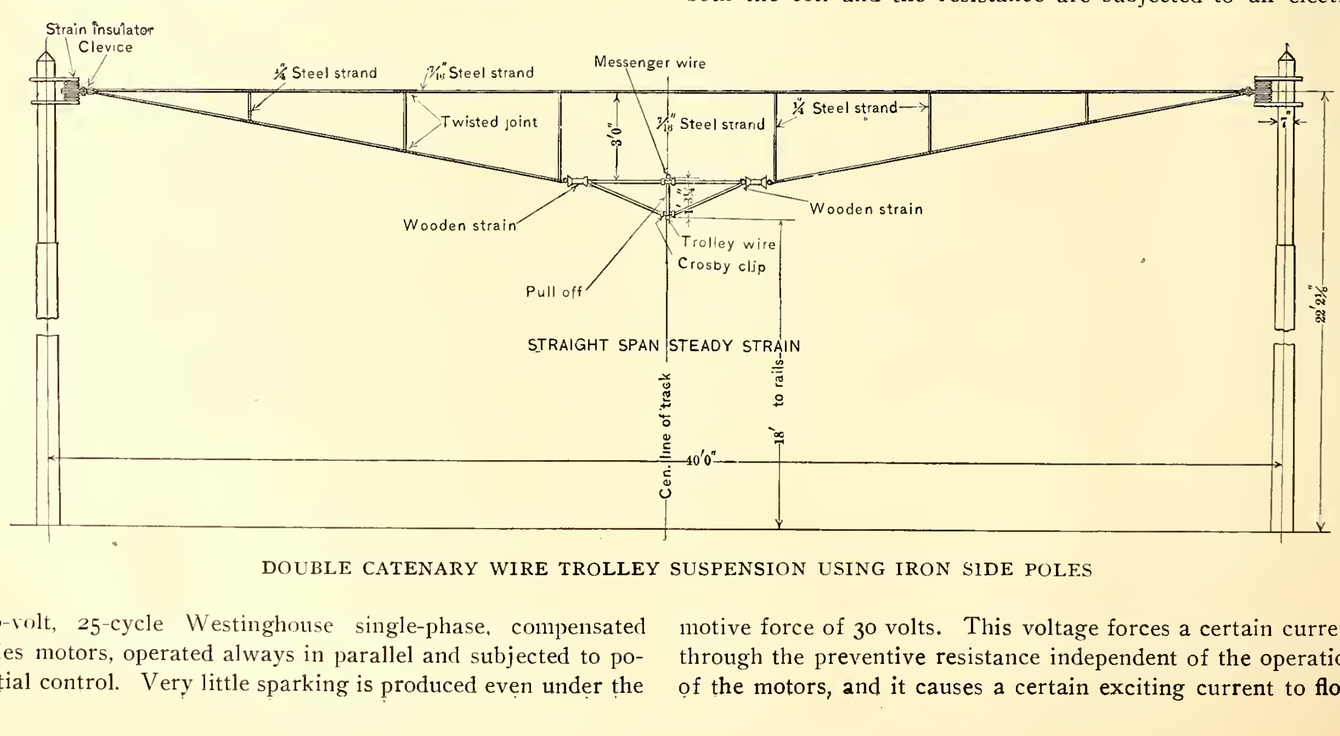


DIAGRAM OF CIRCUITS OF EQUIPMENT USING TWO-PART AUTO-TRANSFORMERS

As stated previously, the variation of the speed of the motor is obtained by subjecting the motor circuits to different voltages. For this purpose there is provided on each car a variable-ratio transformer having a single coil, which acts simultaneously as a primary and a secondary. This so-called auto-transformer is connected directly across between the trolley and the rail circuits, and voltages of different values are obtained by connecting the receiver apparatus between the rail circuit and intermediate taps on the transformer winding. Six of the intermediate taps, giving effective electromotive forces of 160 volts, 190 volts, 220 volts, 250 volts, 288 volts and 310 volts, respectively, are devoted to the use of the propelling motors. There are on the controller, however, only five running points, corresponding to voltages 175, 205, 235, 265 and 295, respectively. It will be observed that the electromotive force impressed upon the motor circuits is in each case intermediate between the voltages available at the transformer taps. This intermediate voltage is obtained through the use of so-called preventive resistance and preventive reactance, the prime object of which is to eliminate sparking at the controller. The motor circuits receive current from the middle points of the preventive reactance coil and the preventive resistance. When the controller is on any one of the first four accelerating points, both the coil and the resistance are subjected to an electromotive force of 30 volts. This voltage forces a certain current through the preventive resistance independent of the operation of the motors, and it causes a certain exciting current to flow





DOUBLE CATENARY WIRE TROLLEY SUSPENSION USING IRON SIDE POLES through the preventive coil. In addition to its exciting current, there flows through each half of the preventive coil one-half of the current to the motor circuits, the two components of the motor current flowing in opposite directions in the two sections of the coil. In changing the controller from a running position to the one next higher in voltage, the lower electromotive force terminals of the preventive coil and resistance are disconnected from the corresponding tap on the auto-transformer and transferred to another tap 60 volts higher in electromotive force. At the intermediate position of the controller, only the necessary exciting current flows through the preventive coil, while one-half of the preventive resistance carries the whole of the current to the motor circuit. It is evident, therefore, that the windings on the transformer are never short-circuited and the circuit to the motors is never opened during the accelerating period. When the controller is placed on the running position giving the highest voltage, the preventive resistance is excluded from the circuit and only the preventive coil is in use, thus eliminating that loss in the preventive resistance due to the 30 volts across its terminals. Experience shows that there is no perceptible arcing at the contacts when the controller is changed from one running position to another, and that when the controller is thrown to the "off" position the arcing is very slight.

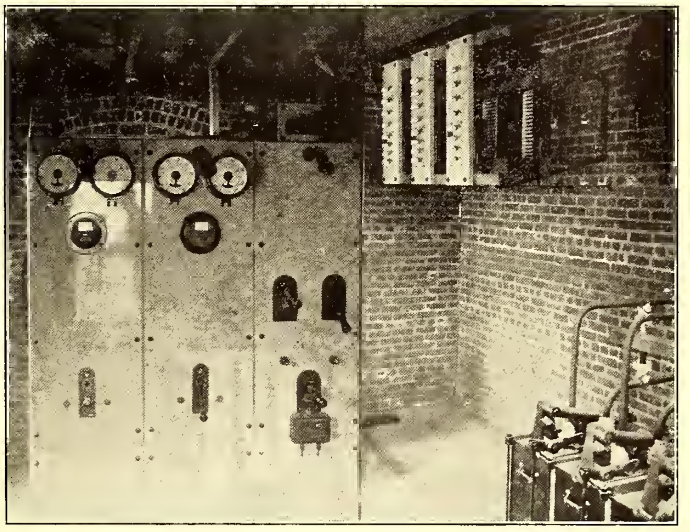
The auto-transformer of each of the double-truck cars is rated at 50 kw, and is of the air-cooled type. Special pains have been taken to eliminate all unnecessary weight of this transformer and to render it as compact as possible. Although each single-truck car is provided with two 25-kw auto-transformers; they are electrically so interconnected as to form virtually a single 50-kw transformer. The object in thus dividing the transformer was to allow of a proper distribution of the weight, since sufficient space was not available for placing it under the center of the car, and it was not considered advisable to concentrate the weight at one end.

The lamps of the car, including those for the two headlights, are connected in parallel and receive current from the 110-volt tap of the main auto-transformer. From the same tap is taken current for operating the rheostatic heaters of the car.

Each car is provided with a plain mechanical hand brake. Although no air-brake equipment is supplied, and the controller has not been designed especially for electric braking, it is worthy of note that there is available an emergency braking arrangement in event of the simultaneous failure of the hand brakes and the interruption of the supply of power. When the controller is in any running position the two motors are joined directly in parallel. It is found that if, when the car is traveling in a certain direction, the reverse lever be thrown over and the controller handle be placed in any running position, the motors will act as opposed direct-current series generators and rapidly limit the speed of the car, in the manner well known with direct-current equipments.

The most prominent feature of the high-potential circuits of the car resides in the extreme simplicity. The trolley pole differs in no wise from the standard construction used in street car work, and it is provided with the usual grooved wheel. The socket in which the base of the pole is placed is rigidly attached to a special platform which is mounted on four substantial porcelain insulators immediately over the center of the car. The conducting circuit from the pole passes across a Wurts lightning arrester equipment suspended beneath the special platform, and is then led through grounded protecting tubing to an oil circuit breaker and switch placed in the canopy of the vestibule. All metallic parts of the car are thoroughly grounded, even the lower end of the trolley rope being joined to the frame work. Two wooden strain insulators are inserted in the trolley rope for the purpose of preventing the passage of leakage current when the rope is damp.

The overhead trolley work throughout is of an exceedingly substantial nature. The conducting wire has an area equivalent to a B. & S. No. 000. It is of a grooved section, and is held in place by means of clamping ears which are suspended from a 7-16-in. steel cable catenary. The method of supporting the catenary varies with the curvature of the track and the nature of the locality. Since very little of the road length is laid on tangents and the route covers village streets, country roads and steam road beds, almost all types of suspensions are in use. Along the track which is laid on the bed of the steam road—that is, for a distance of ½ mile between Sea Cliff and Glen Cove stations, and along a portion of the country roads, the catenary is held in place by means of a bracket arm construction employing wooden poles spaced 120 ft. apart. Along the route of the old direct-current railway, the original side brackets were used without alteration. Each bracket arm is an iron pipe 2 ins. in diameter, which serves to hold the trolley wire about 21 ft. above the rails. Along the line adjacent to the steam road, the brackets are made of substantial T-irons. Within the towns, the catenary is held in place by means of side-pole and double span-wire construction. In the town of Glen Cove, the side poles are built up of iron piping of three sizes, having diameters of 6 ins., 7 ins. and 8 ins., respec-



SWITCHBOARD LIGHTNING ARRESTERS AND OIL SWITCHES IN SUB-STATION

tively. Each pole is 30 ft. in length and is set 6 ft. in the ground on a bed of concrete, the hole being filled with concrete to the level of the ground. The span wires, which are made of 7-16-in. steel cable, are supported and insulated from the iron poles by means of substantial porcelain sleeves. Each sleeve is cemented around a short length of iron piping, the two ends of which are secured to the iron pole by clamps and retaining bolts. The span wires are fastened to a malleable-iron collar, which surrounds the porcelain sleeve, a separating lead collar serving to insure that the mechanical pressure of the iron collar is properly distributed over the porcelain sleeve. In all cases, the major insulation of the line is provided by these porcelain sleeves. The catenary is connected directly to a center porcelain sleeve insulator which is supported from the lower of two span wires. This lower span wire is itself supported from the upper span wire, and in it are inserted two hickory strain insulators, one on each side of the center porcelain sleeve. Owing to the fact that the trolley collector is of the wheel type, guard loops are provided for those porcelain sleeves from which the catenary is directly suspended, in order to protect the insulator in event of the trolley wheel leaving the wire.

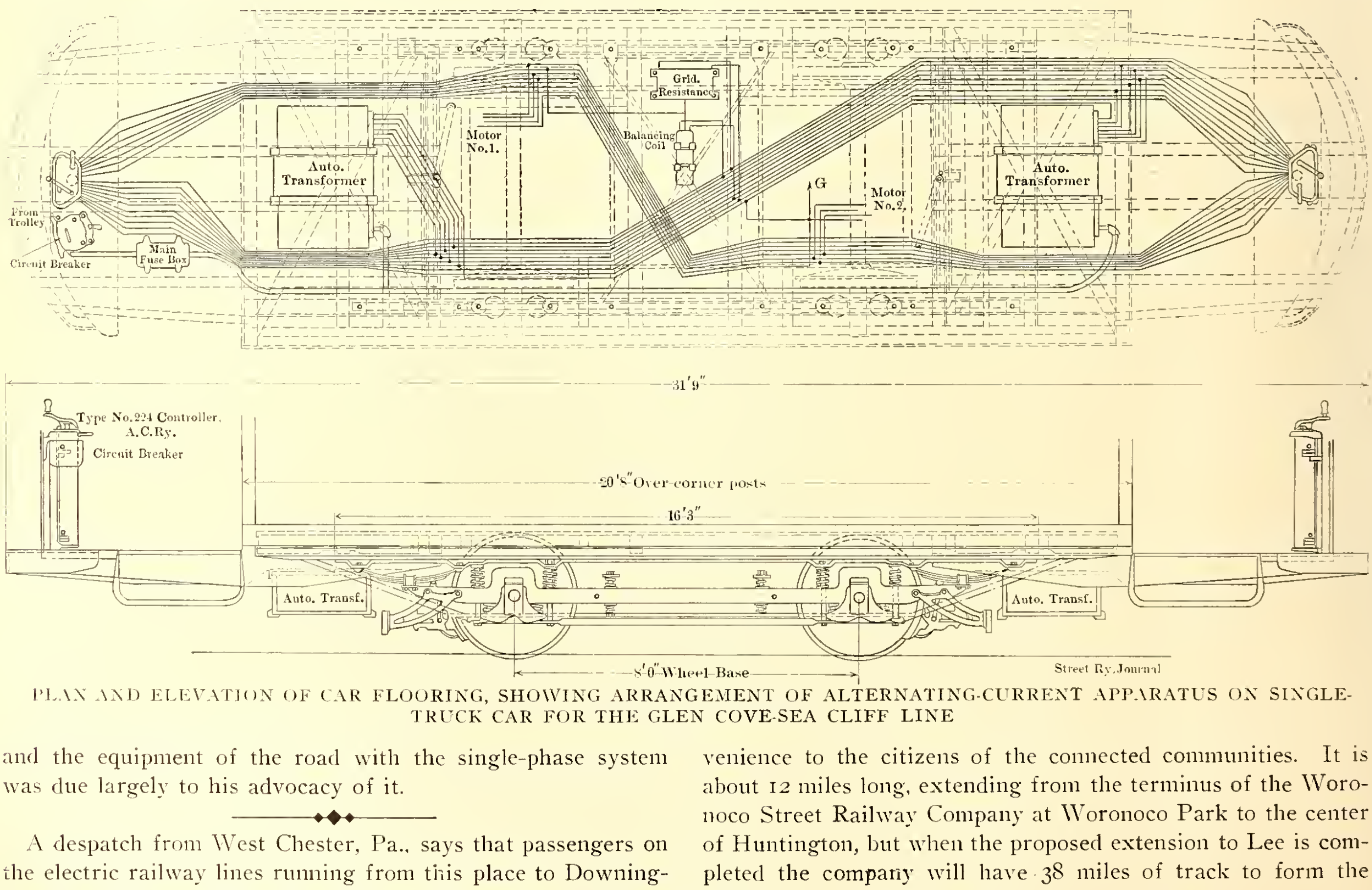
Over certain sections of the railway, where electric light and telephone wires are numerous, guard wires have been erected in order to prevent fallen wires from coming in contact with the catenary or the trolley wire. For this purpose, 30 ins.

above the central trolley wire and catenary have been placed two galvanized iron wires, which are separated from each other by 18 ins. These guard wires are thoroughly insulated from, and supported by, a system of span wires, which are grounded to the side poles. The two wires are transposed at frequent intervals, and it is expected that they can be utilized as a telephone circuit in spite of their proximity to the trolley wire carrying alternating current.

In the town of Glen Cove the street over which the cars operate is paved with brick. Throughout this section of the railway the track is formed of 130-lb. girder rails, electrically-connected through protected ribbon bonds. The terminals of these bonds are placed in holes freshly drilled in the rails, and excellent and continued conductivity is assured by the use of a wedge-shaped steel core, which is driven in a hole in the terminal, and forces the copper of the terminal into intimate contact with the unoxidized surface of the iron web. The bond is then covered by the fish-plate. The track, which is laid parallel to the steam road and on the same roadbed, is formed of 70-lb. T-rails, which were previously used on the steam road. These rails are interconnected by means of protected ribbon bonds, similar to those used on the girder rails.

This road has been in service for the past two months with thoroughly satisfactory results. While the original rolling stock is now idle, and the cars at present in use are throughout of new construction, it is the intention to substitute alternating-current motors for the direct-current machines on he older cars, and to place all cars in service during the next summer season.

Acknowledgments are due for courtesies extended in the preparation of this article to L. S. Wells, electrical superintendent of the Long Island Railroad; to George Gibbs, chief engineer of the Pennsylvania, New York & Long Island Railroad, and to R. G. Slack, of the Long Island Railroad. The work was carried out under the direct supervision of Mr. Wells, and the equipment of the road with the single-phase system was due largely to his advocacy of it.



PLAN AND ELEVATION OF CAR FLOORING, SHOWING ARRANGEMENT OF ALTERNATING-CURRENT APPARATUS ON SINGLE-TRUCK CAR FOR THE GLEN COVE-SEA CLIFF LINE

A despatch from West Chester, Pa., says that passengers on the electric railway lines running from this place to Downingtown and Kennett Square are amusing themselves shooting rabbits from the cars as they run through the country districts. Nearly every day a number of the "cotton tails" are killed along the track in large numbers at many isolated points.

OPENING OF NEW ELECTRIC RAILWAY IN THE WESTFIELD VALLEY OF MASSACHUSETTS

The Western Massachusetts Street Railway Company has recently completed and placed in operation an electric railway

A DEEP CUT ALONG THE RIGHT OF WAY OF THE WESTERN MASSACHUSETTS STREET RAILWAY COMPANY

to serve the towns of Woronoco, Russell and Huntington, all of which are located in the beautiful Berkshire district of Western Massachusetts. The new line will therefore afford a splendid opportunity for pleasure travel, aside from its convenience to the citizens of the connected communities. It is about 12 miles long, extending from the terminus of the Woronoco Street Railway Company at Woronoco Park to the center of Huntington, but when the proposed extension to Lee is completed the company will have 38 miles of track to form the link which will give Berkshire towns and villages a clear electric way to the eastern section of the State.

SCENERY AND PARKS

Attention has already been called to the fact that the new line will derive a large share of its patronage from pleasure travel. The combination of mountain and river, relieved here and there by stretehes of moor and meadow, present scenic effeets of great beauty. Soon after leaving Westfield the traveler can look over the plains below, across the Westfield River,

VIEW OF A PART OF THE PUBLIC HIGHWAY WHICH WAS WIDENED BY BLASTING THE ROCK ALONGSIDE

and thence toward distant Mt. Tom, at the head of Hampton Plains. Mt. Tekoa and the Blandford Hills are also included in this view.

Upon reaehing the State highway, the railway follows the turns of the river, keeping in touch with it all the way to Huntington. Through a wooded avenue the line passes into Woronoeo, where may be seen the famous Salmon Falls and the mills of the Woronoeo Paper Company. The next place on the line is Russell, a typical New England village, which is already known as an ideal summer place. Shortly after leaving Russell, Mt. Tuttle comes in view. This eminence is about 800 ft. above the sea. It is to be made the objective point of a burro trail by the Western Massaehusetts Street Railway Company, which has already purehased over twenty burros or diminutive donkeys. The company proposes to lay out, as soon as possible, a burro trail from Riverbend Park to the top of Mt. Tuttle.

Riverbend Park is the name of the new 10-aere pleasure

RUNNING ALONGSIDE THE STATE HIGHWAY. PART OF THE BERKSHIRE FOOTHILLS ARE SHOWN IN BACKGROUND

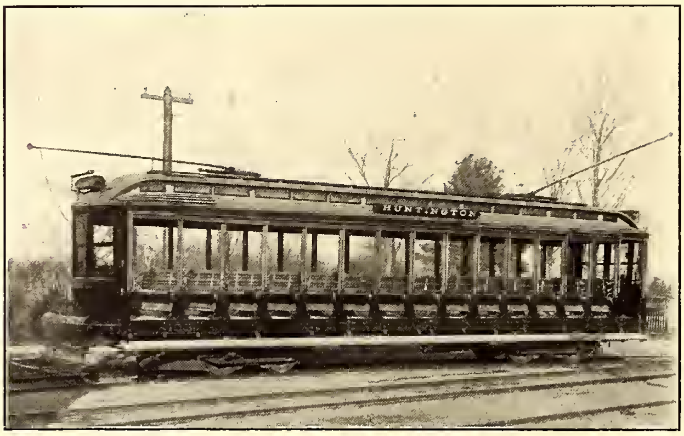
ground which the company is laying out at a point about 1½ miles above Russell. It is located within a few feet of the river bank, and consists of a grove of chestnut and pine. Riverbend Park will not be a gathering place for erowds who come to be entertained by variety acts, music, dancing, etc., but it is the intention of the projectors to provide an attractive

ROAD AND RAILWAY BRIDGES ACROSS THE WESTFIELD RIVER, ON THE LINE OF THE WESTERN MASSACHUSETTS RAILWAY, BETWEEN WORONOCO PARK AND HUNTINGTON

resort where their patrons may picnic, finding enough in the natural beauties of the park and the lunching conveniences provided to have a quiet and pleasant time without the annoyance of large crowds. The park is a series of table lands, the first of which is about 50 ft. above the river. Throughout the park artistie seats and benehes have been provided, many of them being plaeed to give a fine view of the river. Tables are also scattered throughout the grounds for the convenience of picnic parties.

ROAD CONSTRUCTION

Owing to the enormous cuts and fills, the 10 miles of line now in service probably cost more than any like distance



STANDARD OPEN CAR USED BY THE WESTERN MASSACHUSETTS STREET RAILWAY COMPANY

throughout New England. One reason for the high cost of construction is the fact that the railway was obliged to follow the State highway the entire distance, and as the highway already occupied all of the available space between the bank of the Westfield River and the hill or mountain side opposite, it was necessary for the company to construct a right of way under the most adverse conditions. Owing to the rule of the State Highway Commission that the rails must be 14½ ft. from the center of the highway, it was necessary to widen the highway in many places to secure the required clearance. All of this work had to be done on the mountain side of the road, as the commission would not permit any work on the river side except the dumping of the excavated material. An instance of the unusual amount of rock blasting required on this line is the ledge encountered between Russell and Crescent Mills, which averaged 10 ft. to 15 ft. in height, and was ¼ mile long.

Among the many cuts were two between Woronoco Park and the Four-Mile House, each being about 1000 ft. long through 20 ft. of coarse gravel, hard pan and clay. The maximum grade is 5 per cent.

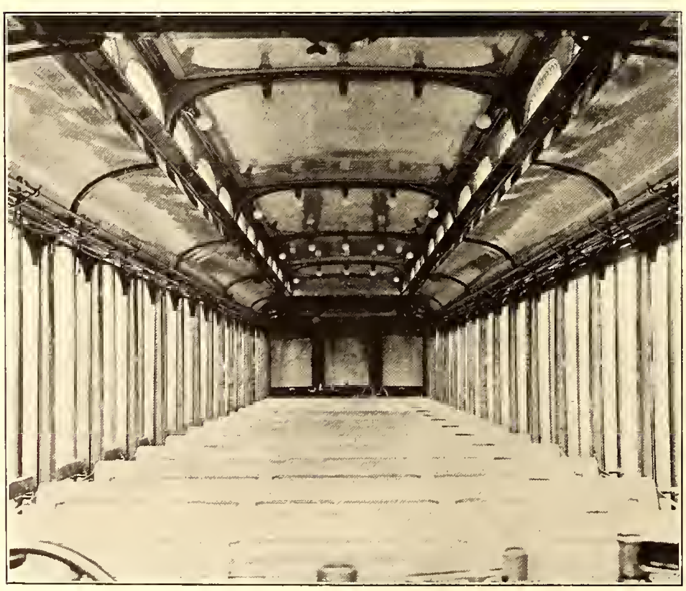
The track is made up of 70-lb. A. S. C. E. T-rail, laid on rock ballast 2 ft. or more in depth, and bolted to chestnut ties either 6 ft. x 6 ins. x 8 ins. or 7 ft. x 8 ins. x 8 ins. It is bonded with 0000 flexible protected bonds of the pin expanded type. Most of the special work consists of split switches, switch stands and targets.

ROLLING STOCK

A glance at the accompanying illustrations of the company's closed and open cars is sufficient to show that the rolling stock adopted is of the most up-to-date character. The present equipment consists of five open and three closed cars, furnished by the Wason Manufacturing Company, of Brighton, Mass., and the Laconia Car Works, of Laconia, N. H.

The open cars are 45 ft. long over all, have a width of 10 ft. and are mounted on extra heavy double trucks. They are equipped with both hand and air brakes, whistles and gongs. Arc headlight and illuminated signs are mounted on the outside of the car, while incandescent lamps are used to illuminate the interior. The roof and ceiling are of the semi-empire type, and the interior finish is mahogany. The cars are painted a rich royal blue, bearing on the sides the words "Western Massachusetts." The seating capacity of these cars, which contain fourteen benches, is seventy-eight. The vestibules are protected by brass railings, and these also serve to form a compartment for carrying small baggage.

TYPE OF THE HANDSOME CLOSED CARS ADOPTED BY THE WESTERN MASSACHUSETTS STREET RAILWAY COMPANY



INTERIOR VIEWS OF THE OPEN AND CLOSED CARS OF THE WESTERN MASSACHUSETTS STREET RAILWAY COMPANY, SHOWING THE SEATING ARRANGEMENT AND THE UNUSUAL METHOD OF CAR LIGHTING

The closed cars are 43 ft. long and 10 ft. wide, in the full empire style, with the interior finish of the finest mahogany. The seats are extra wide and are upholstered in royal blue plush. It will be noticed that the windows extend the width of two seats, this arrangement having been adopted to make these cars ideal for sightseers.

All of the cars have a maximum speed of 25 m.p.h. and an average schedule speed of 14 m.p.h. Telephones are installed on all cars so that the crew can talk to headquarters whenever necessary. In addition to the eight cars mentioned, the company owns one Wason snow plow.

The car house is located at Westfield. It is 47 ft. wide x 200 ft. long, and contains three tracks, with a pit under the center track only. It has a concrete floor and is furnished with Kinnear steel rolling doors. All car repairs are made in the Woronoco Street Railway Company's barn, located about 200 ft. from this company's car house.

POWER SUPPLY

Direct current for running the cars of the Western Massachusetts Street Railway Company is obtained from the Woronoco Street Railway Company at Westfield. This station is located 13 miles from the western terminus of the new railway, and power is transmitted through three No. 0000 feeders for 8 miles, two No. 0000 feeders for 10 miles, and one No. 0000 feeder for 12 miles. The trolley wire is No. 00 grooved type, with Creaghead flexible brackets and mechanical and soldered clips. The poles are of chestnut, 30 ft. high and 7 ins. in diameter at the tops.

RATES AND SCHEDULES

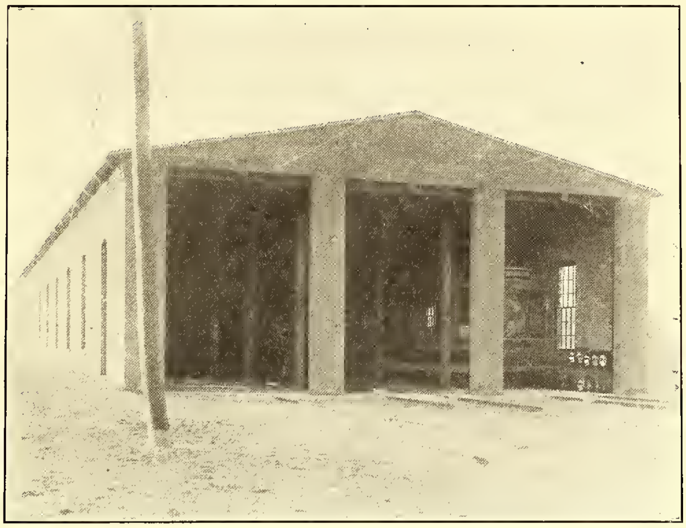
Despite the exceptionally heavy construction cost and the scenic advantages of this railway, the management has been very liberal in its fare charges. The first part of the trip to Huntington is on the tracks of the Woronoco Street Railway Company to Woronoco Parks and costs 5 cents; the stage to Woronoco is 10 cents; the section to Russell, 15 cents; and the total distance to Huntington, 20 cents.

A VIEW ALONG THE HIGHWAY FOLLOWED BETWEEN WORONOCO PARK AND HUNTINGTON

The run from Westfield to Huntington is made in 45 minutes. Thus it will take 22½ minutes to Woronoco, which is just half way, and 34 minutes to Russell. The cars are intended to run on a half-hour schedule.

MANAGEMENT

The Western Massachusetts Street Railway Company was organized on Dec. 10, 1904, with the following officers, who are still serving in the same capacities: President, Ralph D. Gillett; treasurer, A. W. Eaton; secretary, J. D. Cadle; and general manager, A. D. Robinson. Exactly one month after organization the contract for the construction work was awarded to C. W. Blakeslee & Sons, of New Haven, Conn. It is reported that both the Western Massachusetts Street Railway Company and the Woronoco Street Railway Company are to be transferred to the Consolidated Street Railway Company, which is controlled by the New York, New Haven & Hartford Railroad.



THE CAR HOUSE OF THE WESTERN MASSACHUSETTS STREET RAILWAY COMPANY

TOBOGGAN SLIDES FOR ELECTRIC RAILWAY PARKS

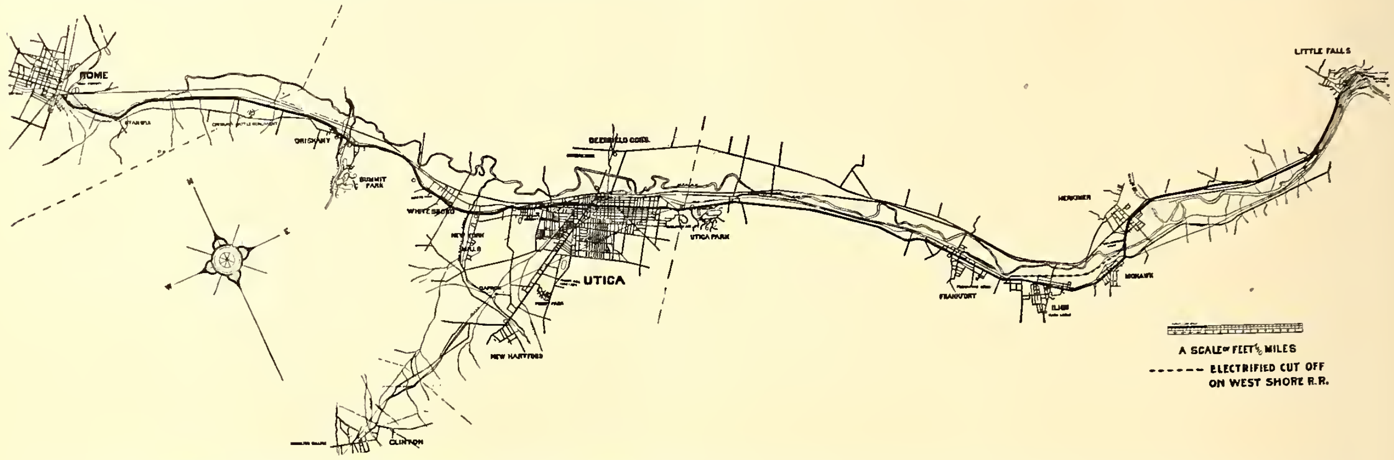
In the STREET RAILWAY JOURNAL for Nov. 25 mention was made of the plans of the Boston & Northern and Old Colony Street Railway Companies, of Boston, for making their pleasure resorts as popular in winter as in summer by building toboggan chutes, ice-skating rinks and other facilities for winter sports. In reply to an inquiry, Robert H. Derrah, general passenger agent for the companies, writes that the electric railway management is building its own toboggan slides at its various parks. The slides vary in detail at the different places, depending upon the contour of the ground. Of the five chutes erected, four are on natural slopes, and some of them are as long as 900 ft. before they reach the level, which is either ground surface, lake or river. The fifth slide, located at Highland Park, near the city of Brockton, is built entirely on trestle work, as the ground is comparatively level. This chute starts from an observation tower 30 ft. high and descends for a distance of some 1500 ft. Rollers have been placed at varying intervals along the slide in order that it may be used even when there is a scarcity of snow. There is also a carrier in the form of an endless chain, to which are attached cradles for carrying the toboggan sleds back to the starting point. The sleds were purchased from the Paris Manufacturing Company, of South Paris, Maine.

In line with the intention of the management to make these resorts as attractive and popular during the winter as possible, large orchestrions have been placed at each of the four principal parks. These will furnish music during the times the toboggan chutes are in use.

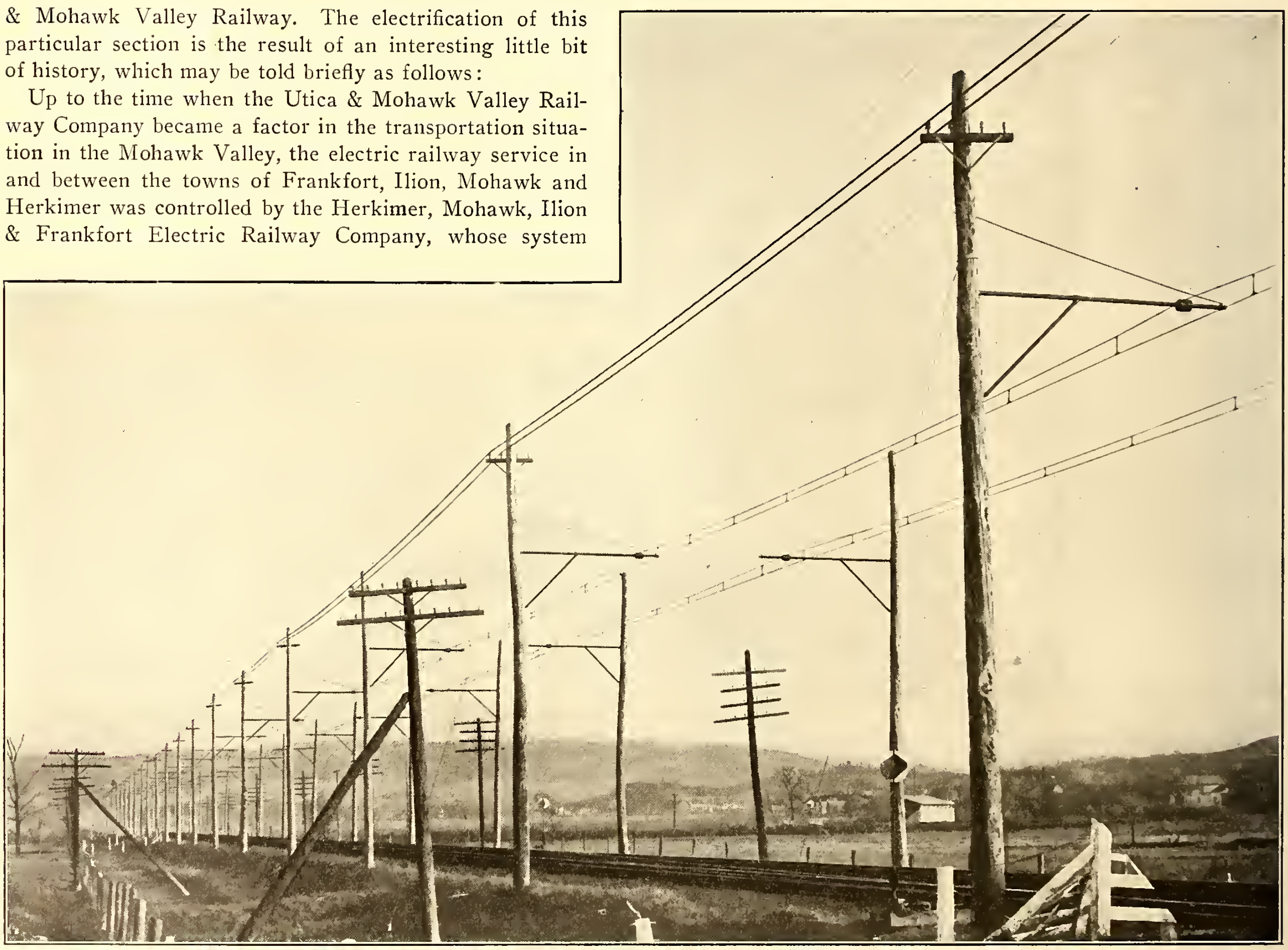
FIRST ELECTRICAL OPERATION ON THE WEST SHORE RAILROAD

A double-track section of the West Shore Railroad, 3.17 miles long, between Frankfort and Herkimer, has been equipped with electricity, and is now used in joint operation by steam trains of the West Shore Railroad and electric cars of the Utica & Mohawk Valley Railway. The electrification of this particular section is the result of an interesting little bit of history, which may be told briefly as follows:

Up to the time when the Utica & Mohawk Valley Railway Company became a factor in the transportation situation in the Mohawk Valley, the electric railway service in and between the towns of Frankfort, Ilion, Mohawk and Herkimer was controlled by the Herkimer, Mohawk, Ilion & Frankfort Electric Railway Company, whose system for the most part comprised a single line of track laid entirely in the highway. The Utica & Mohawk Valley Railway Company came into possession of this property and began at once to reconstruct the line as a double-track road on private right of way in the best manner possible, having in mind the ultimate intention of organizing a thoroughly modern high-speed, double-track electric railway system through the Mohawk Valley from Rome on the west to Little Falls on the east. In carrying out this work a serious obstacle was encountered in the attitude taken by the municipalities of Ilion and Mohawk, as these towns refused to give double-track rights except under conditions so burdensome that the company did not feel justified in accepting them. The company, therefore, opened negotiations with the West Shore interests, the result of which has been the electrification of that section of the steam load lying between Frankfort and Herkimer and running through the outskirts of Ilion and Mohawk. Connecting tracks have been built from the steam road to the electric line at both ends of the electrified section, and



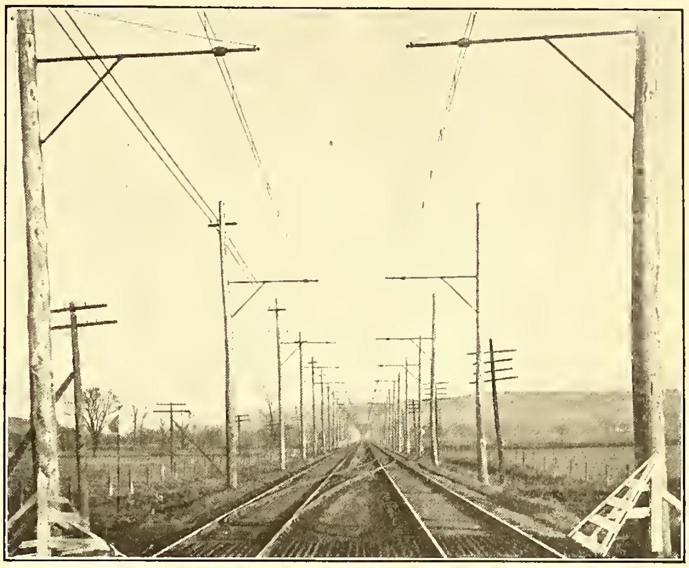
MAP OF INTERURBAN SYSTEM OPERATED BY UTICA & MOHAWK VALLEY RAILWAY COMPANY, SHOWING ELECTRIFIED SECTION ON WEST SHORE RAILROAD, BETWEEN FRANKFORT AND HERKIMER



VIEW SHOWING CATENARY CONSTRUCTION ON WEST SHORE CUT-OFF, UTICA & MOHAWK VALLEY RAILWAY this stretch of track now forms a cut-off that will materially shorten the through line, and with the exception of 2400 ft. of track in the city of Utica, gives the Utica & Mohawk Valley Railway a thoroughly modern double-track system from Rome to Little Falls, a distance of approximately 40 miles. For the present the same schedule as before will be maintained on the old line from Frankfort through Ilion and Mohawk to Herkimer, but the through cars will run by way of the cut-off over the West Shore.

When the through service from Utica to Little Falls was placed in operation in 1903, the running time from the center of Utica to the center of Little Falls was 1 hour and 20 minutes. From Utica to Herkimer the time was 1 hour, and from Herkimer to Ilion was 45 minutes. By the installation of electricity on the West Shore cut-off, the running time from the center of Utica to the center of Little Falls will be 1 hour, and this will be cut ultimately to 52 minutes for the total distance of 23 miles. The time from Utica to Herkimer will be 45 minutes, and this will be cut ultimately to 37 minutes. The running time from Herkimer to Ilion will be 35 minutes for the present, but this will be reduced to 32 minutes. This reduction in the running time between these points will be accomplished with the same schedule speed as formerly, but the cars will travel over double tracks unobstructed by team traffic and other causes of delay. The new service will therefore save the people of this section anywhere from 10 minutes to half an hour on the trip to and from Utica. Incidentally it may be said that it would have cost the company in the neighborhood of $200,000 to reconstruct the old track from Frankfort to Herkimer under the conditions imposed by the municipalities, whereas the cut-off over the West Shore has been equipped electrically, ready for service, at a cost of not over $75,000.

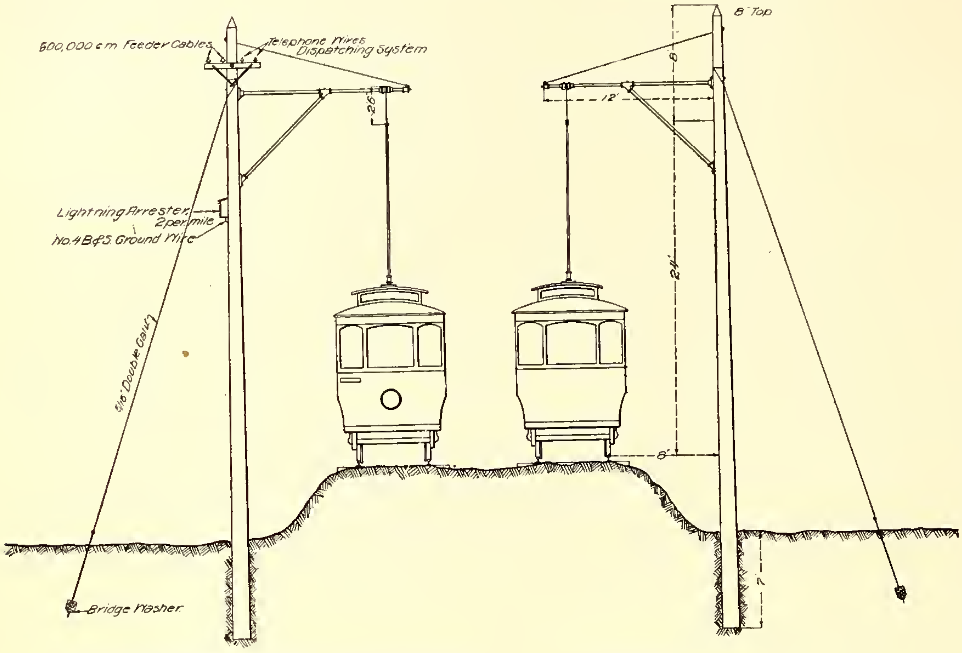
At each end of the electrified section of the steam road, which



ELECTRIFIED SECTION OF WEST SHORE RAILROAD, LOOKING EAST

will be used jointly by the steam trains and electric cars, the company has installed block signals of the standard New York Central type, and a third block has been established in the

SHOWING CONNECTING TRACKS BETWEEN UTICA & MOHAWK VALLEY RAILWAY AND ELECTRIFIED SECTION OF WEST SHORE RAILROAD middle of the section, so that the 3 miles of track will be operated as two distinct blocks, and the movement of all cars and trains through this section will be made by signal movements.

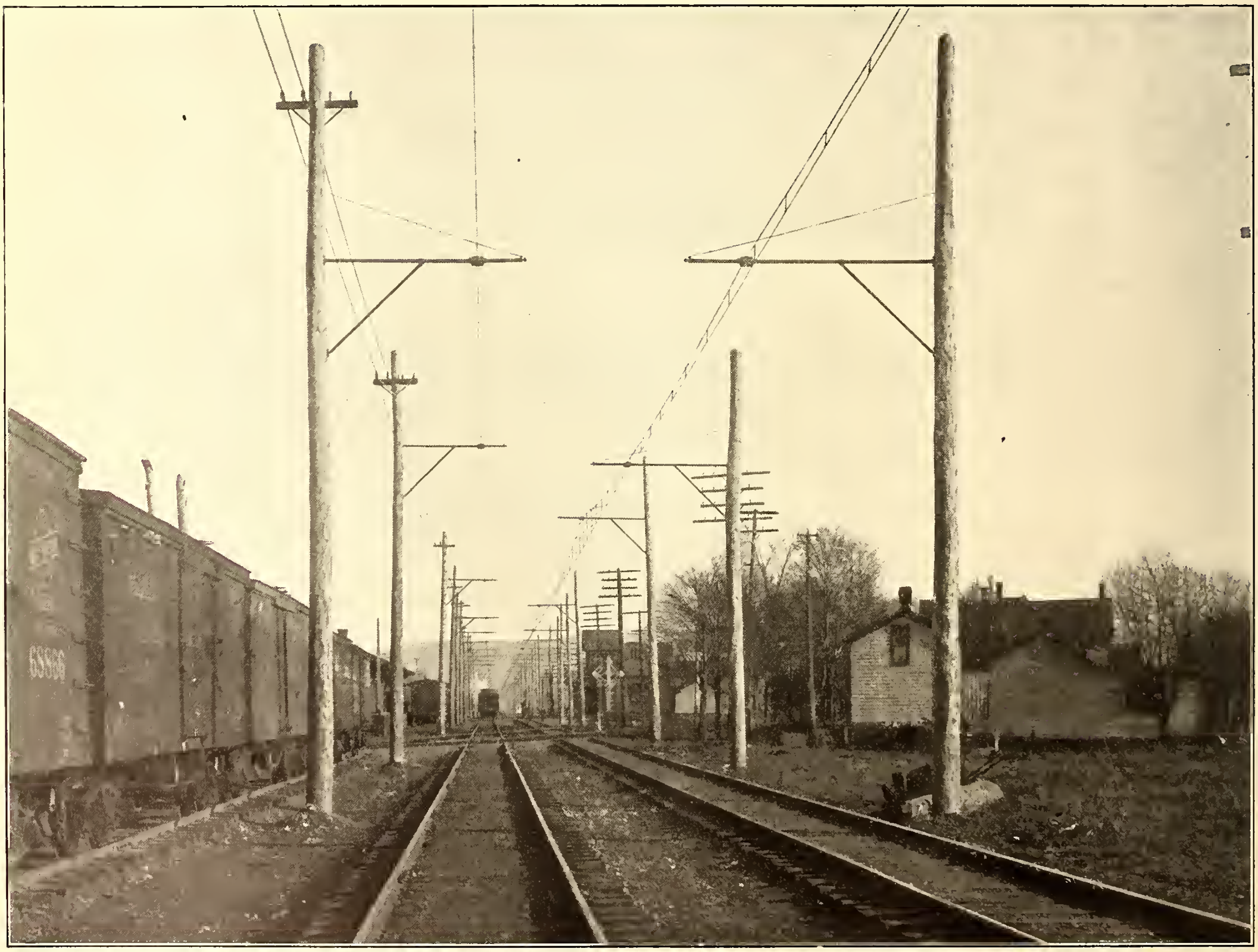


CROSS-SECTION CATENARY CONSTRUCTION, WEST SHORE RAILROAD CUT-OFF

Although electrical operation for the present will be by direct-current motors on the cars, the overhead construction on the West Shore cut-off has been built with catenary construction and is designed eventually for alternating-current operation. It may be said that advantage has been taken to make certain experiments in electrifying the cut-off, and the lessons here learned will be applied in the work of electrifying the West Shore tracks from Utica west to Syracuse, which work is already under way.

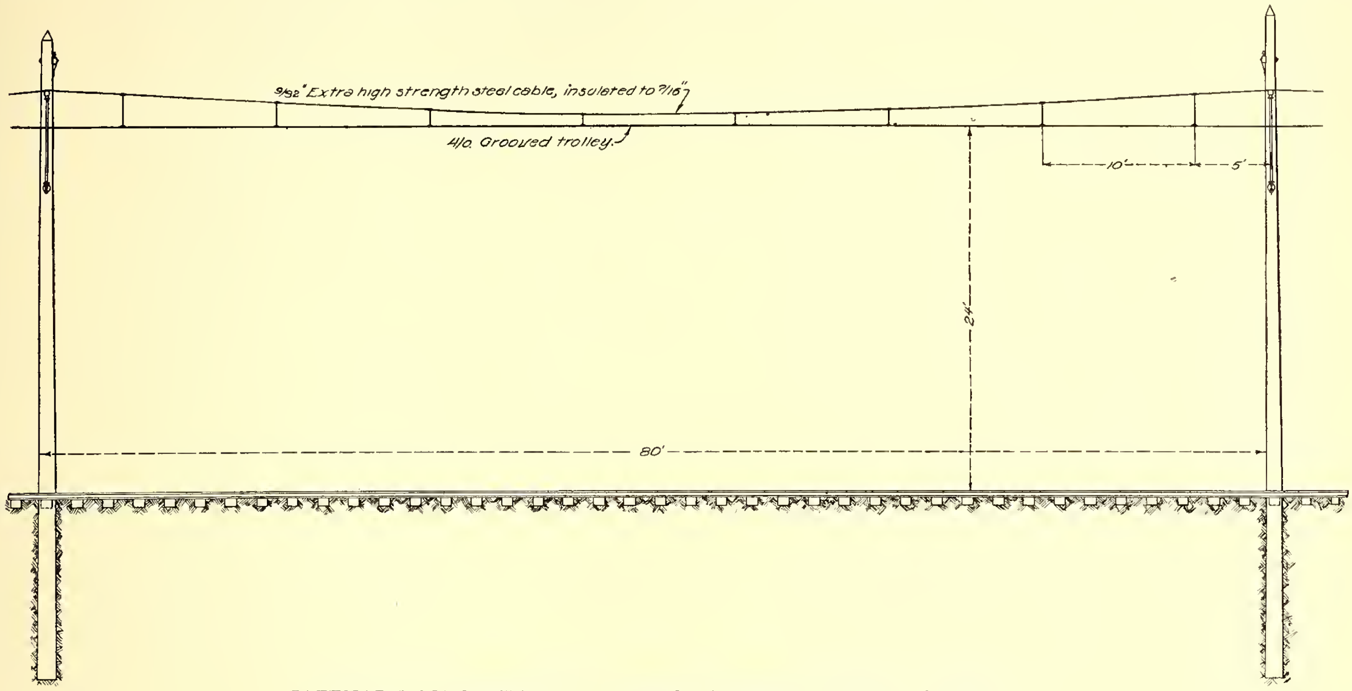
On the cut-off the trolley is 0000 grooved copper wire suspended from a catenary, which consists of 9-32-in. extra high strength steel cable covered with weatherproof insulation to protect the cable from deterioration caused by locomotive gases. The hangers or spreaders between the trolley wire and the catenary are placed 10 ft. apart, and consist in each case of a ½-in. iron pipe flattened at the top to bolt between the lips of a strap clip attached to the catenary and threaded at the bottom into the boss of a bronze clip attached to the trolley wire. The bronze clip on the trolley wire is held together by four screws, and the entire clip is 5 ins. long.

The poles are Southern white cedar, and the catenary is carried on side brackets made of extra heavy 2-in. iron pipe. The line is put up with large insulating



ELECTRIFIED SECTION, WEST SHORE RAILROAD, LOOKING TOWARD ILION STATION. THIS SECTION IS TO BE USED JOINTLY BY STEAM TRAINS AND ELECTRIC CARS OF UTICA & MOHAWK VALLEY RAILWAY collars slipped over the bracket arm to receive the catenary, this having been designed to facilitate the use of a higher voltage a. c. trolley at some future time. The whole overhead construction, including the clips, spreaders, catenary and arms, with the exception of the trolley wire, has been painted with graphite paint in order to give protection against locomotive gases. By demonstration it has been found the gases have no deteriorating effect upon the trolley wire, but the gases do have a tendency to attack unpainted iron or steel. The type of overhead catenary construction used is shown in the accompanying illustration.

The poles are spaced 80 ft., and the wires are drawn a little



CATENARY CONSTRUCTION ON WEST SHORE RAILROAD CUT-OFF

tighter than the true catenary would be. It may be stated that the spacing of the poles and also the spacing of the spreaders between catenary and trolley have been made somewhat shorter than would otherwise be necessary, owing to the fact that the track will be used jointly for steam and electric operation, and it was deemed advisable to take more than usual precautions to avoid any possibility of interruption to either service.

The trolley wire is carried 24 ft. above the top of the rail, and this extra height has made necessary the use of 14-ft. trolley poles on the cars. By designing a special trolley base, however, no difficulty has been encountered in this regard. The trolley base is carried directly over the center of the rear truck, which gives the most advantageous location.

At one point of the line where it was necessary to pass over a crossing, the catenary has been carried on a single span of 220 ft. between poles, and the distance between the catenary and trolley has been increased accordingly. It is probable that in straightaway electric railway work, catenary spans could be carried 250 ft. or 300 ft., or even longer, with entirely satisfactory results. One rail of each track on the cut-off has been reserved for the signal system, and the other is bonded with Lord Electric soldered bonds placed on the side of the rail head to carry return current.

The Utica & Mohawk Valley Railway Company has taken the occasion of the opening of the cut-off to readjust and simplify its rates of fare between all points from Utica to Little Falls. The new rates will average 1.5 cents per mile for one-way trips and 1.4 cents per mile for round trips, these fares being a slight reduction from the former rates. The complete system of fares, tickets and methods of collecting will be described in a later issue of the Street Railway Journal.

MEETING OF THE NEW YORK STATE STREET RAILWAY ASSOCIATION

R. E. Danforth, of Rochester, president of the New York State Street Railway Association, with the sanction of the executive committee, has called a meeting of the association to be held Jan. 10 next in the rooms of the Schenectady Railway Benefit Association, Schenectady, N. Y. The meeting will be called promptly at 9:30 in the morning and will adjourn the same evening. The entire day will be devoted to a discussion of topics relating to Accounts Nos. 6, 7, 8 and 9, namely, Maintenance of Cars; Maintenance of Electrical Equipment of Cars; Maintenance of Miscellaneous Equipment, and Miscellaneous Shop Expenses.

The official announcement of the meeting will state that this will be the first of regular quarterly meetings or, more properly speaking, conferences, to be held under the auspices of the New York State Street Railway Association, each conference to occupy one whole day and to be devoted entirely to discussions of practical topics. It is probable the first quarterly meeting in each year will be devoted to mechanical subjects; the second, held some time in March, to purely operating topics; the third meeting, held some time in June, will be the regular annual convention of the association, occupying two whole days, and devoted to papers and discussions on broad and general subjects of policy and management. The fourth quarterly meeting, to be held some time in the fall, will be devoted to maintenance of way and structures.

In announcing the institution of regular quarterly one-day meetings, emphasis is particularly laid on the fact that these meetings, or conferences, will be wholly and entirely devoted to hard work. All the entertainment features will be eliminated and there will be no exhibits or entertainments of any nature.

For the January meeting, to be held in Schenectady, there will be two short papers, one on "Cleaning and Handling Cars in Car Houses," and one on "Layover Inspection vs. Night Inspection." Leaders will be appointed to open the discussion on each of these and other topics, and the meeting will then be thrown open and the fullest opportunity will be given for asking and answering questions and an interchange of opinions and ideas relating to the maintenance of cars and equipment. In announcing the meeting, a most cordial invitation is extended not only to non-members within the State, but also to companies outside of the State to send representatives of the mechanical department to take part in this conference. Individual representatives of electric railway companies and of engineering firms are also cordially invited to attend and take part in the discussions. The meeting is for active electric railway men only, and the supply men are not invited.

THE TRAFFIC PROBLEM IN CLEVELAND

The Cleveland Electric Railway Company has agreed to another radical tearing up of its system of operation in order to relieve the congestion at the Public Square, the heart of the business section of Cleveland, and looking toward a possible solution of the entire street railway question. As outlined in this paper some weeks ago, the Chamber of Commerce appointed a committee to investigate the necessity for subways which had been urged by the company as the most desirable plan for relieving the congestion at this point. In its report made some weeks ago, the committee maintained that subways were not yet necessary, and suggested building loops around all four corners of the square and running all cars around these loops, making all lines terminate at this point instead of operating lines across the city as at present, thereby cutting out the crossing in the center of the square as well as several other crossings at sides of the square.

Although feeling that this was not a permanent solution of the problem, and that it contained a number of undesirable features, the company agreed to a trial of the plan, and at a meeting held last week the entire plan was gone over and the Board of Public Service authorized the necessary changes for the trial.

As already outlined, the plan contemplates the removal of all through lines and the running of all cars from various portions of the city around the corner of the square most convenient to the street upon which they enter the square. The plan eliminates entirely crossing in the center of the square or on any of its sides. The northwest loop will accommodate five lines entering Superior Street from the west; the northeast corner, four lines entering on Superior Street from the east; the southeast corner, four lines entering on Euclid Avenue from the east, and the southwest corner, seven lines entering on Ontario Street from the south. The plan is to make the loops single track, all cars running in the same direction, the tracks being placed on 6 ft. of the present 30-ft. sidewalks surrounding each section of the square, thus leaving the streets entirely free. One serious objection is that the company may be obliged to unload the people in the streets or cut doors on the inner sides of all its cars so that passengers could unload onto the sidewalk of the square, because at present its cars are all single-enders, running in one direction, and having the inner side next to the devil strips entirely closed on summer as well as box cars.

While admitting that the plan will decrease the congestion of cars in the center of the square, the company pointed out that the plan will enormously increase the amount of transferring at that point. It stated that at present one-third of all passengers ask for transfers, and that 42 per cent of these, or 13 per cent of all passengers carried, transfer at the square under the present arrangement, while if all through lines are cut out, the number of transfers at that point will probably be doubled. Under the present plan many people walk out one of the main arteries to board their car before it reaches the square, thereby securing a seat. Under the proposed plan these people will either flock to the square during the rush hours to board their car or will board another car and transfer at the square; in either case they will add to the congestion of people at that point.

It is stated that it will cost the company approximately $60,000 to purchase and lay the special work necessary to inaugurate the plan. It is quite probable that the present tracks in the centers of the streets will be allowed to remain until the success of the plan has been determined, and it is very probable that the necessary material cannot be secured and laid before next spring. The company will probably insist upon a trial covering several months.

In order to relieve the congestion immediately, the city authorities have announced their determination to divert all team traffic from the center of the square during rush hours. Statistics were recently prepared showing the amount of this team traffic. On a recent Friday, which is not a heavy day, it was shown that 3187 teams traversed the central portion of the square, of which 1987 went directly through the square, the others going around corners at that point. During the rush hour from 5 to 6 p. m., 209 teams went directly through the square and 51 went around corners. During the same hour about 40,000 people were transferring at the square and cars were passing the crossing at intervals of about 15 seconds, which gives some idea as to the congestion at this point. By removing all the teams and all crossing points for the cars, it is believed that the congestion will be much less, although the number of people transferring will be much greater.

From the standpoint of operation it will probably be more expensive for the company because of increased dead mileage for the cars, and it will probably cause loss of time on account of increased transferring at this point, although the time lost at the crossings may compensate for this.

It is a peculiar fact that neither the company's officials nor Mayor Johnson are heartily in favor of this plan. Mayor Johnson is opposed to breaking the lines at the square, believing that the best service can be given by running cars in through routes across the city. The company coincides with this view, and believes that a subway at the square is the only practical solution of the problem. Frank DeHaas Robinson, a prominent railroad man, who formerly operated some of the lines in Cleveland, says it is a step backward, as he claims that it will force 90 per cent of the people in the downtown district to walk to the center of the square to get their car, making it much more dangerous than at present, even though teams and crossings were eliminated.

Altogether it is a most interesting problem, and indicates more strongly than ever the liberality and broadmindedness of the management of this company in testing out schemes in which it has little faith in an effort to suit requirements of the public and its representatives.

It is believed by some that this test may result in the working out of the entire franchise problem in Cleveland on a basis of 2-cent or 3-cent fare for a ride to the Public Square, with an additional 2 cents for a transfer. Needless to say, such a settlement would be even less satisfactory to the company than the 3-cent and 4-cent zone plans which were tested out by the company some months ago in an effort to settle the fare question.

On Tuesday of this week the police authorities of Cleveland instituted a stoppage of team and automobile traffic through the Public Square, this being in line with the recommendations of the Chamber of Commerce committee for eliminating congestion at this point. Red pedestals 4 ft. high, with ropes strung across them, were placed across the various roadways leading to the square, preventing all vehicles from passing through the square by way of Ontario Street, Superior Street or Euclid Avenue, but permitting them to pass around the north side of the square, where there are no car tracks. This plan will be operative during the rush hours and will be continued until after the holidays at least, and perhaps indefinitely. A record of traffic in the Public Square for a period of five minutes during a rush hour recently showed the following: Teams, 427; automobiles, 42; cars, 140; pedestrians, 5444; bicycles, 6.

THE DECEMBER MEETING OF THE MASSACHUSETTS STREET RAILWAY ASSOCIATION

The regular meeting of the Massachusetts Street Railway Association was held at Young's Hotel, Boston, Wednesday evening, Dec. 13, 1905. About 100 members and guests were present, and the meeting was preceded by the usual banquet. Hon. W. Caryl Ely, president, and Bernard V. Swenson, secretary, of the American Street and Interurban Railway Association, were the especial guests of the association, whose members had been invited to hear these gentlemen outline the future plans of the national association.

After the dinner, Hon. E. P. Shaw, president of the association, congratulated the members on the large attendance at the meeting, which he said was the 182d in the history of the association. He also stated, as an interesting and striking coincidence, that the first meeting of the American Street Railway Association had been held at Young's Hotel, Wednesday, Dec. 13, 1882, so that it was twenty-three years ago to the very day of the week since that association was organized. He then asked J. E. Rugg, superintendent of transportation of the Boston Elevated Railway Company, to give an account of the first meeting.

Mr. Rugg, in 1882, was superintendent of the Highland Street Railway Company, and one of those who issued the call for the first meeting of the association. He is also one of the few survivors of those who attended that meeting, and gave some most interesting reminiscences of the early history of the association.

Mr. Ely was then called upon by the speaker, and presented an address which was devoted principally to a discussion of the reasons which led up to the formation of the American Street and Interurban Railway Association. Afterward he discussed some of the future plans of the new association, especially certain of the topics, like municipal ownership, upon which it is proposed by the association to collect data. Following Mr. Ely, Bernard V. Swenson, secretary and treasurer of the association, discussed the plans of the new association more in detail, and suggested certain ways in which the main organization and the State organization could co-operate to mutual advantage. Both of these addresses were received with the closest attention by those present, and on account of their great interest will appear at length in the next issue of this paper.

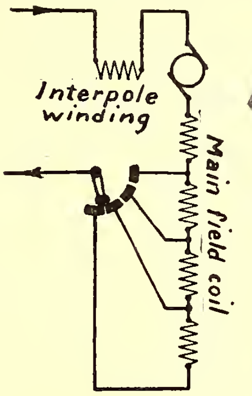
At the conclusion of the speeches, F. H. Dewey, president of the Worcester Consolidated Street Railway Company, speaking in behalf of the Massachusetts Street Railway Association, extended the thanks of the association to Messrs. Ely and Swenson for their addresses, and promised them the hearty co-operation and support of the Massachusetts street railway companies for the national association.

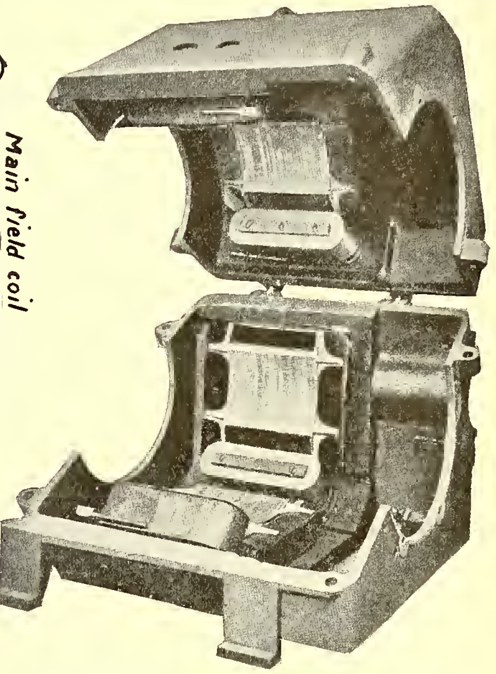
FIRE DAMAGES HUNTINGTON PRIVATE CAR

The private car "Alabama" of Henry E. Huntington, president of the Pacific Electric Railway Company, the Los Angeles Interurban Company and the Los Angeles Railway Company, recently caught fire on the streets of Los Angeles. Aboard the car at the time were Mr. Huntington, General Manager A. D. Schindler and Electrical Engineer R. S. Masson, who were compelled to make a hasty exit. The motorman tried to put out the blaze with a fire extinguisher, but it became necessary for a policeman to turn in a fire alarm, and the department responded in time to save the car from serious damage. The "Alabama" was making its third trial trip for the day, and was returning after a successful trip to Mt. Lowe. The damage to the car is estimated at $500.

HIGH-VOLTAGE DIRECT-CURRENT RAILWAY MOTOR

In view of the interest which is being taken in the possible use of high-voltage direct-current motors for railway service, the recent experiments in this direction by the Oerlikon Machine Works, of Zurich, Switzerland, is of interest. The latest motor of this company is built for 800 volts, and has a rating of 200 hp with one hour's load when running at 400 r. p. m. In this machine the company has introduced a method for improving the commutation under varying loads which has been employed for some time with great success in the case of stationary motors, particularly by the Electro Dynamic Company, of this country, but which up to this time has not been incorporated in any railway motor so far as known. This is by the use of small auxiliary poles between the main poles of the field





INTERIOR OF HIGH-VOLTAGE MOTOR AND DIAGRAM OF FIELD CONNECTIONS

magnet, as shown in the illustration of the motor case open. The effect of this construction, which is known as the interpole type of construction, is to compensate for the armature reaction due to the variations in current with the load and to keep the line of commutation constant. Another novel feature in the construction of the motor is that the armature has completely closed slots. The maximum number of revolutions for which the motor is designed is 1000, at which the circumferential speed of the commutator is 25 m (82 ft.) per second. The armature has 518 turns, two per slot, and the commutator has therefore 259 segments. The exciting windings are made of copper ribbon and are insulated with pressboard. Cotton insulation is entirely absent.

Regulation of speed is secured partly by resistance and partly by commutating the main field windings. The latter are in several sections, which can be gradually cut out, so that only a single coil may be left in the circuit, as shown in the diagram. The motor alone weighs 2300 kg, the gears 310 kg and the gear case 78 kg. The efficiency curve appears to be quite remarkable, being almost a straight line at 90 per cent between one-fourth load and full load.

The Michigan Central Railroad Company has reduced its rate of fare between Detroit and Toledo to $1.50 for the round trip to meet the competition on the Detroit, Monroe & Toledo Short Line Railway. The former price on the steam road was $1.30 each way.

A TALK BY A. H. ARMSTRONG ON THE SELECTION OF THE PROPER MOTOR EQUIPMENT

On the evening of Dec. 5 the members of the transportation course given by the Polytechnic Institute of Brooklyn, N. Y., listened to a lecture by Albert H. Armstrong, of the General Electric Company, on "How to Select the Proper Motor Equipment." The greater part of Mr. Armstrong's lecture was devoted to a detailed description of methods for constructing and using speed-time, energy, acceleration, resistance, braking curves, etc., blue prints of which were handed to those present. Several fundamental traction formulæ were also presented, together with examples of their application to different problems. Special attention was given to the subject of train resistance. Mr. Armstrong defined the different kinds of resistance encountered by the car, and pointed out the saving in power obtained by operating cars in trains instead of singly.

The concluding portion of the lecture was devoted to comparisons of the costs of rolling stock, as shown in the following tables. The figures given, of course, are only approximate:

DATA ON CARS

Type of Car	Length Body	Length Over All	Weight Lbs.	Passengers	Cost
Single truck.....	18 ft.	26 ft.	12,000	26	$1,500
Double truck....	30 ft.	40 ft.	24,000	42	3,000
Double truck....	40 ft.	50 ft.	35,000	52	4,500
Double truck....	50 ft.	60 ft.	50,000	64	6,000

COST AND WEIGHT PER HORSE-POWER OF DIRECT-CURRENT RAILWAY ELECTRICAL EQUIPMENT

	Cost	Weight
Up to and including 200 hp with hand control.	$15.00	700 lbs.
From 200 hp to 300 hp with multiple-unit control	16.00	650 to 500 "
For 400-hp equipments and larger, with multiple-unit control........................	16.00	350 "

Owing to the fact that alternating-current equipments have not yet been standardized, the lecturer could not give very definite figures. In general, a. c. motor equipments would appear to cost about $25 per horse-power for all sizes from 75 hp to 150 hp. The weight of the 75-hp equipment averages 900 lbs. per horse-power, and that of a 175-hp equipment 750 lbs. per horse-power. These weights include the controlling equipment, transformers, wiring, etc.

DATA ON DIRECT-CURRENT LOCOMOTIVES

Type	Approximate Weight	Cost Per Ton
Low speeds, geared or gearless...	100 tons or more	$300 to $350
High speeds, gearless............	75 tons or more	350 to 400

Regarding the relative cost of maintenance, Mr. Armstrong stated that cars equipped with two 125-hp direct-current motors can be maintained for approximately $.01 per car-mile, this cost including maintenance, inspection of the motors and control, car bodies, trucks, painting, varnishing, etc. Of this $.01 per mile, he estimated that the electrical equipment amounted to $.003. On a four-motor equipment the cost per car-mile of the electric equipment would be $.004 to $.0045.

In considering locomotive maintenance, Mr. Armstrong compared the annual maintenance charge of the average steam locomotive with the record made by the two 40-ton electric locomotives running between Buffalo and Lockport. Each of these electric locomotives, which have been in service for the past four years, has cost $170 annually. Since each locomotive made 35,000 miles per year, the maintenance charge amounts to $.00485 per mile as against the steam locomotive average of $.06. The New York Central electric locomotive which is undergoing a 50,000-mile endurance test run has already covered half of the distance with an average maintenance cost of $.017 per locomotive-mile, and this at speeds up to 80 m.p.h. and with loads sometimes as high as 450 tons. It is expected that the second 25,000 miles will show an even lower maintenance cost.

CHANGES IN THE RULES ON CAR WIRING

As stated in the last issue of this paper, a meeting of the Underwriters' National Electrical Association was held Dec. 6 in New York to consider changes in the National Electric Code. The only change in the rules in regard to car wiring was in Rule 32 g, 2, which was changed on the recommendation of the committee on car wiring, to read as follows: "Heaters to be constructed with a protecting ventilated metal casing providing an air space of not less than 2 ins. on all sides of the resistances. Heaters to be so located that the resistances will be not less than 4 ins. below the under side of the seats or from any woodwork, unless the under side of the seat, or such woodwork, is protected by not less than ¼-in. fire-resisting insulating material, or .04 sheet metal, with 1-in. air space between the sheet metal and the seats or woodwork." This is the only change made in the rules on "Car Wiring and Equipment of Cars" in the National Code, and since a revised edition of the Code will not be published until after the next meeting of the Underwriters' National Electric Association in 1907, it might be well for those interested to make this change in their editions of the Code.

SINGLE-TRUCK CARS FOR PEORIA

The Central Railway Company, of Peoria, Ill., has just received from the American Car Company eighteen single-truck closed motor cars similar to a number furnished by the same company several years ago. The platforms of these cars, as the illustration of the exterior shows, are closed at one side, so that the entrance is from the rear only. It will be noticed that

SINGLE-TRUCK CAR USED IN PEORIA

there are two window openings at the closed side of the platform, and that the one next to the car body is provided with a wooden panel as well as a sash. This is for the purpose of excluding the light which comes through the side windows at night and is reflected by the glass of the sash in front of the motorman, and which would prevent him from seeing the roadway clearly. Curtains are also provided for the sashes and doors at the car ends for the same purpose. The platforms are 5 ft. long from the end panels over the vestibule sheathing, and are used to increase the standing space of the car. The destination signs on the hoods are placed at an angle, so that they may be read from the side as well as from the front of the car. The window sashes of the car are in two sections, with the upper stationary and the lower arranged to drop into pockets in the side walls, which have hinged covers. The interiors are finished in cherry and the head linings are of bird's-eye maple.

The general dimensions of the cars are as follows: Length over end panels, 20 ft.; over crown pieces, 30 ft.; from end panels over vestibules, 5 ft.; width over sills, 7 ft., and over posts at belt, 7 ft. 8 ins.; sweep of posts, 3 ins.; from center to center of side pieces, 2 ft. 9½ ins.; size of side sills, 4⅝ ins. x 7¾ ins.; end sills, 3¾ ins. x 9 ins. The sill plates are on the outside of the sills and are 7 ft. x 5/8 in.; thickness of corner posts, 3 3/4 ins., and side posts, 2 1/4 ins.; height of platform steps, 13 7/8 ins., and from step to platform, 12 ins.

THE ALLIS-CHALMERS STEAM TURBINE

The recent starting up of a steam turbine at the Washington Street power house of the Utica Gas & Electric Company, Utica, N. Y., calls attention to the fact that this is the first turbine to be put into operation by the Allis-Chalmers Company, which has recently entered the steam turbine field. The turbine outfit installed at Utica is shown in the accompanying Fig. 1.

This turbine is rated at 1500-kw normal load, and runs at a speed of 1800 r. p. m. It is direct coupled to an Allis-Chalmers two-phase, 60-cycle, revolving-field alternator, operating at 2500 volts. The unit has a continuous overload capacity of 25 per cent, with a three-hour, 50 per cent overload capacity without exceeding a safe generator temperature, and capable of a 100 per cent safe momentary overload. Artificial ventilation by means of an electrically-driven fan blower will, however, enable the unit to be run safely beyond its rated overload capacity. The turbine follows the well-known Parsons type, which has proven itself eminently successful in numerous installations both here and abroad. The Allis-Chalmers construction, however, embodies a number of features which are new in this country, and which are claimed by the builders to be distinct improvements.

The chief distinguishing feature of this construction is the blading, which, while it is of the Parsons reaction type as regards the principle of operation, differs in mechanical construction in a number of essential details. The roots of the blades are formed in dove-tail shape by special machinery, and are inserted in slots cut in foundation or base rings, these slots being formed by special machine tools in such a way as to exactly conform to the shapes of the blade roots. The foundation rings themselves are of dove-tail shape in cross section, and are inserted in dove-tailed grooves cut in the turbine cylinder and spindle respectively, in which they are firmly held by key pieces, much in the same way that the well-known

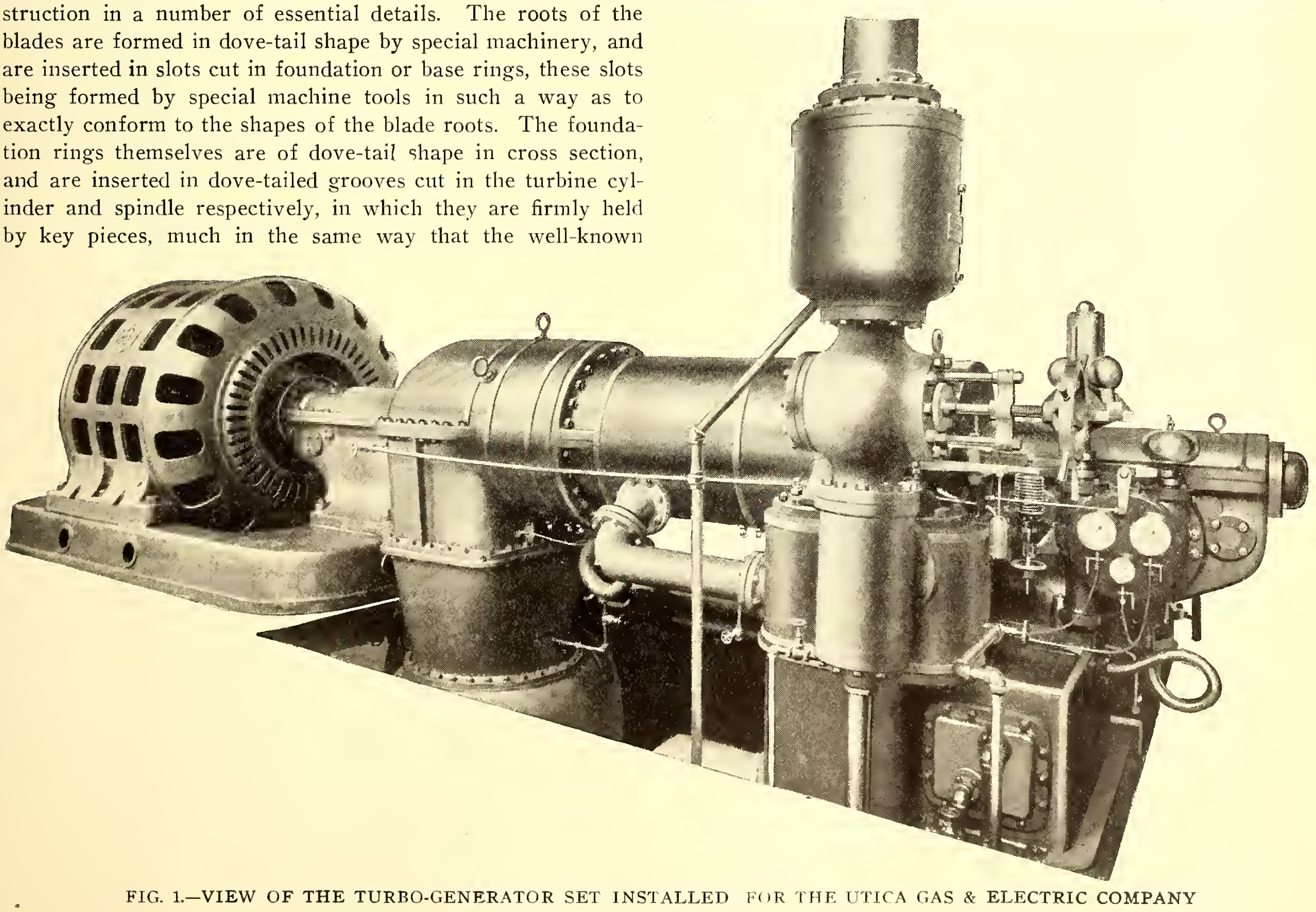


FIG. 1.—VIEW OF THE TURBO-GENERATOR SET INSTALLED FOR THE UTICA GAS & ELECTRIC COMPANY

"Lewis bolt" is fastened. In order to further insure the integrity of the construction, the key pieces or rings after being driven into place are upset into undercut grooves.

Another noticeable feature of the blading is the method of reinforcing and protecting the tips of the blades. This point in steam turbine design is one upon which much thought has been expended by various inventors, and the company building

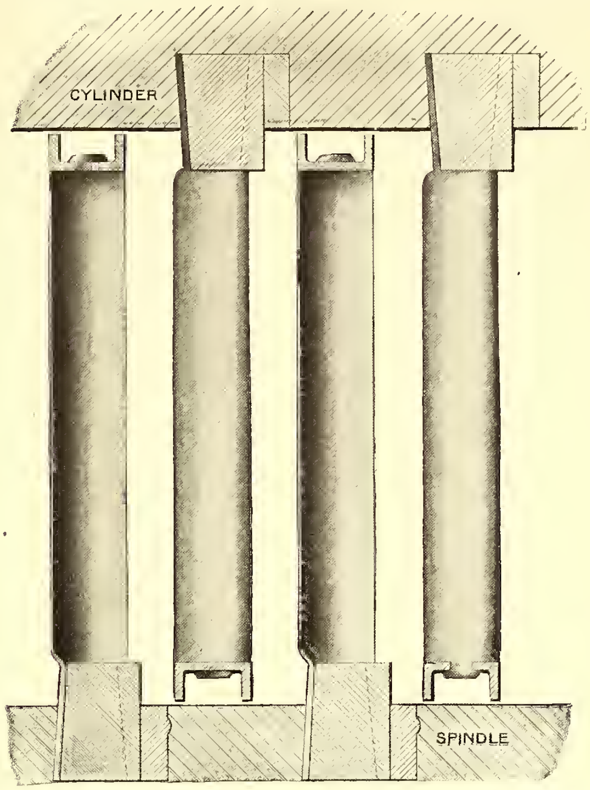


FIG. 2.—ILLUSTRATING THE METHOD OF FASTENING THE BLADES AS WELL AS THE CHANNEL-SHAPED SHROUD RING

this type claims that the construction employed by it successfully solves all difficulties. In forming the blades a shouldered projection is left at the tip. This is inserted in a slot punched in a shroud ring, the slots being punched by special machinery in such a way as to produce accurate spacing and at the same time form the slots so that they will give the proper angles to the blades independent of the slots in the base ring. After the blade tips are inserted in the slots in the shroud rings they are riveted over by specially arranged pneumatic machinery.

The shroud rings are made in channel shape, with outwardly projecting flanges, which, after assembly in the turbine, are turned and bored to give the necessary working clearance.

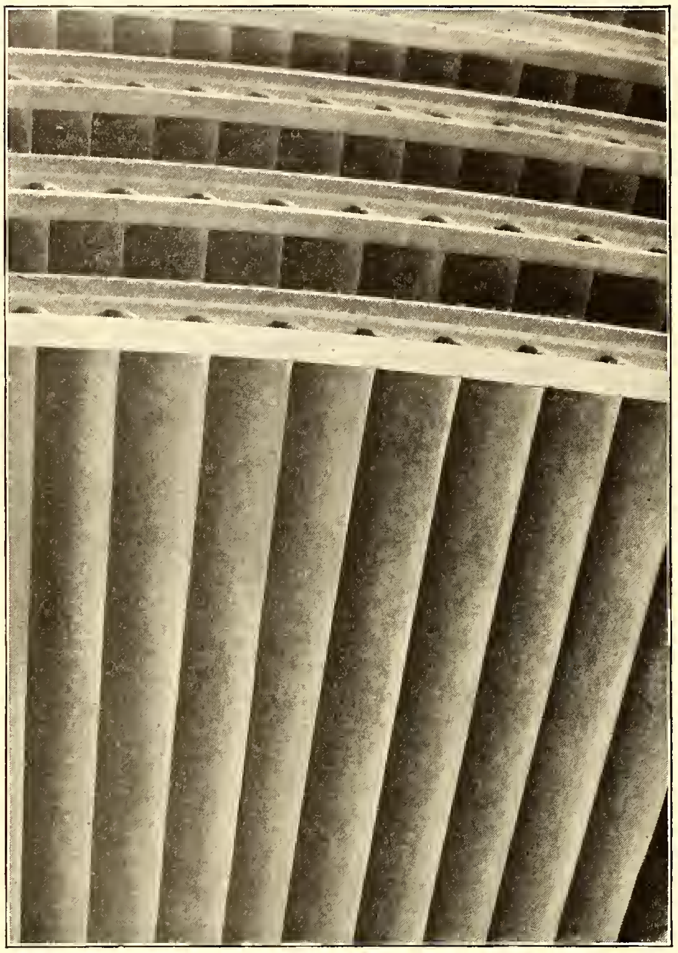


FIG. 3.—VIEW OF THE TURBINE BLADING

enables the working clearance to be made smaller than in the case of naked blade tips, without danger in case of accidental contact, thus reducing the leakage loss to a minimum, the leakage past the blade tips being the principal source of loss in the steam turbine. As to the safety from damage in case of accidental contact, it is claimed that this has been proven by experiment with actual blading, by throwing the bearings out of center so as to produce contact, without detrimental results. An incidental advantage claimed for this construction is that if by chance a blade should prove defective, it is so held in place by the shroud ring that it cannot possibly work loose and produce damage.

By the method of construction described, the entire blading is produced by machinery, thus eliminating the personal equation which enters into blading done by hand work, which depends upon the skill of the individual workmen. Besides insuring that every blade is securely fastened, all blades are necessarily set at exactly the designed angle and pitch, the openings between blades, upon which in great part the economical performance depends, being absolutely uniform. The blading is made up in half rings in the blading shop and is carefully inspected before being inserted in the turbine.

Fig. 2 shows the general scheme of the blading, illustrating the method of fastening the blades as well as the channel-shaped shroud ring. Fig. 3 is from a photograph of blading, showing the character of the construction as well as the uniformity of the work. Fig. 4 shows a turbine spindle of the same size as that of the Utica turbine, this illustration having been taken in the West Allis shops of the turbine builder.

Another special feature of this turbine will be noticed by referring to Fig. 4, viz., the absence of the usual low-pressure "balance piston," the illustration showing only two balance pistons instead of the three pistons formerly used in this type of turbine, where it is said to have been found difficult to produce a balance piston of the size required for balancing the low-pressure stage of the turbine and at the same time make it sufficiently rigid to run with the necessary small working clearance. In the Allis-Chalmers construction there is, however, a third balance piston, but instead of being at the high-pressure end of the turbine, as formerly arranged, it is at the low-pressure end, and as it is smaller than the large end of the

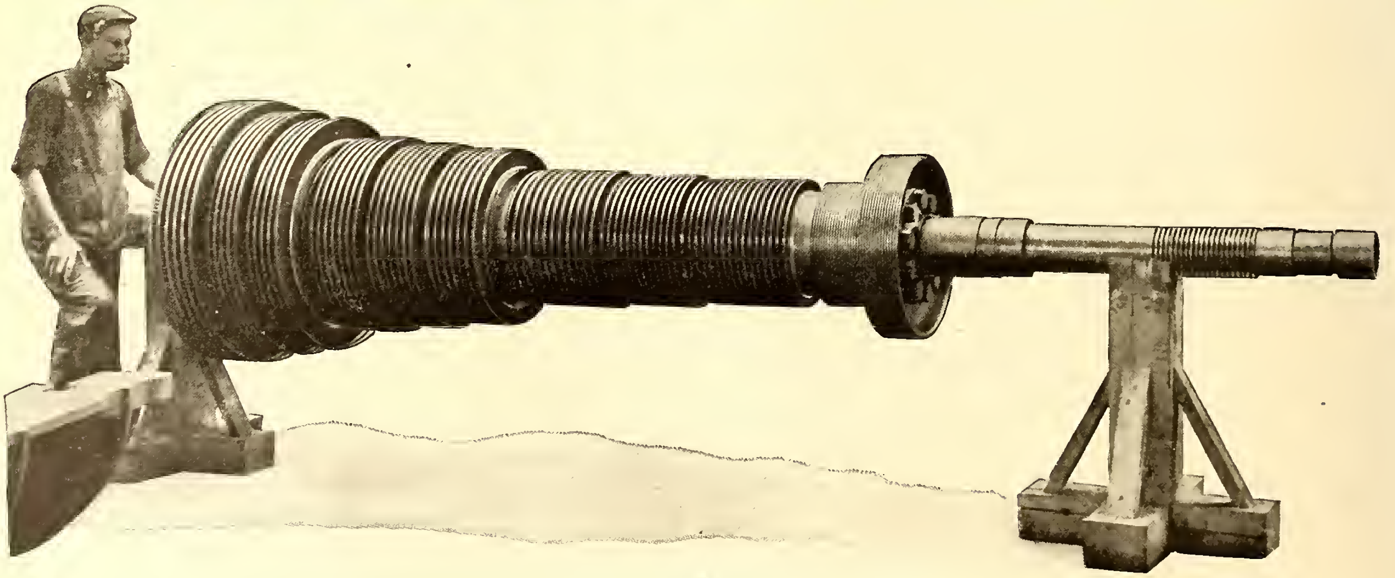


FIG. 4.—SPINDLE OF 1500-KW STEAM TURBINE

The flanges of the channels are made so thin that, although amply sufficient for stiffness, the shroud ring does not have the disadvantage of a solid shroud which acquires a dangerous temperature by friction in case of an accidental contact of the rotating and stationary parts. It is claimed for this construction that the blades are stiffened against the effect of vibration in a much more substantial manner than by any other means thus far employed, while the use of a protecting shroud ring

spindle, it is hidden from sight in the illustration. By making this piston in such a way that its circular area is equal to the annular area of the pistons used in the older construction, the low-pressure balance piston is made much smaller. Instead of reducing the leakage past this piston by means of "dummy packing," as in the high-pressure and intermediate pistons, and as used in the low-pressure pistons of the older construction, a labyrinth packing of radial baffling type has been adopted, thus eliminating small axial clearance in this turbine. A considerable advantage is claimed for this construction in permitting of the use of smaller working clearances in the high-pressure and intermediate balance pistons.

There are a number of other points of improvement claimed for this type of turbine which will not permit of description within the space of the present article. These include details of spindle construction, governing mechanism, lubrication and other minor features.

The alternating-current generator of the Utica outfit, which also is deserving of a more detailed description, has for one of its most noticeable features the substantial design of the revolving field, providing great strength and at the same time giving the thorough ventilation which is essential. Particular attention has been paid to the insulation, as may be inferred from the fact that the armature was subjected to an alternating-current insulation test of 10,000 volts for 15 minutes.

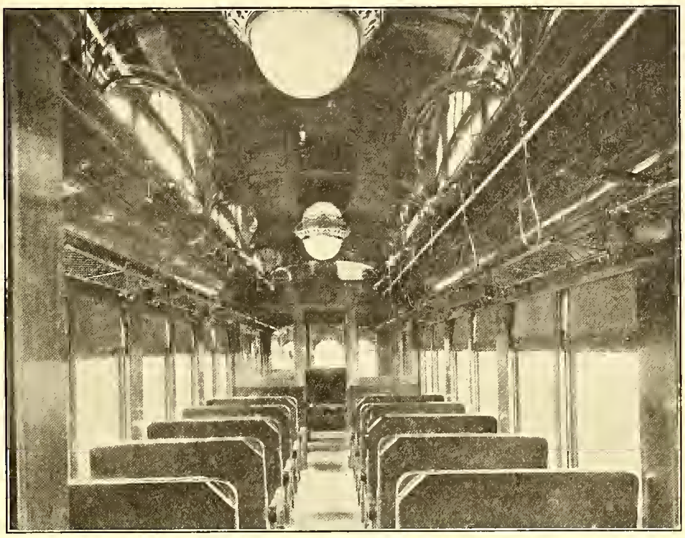
The Allis-Chalmers Company, in entering the steam turbine field, effected an alliance with the Turbine Advisory Syndicate of England, thereby securing the co-operation of the firms therein interested, including Willans & Robinson, the high-speed engine builders, of Rugby; Yarrow & Company, the torpedo boat builders, of the Isle of Dogs, London; and the Neptune Shipbuilding Works, of Walker-on-Tyne. The Utica turbine, in fact, was built for the Allis-Chalmers Company by Willans & Robinson, to whom a number of turbine contracts were sub-let by the Allis-Chalmers Company before the latter had installed its turbine-making machinery.

An agreement has more recently been effected with the Hon. Charles A. Parsons, C. B., for the interchange of data, thereby giving to the Allis-Chalmers Company the benefit of the experience of Mr. Parsons, the inventor of this type of turbine, and to whose engineering ability and indomitable energy the evolution and present state of perfection of the successful steam turbine are principally due. The Allis-Chalmers Company has also secured rights under Mr. Parsons' patents for marine turbines and turbo-compressors and blowers.

At present the company is building its steam turbines in its engine works at West Allis. The growth of the business, however, has led to a large extension of the works, amounting to a practical doubling of the present plant. A considerable part of the extension will be devoted to the manufacture of turbo-generator sets, one of the three manufacturing buildings being given up to the exclusive manufacture of the turbines.

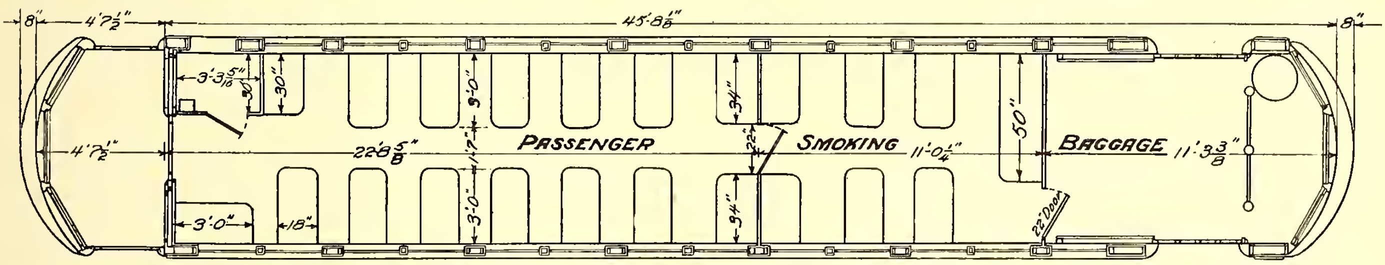
NEW CARS FOR THE CLEVELAND & SOUTHWESTERN TRACTION COMPANY

The Cleveland & Southwestern Traction Company, of Cleveland, has received the first of fifteen cars ordered some time ago for the through runs on its main lines. Ten of the cars



INTERIOR VIEW OF NEW CLEVELAND & SOUTHWESTERN CAR

are being supplied by the St. Louis Car Company and five by the Niles Car & Manufacturing Company. They are practically identical, and the illustrations herewith are some of the Niles cars. The latter were ordered by Charles F. Johnson, of Buffalo, N. Y., who sold them to the Cleveland & Southwestern Traction Company.



PLAN OF LATEST TYPE OF INTERURBAN CAR ADOPTED BY THE CLEVELAND & SOUTHWESTERN TRACTION COMPANY

AN EXTERIOR VIEW OF ONE OF THE CLEVELAND & SOUTHWESTERN TRACTION COMPANY'S LATEST INTERURBAN CARS

In line with the growing policy of all interurbans in that district to carry baggage on all cars, these cars have three compartments. They are 51 ft. 8 ins. long over buffers; extreme width, 8 ft. 6 ins. The baggage compartment is combined with the vestibule, having a 40-in. baggage door at each side, but without passenger entrance, as all cars are run one way. The motorman is separated from the baggage by heavy iron railings extending from floor to deck sills. The hot-water heater is at the left-hand side, and is cared for by the motorman. Next to the baggage vestibule is a smoking compartment occupying the space of four side windows, the door between the smoker and baggage compartments being at the right side, with long seat against the bulkhead. The main passenger compartment is 22 ft. 9 ins. long, with toilet room in the rear left-hand corner. The rear vestibule has passenger entrance, with double steps at each side. There are no double doors whatever in the car, there being a single sliding door for entrance at the rear end of the car and single swinging door at each side of rear vestibule, with swinging doors between each compartment. The center sills are 6-in. steel I-beams, and the side sills are double, having heavy steel plates between, the intermediate sills being of 6-in. x 3¾-in. yellow pine. All sills extend from the rear end sill under the vestibule to the front buffer, as the rear platform is dropped 6 ins. below the car floor.

The interior finish and furnishings are particularly handsome, polished plate glass being exclusively used, except the deck sash and upper side windows, which are cathedral art glass. The interior finish is solid mahogany, having smooth, plain panels without raised work so as not to collect dust, and which are easily cleaned, the main panels being outlined with neat inlay of colored woods. The ceiling is full Empire style, decorated in green and gold, and fitted with holophane globes, each containing four incandescent lamps. The seats are Hale & Kilburn No. 3-C style, green plush, with stationary backs of the high head-roll style and with mahogany seat arms along the aisle. As it is intended to run the car but one way, it was not considered advisable to have the backs reversible.

The cars are mounted on Baldwin extra heavy M. C. B. trucks with 7-ft. wheel base, and carry four Westinghouse No. 112 motors with L-4 controller and single-end control. The trucks are of special design, embodying ideas of C. N. Wilcoxon, general superintendent of the Cleveland & Southwestern Traction Company. The wheels were made by the Standard Steel Company, and are of forged steel, 37 ins. in diameter. They are equipped with Christensen 2-B air brakes and heated by Smith heaters. All of this equipment was purchased for the company by Charles F. Johnson, of Buffalo, N. Y.

ADDITIONAL ROLLING STOCK FOR LAKE SHORE ELECTRIC RAILWAY

The Lake Shore Electric Railway Company, of Cleveland, has closed contracts for ten new interurban cars. They are intended for its limited service between Cleveland and Toledo, 120 miles, and while following the company's standard as closely as possible, they will be designed for a maximum seating capacity. It is the intention to precede each limited car with a baggage car, so that the new cars will not be equipped with baggage compartments. The contract for car bodies was awarded to J. A. Hanna & Company, of Cleveland, general sales agents for the Niles Car & Manufacturing Company. The cars will be 52 ft. long, seating fifty-four passengers; twelve in the smoker. They will be finished in cherry, have semi-Empire ceilings, Pullman type windows with art glass above, and Hale & Kilburn leather upholstered seats. They will have type M controllers and will be mounted on Baldwin heavy interurban trucks fitted with four Westinghouse No. 121 motors. The cars will be equipped with storage batteries for operating the headlight and two lamps in the car, which are automatically switched on if the trolley leaves the wire, the batteries also taking care of the Lintern car signal marker and classification lamps with which they will be equipped. This system gives all the signals required for the classification of trains, and provides for rear end marker lamps. On the cars two red lenses will be fixed in the panel above the vestibule windows, with a small incandescent lamp behind each lense. The lamps are in multiple connection with each other. On the front end are green and white lenses fixed in the panel above the vestibule windows, with a lamp behind each lense. The various signals are controlled by separate switches.

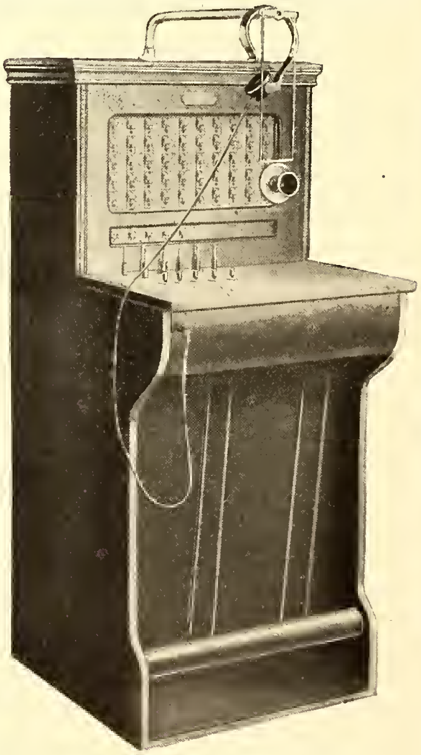
TELEPHONE SWITCHBOARDS FOR INTERURBAN RAILWAYS

The telephone has been in use for several years by interurban railway systems for despatching trains, but it is only within a recent period that the value of private telephone systems connecting the central offices with the shops, power houses and stations has been fully appreciated. For the latter service the Fisk-Newhall Company, of Chicago, has placed upon the market the switchboards shown in the accompany illustrations.

SELF-RESTORING DROP

The smaller of these has a capacity of twenty-five stations or telephones, and, as may be inferred from the form in which it is built, is designed for systems where the calls are not sufficiently frequent to require the constant attention of an operator. Calls on the board are readily answered by any of the office force nearby as easily as with an ordinary telephone.

For telephone needs beyond the capacity of this board, the company manufactures a cabinet of fifty-station capacity. This, as may be observed in the illustration, is built for a constant attendant, being constructed with pendant transmitter and head telephone. The "Fi-ne" tubular drop used on the switchboards is the outcome of years of study by Mr. Fisk, who, it is stated, is the inventor of the first self-restoring drop. A prime feature of the switchboards is the steel frame drop cabinet which holds the drop absolutely rigid, and yet permits its removal at the front by simply loosening a screw. Messrs. Fisk and Newhall claim that their equipments are simple, sensitive, efficient and durable beyond any similar telephone apparatus yet offered, and are ready to make installations for a thorough trial on any electric railway.



SWITCHBOARD FOR FIFTY TELEPHONES

SWITCHBOARD FOR TWENTY-FIVE TELEPHONES

FINANCIAL INTELLIGENCE

Wall Street, Dec. 14, 1905.

The Money Market

The money market ruled decidedly strong during the past week, rates for all classes of accommodations making new high records for the year, as a result of a continued heavy demand for funds both from local and out-of-town sources, and a complete wiping out of the surplus reserves of the New York City banks for the second time within the past month. At the beginning of the week the heavy requirements, in connection with an active stock speculation, sent the price of call money up to 28 per cent, the highest point attained since September, 1902, while short time accommodations commanded a premium. The local banks practically withdrew from the situation, but the announcement that the Secretary of the Treasury would anticipate the payment of January interest in government bonds, amounting to between $4,000,000 and $4,500,000, together with the influx of considerable amounts of funds from the interior and from Canada, were reflected in a gradual decline in the call loan quotations. International houses also loaned freely against exchange transactions. From the high rate quoted above, call money declined to 3 per cent, but subsequently it advanced to 8 per cent, which was the final quotation. The time money market continued decidedly strong throughout, and at the close rates for all maturities ruled practically unchanged from those prevailing earlier in the week. Sixty-day money commanded a per cent and a commission, equivalent to 8 per cent, while three and four months' accommodations were difficult to obtain at 6 per cent. For six months' maturities 5½ per cent was strongly bid, with little offered under 6 per cent. Commercial paper was practically at a standstill, merchants generally securing necessary requirements direct from their respective banks. The minimum rate was 5¾ for the very best indorsed bills receivable. The foreign exchange market has been irregular, rates being influenced almost entirely by the fluctuations in call money quotations. The European markets have ruled easier, especially at London and at Paris, owing to the improvement in the Russian situation. At Berlin, however, the market has ruled decidedly firm, the Imperial Bank of Germany advancing its discount rate to 6 per cent. The statement of the associated banks published on last Saturday was rather disappointing. Loans decreased $7,561,500, as a result of the extensive operations in the money market by foreign houses. The decrease in cash amounted to $7,546,100, which was considerably more than expected. The reserve required was $3,734,200 less than last week, which, deducted from the loss in cash, resulted in a reduction in the surplus reserve of $3,811,900, leaving a deficit of $246,525, as against a surplus of $9,365,200 in the corresponding week of 1904, $8,007,975 in 1903, $8,386,900 in 1902, $5,455,025 in 1901, and $6,325,375 in 1900. At the close, all indications pointed to a continued firm market until after the turn of the year. It is generally conceded that the position of the local institutions has been materially strengthened during the week by the heavy receipts of funds from the interior, but at the same time preparations must soon be made for the Jan. 1 interest and dividend disbursements, which promise to break all previous records, and which will be sufficient to check any decided easing off in rates for money.

The Stock Market

Despite an advance in the call money rate to the highest point attained in three years, and a complete wiping out of the surplus reserves of the New York City banks, which, under ordinary circumstances would have resulted in great demoralization in the stock market, speculation on the stock exchange during the past week continued to broaden and strengthen in a manner little short of astounding. It is true that the general public still refrained from taking an active hand in regulating the course of values, but at the same time there were unmistakable evidences of a considerable influx of this important element. This, together with the fact that stocks are at present concentrated in unusually strong hands, which, therefore, necessitates extraordinary happenings to dislodge them, accounts, to a great extent for the failure of security values to yield under the depressing influences above noted as well as for the really sensational advances that took place in certain parts of the list. Additional reasons for this state of affairs were, however, found in a belief that the splurge in the money market was to some extent not genuine, and that within a comparatively short time conditions will have become considerably and permanently easier. As a matter of fact, toward the close of the week there was a distinct let up in the tension that prevailed in the call money market earlier, and leading bankers express the firm conviction that after the first of the year rates will rule much lower than at present. This of itself was an encouraging feature of the speculative situation, but there were others of a similar nature. Chief among these, no doubt, was the disposition to devote more attention to the higher grade industrial and standard railway shares, which was reflected not only in greater activity but also in substantial advances in a number of such stocks. One of the principal reasons for the increased demand for railroad issues was the excellent condition reported for the winter wheat crops, while another was a disposition to regard the Cincinnati, Hamilton & Dayton affair as a help rather than a deterrent to the general railroad situation. A better tone to the foreign securities markets, due chiefly to a sharp recovery in Russian Government bonds, likewise proved a help, as did also the continued prosperity of all leading industries in this country, the most notable instance of which is the copper metal trade, where prices both for immediate and future delivery rose to the highest figures attained since 1899. The stocks of the Southern coal and iron companies still occupied positions of prominence, on account of more talk of a probable merger of these properties, while the copper stocks, for reasons just given, and the United States steel securities also attracted more attention than of late. However, such issues as Union Pacific, St. Paul, Reading, New York Central and Pennsylvania moved prominently forward in the closing days of the week, and as above stated the attention given to these constituted one of the most hopeful signs for the future of the market in general.

Speculation in the local traction issues was comparatively quiet, and fluctuations in prices were generally narrow and in sharp contrast with those that have recently taken place, especially in the case of Brooklyn Rapid Transit. The week was remarkably free of developments of one character or another in connection with these properties, and for the time being the disposition appeared to be to refrain from an extensive speculation in them.

Philadelphia

Moderate activity developed in the traction stocks this week, and although prices displayed some irregularity as a result of profit-taking sales, the general tone of the market was firm. Interest again centered in the speculative issues, of which Philadelphia Rapid Transit was the feature. From 32 at the opening the price ran off to 31⅝, but later it advanced sharply to 33⅜ on good buying. At the close heavy selling for New York account carried the price to 32½, but the buying on the decline was considered excellent. Upwards of 17,000 shares were traded in. Philadelphia Company common was exceptionally weak, the price declining steadily from 52⅜ at the opening to 51⅛, which was the closing figure. About 5000 shares changed hands. The preferred sold at 49¾ and 49⅞ for several hundred shares. Philadelphia Traction was quiet but strong, odd lots of the stock selling at 100¼ and 100⅞. Union Traction held firm around 63 during the early part of the week, but later sales were made at 62, ex. the quarterly dividend. About 1000 shares were dealt in. Other transactions included Fairmount Park Transportation at 17 and 16½, Railways General at 6¼ and 6⅜, United Companies of New Jersey at 272 and 271, American Railways at 52¼ and 52½, Consolidated Traction of New Jersey at 82½ and 82¾, Rochester Railway & Light at 120, and United Traction of Pittsburg at 51.

Baltimore

The market for traction issues at Baltimore were extremely dull and heavy. United Railway issues, which have displayed considerable activity of late, ruled unusually quiet, and prices for both the 4 per cents and the incomes sustained fractional losses. About $20,000 of the former were traded in at 92¼ and 92⅛, while the dealings in the incomes aggregated only $40,000, all of which sold at 65. The trust receipts representing income bonds deposited were pressed for sale, $25,000 changing hands at 64½ and 64. Other transactions were United Railway free stock at 15, 632 deposited stock at 15¼ and 15⅝, $5,000 City & Suburban 5s at 112¾, $7,000 Virginia Electric Railway & Development 5s at 99¾, and $7,000 Washington City & Suburban 5s at 106½.

Other Traction Securities

The Chicago market continued dull, trading being restricted to some extent by the prevailing high rates for money. A feature of the dealing was a sale of a small lot of City Railway at 200, a decline of 5 points as compared with the last previous call. Chicago Union Traction preferred sold at 40 for 100 shares, which is 2¾ below the last previous call. North Chicago sold at 85 and 83 for odd lots. The elevated issues generally displayed firmness. Metropolitan common rose from 27 to 28 on purchases of about 300 shares, while several hundred shares of the preferred brought 70 and 69½. Northwestern Elevated common brought 24, and the preferred sold at 63. South Side held firm at 97, nearly 300 shares changing hands at that price. Chicago & Oak Park common sold at 6, and the preferred at 23 and 22¾. The feature of the Boston market was the activity in Massachusetts Electric issues. At the opening the common sold at 16½, but later the price ran off, and closed at 15¾; while the preferred, after selling at 60, rose sharply to 62¼. In the final dealings there was a reaction to 61, which was the closing figure. About 800 shares of the common, and about 1000 shares of the preferred stock, changed hands. Boston Elevated sold at 152 and 153. Other sales included Boston & Worcester preferred at 74 and 75, West End common at 98½, preferred at 114 and 113½, and one $1,000 bond of 1915 at 102¼. In the New York curb market Interborough Rapid Transit has displayed moderate activity and firmness. Early in the week several thousand shares changed hands between 211 and 212, but later the price dropped to 209 ex. the 2 per cent dividend. At the close there was a partial recovery to 210. In all nearly 4000 shares were traded in. New Orleans Railway issues were in good demand, but even at the higher prices very little stock came upon the market. Of the common, 300 shares sold at 38, and 500 of the preferred brought 84 and 85. The 4½ per cents sold to the extent of $51,000 at 90.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Dec. 6	Dec. 13
American Railways	*52⅛	52½
Boston Elevated	152½	153
Brooklyn Rapid Transit	85	86
Chicago City	200	200
Chicago Union Traction (common)	10¾	11¾
Chicago Union Traction (preferred)	—	—
Cleveland Electric	83	83
Consolidated Traction of New Jersey	81	81
Consolidated Traction of New Jersey 5s	108	107½
Detroit United	92¾	94¼
Interborough Rapid Transit	211	*210
International Traction (common)	35½	35½
International Traction (preferred) 4s	75½	75½
Manhattan Railway	163	163
Massachusetts Electric Cos. (common)	15	15
Massachusetts Electric Cos. (preferred)	59	60
Metropolitan Elevated, Chicago (common)	28	27½
Metropolitan Elevated, Chicago (preferred)	70	70
Metropolitan Street	117¾	118⅜
Metropolitan Securities	72¼	73½
New Orleans Railways (common), W. I.	37	38
New Orleans Railways (preferred), W. I.	84	84½
New Orleans Railways, 4½s	90¾	91
North American	100	100
North Jersey Street Railway	25½	25½
Philadelphia Company (common)	52⅛	51⅞
Philadelphia Rapid Transit	31¼	32½
Philadelphia Traction	100½	100¾
Public Service Corporation 5 per cent notes	95	95
Public Service Corporation certificates	65	66
South Side Elevated (Chicago)	96	97
Third Avenue	122	121
Twin City, Minneapolis (common)	114	114¾
Union Traction (Philadelphia)	62½	62
West End (common)	97½	98
West End (preferred)	113½	113½

* Ex-dividend. W. I., when issued.

Iron and Steel

According to the "Iron Age," the Lake Superior ore market has furnished in the past week one of the most remarkable developments of this record-breaking year. At the end of the first week in December, with cargoes of 1905 ore still coming down the lakes, it was authoritatively estimated that nearly 90 per cent of the merchant ores to be mined in 1906 had been sold. Counting the ore of consumers having their own mines, and of consumers receiving ore on long-time contracts, there has now been placed 95 to 96 per cent of all the lake or available for next year. The eagerness of buyers has taken sellers by surprise. Returns from the shipping ports show that the water shipment this year aggregates 33,473,761. Adding all-rail shipments this indicates total shipments for the current year of 34,100,000 tons, a record output, which compares with the maximum 22,757,121 gross tons in 1902, and an average of 23,500,000 tons for the past four years.

MICHIGAN PROPERTY LIKELY TO CHANGE HANDS

Plans are making for the transfer of the control of the Muskegon Traction & Lighting Company, of Muskegon, Mich., from the eastern owners to other interests. It is said that the new owners will be the Grand Rapids-Muskegon Water Power Electric Company, but this has not been verified. The power company is preparing to market power, which it will manufacture at its dams on the Muskegon River, in Muskegon and in Grand Rapids. It will also furnish power for the operation of the Grand Rapids, Grand Haven & Muskegon Railway, and could operate the traction lines and lighting plant in that city much more economically than the present management. Preparatory to the sale, which it is planned to consummate early in December, F. A. Nims, president of the Lighting & Traction Company, has petitioned the Council for an amendment of its franchise for the traction lines. The present franchise has no definite term to run and does not provide for the transfer of the franchise to other parties. The city is seeking along with the granting of the request of the traction company, that the franchise run for twenty-five years from Jan. 1, 1906, for the right to demand a 10-minute service in place of the 20-minute schedule on which cars are now operated, when the Council shall deem it necessary. It may also ask for a reduction from the rate of $76 now charged for street lights and also of the gas rate. The business management of the property, when the transfer is made, will remain as at present with local stockholders. The company is capitalized at $600,000.

AUGUSTA, GA., SYSTEM SOLD

The Augusta Railway Company and the Augusta-Aiken Electric Railway have passed out of the hands of the Williams-Mittendorf people into the hands of James U. Jackson, of North Augusta, and the syndicate which he represents. Hampton Terrace Hotel and hundreds of acres of land in North Augusta are included in the sale. It will be recalled that these interests were once in the hands of Mr. Jackson, he having built the Aiken line and the Hampton Terrace Hotel, and organized the North Augusta Land Company.

CHANGE IN CONTROL OF A LONG ISLAND RAILROAD

It is stated that the Belmont interests, which own the New York & Queens County Railway, have acquired control of the Long Island Electric Railway Company, of Jamaica, N. Y. This line is about 27 miles in length, and is the successor to the New York & North Shore Railway Company, and connects Brooklyn, Queens, Jamaica and Far Rockaway. It owns about forty-six cars. The president of the company is Charles A. Porter, of Philadelphia.

EARNINGS OF APPLEYARD PROPERTIES

The report of the receivers of the Appleyard properties just filed with the United States Court, shows that all of the Appleyard lines have a net surplus over the operating expenses for the month of October. The figures do not give the amount of the bonds or the amount of interest due on the same, consequently there is no telling from the part of the report published just what shape the various roads are in. The following is the report of the receivers as to earnings:

"The Central Market Street Railway Company: Gross earnings, $12,729.27; for 1904, $9,055.42; for ten months, $120,810.32; surplus for October, $1,149.98; for ten months, $10,216.18.

"The Columbus, London & Springfield line: Gross earnings, $21,278.41; for October, 1904, $19,026.20; for ten months, $186,109.-05; surplus for month, $5,288.83; for ten months, $52,142.33.

"The Urbana, Bellefontaine & Northern line: Gross earnings for month, $2,207.15; for ten months, $19,426.01; net income for month, $317.19; for ten months, $3,174.10.

"Columbus, Grove City & Southwestern: Gross earnings for month, $4,343; for ten months, $38,200.86; surplus for month, $896.61; for ten months, $4,936.95.

"Dayton, Springfield & Urbana: Gross earnings for month, $20,123.35; for ten months, $186,279.05; surplus for month, $3,260.-97; for ten months, $41,010.96."

ANNUAL REPORT OF THE MASSACHUSETTS ELECTRIC COMPANIES

The report of the Massachusetts Electric Companies for the year ending Sept. 30, 1905, as presented to the stockholders by Gordon Abbott, president of the company, shows earnings as follows:

	1905	1904
Gross receipts	$6,734,127	$6,380,863
Operating expenses	4,456,303	4,479,520
Net earnings	$2,277,824	$1,901,342
Fixed charges	1,543,514	1,462,626
Surplus	$734,310	$438,716
Dividends	372,448	466,003
Surplus	$361,862	def. $27,286

The profit and loss statement we compare with previous years as follows:

	1905	1904
Dividends on stock owned	$372,540	$466,016
Miscellaneous interest on notes	77,029	105,181
Total income	$449,569	$571,197
Total expenses	17,170	15,222
Net income	$432,399	$555,975
Interest on notes	127,400	121,500
Four per cent on preferred stock	......	822,296
Surplus	304,999	def. 387,821
Total surplus	*$176,919	$29,419

*After $157,500 has been charged out for discount on coupon notes.

The general balance sheet of the Massachusetts Electric Companies as of Sept. 30, 1905, compares with previous years as follows:

Assets—	1905	1904
Sundry stocks in treasury	$29,913,784	$33,026,744
Stock deposits to secure notes	7,086,000	2,711,000
Cash	35,938	69,769
Notes and accounts receivable	1,305,350	1,750,000
Due from other companies	349,408	54,170
Cash to pay dividends	668	2,449
Total	$38,691,149	$37,614,134
Liabilities—		
Preferred stock	$20,557,400	$20,557,400
Common stock	14,293,100	14,293,100
Coupon notes	3,500,000	2,700,000
Accounts payable	2,187	1,390
Accrued dividend on preferred	......	......
Accrued interest on notes	39,375	30,375
Dividends uncalled for	668	2,249
Discount reserve	121,500	......
Surplus	176,919	29,419
Total	$38,691,149	$37,614,134

President Abbott, in presenting the report, said in part:

"The weather conditions for the year, in spite of the several warm spells during the summer, were not, on the whole, favorable. The winter, while by no means as severe as the winter of 1903-04, was still much more trying to street railway operation than any other winter since the Massachusetts Electric Companies were formed, as will be shown by the following table of figures of the winter expense on the lines during the past six years:

1900	$20,378.14
1901	17,293.54
1902	41,300.62
1903	43,459.24
1904	173,084.81
1905	82,658.38

"These figures give only the amount expended for the removal of snow and ice, and do not include the amount expended for increased consumption of coal, or for the repairs to equipment, power stations and cars, made necessary by a severe winter, which were especially costly last year.

"One more fact remains to be noted, which is that the past summer gave more than the usual proportion of stormy Sundays and holidays. The business done on Sundays and holidays from May 1 to Sept. 30 amounts to more than 11 per cent of the total passenger business of the year. The earnings on those days amounted to $719,106.91 in 1904 and $724,554.94 in 1905, an increase of less than 1 per cent, while the increase in the total earnings for the same months amounted to $135,664.95, or 4½ per cent.

"Since the publication of the last annual report, the new power station at Quincy has taken on the operation of practically the whole Old Colony Street Railway system. There was delay in securing an entrance for the transmission line into Fall River, but since June 19, 1905, the Quincy station has furnished all the power south of Boston, with unimportant exceptions. The results have been satisfactory. The economies resulting from the consolidation of the scattered plants into one, and the employment of the steam turbine have more than paid the interest on the money invested, and instead of being short of power, as was the condition of the line before the completion of the Quincy plant, there is now a surplus large enough to take care of all the increase in business which is likely to occur in the next five years. The electrical engineers of the system are of opinion that further experience in operation and the adoption of improvements which are now being applied will result in substantial further savings. During the past year additional machinery has been installed in the stations at Woburn and Gloucester, and steam turbines are now being erected in the stations at Salem and Haverhill. This work when completed will, in the opinion of the engineers, give the Boston & Northern sufficient power to take care of any probable increase in the business on that road during the next few years, so that the matter of power may be considered as disposed of for the present as far as capital expenditure goes; and the cost per unit of producing this power has been reduced to a figure which is satisfactory.

"In the last annual report a summary was given showing that $10,549,681.05 had been expended on the various properties since you became interested in them. During the fiscal year ending with the 30th of September last, a total amount of $2,255,777.97 was further expended for the same purposes, as follows:

Track and line construction	$741,301.20	
Cars, plows, rolling stock and electrical equipment	158,159.97	
Land and buildings	52,730.96	
Power stations and machinery	779,433.76	
Sundry equipment	19,908.73	
		$1,751,534.62
Track and Line reconstruction		504.243.35
Total		$2,255,777.97

"As against the above work, and some which was done in the previous fiscal year, the Board of Railroad Commissioners have authorized the issue at various times during the year of $700,000 par value of stock and $500,000 par value of bonds, of the Boston & Northern Street Railway Company, and $500,000 par value of stock and $500,000 par value of bonds of the Old Colony Street Railway Company. Application for an issue of a further amount of $200,000 par value of stock of the Old Colony Street Railway Company is now pending before the board, and it is the intention of both of the above-mentioned companies to apply for permission to issue further bonds as soon as this matter is settled.

"In the last annual report it was stated that 'while improvements and a certain amount of reconstruction must be necessary from time to time on any system as large as that in which you are interested, your trustees feel that by far the largest part of the work which ought to be done has been already accomplished.' The trustees have now come to a point where they believe that it is possible for the experts to make an estimate as to the amount necessary to be spent in the next two or three years in order to put the entire properties into first-class condition to do the business which is now in sight and take care of the probable growth during the same period. A summary of the estimates of the experts follows:

Track construction	$443,636
Reconstruction	1,377,638
Cars and snow plows	1,069,245
Feed wire and bonding	159,900
Power stations*	281,225
Buildings	223,400
Total	$3,555,044

* Now under construction.

"There are now in the treasuries of the operating companies $1,390,500 bonds, and application will soon be made for leave to issue others on account of work done since Aug. 31 last. These bonds will be sold when the directors of the operating companies deem it advisable so to do. The proceeds should provide funds enough to complete work which will justify an application for leave to issue additional stock of a par value of $1,500,000, which will be taken by the Massachusetts Electric Companies and paid for by surrender of notes held in the treasury at the date of the publication of this report. The issue of this stock will give the operating companies the right to apply for leave to issue a further amount of $1,500,000 in bonds, whenever that amount is expended on the above-mentioned work.

"The increase in income was due to two causes, namely, increase on existing lines and increase due to enlarged trackage. In 1900 there were 770 miles of track and 21,733,725 car-miles run; in 1905, 866 miles of track and 25,707,594 car-miles run.

"Maintenance of Roadway and Track.—This item represents only the increase which was charged to operating expenses. In addition there was expended in track reconstruction and charged to profit and loss in the six years included in the above period, $1,061,682.61.

"Maintenance of Equipment.—This increase was due to the greater number of cars operated in 1905, to increase in cost of materials and wages, and to a higher standard of maintenance. In addition there was expended in reconstruction of cars and charged to profit and loss in the six years the sum of $106,785.35.

"Wages of Conductors and Motormen.—This increase was due to increase in wages made March 1, 1903, and to an increase in number of cars operated.

"Cost of Power.—This increase was due to more cars operated, to larger cars, the use of four-motor equipments, higher speed, more severe winter conditions and heating cars for a longer period. By order of the Railroad Commissioners cars are now heated seven months of the year instead of five months as formerly. The cost of production of each unit of power has decreased, but a great many more units are used than in 1900.

"Accidents.—The number of serious accidents has not increased, but litigation has increased to a very marked extent.

"Winter Expenses.—The winter of 1904-05 was much more severe than that of 1899-1900, and cost of removal of snow and ice was nearly four times as large.

"Taxes.—The valuation has been reduced, but the number of shares on which the tax is assessed has largely increased. There has been an increase in property tax and in excise tax, which last amounted to $131,590.80 in 1905. When this tax was imposed in 1899 by the Legislature it was intended to relieve street railway companies from expense of removal of snow and ice and repairs of surface of streets. The Boston & Northern and Old Colony Companies get very little, if any, benefit from the payment of this large tax.

"Much interest has been expressed by shareholders in the question of increasing fares. Both companies have increased their rates of fare in cases which appeared justifiable and necessary, but these changes have not been in effect long enough to enable intelligent conclusions to be drawn.

"The efforts of the past six years have been directed to improving the properties for passenger income, and therefore little has been done until 1905 toward securing the necessary permissions to do a freight and express business. Some freight grants have been obtained and others are pending on the Old Colony lines. When they have been obtained, that company will begin immediately to do that class of business. The Boston & Northern is endeavoring to arrange for transporting its own coal from tidewater to inland points, a matter which is of much more consequence to it than to the Old Colony, where nearly all the coal is consumed at tidewater.

"Future annual reports will not contain balance sheets of the Massachusetts Street Railway Accident Association, because the association has ceased to do business and has distributed its surplus among the companies heretofore insured, who will hold it as the nucleus of a separate fund for the payment of damages for injury to persons and property. The association was formed when the companies in which you were interested were many in number, and it was at that time a useful instrument. Since then they have been reduced by consolidation to four, and suits against them can now be taken care of by a claim department quite as well as by a mutual insurance company. For the purpose of saving the taxes which the Accident Association has had to pay, it was considered judicious to wind it up and let the operating companies insure themselves.

"The unusual amount of reconstruction determined by the Railroad Commissioners during the past year necessitated a charge of $311,970.61 to the profit and loss account of the operating companies. The remaining surplus permitted dividends of only 2 per cent for the year, excepting in the Hyde Park Electric Light Company, which earned and paid 8 per cent. These dividends were paid into the treasury of the Massachusetts Electric Companies, but after charging off the discount on the coupon notes your trustees have thought it wiser not to declare any dividend on the preferred shares in view of the work still to be done on the properties. They believe that this conservative policy is the wisest one to pursue for the present, and that the result will be more favorable to the shareholders than that of any other course.

GENERAL ELECTRIC COMPANY GETS CONTRACT FOR EQUIPPING PENNSYLVANIA'S ATLANTIC CITY LINE

The Pennsylvania Railroad has given to the General Electric Company a large contract for the electrification of one of its lines from Philadelphia to Atlantic City. The contract includes the necessary power station, equipped with large Curtis turbines and sufficient car equipments to maintain a 15-minute train service between Philadelphia and Atlantic City. Also to maintain local train service between Philadelphia and Millville and Philadelphia and Woodbury. The cars will be equipped with direct-current motors and the Sprague-General Electric control. This change to electrical equipment will represent an expenditure of from $2,000,000 to $3,000,000. While electrical contracts have been placed for terminal facilities and local service, this is the first instance where a great trunk railroad has taken such a decided step as to replace steam by electricity for express service on a complete line.

NEW CARS FOR CHATTANOOGA ELECTRIC RAILWAY COMPANY

The St. Louis Car Company has received an order for six 28-ft. cars for the Chattanooga Electric Railway Company. The bodies will be mounted on St. Louis Car Company No. 47 trucks. The cars ordered are duplicates of some furnished the company about a month ago. The St. Louis Car Company also announces that it has received from the Sharon Coke Company, of Pittsburg, Pa., an order for several of its No. 23 A. M. C. B. trucks.

INSPECTION OF INDIANA SINGLE-PHASE RAILWAY

The Westinghouse interests invited a large party of electric railway managers and engineers in the Central States to inspect the single-phase line of the Indianapolis & Cincinnati Traction Company between Indianapolis and Rushville on Saturday, Dec. 9. About sixty were taken in special cars from Chicago at the invitation of T. P. Gaylord, manager of the Westinghouse Electric & Manufacturing Company's Chicago office. Smaller parties were also brought from the Cleveland and Detroit offices, and a few persons from other parts were present, making the total number convening at Indianapolis about seventy-five. All were entertained at breakfast on Saturday at the Claypool, after which, through the courtesy of President C. L. Henry, of the Indianapolis & Cincinnati Traction Company, a multiple-unit train, consisting of two cars equipped with single-phase motors and apparatus, was run from the interurban terminal station in Indianapolis, to Rushville, stops being made en route, to inspect the line and the sub-stations. These sub-stations, it will remembered, are operated entirely without attendants. The power house and shops are located at Rushville, and every opportunity was afforded the visitors to study details of equipment and the repair work as it is actually being carried out on these equipments and to inspect the power supply. The party was divided between two hotels in Rushville for lunch, and after lunch was given an opportunity further to investigate the shops and shop methods. The return to Indianapolis was made on limited time in 1 hour and 20 minutes for the run of 40 miles. Dinner was served in the banquet room at the Claypool Hotel, after which a theater party was given at the Grand Theater. The Chicago party returned by night, arriving in Chicago Sunday morning.

The single-phase road was found to be in first-class operating condition, most of the minor defects which gave trouble at first having been weeded out. The situation is as outlined in the editorial in the STREET RAILWAY JOURNAL of Sept. 23, 1905, and in the paper by Charles F. Scott before the American Street Railway Association, which appeared in the STREET RAILWAY JOURNAL of Sept. 30, 1905.

The opportunity to inspect this line was much appreciated by every member of the party, and the willingness of the company to lay before electric railway men exact information as to the performance of the road has been the subject of much favorable comment.

MEETING OF BOSTON SUBURBAN ELECTRIC COMPANIES

At the annual meeting of the shareholders of the Boston Suburban Electric Companies, held last week, Frederick H. Lewis and Horace B. Parker declined re-election as trustees, owing to the pressure of other business, and G. Fred Simpson and Henry Hornblower were elected for three years to succeed them, with Charles M. Baker, William H. Coolidge and R. Elmer Townsend, the retiring trustees. There were represented in person and by proxies 42,189 shares of the preferred stock out of a total of 47,969 outstanding, and 40,818 shares of the common stock out of a total of 47,119 outstanding.

President Claflin said: "The condition of the companies is materially better than at the time of our last meeting, and it is still improving. The last two months, the first of the current fiscal year, show a material increase over the year previous.

"The improvement extends to all branches of our interests, and promises much for the future. Operating expenses have been reduced, and gross income has increased, and it will be our endeavor to continue to reduce our cost of operation still further the present year.

"There has been some discussion concerning an increase in the dividend rate, but your executive committee is not prepared to recommend an increase at this time, just as we are entering upon the most critical period of the year, believing it will be better policy to wait until the end of the winter season. With normal winter conditions, there is hope that earnings will warrant an increased dividend later.

"The physical condition of our properties is better than ever before, and extraordinary expenditures are no longer required upon them. Under normal conditions, the subsidiary companies may be expected to make a much better showing than ever before.

"Our relations with the authorities of the towns through which we operate are very harmonious at the present time. Under the authority of the Railroad Commissioners, we have been able to revise fares and discontinue certain transfer privileges. Under these more reasonable conditions we are looking forward to the best year in the history of the companies."

The annual report of the companies for the fiscal year ended Sept. 30, 1905, compares as follows:

	1905	1904
Gross income	$164,556	$102,283
Expenses, inc. interest	30,595	37,481
Net income	$133,961	$64,802
Dividends	88,196	93,303
Surplus	$45,765	def. $28,501
Previous surplus	10,358	38,359
Total surplus	$56,123	$10,358

The trustees of the companies have declared the regular quarterly dividend of 50 cents per share on the preferred stock, payable Jan. 16, to stock of record Dec. 15. Transfer books do not close.

A YEAR OF THE INDIANA INTERURBAN LINES

The figures compiled by Joseph H. Stubbs, chief of the State Bureau of Statistics, relative to the interurban traction lines of Indiana for the year ending June 30, 1905, show that the gross disbursements exceeded the gross earnings for the year by $615,798.16. The gross income was $6,758,900.27, and the gross disbursements $7,374,698.43. This report includes some local street railways that are connected with interurbans.

The report shows other interesting totals, such as that 122,838,665 people were carried on the interurbans during the year, and 33,216 tons of freight and express. The latter seems a small amount as compared with the railroads, until it is realized that, so far as freight business is concerned, the interurbans are still in their infancy. Companies report 847.49 miles of main and 34.25 miles of side-track. The employees during the year numbered 3337, and received wages and salaries amounting to $2,003,161.02.

Forty persons were killed and 4346 injured during the year. Of those killed, one's death resulted through causes classed as being beyond control, the other 39 being due to carelessness.

Injury to 60 persons resulted from causes classed as being beyond control, and injuries to 4286 are classed as being due to persons' own carelessness. Ten of those killed were passengers, 3 employees and 27 others. Of those injured, 1907 were passengers, 141 employees and 2298 others.

The total earnings were divided as follows: Passengers, $6,308,653.95; freight, $120,770.37; express, $66,522.48; mails, $3,741.17; rents, $82,033.60, and other sources, $176,008.65. The total expenses under the class name expenses are divided as follows: Maintenance of way and structures, $405,039.43; maintenance of way and equipment, $369,265.60; conducting transportation, $1,798,928.91; general expenses, $1,078,236.19; additions and betterments, $1,027,557.44, making a total of $4,679,027.57 counted as expenses. Added to that total are the following items: Interest on the debt, $2,078,302.01; taxes, in Indiana, $294,619; taxes in other States, $55,748.17, and rentals, $267,001.68; and these items, added to the total under the head of expenses, brings the total disbursements up to $7,374,698.43. The comparative figures follow:

EARNINGS AND EXPENSES

Gross earnings	$6,758,900.27
Grand total expenses	4,679,027.57
Gross income	$2,079,872.70

EARNINGS IN DETAIL

From passengers	$6,308,653.95
From freight	120,770.37
From express	66,522.48
From mails	3,741.17
From rents	82,033.60
From all other sources	176,008.65
	$6,758,900.22

EXPENSES IN DETAIL

Maintenance of way and structures	$405,039.43
Maintenance of equipment	369,265.60
Conducting transportation	1,798,928.91
General expenses	1,077,236.19
Additions and betterments	1,027,557.44
Grand total expenses	$4,679,027.57

DISBURSEMENTS IN DETAIL

Total expenses as above	$4,679,027.57
Interest on funded debt	2,078,302.01
Taxes for Indiana	294,619.00
Taxes for other States	55,748.17
Rentals	267,001.68
Grand total disbursements	$7,374,698.43

PASSENGER AND FREIGHT BUSINESS

Total number of passengers carried	112,838,065
Total tons of freight and express	33,216

MILES OF TRACK

Number of miles of main track in Indiana	847.49
Number of miles of side-track in Indiana	34.25

WAGES—1905

Employees in Indiana—	Number Employed	Total Yearly Compensation
General officers	51	$115,141.83
Other officers	38	65,875.68
General office clerks	140	70,889.64
Station agents	66	23,255.00
Other station men	29	13,340.00
Motormen	806	489,291.35
Conductors	803	489,235.38
Other trainmen	119	90,351.74
Machinists	33	23,093.61
Carpenters	39	26,231.54
Other shopmen	265	151,490.16
Section foremen	90	51,991.99
Other trackmen	524	199,271.05
Flagmen and watchmen	16	8,040.55
Operators and despatchers	23	13,315.20
All other employees	295	172,346.30
Totals	3,337	$2,003,161.02

	Killed	Injured
Passengers	10	1,907
Employees	3	141
All others	27	2,289
Totals	40	4,336

The amount paid in damages during the year 1905 for accidents was $96,061.36.

ELECTRIC RAILWAY FOR VIGO, SPAIN

A plan for the construction of an electric railway in Vigo, Spain, which is likely to be accepted, has been made by Emilio Montenegro, of the Bank of Vigo. It comprises five lines of tramway and one side line, altogether about 14 km in length. The trolley system will be adopted. The rails are to be of Bessemer steel, Phœnix type, with automatic switches. The gage of the line will be 1.44 m, and the minimum radius of curves is not to exceed 16 m. As regards rolling stock, there will be wanted thirty-nine motor carriages and traction cars, to be in constant use. Each motor carriage is to accommodate thirty-two, and each traction car twenty-four persons. There will be two principal and two auxiliary stations. The electric power will be furnished by the gas company from the fall of the River Lerez. Telephone service is to be established for the use of the line. The estimated cost is $332,000.

Persons interested may apply for further particulars to E. Mulder, consular agent at Vigo.

CENTRAL BUYS MORE TROLLEYS

Henry D. Walbridge, of Hodenpyl, Walbridge & Company, of New York, who is president of the Rochester Railway & Light Company, has announced that the Andrews-Vanderbilt syndicate has arranged to purchase a controlling interest in the Rochester Company.

It has been currently reported for more than a year that the Central was after the Rochester railways, but the actual deal has been on only since Dec. 1. Mr. Walbridge says that the syndicate has purchased the $6,500,000 of common stock, the price being 125. The company also has $3,000,000 preferred stock and controls a large number of subsidiary companies. Its purchase gives the New York Central control not only of the traction lines and lighting plants in the city of Rochester, but also of four railroads running from Rochester to Lake Ontario, and of the Rochester & Sodus Bay Railway Company.

One of the first steps which the New York Central will take, now that it has secured control of the Rochester company, will be the formation of a holding concern to take over all the electric railway lines and lighting plants which it owns. Among the concerns the New York Central owns which will be operated by the new company are the Syracuse Rapid Transit Company, the Rochester & Eastern Rapid Railway and the Rochester Railway & Light Company. The new company will be known as the Mohawk Valley Company.

THE OPENING OF THE NEW YORK ELECTRICAL SHOW

The electrical show, which is being held in Madison Square Garden, New York, until Dec. 23, was formally opened on the evening of Dec. 12. Temporary Chairman George A. Miller, Jr., secretary of the Exposition Company of America, introduced Prof. George F. Sever, of Columbia University, as chairman of the Exposition. Prof. Sever made a brief speech of welcome and introduced Borough President Fornes as the speaker of the evening. As Mr. Fornes finished his address of dedication the news was flashed to Washington over a special wire, and President Roosevelt pressed the golden key, completing the circuit which started the machinery of the exhibits and turned on the numberless lights. The spectacular opening created much enthusiasm, which reached its height as the strains of the "Star Spangled Banner" rose from the band stand, and the President's salute of twenty-one lyddite shells crashed from the roof of the Garden.

Not only are the engines and generators shown in operation, lighting various exhibits, but motors from the very smallest sizes and of an infinite variety of form adapted to all sorts of service. The portable electric tools and labor-saving devices form an interesting group.

Electricity, as applied to the preparation of food, is also ably presented. The manufacturers of shredded wheat biscuits have a complete exhibit, showing every detail of their electrically-prepared and baked product, from the whole wheat to the finished wafers, passed out fresh and hot to visitors. A large and absolutely complete electric kitchen proved a great attraction.

Among the other interesting exhibits are models of the Williamsburg Bridge and a complete working model of the New York City incinerating plant, which has attracted much attention. Safety elevators also are shown in operation.

A wireless telegraph system and miniature electric contact system are shown, as well as the telautograph or writing telegraph.

A NEW PARK FOR GREATER PITTSBURG

West View Park is the name of the newest amusement park of Greater Pittsburg. Thirty acres of land have been taken on the outskirts of Allegheny, and with all the devices known to the promoter of summer parks, the new spot will be opened in the coming summer. A charter will be applied for on behalf of the West View Park Company, headed by T. M. Harton and F. W. Henninger. The site of the park will be easily reached by street cars. The West View line, which is soon to be made a belt line through Bellevue and Avalon, thence back to Pittsburg, passes the grounds and a station of the Pittsburg Railways Company will form the entrance to the park. A liberal transfer system for the use of park patrons will come into being when it opens, and for a nickel any resident of Allegheny can reach it, as well as anyone in downtown Pittsburg. A storage battery is to be erected at the park by the railway company to insure against the non-failure of current.

Most of the concessions will be owned by the operators of the park, who now control large concessions in twenty-five parks of the country and own the famous Athletic Park in Buffalo. It is probable that a "chute the chutes" into a lake will be erected. Circle swings, switchbacks, Ferris wheels, small theaters and every other sort of amusement device will also be installed. T. M. Harton, of North Highland Avenue, Pittsburg, is to be president of the company, and Mr. Henninger is to be the secretary-treasurer.

ELECTRICAL SHOW AT CHICAGO

An exhibition of electrical appliances, similar to that held at the Madison Square Garden in New York this year, is to be held, Jan. 15 to 27, 1906, in Chicago at the Colliseum. This will be the first exhibition of the kind to be held in Chicago, and space is being taken rapidly by various electrical manufacturing concerns. The officers of the association are well known electrical men of Chicago, as follows: Samuel Insull, president; Edward B. Ellicott, Charles E. Gregory, E. B. Overshiner, vice-presidents; John J. Abbott, treasurer; Stewart Spalding, secretary; Thomas R. Mercein, general manager.

The conventions of the Northwestern Electrical Association and the National Electrical Salesmen's Association will be held during the time of the exhibition in Chicago. The Northwestern convention dates are Jan. 17 and 18.

OCEAN SHORE OFFICIAL SAYS SOUTHERN PACIFIC HOLDS NO STOCK IN THE NEW CONCERN

That the Southern Pacific Company is largely interested in the Ocean Shore Railway Company and has even granted it rights of way which had formerly been contested, as well as helping its erstwhile rival with track construction at the Santa Cruz end, is denied by the officials of both companies, although it is admitted they have traded rights of way.

Burke Corbet, attorney for the Ocean Shore, explained the matter of the Southern Pacific's contract to deliver machinery for a cement plant by saying that his road had the Southern Pacific so completely blocked by the rights of way that it had secured that the latter could never hope to haul in the machinery unaided or to take out the cement as it had contracted to do.

"The Southern Pacific, awaking too late to the realization that it had agreed to handle traffic without tracks or even a place to put them," said Mr. Corbet, "came to us in an imploring mood and signified its willingness to do some bargaining. We were willing, so rights of way that would enable the Southern Pacific to reach the cement plant were traded for rights of way for the Ocean Shore Railway across Southern Pacific tracks in San Francisco and Santa Cruz."

Mr. Corbet denies that the Southern Pacific is aiding the Ocean Shore in the construction of track at Santa Cruz. "The untangling of the right of way has been quite a job," he says, "and the Southern Pacific has lent all the assistance possible in order that the cement may be delivered at the time the contract calls for—over the tracks of the Ocean Shore. The only track work being done by the Southern Pacific at Santa Cruz is on its own tracks, which, according to the terms of the right of way, are to parallel ours for a considerable distance.

"You may quote me as saying," continued Mr. Corbet, "that the Southern Pacific has nothing to do with the Ocean Shore, and that the stockholders of the former hold no stock in the latter."

THE ALLIS-CHALMERS STEAM TURBINE

On Tuesday, Dec. 12, a party of about 100 engineers inspected, by invitation, the 5500-hp Allis-Chalmers turbine in course of installation in the Williamsburg power station of the Brooklyn Rapid Transit Company. Asa M. Mattice, chief engineer of the Allis-Chalmers Company, was present to explain to the visitors the special features of the turbine, the upper casing of which was removed to facilitate inspection. An account of the Williamsburg station appeared in the issue of the Street Railway Journal of Sept. 23, and on another page the new turbine is described in detail.

The points which interested visitors in particular were the details of securing the blades, the shroud rings protecting and stiffening the outer ends of the blades, the low-pressure water-packing arrangement and the low-pressure balancing arrangement with its ingenious labyrinth of baffling packing. Among the guests were the following: Frank Hedley, general manager, Interborough Rapid Transit Company; George H. Pegram, chief engineer, Interborough Rapid Transit Company; George E. Thomas, Interborough Rapid Transit Company; John Van Vleck, mechanical engineer, Interborough Rapid Transit Company; H. G. Stott, superintendent motive power, Interborough Rapid Transit Company; M. G. Starrett, chief engineer, New York City Railway Company; Willis Lawrence, New York City Railway Company; C. E. Roehl, electrical engineer, Brooklyn Rapid Transit Company; Edwin W. Winter, president, Brooklyn Rapid Transit Company; J. F. Calderwood, vice-president and general manager, Brooklyn Rapid Transit Company; C. F. Baker, superintendent motive power, Brooklyn Rapid Transit Company; A. Wolff, Brooklyn Rapid Trasit Company; George A. Orrok, constructing engineer, New York Edison Company; J. D. Andrews, New York Edison Company; W. F. Wells, Brooklyn Edison Company; D. S. Kohler, Allegheny County Light Company, Pittsburg, Pa.; W. A. Donkin, Allegheny County Light Company, Pittsburg, Pa.; George H. Howard, Brooklyn Rapid Transit Company; Herbert W. York, chief engineer, American Smelting & Refining Company; H. A. Lardner, George H. Throop, Martin H. Kilgour, London, England. The Allis-Chalmers Company was represented by W. W. Nichols, vice-president and secretary; Asa M. Mattice, chief engineer; F. C. Randall, manager, New York office, and John S. Lord, C. J. Larson, A. G. Christie, Harry Byrne, A. F. Rolf, Frederic D. Herbert, C. A. Hoppin, S. G. Stone, H. W. Rowley, L. C. Marburg and Sam Moore.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED DEC. 5, 1905

806,143. Car Fender; John J. Hoey, New York, N. Y. App. filed March 13, 1905. Consists of a bumper of nested bands of yielding metal graduated in diameter, the outer band of each nest of bands being secured to an outer plate, and all of the bands of each nest to an inner plate, a yielding apron mounted in the rear of the bumper and a fender in the rear of the apron and adapted by novel means to be thrown into operative position when the apron encounters an obstruction.

806,152. Third Rail Protector; William H. Kober and Charles E. Watier, Lancaster, Ohio. App. filed March 6, 1905. A protecting hood and shield made up of alternate sheets of metal and insulating material. The different sheets are lapped with respect to one another so as to be more effectively supported at their edges.

806,215. Railway Coupling; William T. Van Dorn, Chicago, Ill. App. filed April 24, 1905. A draw-bar having oppositely directed rounded hooker ends thereon, and provided with a central cylindric aperture, a coupling pin adapted to rotatively engage therein and in the forward aperture of a complemental draw-head, and a spring in said draw-head adapted to engage the end of the draw-bar and force it against said pin in coupling.

806,225. Car Fender; Wesley G. Winans, Spokane, Wash. App. filed April 5, 1905. The fender is slidably mounted in an inclined frame under the car and is adapted to be pulled up out of operative position by a cable leading around a winding drum under the control of the motorman.

806,248. Trolley; George R. Fletcher, Cambridge, Ohio. App. filed May 31, 1905. A notched scraper blade for removing ice and sleet from the conductor, is spring mounted on the trolley axle.

806,273. Rail-Joint; Franz Melaun, Charlottenburg, Germany. App. filed March 22, 1901. The tread of the rails is cut away at the ends, and a fish-plate provided of such construction as to fill the gap in the tread.

806,294. Street Car Fender; Ernest H. Schulze, Kansas City, Mo. App. filed May 17, 1905. Comprises a supporting frame, a pick-up frame pivotally mounted on the supporting frame and having a bed to receive and carry a person, and a yielding connection between the pick-up frame and the supporting frame to prevent the front end of the pick-up frame dropping below a predetermined plane.

806,310. Trolley Wire Holder; Frank M. Zimmerman, Aurora, Ill. App. filed March 21, 1905. A socket having a cylindrical bore contracted at its mount and provided with ledges in its enlarged chamber, a wire holder stem having an enlarged lower part citted to the mouth and an upper and flanged portion connected to the ledges.

806,430. Trolley Signal; Benjamin H. Roberts, Haverhill, Mass. App. filed Oct. 5, 1905. Details of a single-track trolley signal, consisting of a ratchet, which is stepped around for every car that enters a block, and reversely moved whenever a car leaves the same.

806,442. Electric Switch-Operating Device; Ira J. Stouffer, Altoona, Pa. App. filed July 10, 1905. A contact-shoe mounted adjacent the usual conductor, and adapted to be charged by special contact springs on the trolley pole. Two switch-operating magnets are so connected by compound levers that one of them is effective to hold the switch point in its thrown relation until the other magnet has been energized.

806,453. Metallic Railway Tie; Budd G. Bealor, Aspinwall, Pa. App. filed Feb. 16, 1905. Comprises a trough-shaped metallic member adapted to be placed with its sides projecting upwardly and having triangular portions of its bottom between the rail-seats punched out and bent downwardly to form holding means and drain openings.

806,538. Electric Signal for Railways; John B. Gorrell and Hiram V. Gorrell, Laotto, Ind. App. filed June 21, 1905. Supplemental semaphore signals by which a train may be flagged in case it inadvertently passes the main signals.

806,561. Car Fender; Frederick W. O'Connor, Toronto, Can. App. filed June 27, 1904. A cam operates through the medium of a connecting rod from the car truck to maintain the fender at a uniform height above the rails.

806,567. Switch-Operating Apparatus; James I. Pittman and Elizabeth Harrison, Valdosta, Ga. App. filed May 6, 1905. A depressible frame extending from end to end and side to side of a car, has legs depending therefrom in front of and behind each wheel and shoes at the end of each leg for actuating the switch point.

806,568. Electric Switch for Street Railways; James A. Posey, Midlothian, Tex. App. filed Jan. 21, 1905. A depressible bar adjacent the track rails has connections to the switch point. Also a pair of contact plates for making an electrical circuit, which renders said connections effective to move the switch point to the alternate direction when the circuit is energized.

806,604. Street Car Fender; Vasilie Vlaudutz, Homestead, Pa. App. filed Aug. 26, 1905. Belongs to that type which in the event of an object striking the car, firmly grips said object and holds it during the movement of the car by virtue of a series of spring-pressed arms.

806,630. Trolley; Amos Bopp, Baltimore, Md. App. filed March 25, 1905. The trolley wheel is vertically swiveled in a skeleton guard frame, the arms of which rise sufficiently above the axle to prevent the trolley catching guy wires, etc.

806,635. Motor-Control System; Eugene R. Carichoff, East Orange, N. J. App. filed Aug. 4, 1904. A multiple-unit control system having among other features a pair of locks operable from the controller and operatively connected to both the reversing and controlling switches, one of said locks being inoperative with respect to the reversing switch when the other is actuated.

806,638. Signal for Sectional Conductors; Frank E. Case, Schenectady, N. Y. App. filed May 21, 1904. Signals for indicating to the motorman whether either of two sections of the third rail ahead is grounded, and also whether the sections are at the same potential. A semaphore magnet is energized in case the rail sections are at a different potential, or in case either one of them is grounded.

806,709. Switch Operating Mechanism; Jesse S. Pevear, Schenectady, N. Y. App. filed Feb. 27, 1905. A pair of oil-bath switches are connected to respectively control current through alternating-current and direct-current motors upon the car. The switches are arranged in transformer circuits in such a way as to automatically throw the proper switch by connections to direct or alternating power mains.

806,711. Brake; John H. Piercy, Baltimore, Md. App. filed June 9, 1905. The brake-shoes are spring pressed against the wheels and held out of engagement by means of a chain wound upon a brake-drum.

806,741. Rail-Joint; Patrick J. Haney, Beverfalls, and Patrick J. Lalley, Fallston, Pa. App. filed April 3, 1905. A rail-joint having base portions adapted to bear against the web and flanges of the rails for the full length of the joint, intermediate under portions adapted to project inwardly underneath the rail-flanges, and upper head-bearing portions of less length with downwardly sloping end portions.

806,751. Switch Controlling Mechanism; Jesse S. Pevear, Schenectady, N. Y. App. filed Feb. 27, 1905. Different switches are employed for connecting the apparatus to the source of current supply according as the current which is being supplied is alternating or direct.

806,752. Combined Alternating and Direct-Current Control Apparatus; Jesse S. Pevear, Schenectady, N. Y. App. filed May 8, 1905. A control system for motors operating alternately on alternate and direct currents, so arranged that through the medium of a single master switch the speed of the motor may be governed by a governing device best adapted for use with the particular current on which the motor is being operated.

PERSONAL MENTION

MR. WALTER B. HALL, for nine years connected with the Salem division of the Boston & Northern Railroad, has severed his connection with the company, to become connected with the Old Colony Railroad.

MR. GEORGE H. GIBSON, of George H. Gibson & Company, advertising engineers of New York, presented a paper on "Lost Motion in Machinery Advertising" at a meeting, held in New York on Dec. 8, of the Technical Publicity Association.

MR. RICHARD WORSAM MEADE, president of the New York Transportation Company, of New York, who formerly was assistant to President Vreeland, of the New York City Railway Company, was married on Saturday, Dec. 9, at Trinity Chapel, New York, to Miss Helena Rutherford Ely.

MR. HOWARD E. HUNTINGTON, general manager of the Los Angeles Railway Company, has returned from a trip to Europe. While abroad Mr. Huntington combined business and pleasure, and availed himself of the opportunity to study the methods of operation of the street railway properties in the principal cities which he visited.

MR. C. E. MEAD has resigned from the Westinghouse Electric & Manufacturing Company and opened offices in the Reibold Building, Dayton, Ohio, with his associates, as C. E. Mead & Company. In addition to other work in hand, Messrs. Mead & Company have been retained as consulting engineers for three interurban railways to be built during the coming year.

PROF. FRANK H. ROBERTS, of the University of Denver, Col., has just returned from an extended trip in Europe, where he has been studying the question of municipal ownership of public utilities. He called on President Roosevelt on Dec. 9 and is said to have reported to the President that public ownership of public utilities has been a failure in Europe.

MR. THOMAS B. EATON, of Worcester, has been elected a director of the Worcester Consolidated Street Railway Company, to fill the vacancy caused by the death of the Hon. Stephen Salisbury. Mr. Salisbury had been a director since March 11, 1901, and for a long time previous had been a director of the Worcester Traction Company. Resolutions on his death were adopted.

MR. S. E. WOLFF, recently general manager of the Jackson Gas Company, of Jackson, Mich., has assumed the duties of general manager for the Saginaw-Bay City Railway & Light Companies, vice Bernard C. Cobb, resigned. Mr. Cobb will retain his interest as a director, and will also continue to hold the office of vice-president, though after Jan. 1 he will remove to New York, where he will be connected with the head offices of the Hodenpyl-Walbridge Company, who control the Saginaw properties.

MR. DE KANDO, chief electrical engineer of Ganz & Company, Buda-Pest, arrived in New York on the Cunard turbine liner, "Carmania," on Dec. 11. Mr. De Kando's visit to this country is partly due to the great interest being felt in three-phase traction at present, and the many important projects where this system might be used. He expects to visit also the three-phase line now being equipped between London and Fort Stanley, Ontario, Can., described in the Street Railway Journal of Dec. 9, on page 1026.

MR. RANDALL MORGAN, of Philadelphia, who has been in Cincinnati for about a month as the guest of President W. Kesley Schoepf, of the Ohio Traction Company, has left for California, where he will remain until the first of the year, when he will return to Cincinnati again as the guest of Mr. Schoepf. As previously stated in the Street Railway Journal, Mr. Morgan while in Ohio availed himself of the opportunity of making a study of electric railway operation in Ohio and Indiana, in doing which he traveled over nearly very line in the two States.

MR. H. P. McINTOSH, Mr. Horace E. Andrews, Mr. S. F. Haserot and Mr. E. G. Tillotson have resigned as directors of the Lake Shore Electric Railway Company. As stated in these columns some weeks ago, Mr. Warren Bicknell will leave the company about Jan. 1, to become president of the Cleveland Construction Company, and it is understood to be settled that he will be succeeded as president by Mr. E. W. Moore, who is one of the heaviest stockholders of the property and a leading member of the Everett-Moore syndicate, which recently reassumed control of the property as a result of the winding up of the voting trust which has had charge of the company since the receivership.

MR. CHARLES P. THRASHER, engineer for the Cleveland Construction Company, has opened an office in the Citizens Building, Cleveland, for the engineering department of the Youngstown & Ohio River Railway, which will extend from Youngstown to East Liverpool by way of Salem and Lisbon. Surveys are being made and specifications are being prepared for all the engineering details. The section from Salem to Lisbon will be built first, and work on this will be started early in the spring. The road is being promoted by a Cleveland syndicate headed by Mr. Will Christy, Mr. J. R. Nutt, Mr. Warren Bicknell, Mr. E. H. Hale and others.

MR. L. L. SMITH has been appointed master mechanic of the Schenectady Railway, of Schenectady, N. Y., in place of Mr. J. G. Baukat, resigned. Mr. Smith is a graduate of Cornell University, class of 1890, with degrees of mechanical and electrical engineer. From 1890 to 1899 he was connected with the Chicago, Burlington & Quincy Railroad. From 1899 to 1902 he was division master mechanic and general shop foreman of the Chicago, St. Paul & Western Railroad at St. Paul, Minn., and from 1902 to 1903 he was machine shop foreman of the Central Railroad of New Jersey. Since that date up to Dec. 1 he has been master mechanic of the New Hampshire Traction Company, of Haverhill, Mass.

MR. WALTER W. WHEATLY, president and general manager of the Mexico Electric Tramways, Ltd., left New York for Mexico City on Thursday, Dec. 14, by the Ward Line steamer "Esperanza." Before his departure Mr. Wheatly gave a pleasant farewell dinner on Tuesday evening, Dec. 12, at the Café Martin. Among the prominent guests were the following: H. H. Vreeland, president, Mr. Frank S. Gannon, vice-president, and Mr. Oren Root, Jr., general manager, of the New York City Railway Company; Mr. Thos. N. McCarter, president; Col. Edwin W. Hine, assistant to president, and Mr. Albert H. Stanley, general superintendent of the railway department of the Public Service Corporation of New Jersey; Mr. G. Tracy Rogers, president of the Binghamton Railway company; Dr. F. A. C. Perrine, the well-known transmission engineer; Mr. Frank Hedley, general manager of the Interborough Rapid Transit Company Company, of New York; Mr. W. J. Clark, of the General Electric Company; Mr. Maurice Coster, of the Westinghouse Electric & Manufacturing Company; Mr. Daniel M. Brady, president of the Brady Brass Company; Mr. Ira McCormick, of the New York Central Railroad; Mr. H. W. Blake, editor Street Railway Journal.

MR. R. C. TAYLOR has resigned as mechanical engineer of the Brooklyn Rapid Transit Company, and the position has been abolished. Mr. Edward Taylor, engineer of equipment and tests of the company, also has resigned, and Mr. J. R. Williams, general foreman of shops, has left the service of the company. Mr. Edward Taylor was connected with the company four years, first as engineer of tests and later as engineer of equipment. Before coming to Brooklyn, Mr. Taylor was with the International Traction Company, and before that, during the Pan-American period, was connected with the engineering department of the International Traction Company, of Buffalo. Mr. Williams has been with the mechanical department of the company for a number of years. Another to leave the service of the Brooklyn Company is Mr. E. F. Perrine, assistant to the mechanical engineer. Mr. W. G. Gove has been appointed superintendent of equipment of the company, having charge of construction, inspection and maintenance of rolling stock of both elevated and surface lines. Mr. Gove has been assistant mechanical engineer of the company for about two years. Previous to his connection with the Brooklyn company he was with the Boston Elevated, where he served a term of service of about ten years.

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Of this issue of the Street Railway Journal 8000 copies are printed. Total circulation for 1905 to date, 416,350 copies, an average of 8164 copies per week.

The Philadelphia Subway

The opening of the Philadelphia Subway on Monday of this week constitutes a most important step in the history of transportation in that city. We doubt whether one person in 1000 among the inhabitants of Philadelphia has had any adequate conception of either the extent of the work which has been conducted under Market Street during the past two years or the effect which the Philadelphia Subway must have upon the development of the city. Unlike the work on the first subway sections in New York, the Market Street tunnel was constructed without serious interference with the surface of the street or the traffic upon it. As a result of this method, which is also being followed on the later sections of the New York Subway, the general public sees nothing except a few inconspicuous openings at occasional intervals for the removal of earth, until the preparations are completed for the actual transportation of passengers.

The effect of the new tunnel on the transportation problem of Philadelphia will be even a greater revelation to the citizens than the appearance of the work itself. Street transportation in Philadelphia, as in most of the other large cities in this country, has passed through a clearly defined cycle, although its course has been more marked in Philadelphia than elsewhere on account of the narrowness of most of the streets. This cycle commenced with the introduction and expansion of the horse railway system until its carrying capacity was practically reached, then followed the tremendous gain in both carrying capacity and speed through the introduction of electricity, and finally the congestion by cars and other vehicles of the main arteries, until the speed of the electric cars was reduced practically to that during the former horse régime. In Philadelphia the only solution to this problem was the subway, which, with its four tracks, promises a practically unlimited opportunity for transportation development, east and west. It will be many years before the capacity of the present tunnel is reached, and by that time other subways built by the company will probably parallel it, and still others will be supplying the need for north and south travel.

Turning now from the transportation aspects of the Philadelphia Subway to its constructional features, several radical departures from similar systems elsewhere will be noticed. The first of importance is the elimination of all track ballast. The local or outside tracks in the subway are laid in concrete on cast-iron chairs, while the express tracks are on wooden blocks, which in turn rest on steel and concrete stringers. So far as we know this is the first time that the use of stone or gravel ballast in underground work has been abandoned, and the resulting advantages from a sanitary standpoint are obvious. It is the belief of the officials of the company that a large proportion of the smell in a subway comes from the collection on the stone ballast of various kinds of refuse, but particularly of iron dust from the wheels and brake-shoes. This dust becomes sticky and odorous through the drippings of oil from the various bearings. The composition of this mixture renders it almost impossible of removal in any way short of the direct application of water with the assistance of a brush, a method which is perfectly feasible in the Philadelphia Subway. Just what effect this construction will have upon the noise in the subway cannot yet be determined, but the experience of the company with surface car operation on a rigid concrete sub-construction seems to indicate that the noise will not be appreciably greater than on a ballasted track. It should also be remembered that the express tracks are on what is practically a tie support.

In another feature the Philadelphia Subway represents an interesting departure from its predecessors, and that is in the introduction of an extensive system of ventilation. Arrangements have been made with owners of property along the route by which stacks from 60 ft. to 300 ft. in height are used to exhaust air from the tunnel. At present it is thought that natural draft will suffice, but this can be supplemented by exhaust fans if necessary.

It is not possible to discuss to any extent the design of the cars adopted for subway operation, as express trains will not be in service for some time, and the side doors provided in the cars will not be used at first. Nevertheless, this provision for future station congestion will undoubtedly prove valuable later, while the adoption of pneumatically-operated platform doors gives added evidence to the efficiency of this method, which was used first, as we remember it, on the Illinois Central cars, and later on the Boston Elevated.

The Future of the American Street and Interurban Railway Association

The Massachusetts Street Railway Association, which is one of the leading, as well as one of the oldest, among the State street railway organizations of the country, held, on Dec. 13, a most interesting meeting, which was devoted to a discussion of the future policy of the American Street and Interurban Railway Association. The speakers of the evening were J. E. Rugg, superintendent of surface transportation of the Boston Elevated Railway Company, and W. Caryl Ely, president, and Bernard V. Swenson, secretary and treasurer, of the American Street and Interurban Railway Association. Mr. Rugg gave some reminiscences of the first meeting of the American Street Railway Association, of which he was one of the organizers. The addresses of Messrs. Ely and Swenson were devoted to outlining the reasons for the reorganization of the association at Philadelphia last fall, and to describing the work which it proposes to do and the methods by which it will be accomplished. A short article referring to the meeting was published in the last issue, but the subject is one in which so much interest is being felt at present that the addresses are printed at length elsewhere in this issue.

The history of the American Street Railway Association is one of which no member need feel ashamed, but with the change in methods which has attended the street railway industry since the establishment of the association, and these changes are described clearly in Mr. Ely's address, its reorganization became a necessity. The first year of the life of any association of this kind, which is dependent for support upon the principle of co-operation among those engaged in the same industry, must necessarily be a somewhat critical period. Those who have followed closely the reasons which led up to the organization of the American Street and Interurban Railway Association and understand its plans for future work, are satisfied that it is worthy of most hearty support. To those who are not as well acquainted with its purpose, the addresses at Boston will prove most instructive.

The association requires during the year not only the support of the street and interurban railway companies, but also of all individuals who are interested in the electric railway industry. Under the new constitution, such persons can join as associate members. This is a departure from the former plan, and for this reason may not be generally understood. Associate membership entitles a person to receive a copy of the annual printed proceedings of the association, and this privilege alone is worth the annual dues. There is no reason why the association should not receive many applicants for associate membership from officials and others who are connected with companies which are active members of the association. The proceedings of the association will contain technical information of the highest value, and in a much more complete and convenient form than the reports which appear in the technical papers immediately after the meetings. Such a file of volumes should be invaluable to any man who is engaging in the industry as a life's work, even if associate membership in the association did not carry any other privileges. President Ely announced that he hoped that the associate members would include 1000 persons before the close of the association year, and when we consider the number, both of those actively engaged and those indirectly interested, in the industry, who ought to welcome the opportunity of allying themselves individually with the association, this estimate appears extremely moderate.

Proportioning Car-Resistance Steps

When one considers what a small amount of trouble it is to properly proportion the different steps of the resistance in the motor circuit of a car, he wonders the more at the great number of cars that do not have their resistance leads connected as they should be. To the passenger the effect is very evident. The car, instead of having a smooth acceleration, starts with one or two jerks. If the car is traversing city streets where the stops are frequent, this effect becomes very annoying, and no doubt induces many to walk to their destination rather than submit to the rough usage they know they will experience if they board a car.

The effect on the motor and on the car in general is not so evident, but could the percentage of repair costs for a year due primarily to wrongly proportioned resistance steps be isolated, the impression on the management would often result in more attention being given to this small but important detail. The effect on the electrical equipment could be shown in a rather impressive manner by placing an ammeter in the motor circuit. On some cars, where practically all the resistance is cut out on one point, the needle would indicate several times the normal current. The excessive amount of current is a good indication of the strain put on every part of the car, and where this strain is several times that for which the car is built, or several times that for which there is any occasion, it is no wonder that there are numerous breakages of parts and loosening up of nuts. The working loose of these, of course, permits the parts of the car body to loosen up, and in a year or two what might have been a solid car is ready to be sold as a children's playhouse. And all this is due to a little carelessness about connecting resistance leads into their proper places. Where all the resistances under a car are connected in series, it is at the most not more than a one-hour job to disconnect them and then connect them properly, and on a comparatively large per cent of cars we believe such an hour would be well spent. Besides the harm resulting to the equipment and discomfort of the passengers due to the causes outlined, there is always a good chance that the wheels will be started slipping on the point that the jerk occurs, and this interferes with rapid acceleration, necessary to good operation in large cities.

D. C. Operation at Higher Voltages

The letters from Mr. Sprague and Mr. Mudge, published in this issue, are interesting contributions to the knowledge which we have on heavy electric railway work. Mr. Sprague, who has long been known as an advocate of higher voltages for direct-current operation, states unequivocally that he is willing to recommend under present conditions a working pressure, even on a third rail, of not less than 1500 volts, and predicts that even this is not the limit of d. c. operation. Mr. Mudge has something to say about European practice with high-voltage d. c. machines, and in referring to the New Haven order, enters a mild protest against unwarranted enthusiasm over the a. c. commutating motor.

In certain respects there is just now a curious resemblance in the traction field to the situation which existed in the lighting field fifteen years ago. Electrical engineers were then divided into two camps, each well fortified and with its artillery trained upon the other. It was war to the knife and no quarter asked or given. The lines of attack and defense were laid out then very much as now. The battle cry of the a. c. legions was efficiency and economy in distribution, to which the d. c. contingent responded by shouts for standard apparatus and conservative methods. The conflict, at first fast and furious, gradually merged into forays on the one side and a financially fortified trocha for defense on the other, and has now developed into a condition where the field and economic limitations of each system of distribution are pretty clearly recognized by all.

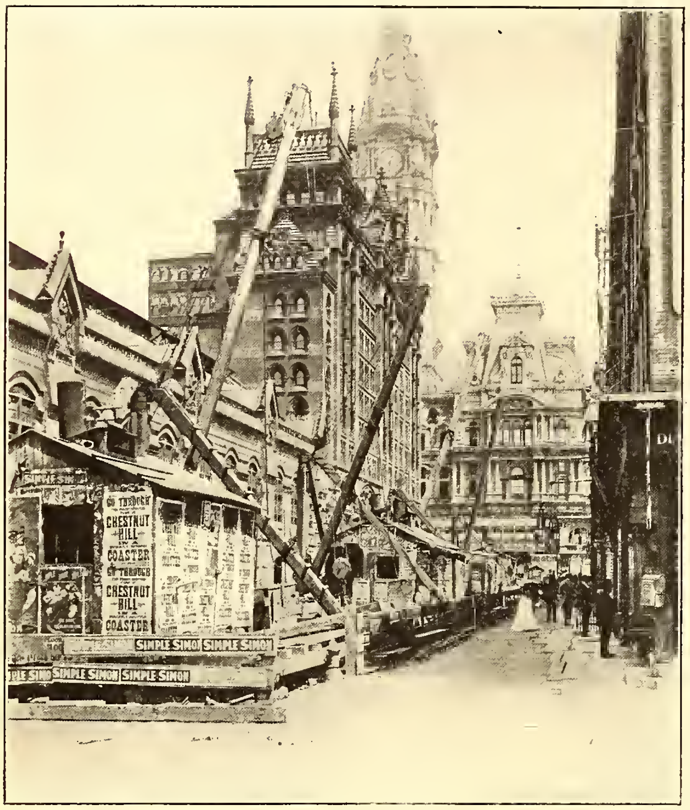
It requires no great foresight to predict in the present case a somewhat similar campaign, and it remains to be seen whether the same parallel will apply to the final result. So far as the New York, New Haven & Hartford Railroad case is concerned, the real issue involves very much more weighty considerations than the mere sale of a. c. locomotives on an unexpectedly large scale, or a change of motive power on a large suburban division. If these locomotives prove thoroughly successful from an operative standpoint, direct-current operation on a large scale will receive a serious check. Granted success with the alternating motors, and the advantage of distribution lies so far on the side of the alternating current that comparison is a waste of good ink. It is not a question of distribution at 500 volts, or 1000 volts, or 1500 volts, but at 3000 volts, or 10,000 volts, or 15,000 volts, together with the abolition of rotary converter sub-stations, and all the losses and complications thereby implied. We readily grant with our two correspondents that the last word on direct-current voltages has not yet been said. It may be perfectly feasible to build successful traction motors on a large scale for the direct use of 1000 volts or 1500 volts. At present they are not included in the standard apparatus commercially available, and it must be proved, first, that they can be successfully constructed, and second, that they will be as good and as cheap to maintain as either the a. c. or present d. c. motors.

The question of distribution is all-important in the larger field for electric traction. The key to the situation is high voltage on the working conductors, and whether this is attained by direct or by alternating current is a matter altogether subsidiary. At the present time the a. c. distribution has the best of the contention on this score, for which reason it is being pushed to the front. If it proves feasible to distribute direct current at very high voltage, as Mr. Sprague and Mr. Mudge suggest, the advantage of so doing is not lightly to be put aside, since, unquestionably, commutation presents less difficulty in d. c. than in a. c. motors, other things being equal. Whether a 1500-volt d. c. motor will give better facilities for commutation than a 300-volt or 500-volt a. c. motor is, however, quite another question, which can be answered only by experience. Commutation is admittedly the chief difficulty in a. c. traction motors, and experience with them has so far been too limited to enable a proper judgment of the commutation matter to be formed. This, indeed, is the essential thing to be demonstrated in the case of the New York, New Haven & Hartford locomotives. There are now enough a. c. roads in operation to make it certain that in moderate sizes the motors perform at least respectably well. But there is a wide difference between commutation on a 50-hp motor and in one five or ten times as large, the same sort of difference that exists as between a 5000-volt arc dynamo and one of similar voltage for large current. In each case the question is not of theory, but of fact, and the fact is to be determined by building the machines. This test is now soon to be applied, and then more will be known about the matter.

Meanwhile d. c. traction has most assuredly not been frightened from the field. The recent award of several contracts, particularly the one for the line to Atlantic City, noted in our last issue, shows plainly enough that there is ample assurance of success with the means now at hand. Granted that the present d. c. apparatus can make a thorough operative and commercial success of the Atlantic City line, which no one is disposed to dispute, there is no good reason for delaying the work for the sake of a possible future advantage. If the time comes when it will pay to change the equipment to the alternating type, the change will doubtless be made, and meanwhile the road will be earning dividends. With the very great present use of d. c. apparatus, the situation is certainly not one that demands precipitate action, for, even granting the success of the great experiment now under way, it will take a good many years to work a complete revolution in methods, and meanwhile the present apparatus will be earning the cost of its own replacement. A road well equipped with the standard apparatus of to-day is in position to give a good many years of useful and profitable service, whatever turn affairs may presently take. It is in new work, the exploitation of a new field, that the alternating-current motor, granted its success, will find immediate and profitable application, just as the polyphase system found its field in electric power transmission a decade since, without to any considerable extent interfering with existing direct-current plants. The immediate effect of the a. c. motor would be to fill a useful place of its own and to improve d. c. practice. We see this plainly in the letters from Mr. Mudge and from Mr. Sprague. The advent of a 1000-volt d. c. system for traction would be a good thing in and of itself, quite apart from its effect on a. c. railway work. So far as we can see, the art will be greatly advanced, whatever the outcome. If the a. c. motor is able to push its d. c. confrere up stairs, into the region of economical working voltage, so much the better for the railway business at large. What the practical railway man wants is a cheaper and more efficient system of equipping long lines than now exists. The particular kind of apparatus by which the result is achieved is a matter of comparative indifference, for he will probably have to make considerable changes in his equipment in any event. Therefore, he looks at the present discussion cheerfully and without fear of the final result.

THE OPENING OF THE PHILADELPHIA SUBWAY

On Monday, Dec. 18, the first section of the Philadelphia Subway was officially opened by the operation of surface cars



DERRICKS ON SOUTH SIDE OF MARKET STREET AT FIFTEENTH STREET LOOKING TOWARD CITY HALL

on a 5-minute schedule. These cars belong to one of the divisions of surface cars which run out Market Street, and the section of subway now in use extends under Market Street from Fifteenth Street to the Schuylkill River. After leaving the subway the cars cross the river on the new bridge erected by the Philadelphia Rapid Transit Company, connecting Philadelphia and West Philadelphia.

The subway is not entirely completed from Fifteenth Street west, as there are to be four tracks, two for express trains and two outside for surface cars, which enter the subway system at Thirtieth Street. For the express service the company will employ trains made up of all-steel cars, which after crossing the Schuylkill River will continue out Market Street on an elevated railway structure as far as Sixty-Third Street. The completion of the elevated structure, however, has been delayed by the strike in the building trades, so that it will not be possible to put the elevated trains in service for some considerable time. It was thought desirable, therefore, to utilize the subway for surface cars immediately and thus relieve that portion of Market Street between Thirtieth Street and Fifteenth Street of part of its traffic. The local tracks in the subway will then be used by trolley cars as far east at the Nineteenth Street station, where the cars will cross over on to the express tracks. They will then use these tracks to Fifteenth Street.

On Dec. 16, the Saturday preceding the opening of the subway, a number of prominent railway engineers and managers, city officials and others interested in elevated and underground traffic made an informal inspection of the subway. They were the personal guests of John B. Parsons, president of the Philadelphia Rapid Transit Company, and about 500 were present. The subway was entered at the Fifteenth Street and the Nineteenth Street stations. No attempt was made to run cars, as the guests preferred to walk through the underground passage, which was lighted by temporary fixtures as well as by the permanent lighting system of the tunnel. At 1 o'clock an elaborate lunch was served at the Nineteenth Street station, which had been temporarily enlarged by extending the platform over the westbound track. On Sunday, Dec. 17, the Philadelphia Rapid Transit Company extended a general invitation to the citizens of Philadelphia to visit and inspect the subway, and more than 50,000 people took advantage of this opportunity. Many of them walked the entire distance from Fifteenth Street to the Schuylkill River.

An extended account of the subway and elevated plans of the Philadelphia Rapid Transit Company was published in the Philadelphia convention section of the issue of the Street Railway Journal for Sept. 23, 1905. As will be remembered, the present completed subway section between Sixteenth Street and the portal at Twenty-Third Street is a small portion only of the proposed system. When completed there will be an elevated railway from the Schuylkill River to Sixty-Third Street. The subway is to be extended east around the City Hall, and thence under Market Street to Water Street, where it will emerge through a portal on to an elevated structure which runs north on Water Street and east on Arch Street to the Delaware River, and then south along the river front, a distance of a little over ½ mile. This portion of the subway will be double-tracked and is intended for express trains only.

VIEW TAKEN SEPT. 26, 1905, BEFORE TRACKS WERE LAID, SHOWING REINFORCED CONCRETE STRUTS BETWEEN COLUMNS

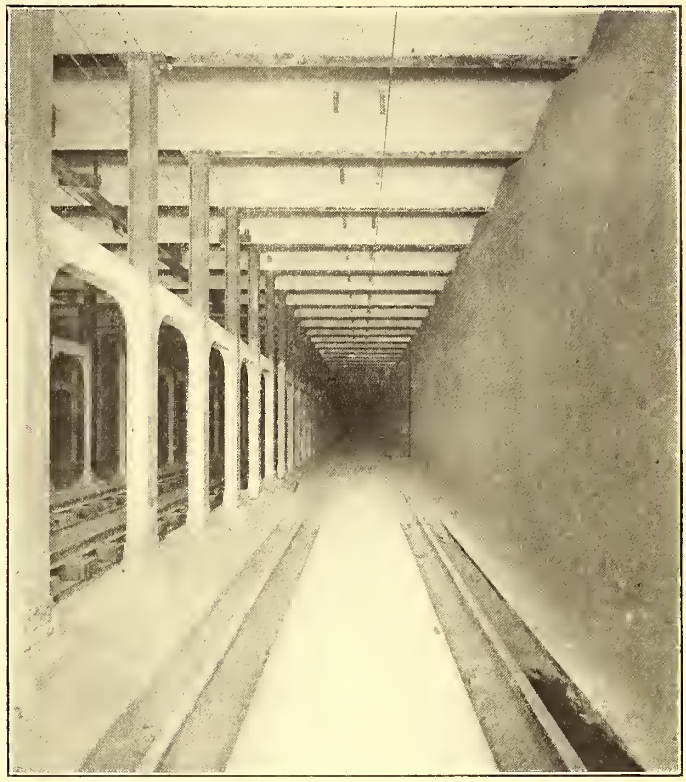
The two outer tracks in the subway, which are to be used by the trolley cars, will branch off from the present subway at the

City Hall and will make a loop through the business district via Walnut Street, Fifth Street and Arch Street. In this way the trolley cars bound east from West Philadelphia will run on the south outside track in the present subway, and after making the loop described will return west by the north outside track.

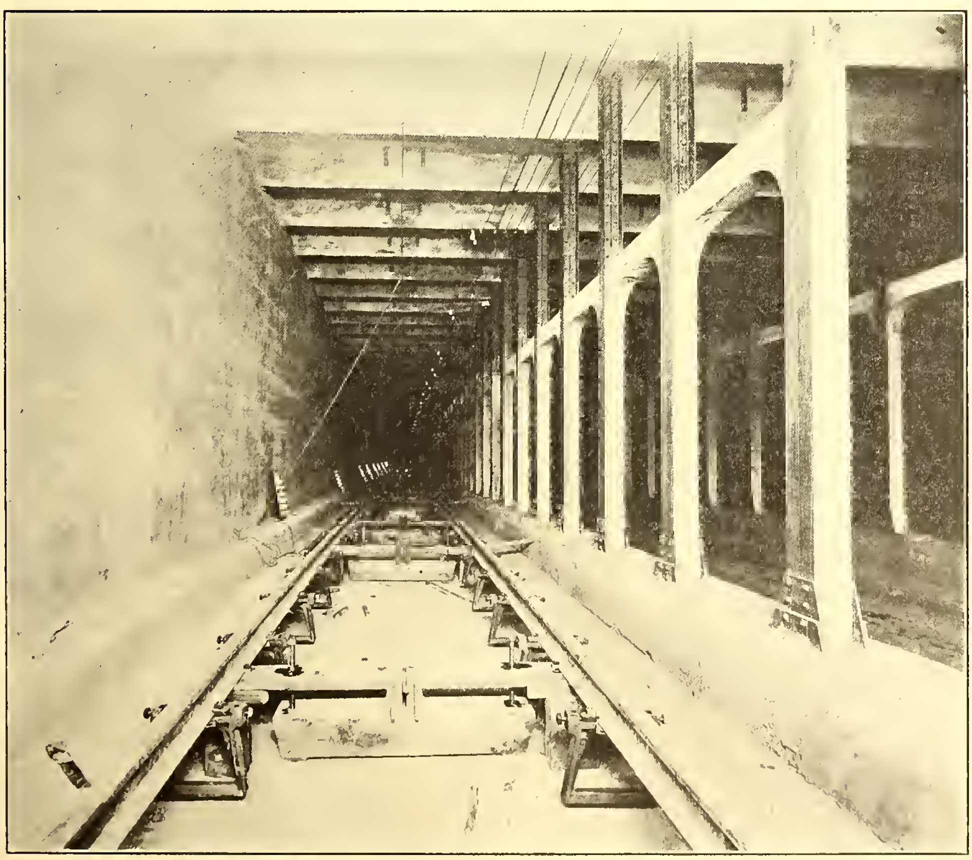
SUBWAY CONSTRUCTION

The subway structure on the present section has a width of 48 ft. 6 ins. in the clear between walls, and is 14 ft. 6 ins. high in the clear, above the tops of the rails. Three intermediate lines of columns support the roof, which is designed to support the heaviest street traffic liable in any municipality. The roof is formed of concrete arches, supported on steel I-beams, 5 ft. apart, placed across the subway; the side walls are of concrete, reinforced with steel rods, and the floor is of concrete alone. Terra cotta ducts, with manholes at frequent intervals, are built in the south wall, forming the conduits for the cables conducting electricity for the operation of the railway and lighting the subway and stations. The roof over its entire length is waterproofed with asphaltic mastic, 1 in. thick. The side walls are waterproofed where necessary with layers of burlap, coated with a compound consisting of the residuum from the refining of petroleum.

LOOKING UP AN EXPRESS TRACK. A THIRD RAIL WILL BE USED LATER INSTEAD OF THE OVERHEAD WIRE SHOWN



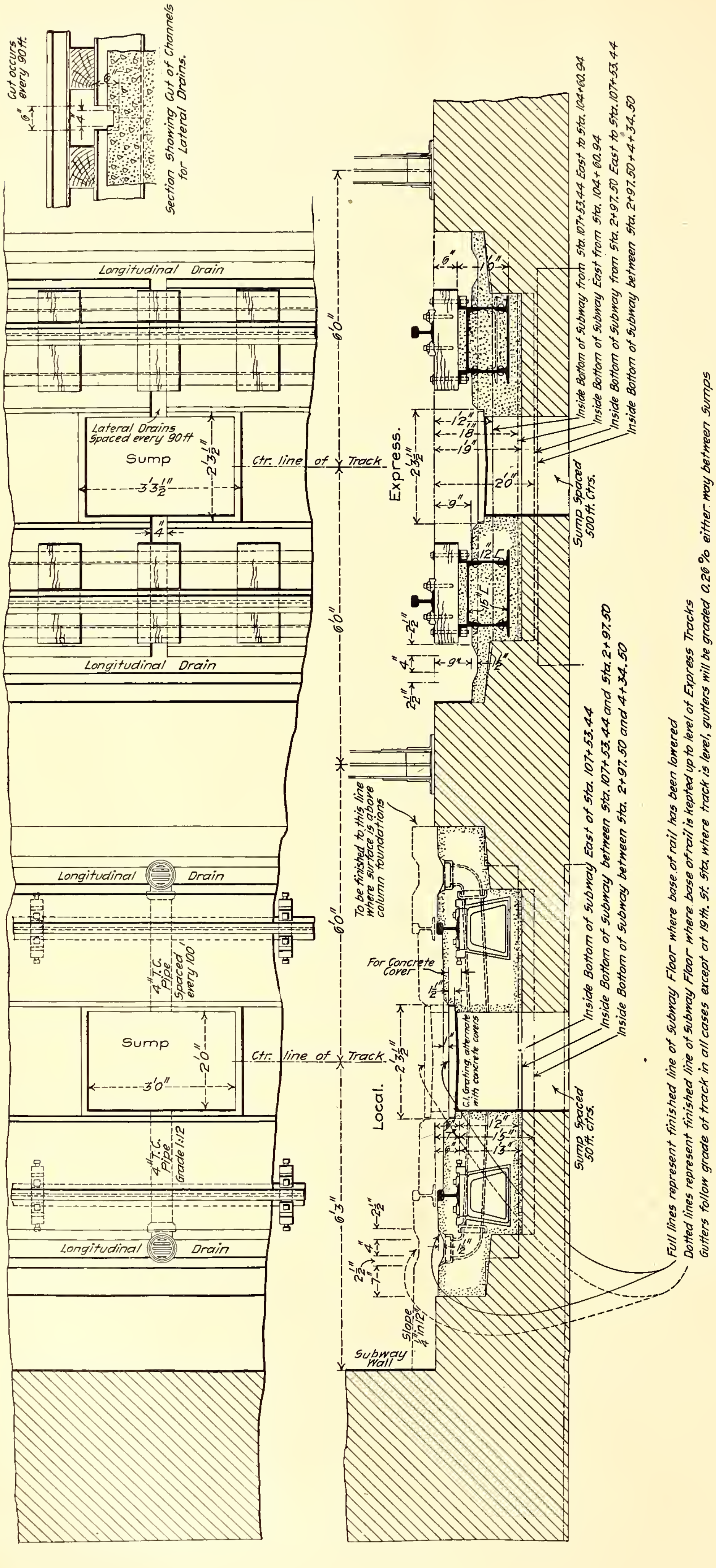
METHOD OF LAYING LOCAL TRACK IN TRENCH, WHICH IS AFTERWARD FILLED UP WITH CONCRETE



LOCAL TRACK BEFORE CONCRETE IS FILLED IN

The conditions as to underdrainage permitted the placing of subdrains below the floor of the subway, by which any appreciable head of water against the side walls is prevented. This increased the dryness of the structure and permitted the omission of the waterproofing on the parts of the side walls where they have been made thick to promote facility of construction by the adopted method.

The underdrains include two lines of terra cotta pipe, one under each outside track, with laterals passing to the exterior of the side walls every 50 ft. The main drains lead to a pump well at Twenty-Second Street, where the water is discharged into a sewer by electrically-driven centrifugal pumps



SECTION OF PHILADELPHIA SUBWAY AND PLAN OF TRACK CONSTRUCTION FOR LOCAL AND EXPRESS TRACKS

regulated automatically by floats.

The stations on the present section are located at Fifteenth Street, Nineteenth Street and at the east end of the Schuylkill River Bridge, near the line of Twenty-Fourth Street. The latter station is designed to make connection with the Baltimore & Ohio Railroad station, and, with the Fifteenth Street station, is for both express and local trains. The stations at Nineteenth and Twenty-Fourth Streets are intended for the trolley cars only. The stations are to be finished in glazed tile, probably of a buff color.

Ground was broken for the subway work on April 6, 1903, at Twenty-Third and Market Streets to begin the reconstruction of the sewerage system, which necessarily preceded the work on the subway proper.

LIGHTING

The lighting circuits in the subway are entirely separate from the power circuits. The subway lighting system is divided into sections about ½ mile in length, and the lamps at each station and for a distance half way to the next station on each side are supplied on a 110-volt circuit from the transformer located in the station. Each transformer sub-station is provided with a throw-over switch by which the lamps can be connected, if necessary, in groups of five, on to the railway circuit.

TRACK CONSTRUCTION

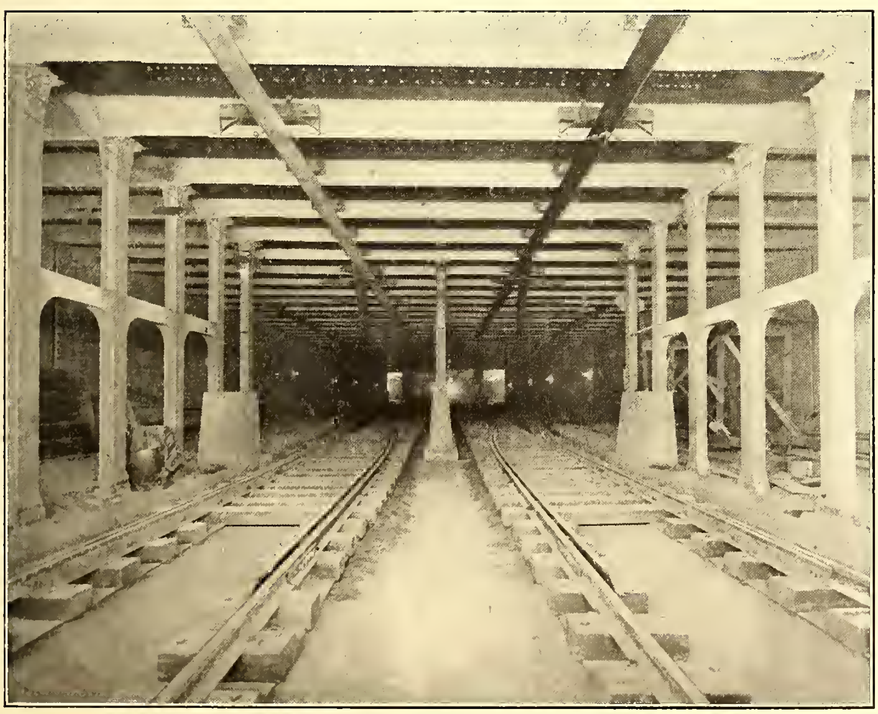
The track is quite novel, as no ballast is used. The object is to keep everything in a perfectly sanitary condition, and the entire roadbed can be washed down with the hose and drained through sumps which are placed at frequent intervals. Different forms of construction have been used in the express and in the local track. In the latter the rails are mounted on cast-iron chairs, which, with the rails, are completely embedded in concrete. This form of construction has been employed for a number of years on the surface lines of the company with excellent results. The chairs or yokes are spaced 5 ft. apart and are provided at their upper ends with guide lugs in which are adjusting screws. The inside ends of these screws bear against holding blocks which grip the foot of the rail so that the rail is adjustable to exact gage by manipulating the screws. The rails are laid in a trench left in the concrete.

which forms the rest of the roadbed. They are then aligned and the concrete is filled into the trench even with the top of the head of the rail on the outside and with the lower part of the head of the rail on the inside. In this way, if a rail has to be replaced, it is only necessary to remove the concrete in the trench. Sumps are provided in the local tracks at average distances of 50 ft.

On the express tracks, except at cross-overs, the rails are mounted directly on yellow pine blocks 6 ins. x 24 ins. x 10 ins., to which they are attached by clips and screw spikes. These blocks are bolted to 12-in. channels, which are braced top and bottom at intervals by 15-in. channel braces. The longitudinal channels are set in concrete, as shown in the section on the opposite page. The sumps on the express track are placed 500 ft. apart. One rail of each express track has been reserved for block signaling. The other rail is bonded with a Mayer & Englund protected bond, and the two return rails are cross-bonded. The return circuit is then reinforced by a 2,500,000-circ.-mil cable. The local track rails are laid with the standard zinc joint of the Philadelphia Rapid Transit Company. The rails for both tracks are 90-lb. A. S. C. E. standard.

OVERHEAD AND THIRD-RAIL CONSTRUCTION

As the local tracks are to be used by trolley cars they are equipped with an overhead wire which is supported in a special flexible suspension. This consists of two 2-in. x 5/8-in. bars, which were set in the concrete roof of the tunnel while the latter was being built. To these bars are attached a 3-ft. 6-in. x 6-in. x 3-in. yellow pine timber, to which the wrought-iron brackets holding the flexible suspension are bolted. The double pull-off, which holds the trolley wire, is of the usual type, with two globe strain insulators, and is supported by a 5-16-in. steel span wire connecting the two brackets mentioned. The usual wooden guard plank is carried on the yellow pine timber above the trolley wire. A No. 0000 grooved trolley wire is used, and is held in a mechanical clip. A drawing of this suspension will be published in an early issue of this paper.



CROSS-OVER NEAR NINETEENTH STREET STATION FROM EXPRESS TRACKS TO LOCAL TRACKS

The express tracks and elevated structure will be equipped with a third-rail system. The type of third rail has not yet been selected. At present the express tracks will be equipped with the trolley system and will be used by the trolley cars until the elevated structure is completed.

VENTILATION

An interesting feature of the subway construction is the arrangement for ventilation which has been provided at different points. Ventilation is secured not only by the openings into the street at the different passenger stations, but also by special chambers which are connected to stacks outside. Arrangements have been made at the base of these stacks for the installation of fans if necessary, but in most cases it is thought that the natural draft will be sufficient. There are three of these stacks on the section now completed, viz., at Fifteenth Street, Nineteenth Street and Twenty-Second Street. Similar ventilation shafts will be constructed on private property on the section of the subway which will next be opened, viz., that east of Fifteenth Street.

VIEW DURING CONSTRUCTION NEAR PORTAL AT TWENTY-THIRD STREET, SHOWING CONCRETE BULWARKS

ROLLING STOCK

As already stated, the subway for the present will be used by surface cars, but an order for forty steel cars to be employed in express service has been awarded the Pressed Steel Car Company, which is now engaged on their construction. A plan of the seating arrangement of these cars will be published in an early issue. The cars are provided with side doors as well as end doors, although it is not the present purpose of the company to utilize these side doors. In case the traffic increases, however, so as to cause any considerable delay in station stops, the seats will be removed and the side doors will be used. The platform doors are arranged to be opened pneumatically, as in the latest cars of the Boston Elevated Railway Company.

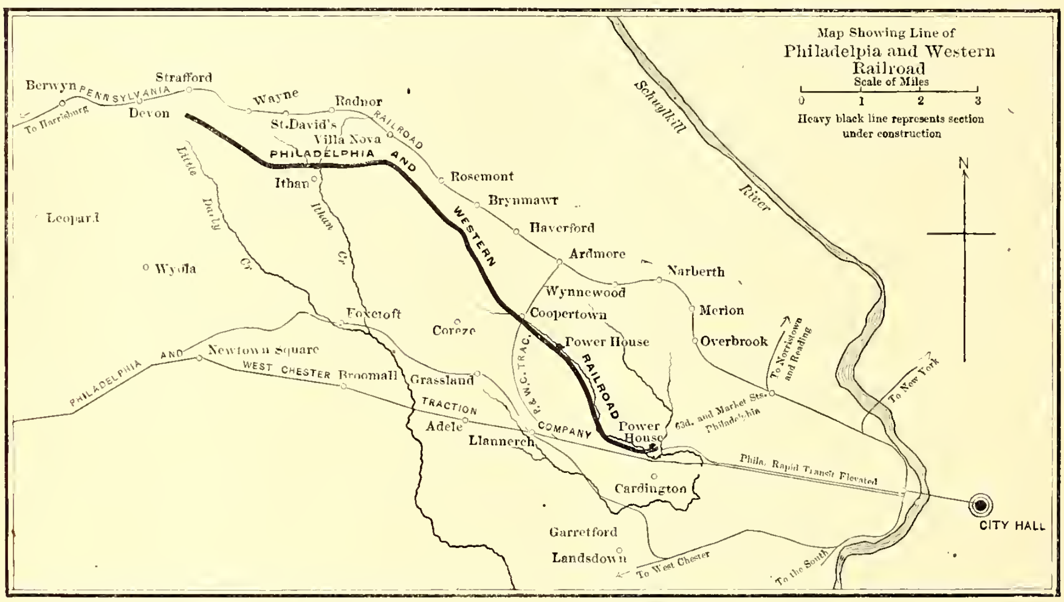
ENGINEERING

The engineering for the Philadelphia Subway was conducted directly by the engineering department of the Philadelphia

Rapid Transit Company, and was in direct charge of W. S. Twining, chief engineer of the company. Mr. Twining's principal assistant in this work was C. M. Mills.

THE PHILADELPHIA & WESTERN RAILROAD

The Philadelphia & Western Railroad Company, about which several items have appeared in recent issues, has now more than 11 miles of road actually under construction, and all work has been carried out in a most substantial manner. The route of the road is shown in the accompanying map. As will be seen, it extends from the termination of the Philadelphia Rapid Transit's subway-elevated line, at Sixty-Third and Market Streets, Philadelphia, to Devon Road, Strafford. Beginning at the end of the Rapid Transit Company's line, and extending westward, the grading is completed practically for about 6 miles. Grade crossings have been avoided, and there is a large number of heavy fills and deep cuts. All the culverts and bridge abutments are of concrete. Between Bryn Mawr and Villa Nuova, the company is building a steel bridge 400 ft. in length and 62 ft. above the small stream crossed. After crossing the west branch of the Ithan Creek on a fill and bridge 30 ft. in height, the road will run through a cut nearly a mile long and terminating on West Wayne Avenue, in Wayne. The last 500 ft. of this is through solid rock. Grading is being done for a loop at Strafford, which is the furthest point that cars will be run at the opening, and this will doubtless be the terminus of one-half the suburban service for some years to come.



MAP SHOWING ROUTE AND TERRITORY OF THE PHILADELPHIA & WESTERN RAILROAD

All the grading is being done for a double track throughout the 11 miles, and several side-tracks are planned at intermediate points. The heaviest grade will approximate 2.5 per cent, but this will be for a short distance only. Other grades will run from 0.5 per cent to 1.5 per cent, with some nearly level track for short distances. The country itself is hilly, rising from tidewater at Philadelphia to about 400 ft. at Wayne and 456 ft. at Malvern, 21 miles out. The curves will run largely at 1 deg. and 2 degs., with a few 3-deg. and 4-deg. curves, and a very few sharper. All of them will be safe for a continuous speed of from 55 m.p.h. to 60 m.p.h., and most of the road will be good for 70 m.p.h. or 75 m.p.h.

Both tracks will be of 80-lb. A. S. C. E. section rail, laid on 6-ft. x 8-in. x 8-in. ties on stone ballast. The third rail is of an inverted U-shape. It weighs 40 lbs. to the yard, and is laid in sections 30 ft. long.

The cars, which have been ordered from the St. Louis Car Company, will be about 51 ft. in length, and will be equipped with the multiple-unit control so that they may be operated in trains.

The power house is being erected at a point along Cobb's Creek, 3 miles from the Philadelphia terminus. The equipment has not yet arrived, but work on the building is progressing steadily.

The Philadelphia & Western Railroad practically parallels the Pennsylvania Railroad, being about 2 miles to the south of Merion and Narberth, on the latter road, and less than a mile from the Pennsylvania between Bryn Mawr and Strafford. Each town is passed through in the southern part, which is most built up and furthest from the steam railroad, until Wayne is reached, where the Philadelphia & Western runs along the high ridge to the south of the town, while the Pennsylvania runs through the geographical center. The new line, though, goes through a very desirable part, and, it is thought, will assist greatly to build up the heights.

Although no preparations have been made as yet to extend the construction beyond Strafford, the original charter gives the company the right to extend to Parkesburg, 44 miles out of Philadelphia, passing through Devon, near Berwyn, Paoli, Duffryn Mawr, Malvern, West Chester, Downingtown, Coatesville and Pomeroy. There is an electric railway in operation between West Chester and Downingtown, and another between Coatesville, Pomeroy and Parkesburg, but they would not form a part of the Philadelphia & Western, as their grades and curves would not permit, and they have only street railway charters, while the Pennsylvania & Western has a steam railroad charter.

With a population of about 12,000 within 1 mile of its line, between Philadelphia city line and Strafford, and a competitor running 116 loaded local trains (not mentioning nearly fifty more through express trains not stopping within the suburban territory mentioned), the Philadelphia & Western will have an excellent chance to show whether it can divert a huge slice of the Pennsylvania's business or whether it can increase the already abnormal traffic to still greater proportions.

CLEVELAND CHAMBER OF COMMERCE COMMITTEE ASKS FOR SECRET HEARINGS ON FRANCHISE RENEWAL QUESTION

The Chamber of Commerce Committee of Cleveland, appointed to investigate and work out the franchise renewal problem, has declined to accede to the suggestion made by Mayor Johnson and President Horace Andrews, of the company, that the investigations and deliberations be made in public. The committee believes it can best bring out the facts in detail if the parties giving information were free from the embarrassment that an open session would involve. The committee will receive and consider written communications from parties interested, and it will make an exhaustive study of statistics from all possible sources. It is the intention of the committee, however, to give out from time to time such information as is deemed advisable and practical.

CORRESPONDENCE

A NEW AND HIGHER STANDARD OF D. C. OPERATION

New York, Dec. 14, 1905.

Editors Street Railway Journal:

The hope of extended electric equipment and operation on the main lines of trunk railways, as distinguished from special problems such as terminals, tunnels and congested sections, lies not alone in the possibility of increased traffic or economy of operation, but in such limitation of capital investment as will keep the burden of interest account measurably below the savings effected.

A vital element in this investment is, of course, that relating to sub-stations and conductors. As to the latter, it is evident that greatly increased potentials are necessary to keep down their size, or with any given cost of conductor per mile to increase the distance between sub-stations, with resultant less aggregate investment in them and higher economy in operation. These are common requirements, no matter whether alternating or direct currents are used. The bearing of the increase of potential upon the problem is quite evident from a consideration of the following general facts: When the traffic increases directly as the mileage, the distance between sub-stations, with any given loss and size of working conductor, will increase directly as the increase of working potential; on the other hand, so long as the train load between sub-stations is not increased, this distance will increase as the square of the potential; but taking the average of service conditions on a trunk line, the allowable increase in sub-station distance will lie between these extremes. To illustrate: Doubling the working potential would probably on an average allow trebling the sub-station distances, and trebling the potential would very likely allow an increase to, say, five times in distance.

To meet the various economic requirements, and proceeding on the assumption that 500 volts to 600 volts is the limiting standard for d. c. operation, the principal energies of many engineers and manufacturing companies have of late been devoted to operation by alternating currents, with varying degrees of success as applied to railroads, with the abandonment of third-rail construction and adoption of a special type of overhead contact. These developments have resulted in a variety of designs for both polyphase and single-phase motors, and considerable divergence in views as to potentials, frequency and mode of construction and operation where the single-phase has been adopted.

It is not my purpose at present to enter into a discussion as to the comparative merits of the various systems, all of which have their field of usefulness. I have long advocated, and am keenly alive to the economic bearing of increased potentials, however obtained, but also mindful of certain practical features which must be considered in connection with them. I believe, however, that where alternating-current motor operation, with overhead construction, is adopted, there is little reason for halting at any moderate limit, but that such potential should be used as may be necessary, all things considered, to get a reasonably full measure of the possible economy of investment.

On the other hand, I have frequently pointed out that the limits of d. c. operation are by no means reached, and that 500 volts or 600 volts was an arbitrary standard which present possibilities in construction of apparatus no longer warranted maintaining when leaving the field of tramways to take up the consideration of trunk line applications.

The time has now come, I think, in view of the developments which are taking place on the terminals of the roads entering New York City, the interest which railway officials are taking in the subject, and especially because of the various claims which are from time to time made, when equipment engineers, in considering the practical application of electricity to the more serious problems of railway operation, shall have as a choice the possibilities of higher limits in d. c. as well as in a. c. operation.

To that end I beg, therefore, to announce that if in any case, after considering the various kinds of equipment possible, it should seem from an analysis of all elements entering into the problem that a comparatively high potential d. c. equipment would produce the best net results, I am prepared to engineer and carry to a successful conclusion a d. c. installation at a working pressure, even on a third rail, of not less than 1500 volts, which is at least two and a half times that ordinarily used.

I believe that it may be admitted that, although oftentimes having taken a somewhat radical and advanced position in electric railway matters, I have never made a public proposal which I have not been ready when called upon to carry out, and should conditions arise warranting an equipment such as is proposed, I propose to establish a new and necessary comparative standard in equipment possibilities. And I venture further to affirm that 1500 volts is not the limit of practical d. c. operation.

Frank J. Sprague.

THE NEW YORK CENTRAL-NEW HAVEN SITUATION

New York, Dec. 14, 1905.

Editors Street Railway Journal:

The decision of the New York, New Haven & Hartford Railroad to use a. c.-d. c. locomotives must, in the light of present single-phase development, be regarded as a decidedly experimental undertaking. The advocates of the single-phase system are naturally very enthusiastic in attempting to settle at a single stroke a problem which has been in course of evolution for almost a decade, and which has been brought nearer a solution by the advent of a commercial single-phase motor.

The words of warning sounded by a distinguished railway engineer are of more than ordinary interest and should receive careful consideration, as it seldom happens, in problems of this magnitude where a distinct change in existing methods is decided upon, that men of such recognized ability care to have their opinions made public, unless it is after some substantial results have been obtained. The only object of these few lines is to call attention to the non-committal replies to the article appearing in your issue of Oct. 21, and sent as answers to such specific charges as are made in this article, by those who are in possession of the facts in the case, and who are able to throw some light upon the factors which led to this probably epoch-making decision.

It is well known that direct currents have certain limitations compared with alternating currents, but the tendency of late seems to exaggerate these features to such an extent, and especially in problems of this nature, that those not intimately acquainted with the facts are led to believe that these limitations are of such a vital character as to positively and finally decide in favor of alternating current were suitable equipment apparatus of this latter type always available. This impression is not only absolutely false in a great many cases, but it would have a very detrimental effect upon the future development of the direct-current system unless the enthusiasm of the reformers is not occasionally moderated by opinions of older heads who have been through the mill and know full well that rational development along most lines of great commercial activity is naturally slow if it is to remain healthy.

There is no doubt that alternating current will play a most important part in the great problem of the electrification of steam roads, but it is quite worth our time to remember that any system capable of being so rapidly developed to the importance of the present d. c. system, must have inherent virtues which are not going to die as easily as some of its apparent enemies seem to think.

That the direct-current system has reached or is anywhere near its final state of development, no conscientious engineer would prophesy, and just at this time, when we are being presented with results and tests of 1500-volt d. c. railway motors and rumors of 700-mile d. c. transmission projects, it would seem rather premature to consider 500 volts as either the standard or the limit.

The future of direct-current railway work should not be judged by its present development, as some of us are in the habit of doing, and the apparatus which is now supplied for 500-600 volts should only be considered as a stepping stone to the higher and more efficient pressures which are gradually coming into use. It is now practically possible to furnish reliable direct-current railway apparatus for twice this voltage, and with proper attention to the proportions and material of the magnetic circuit in the motors and the insulation and disposition of the controlling apparatus, no reason exists, whatever, why the advantages of high voltages should not be utilized in this system as they are in the alternating system.

Through recent applications and inventions the flexibility of the d. c. motor has been greatly increased. Commutation in direct-current circuits can be better and more easily taken care of than in alternating-current circuits, and the sensitive motor magnetic circuit when laminated throughout, combined with the practical application of the inter-pole with its enormous speed variations under good commutating conditions, suggest methods of control which would almost, if not entirely, eliminate the inefficient resistances now used in d. c. railway practice, and, even with these few modifications, the efficiency and flexibility of the present system would be greatly increased.

It is difficult to find a reasonable cause just why the impression exists that the development of the direct current in railway work is at or near the stopping point, and it is gratifying to see that the principal European electrical companies do not share in our skepticism as to the value of the direct-current system, but are ready to furnish apparatus for twice and, in some instances, three times the pressure some of us consider the limit. While the results of these new types of locomotives are anxiously being awaited, it appears to me that now is an excellent opportunity for those who are more or less acquainted with the facts relating to their choice, as well as those who are acquainted with both the a. c. and d. c. side of the situation, to register their opinions and save their feelings for some other time.

CHARLES A. MUDGE.

THE DESIGN OF INTERURBAN CARS

SHEBOYGAN LIGHT, POWER & RAILWAY COMPANY

Sheboygan, Wis., Dec. 11, 1905.

EDITORS STREET RAILWAY JOURNAL:

The criticisms of the interurban car suggested by the writer in the Nov. 18 issue should prove to be of interest, and the writer is under obligations to the gentlemen who have been kind enough to discuss the matter. Mr. Bacon, in his communication, shows clearly that he had in mind a suburban car, while Mr. Giffen apparently had an interurban car in mind, but overlooked the fact that the car is proposed not for a road operating out of a large city, but for an interurban road having to travel a long distance between cities of moderate size, under which conditions there rarely occurs as much crowding as exists in suburban traffic.

The fact that nothing more serious could be charged against the design of the car than the rather trivial objections which are mentioned in both the communications, forms a strong recommendation for the plan suggested. A summary of the objections contained in the communications, as well as in your editorials, are as follows:

1. The difficulty of collecting fares.
2. Obstruction of view ahead.
3. Isolation of compartment.
4. Width of aisle.

All of the objections mentioned may be catalogued under one or another of these heads, and it may be of interest at this time to your readers to have another view of the situation:

1. In the collection of fares it should not be necessary for the conductor to enter the smoking compartment at all. Two or three hand holes in the partition will permit of the conductor collecting all fares in the smoking compartment without actually entering it. Mr. Bacon mentions the difficulty of collecting fares on the zone system, and thereby proves what has been referred to above, that he had in mind a car for suburban rather than interurban service.

2. The writer has not been aware of the fact that interurban cars have been constructed on any considerable scale with the object of giving a view ahead. As a matter of fact, the location of baggage and smoking compartments at the front end, and the location of heaters in the motorman's vestibule, are not particularly conducive to an uninterrupted view ahead, and the plan suggested in your issue of Nov. 18 has at least the merit that it gives half the car a clear and interrupted view, if that has any commercial value, which seems to be open to doubt.

3. The isolation of the compartment may no doubt be the cause of some neglect, and will require increased vigilance to keep it clean. As Mr. Giffen points out, if there is such neglect, then at least the location of the smoking compartment, in the proposed manner, has the merit of hiding the debris from the view of the more sensitive class of passengers. One of the objections named is referred to as the "cramped" position of the passenger in this compartment. In this connection it is curious to note that the plan as shown actually provides more room for the passenger's feet than he would have in a transverse seat, and such an objection, therefore, presupposes a too hasty comprehension of the design.

4. The fact that the aisle is not actually narrower than it would be without these compartments does not clear this form of design from the charges made against it, and it must be admitted that this design is weak in that regard, but it is so only on account of the fact, as Mr. Giffen points out, that in a loaded car a standing passenger may temporarily crowd between two seats. It is again apparent that this objection is more formidable on a suburban car than on an interurban car. The latter are not nearly as often crowded as the former, and the slight disadvantage of a narrow aisle, it seems to the writer, is very largely overbalanced by the convenience of the plan under normal operating conditions.

The objection referring to the inaudibility of the conductor's voice when calling streets, etc., may possibly be classified under this head. This objection is also made from the suburban standpoint, which can have little bearing in this case. The fact is that in city or suburban operation, the conductor, as a rule, pronounces the names of streets as if he were preoccupied in the mastication of a hot potato. In interurban service it is very rare indeed that a conductor is obliged to call the name of a stopping point. In the country the destinations are known to him, and in the city the calling of streets is occasionally attempted, but is quite useless, particularly if the man is a graduate from city or suburban service.

The writer is informed that there is a road at present contemplating the construction of cars along the lines similar to those proposed in the issue of Nov. 18. When these cars go into service the time will be ripe for a further discussion of the pros and cons of the question.

ERNEST GONZENBACH.

THE POLICY AND AIMS OF THE AMERICAN STREET INTERURBAN ASSOCIATION

A short account was published in the last issue of this paper of the December meeting and banquet, last week, of the Massachusetts Street Railway Association, at which the subject of the addresses of the evening was the future of the American Street and Interurban Railway Association and the reasons which lead up to its organization. The speakers of the evening were J. E. Rugg, of the Boston Elevated Railway Company, who described the first meeting of the American Street Railway Association; Mr. Ely and Mr. Swenson. The date at which the last issue went to press precluded an extended report of these addresses, but in view of the general interest which attaches to the topic discussed, the remarks of the different speakers are given below:

MR. RUGG'S REMARKS

Twenty-three years ago to-night the first banquet of the American Street Railway Association was held, and twenty-three years ago to-day the constitution and by-laws of the association were adopted. It was a small beginning. If I recollect aright, one table accommodated all that were present at the banquet and a smaller hall than this accommodated all who attended. I suppose you are somewhat familiar with what caused or brought about this association, but perhaps it would not be out of place for me to say in a few words what I know about it. In the autumn of 1882, in September, a self-appointed committee of three (of which I was one) arranged for a vacation trip to go through some of the Western States and meet our friends in the street railway business. We went to Buffalo, where we met Henry M. Watson and S. S. Spaulding. We also stopped at Cleveland, Chicago, Louisville and Cincinnati, but there was no real object in our visit, except pleasure and association. The association was found to be pleasant, as we were all engaged in the same business, and after we got back it was arranged through correspondence that there should be an attempt made to form an organization. Mr. Littell, of Louisville, issued a circular over his own name to all the street railway companies in the country, asking them, if they favored the project, to communicate with myself in Boston. I was then superintendent of the Highland Street Railway and had been for ten years. Whenever these men came to Boston it was my pleasure to meet them and make their acquaintance, and it was thought perhaps it would be well for them to communicate their responses to me.

As soon as the circular was sent out there was quite a general response. Acknowledgments were received from perhaps a hundred gentlemen, managers of street railways from Montreal to New Orleans, and a very large proportion favored the scheme. There were only perhaps six out of all to whom letters were sent who did not favor it. It was decided that I should issue a call for a convention to be held at Young's Hotel on Dec. 12, 1882. The call was not issued until about two weeks before that date, and I know it was pretty close connection to get notice to New Orleans and back again before the convention was called. But the response was general, and we had a pleasant meeting of earnest men, working for the good of the business, and I think the constitution and by-laws which were adopted stand to-day. They were carefully considered and fully discussed in a two days' session.

That was the beginning, and you know what the result has been. The association has been growing; it has met the approval of street railway managers generally throughout the country, and to-day it is a strong body, officered by very strong and able men; but I want to say that no matter how strong and able the men are who are its officers to-day, or those of its successor, because it has followed the custom of most of the railroads that were in the formation, and absorbed and consolidated with other associations and made itself stronger and larger, there are no more able men to-day, no more earnest men in the official positions than were at that time placed at the head of the association. I am not speaking for myself, because I was not one. I was simply a helper; a pusher, trying to induce others; but these men who came to the front were much stronger and much abler men than I could ever hope to be. There were William H. Hazzard, H. H. Littell, Henry M. Watson and many others whose names I do not recall, but they are on record, and what they did and their success are on record as well.

I would like to be able to talk longer and say more, but there are other speakers to come. All I can say is that I am very glad to be here to-night and to meet so many men in the business which I have followed all my life and for which I have a great deal of regard. I feel that it takes the best men in the community to attend successfully to the business of public transportation. I wish to thank you for the opportunity and to wish the new association all possible success, and hope it may live long and prosper.

MR. ELY'S ADDRESS

I was greatly pleased to receive your invitation to be present here to-night, because it gave me an opportunity, in the first place, of meeting you all; in the second place, to observe your association and its membership; and, in the third place, to say something relating to the American Association, concerning which much has been done in the last two or three years, but about which something may yet remain to be explained and made clear to the satisfaction of all. It is a curious thing, a singular coincidence, that the American Association should have been born twenty-three years ago in this very building, on a Wednesday, and on the same day of the month, and that the coincidence should have been lost sight of, and not had in mind in the fixing of the date of this particular meeting.

At the risk of wearying you, I have felt that it would be well to take a running glance at the American Association and its history. Originating here, as has been described by Mr. Rugg, it seems to me we all ought to congratulate ourselves, and to unite in congratulating Mr. Rugg that he should be here upon this occasion, to stand in *loco parentis*, as it were, to the American Association at this time. It seems from an examination of the papers that the two documents upon which the organiation was founded were a letter which was in the form of a call signed by H. H. Littell, at that time superintendent of the Louisville City Railroad Company, and the acceptance, which was signed by Mr. Rugg, in fixing the date, in his capacity as superintendent of one of the Boston railways. In Mr. Littell's letter the statement of the purposes of the meeting which was called is as follows: "The formation of an association based upon well established principles governing similar organizations,the ideaof which shall be the promotion and advancement of knowledge, scientific and practical, in all matters relating to the construction, equipment and management of street railways, the establishment and maintenance of a spirit of fraternity among the members of the association by social intercourse, friendly interchange of information and ideas, to the end that the best service may be obtained at the lowest possible cost."

Among those actively associated with Mr. Littell in the fundamental work of the organization were Mr. Rugg, D. F. Longstreet, Thomas Lowry, Walter A. Jones, George B. Kerper, Henry M. Watson and Tom L. Johnson. In response to the call, which was issued by Mr. Littell, and the subsequent letter of Mr. Rugg, the meeting was held at this hotel on Dec. 12. It was called to order by Mr. Littell, and the Hon. Moody Merrill, president of the Highland Street Railway Company, of Boston, was elected chairman. Messrs. Woodworth, of Rochester, and Clegg, of Dayton, Ohio, were chosen as secretaries. On the following day the constitution and by-laws were adopted, and on that day, Dec. 13, the first meeting of the association was held. The officers chosen were: President, H. H. Littell, of Louisville; first vice-president, Wm. H. Hazzard, of Brooklyn; second vice-president, Calvin A. Richards, of Boston; third vice-president, George B. Kerper, of Cincinnati; secretary and treasurer, William J. Richardson, of Brooklyn; executive committee, Julius S. Walsh, of St. Louis; Charles Cleminshaw, of Troy; Thomas Lowry, of Minneapolis; James K. Lake, of Chicago, and D. F. Longstreet, of Providence. I mention these names partly for the reason that so many of them have been so prominent in the street railway world from that time to this.

Coming to the objects of the association, they were defined in the constitution and by-laws as follows: "The acquisition of experimental, statistical and scientific knowledge relating to the construction and operation of street railways, and the diffusion of this knowledge among the members of the association, with the view of increasing the accommodation of passengers, improving the service and reducing its cost; the establishment and maintenance of a spirit of fraternity among the members of the association by social intercourse and encouragement of cordial and friendly relations between the roads and the public." The general scheme of the work of the association was the holding of an annual convention, at which reports of special committees were presented and papers were read and discussed. With the exception of the work of the special committees and the work of the secretary incidental to the printing and distribution of the proceedings, the entire work of the organization was performed at the annual conventions. In the early days of the association, a good deal of important work was done by the special committees, but as the time went on the special committees became fewer in number, and the work accomplished by them (except in certain notworthy instances, which constituted marked exceptions) grew less and less, and in the last few years very little of that work was done. So that, aside from the work done at the conventions and the work which was performed by the secretary and treasurer in collecting dues and assigning space to the manufacturers for their exhibits at the annual meetings, there was very little work done by the organization itself.

The association, during the time the special committees were active, devoted considerable attention to technical problems, such as questions of taxation, franchise rights, insurance, corporate control, patent suits, damage claims, municipal ownership, and other problems which were important, and from time to time were confronting the street railway interests. The association started with 31 members, grew in three years to a membership of 123, and by 1892 the membership had increased to 201. In 1893, 1894 and 1895 there were times of financial stress, and there was for some reason a lack of interest in the association, and the membership fell off, until in 1895 and 1896 very heroic measures were taken to rescue the association from what appeared to be danger of failure. From that time, within a few years after 1895, there was a considerable increase in membership, up to about 200 members, and with some slight variations the membership has been held at about that figure down to the present time. Unquestionably, it would have been very considerably increased had it not been for the consolidation of a great many companies in the great corporations which have been formed, in each of which several companies have been combined.

During the past ten years of the association the duties of secretary and treasurer, and the performance of the work that was associated therewith, have been very faithfully administered by Thomas C. Penington, treasurer of the Chicago City Railway, and the financial condition of the association has been good.

About the year 1893 the exhibit of the manufacturers of mechanical appliances pertaining to the business, which for some time had been assuming form, became the distinctive feature of the annual assemblages. This exhibit grew in size, until finally it became one of the most important features of the annual meeting. It became of great importance to the association for the further reason that the practice grew up of permitting the association to allot to the manufacturers space for their exhibits in the exhibit halls and to charge the manufacturers for that privilege. From that practice came quite a large part of the financial support of the association. Coupled with this growth of the manufacturers' exhibits, indeed, antedating it, there became established the custom of locating the conventions of the association in cities to which it was invited by the officers (quite often the president) of some one or more of the street railway companies of the particular city. With that practice there grew up that of responding to the compliment by making some popular street railway official in the city wherein the convention was held the president of the association for the following year. Possibly that had something to do with the fact that invitations were for some years frequent and easily obtained. But there came a time when, on account of the large number of persons attending the conventions (which brought, many times, several thousand) the burden of entertainment of the association on the part of the local companies became very, very onerous, amounting in those last years to many thousands of dollars; so that it came to pass that the compliment which was paid in return for the entertainment did not seem to counterbalance the expense involved, and the invitations about three years ago ceased entirely.

The dues which were paid by the companies for membership in the association were small, and the financial support was derived, as you have seen, largely from the sale of the space in the exhibit hall to the manufacturers and from the amounts contributed by the local companies toward the annual expenses of the conventions. When the invitations ceased, the last-named source of revenue ceased entirely, and then there was a feeling that the work of the association could not be prosecuted on a dignified and proper plane if the association were to become almost solely dependent upon the kindness and magnanimity and benevolent assistance, if you please, of the manufacturers' association, or the manufacturers themselves, because until two years ago there had been no association between the manufacturers. In the meantime there had been organized some eight years ago an association of street railway accountants known as the Street Railway Accountants' Association of America. That association had members largely composed of the auditors of the various companies throughout the country, and it devolved upon the different companies some additional expense, and the loss of the time of those who attended those conventions, for a period, during each year. Soon after there came other subsidiary associations. Two of them being formed and others in sight, that matter assumed a phase that was very important to the companies. This association had arrived at the point where it had its own expenses to pay; it had no place of meeting upon invitation in sight; it had the subsidiary organizations and associations to care for, and it became apparent to those who had been engaged actively in carrying on the organization, and who had happened to be placed in those positions by reason of election (possibly not of their own seeking) at the conventions from year to year, that something had to be done about reforming the method of work and of financing the organization, or the association might possibly find it necessary to discontinue the greater part of its work, or possibly be abandoned.

At that juncture it was decided to hold the convention at Saratoga Springs, and that the association should at that meeting hold its expenses down to the lowest notch, and defray all of the expenses except such portion as might be derived from the manufacturers. That was the last convention at which the association made any charge for the space allotted to the manufacturers' exhibit. At that convention the question of reformation, reorganization, change in the lines of work and method of carrying on the work of the organization was very exhaustively canvassed, considered and agitated, and it was determined that it would be better, more dignified, more conducive to the attainment of proper results, if the manufacturers should be formed into an association whose duties and objects it should be to install and defray all the expenses of the annual exhibit, and to divorce that source of revenue from the association, and leave the association to care for itself and stand upon its own bottom in a dignified and proper way. That decision was arrived at as the common judgment and opinion of those who were present, upon consultation with many important men who were absent from that convention.

It happened that at that juncture I was chosen president of the association. I assure you that instead of having been voluntarily instrumental in this matter, it came upon me like a thief in the dark, and I was pressed into a service that has taken a great amount of time, and of the magnitude of which I had absolutely no conception at that time. It is no fad of mine; it is no fad of the men who have composed the executive committees during the last three years. An immense amount of painstaking and self-sacrificing work has been done by those gentlemen throughout the year, for the purpose of endeavoring to put that association where it belongs, in the first position among the technical societies of this country, and of the world.

Those gentlemen at Saratoga who took charge of the movement for the organization of a manufacturers' association worked hand in hand and shoulder to shoulder with the officers of the American Street Railway Association, and builded so well that the exhibit which has just been held at the Philadelphia convention deserved to rank almost as an exposition. Certainly, it did deserve to rank as an exposition of the appliances that are used in the street railway industry. It was most creditable to all concerned, and also to this association. At St. Louis there was no exhibit by the manufacturers. It was not deemed necessary that there should be, but the St. Louis convention followed the Saratoga convention, in that the association defrayed its own expenses entirely, except some entertainment which was afforded by the manufacturers' association.

Then came the meeting at Philadelphia, at which the measures which had been going on during almost three years culminated in the adoption of a new form of constitution and by-laws for the association. There was as little a departure from the old form as was possible to make and provide a new method for the prosecution of the work. It is hoped and believed that if all shall work together in the new organization, instead of the steady-by-jerks method of procedure which was afforded by simply meeting together once a year and then dispersing and practically letting the whole thing drop until the convention of the following year, work upon the problems that confront the street railway industry and its foremost members will be prosecuted intelligently, coherently, in a centrally directed way, throughout the year by the meeting of the convention and its committees, the secretary's office with an incumbent and proper assistants, and then such other instrumentalities as will be afforded by the subsidiary organizations, which will preserve their autonomy, but will be controlled and work under the direction of the central body. Assisting that will be the manufacturers' association, which will install its exhibits annually and pay the expenses therefor, and may provide such reasonable entertainment at the annual conventions as will meet with the approval of the executive committee from time to time.

This brief resume brings us to the work as completed at the Philadelphia convention. Since that time, the secretary who was chosen, Professor Bernard V. Swenson, has entered upon the discharge of his duties. An office has been secured at No. 60 Wall Street, in New York City, and the headquarters of the association have been opened there. The secretary, like the officers of the association, did not seek his position. The position sought the man, and his qualifications were the sole factor that brought about his appointment by the executive committee, which looked earnestly and with splendid advisers throughout the field, in its choice of secretary and treasurer. It is not my purpose to speak at this time of Professor Swenson and his qualifications, but I may say (and perhaps I ought to say) that in the judgment of all those who had anything to do with the selection and appointment, he is a man admirably qualified for the work, and I know I may say, from what I have seen of him, that he is a man whose work is in his heart, and whose heart is in his work.

Now we are face to face with the future. The expenses of the association from now on, if the work is prosecuted in the most careful and economical manner, will crowd the sum of $20,000. The fixing of the fees to be paid for membership in the organization was a branch of the work that occupied the attention of the executive committee for a considerable time, and upon which we sought the advice of different ones throughout the country. The scale of annual dues, given in the new constitution and by-laws, will provide sufficient moneys, if carefully handled, to defray our expenses, the expenses of the annual banquet being met by those who attend at the banquet, as has been considered proper should be done. As the association was previously carried on, $25 a year was paid by each company, and, in exchange for that $25, the association gave out two banquet tickets, which, at $8 or $10 a head (as was the charge at certain banquets) almost consumed the entire amount of the fee that the company paid for membership. Now we are all enlisted, I trust, for this work. There are two classes of membership provided for; the regular membership and associate membership. Any one interested in the street railway industry may become an associate member of the organization, receive its publications and all the benefits, except the privilege of taking part in the discussions upon the floor of the convention and voting therein, for the small sum of $5 a year, and it is the hope of the executive committee that during the next year at least 1000 associate members will be secured. I hope that in the next few months the response from New England will be as large as it is from the other parts of the country in this regard.

Now, with reference to the kind of work that is being carried on, the manner in which it is to be carried on, and the benefits that are to be accorded by the organization, that for the most part I shall leave to Professor Swenson, who will follow me. After careful investigation of the method and the conduct of the work for the past few years, I said, in my annual address at St. Louis, and again at Philadelphia, that it seemed to me that the broad fields of co-operative work were being neglected by the American Association. The American Association has in its membership the larger street railway interests of America, more than 200 companies throughout the United States, Canada, Mexico and even Porto Rico. Questions which affect us purely through our State legislation, purely State matters, will, of course, be best handled in the future, as in the past, by the State organizations.

I feel that I would not be doing my duty at this time if I should fail to congratulate this association upon the fact that in the years of its being, since 1888, seventeen years, it should have been able to hold as many as 182 separate meetings. You certainly are to be congratulated upon that, and surely the street railway business of the companies in Massachusetts and in New England must have been tremendously benefited by your association, and the work that was done at those meetings and between times. Now, while the work in Massachusetts, in New England, New York, Pennsylvania, Ohio, Indiana, and the other States, which is peculiarly State work, may be best done, undoubtedly, by the State organizations, still it seems manifest that much can be done by the American Association in the way of acting in a measure in concert with the different State organizations, toward bringing into the different localities the benefits which obtain in others, and minimizing in each locality the injurious things that obtain. It is a fact that in looking at the street railway law and its administration in the different States of this country, one is struck very forcibly by the fact that if there had been co-operation among the street railway men in the different parts of the country, there might have been a far greater uniformity, not only of the statute law, but of the municipal law fixing the rights of the companies in franchises, and all sorts of municipal and State legislation.

The American Association, it is hoped, through a properly chosen committee upon State and municipal legislation, may still be able to do much to remedy these things, and to iron out these irregularities and these inconveniences that are surely present. When you come to think of it, gentlemen, this whole thing is yet in a formative state. There is no organization in this country so strong or so powerful that it can afford to stand alone, when in the same business there are many other organizations administered by capable and able men. In co-operation there is strength; everybody knows it; everybody practices it.

The American Street Railway Association and the industries which it represents to-day, has invested in it billions of dollars of capital. Hundreds of thousands of men are employed, and the operations of the business touch the daily life, comfort, convenience and necessity of all classes of citizens. To society and the law we owe duties, and to us society and the law owe duties. We are entitled in all parts of this country to fair treatment and just treatment. The best way to obtain it is to have a strong organization that is supported by a large membership, and that continuously through its organization and its method of work devotes an intelligent attention to all the problems of the day that confront the business. Mention has been made of some of the more important problems that confront us at this juncture, and in the course of my remarks at Philadelphia I mentioned the agitation in favor of municipal ownership that at that time had been making such progress in this country. Certain well-meaning, but misguided, representatives of the press seemed to have taken the idea that the principal object of our organization was to combat the principle of municipal ownership. No such position as that was assumed at Philadelphia, and no such position was advocated there.

I took occasion to point out certain facts that it seemed to those who had been consulted concerning the matter deserved investigation at the hands of this association, to the end that the truth might be known concerning the matter. It was not hinted at as the duty of this association to enter into an academic discussion with any man, or any set of men, concerning the principles of socialism, but it was suggested that we might very properly look into the facts which lie at the base of the proposition that municipal ownership of street railways in the municipalities of this country will be beneficial to all the citizens of the municipalities. The principal thing that is alluded to specially as a reason why municipal ownership of street railways in this country would be advantageous to the people is the statement that it works well in England, where it has been tried, and in other parts of Europe. Now, there are those who have made some important investigations concerning the working of municipal ownership in various cities in Europe, who hold an entirely different view as to the fact, and hold and entertain the opinion, and stand ready to justify it with facts and figures, that municipal ownership of public utilities is not working well in Europe. They further adhere to the opinion that even though it is working well there, and that fact could be established, that the conditions are so very different as to the communities involved and the service afforded, that it might not work so well here, even though it may be working well there. Whatever investigation has been made has, as I suggested, been very imperfect. There has never been prosecuted any inquiry in which those having a special knowledge of the business of conducting street railways have taken part. It was suggested that we might well devote some time to those facts, to the end that the truth should be ascertained.

Now, there are those among us who have expressed the opinion that it was useless to do that; that it is in this country a wave of popular sentiment which has arisen and is breaking over the country, and will expend itself without any particular injury, or that it will die away. Waves of popular sentiment in this country are not in the habit of dying away without doing something as the wave progresses, any more than epidemics are apt to die away without causing some havoc. I believe that it is for us to take some measures at this time to ascertain the facts, to the end that if we do no more, we will contribute those facts to this discussion. Since the Philadelpha convention, in many municipalities in this country the question of the public ownership of the public utilities in the different States has been made the principal topic and the principal issue in municipal elections.

The National Civic Federation in the United States has recently appointed a committee to make an investigation into municipal ownership, both in this country and Europe, and in making that investigation, to go into everything affecting it, the social conditions, financial conditions, and everything that affects the case, both here and there, to the end that the Civic Federation may inform itself upon the merits of the case and take whatever action it may deem desirable or best. Within the last few weeks we have had some conferences with various members of the sub-committee of twenty-one of the Civic Federation, looking to some kind of co-operative effort on our part, in connection with that investigation. It is believed that in some way this could be done, so that we would in a proper manner be represented in or about the investigation, which might be pregnant with great results, either of benefit or of injury to our business. That is about the situation, as far as any action or contemplated action on our part is concerned, touching the question of municipal ownership.

There are other questions of great importance affecting our business, which it would seem ought to be carefully considered from year to year by this association, and it is not only upon technical matters, but upon these broad problems of the day that the work of this association should be exerted. It would not seem to require argument; it would seem to follow as the night the day that intelligent work, every man and every company taking part, skilfully directing it and assisting in it, ought to be productive of great good and great benefit to the street railway industry.

Concerning the question of statutory law, and the possibility of effort from one part of the country being judiciously exerted in another part of the country, let me say that within the last three days there has come into the secretary's office in New York an inquiry from a very large street railway company concerning certain legislation that is proposed in a neighboring State. The inquiry will call upon the secretary's office for considerable work and considerable information concerning the status of statutory grants in this country. I undertake to say that there are large financial interests in the city of Boston that would have been very materially assisted in their investments in street railway properties outside of this State if there had been uniformity of the laws regulating such corporations and granting them their rights. There are States where it is impossible to obtain for an interurban railroad, no matter how greatly the public need may demand it, a franchise for a longer term than twenty or twenty-five years. While that is not the condition in Massachusetts, or perhaps in any New England State, there are other things that are present in this section of the country not present in those sections, and things of benefit present there that perhaps may not be present here. Co-operation and intelligent investigation in the work must, it seems, be of great benefit to all of us.

I have said that which I came to say; I do not wish unduly to detain you. The new form of organization is afloat; it must be supported or it will fail. Its officers have entered upon the work of the year with a pledge to you and to themselves that they will do their duty to the uttermost and as best they may; but we may have a secretary's office in New York; it may be well equipped, and it may stay there until doomsday, but it will be of no avail unless it has your hearty support. The officers of the association, unaided by a large membership that works hard and earnestly throughout the year, can do hardly anything. If we are to have the benefits which should come from this organization, all along the line, we will only attain them by hard, united work and effort by the members of the street railway fraternity in New England, the Massachusetts Association and the New England Club, and every form of united and co-operative, as well as individual, work. I thank you for your attention, and I trust that we will surely receive the support of all who are here, and that the association will receive the earnest support of your association and its members.

MR. SWENSON'S ADDRESS

President Ely has addressed you upon the general subject of the history of the American Street Railway Association from its organization here in Boston just twenty-three years ago to-day to the close of the annual convention at Philadelphia, the last week in September of the present year. He has spoken of the close relations which have existed between the association and the street railway interests of this country and Canada and Mexico in the past. He has also pointed out the growth of the street railway interests during the past twenty-three years and the important part which the American Street Railway Association has played in this great development of properties. With the close of the Philadelphia convention the work of the reorganized association began, and it now becomes my pleasure to say a few words as to what the association is doing and what its plans are for the future.

As the name implies, the American Street and Interurban Railway Association is international in character, its membership comprising not only street and interurban railway companies in the United States, Canada and Mexico, but also companies which are operating such railways in the island possessions of our country. The word "Electric" does not appear in the title of the association, as it is an association of a certain general class of railways, irrespective of the means of motive power. The terms "Street" and "Interurban" have been considered as covering most comprehensively these classes of railways. The term "Street" refers to railways in cities, irrespective of whether they are operated directly on the public highway, on an elevated structure or in a subway. The term "Interurban," as applied to railways operating between cities, is quite specific in its usage and relates to the lighter type of railways which are now in general operated by means of electric power. The suburban roads of a city are so closely interrelated with the city and interurban lines that they are usually a part of one or the other of these systems, so that it was not considered necessary to designate them separately.

The first object of the association, as stated in the constitution, is "The discussion and recommendation of methods of construction, management and operation of street and interurban railways, and of safeguarding the interests of the same." This may be considered as covering the more general work of the association, particularly that relating to the annual convention, the reports of committees, and matters of this general class.

The second object is "The establishment and maintenance of a spirit of co-operation among the members, and the encouragement of friendly relations between the companies and the public." This is most vital to the interests of the association, and it appears to the speaker to be, in itself, a sufficient reason for the existence of the association. This co-operative principle enters into your every-day business, and is necessary to its successful conduct.

The third object is "The acquisition of experimental, statistical and scientific knowledge relating to the construction, equipment and operation of street and interurban railways, and the diffusion of this knowledge among the members." This means that the association is to carry on an investigating bureau of information, the primary object of which is not to be a mine of information which will have to be worked with pick and shovel, but rather that the material shall be tabulated, published and sent out among the members.

The membership in the association consists of two classes. The active members are the American street and interurban railway companies, or lessees, or individual owners of street and interurban railways. Each member is entitled to one vote, which is cast by the properly accredited delegate. The associate membership consists of individuals, co-partnerships and corporations who are actively identified with street and interurban railway interests, and other persons who, in the opinion of the executive committee, have had experience of such a nature as to render desirable their connection with the association. The privileges of the associate members are similar to those of the active members, excepting that they are not entitled to vote or to hold office, nor to have the privileges of the floor unless permitted by the association.

The active members must necessarily be considered as primarily constituting the association. It was for the mutual interests and advantages of the street railway companies that the American Street Railway Association was formed, and it was primarily for the interests of the American street and interurban railway companies that the association was reorganized in September of the present year.

The associate membership permits of a certain class of individuals, co-partnerships and corporations to become connected with the association. This is highly desirable, as there are many instances in which connections of great value to the association and to the member companies can be formed in no other way.

According to the constitution, the headquarters of the association are located in the city of New York, and the office of the secretary is maintained at these headquarters. This office has been opened at 60 Wall Street, where the association has three rooms on the sixth floor, containing 750 sq. ft. of floor area. The secretary has the services of an experienced office assistant, in addition to a stenographer. The representatives of the various street railway companies and of the different street railway associations of the country will be most cordially received at the association headquarters.

President Ely has spoken of the organization of the Accountants' Association, the Railway Mechanical and Electrical Association, the Claim Agents' Association and the Manufacturers' Association. In accordance with the scheme of reorganization, these various associations have now become directly affiliated with the American Street and Interurban Railway Association.

The Accountants' Association has been in existence for a period of eight years and has accomplished much work of importance. The Mechanical and Electrical Association was organized three years ago. At this year's convention in Philadelphia its name was changed to the American Street and Interurban Railway Engineering Association, and the constitution was so altered as to permit of the admission of maintenance of way engineers to membership. The Claim Agents' Association had its first meeting in St. Louis in 1904, and has already performed valuable service.

The Manufacturers' Association is somewhat different from the other affiliated associations in that it has no connection with the street railway interests directly. Its chief functions are the production of a most commendable exhibit at the annual convention, and the establishment and maintenance of mutually advantageous business and social relations between the street railway interests and the manufacturers.

The American Street and Interurban Railway Association is pledged to do all in its power to promote the welfare of the affiliated associations which have been organized with its approval to investigate technical matters connected with street and interurban railway construction and operation. Each of these affiliated associations (this does not include the Manufacturers' Association) is granted financial assistance, and is represented on the executive committee of the parent association. In addition, the latter association co-operates with the various affiliated associations in the editing, printing and binding of their proceedings, and in arranging for conventions and suggesting suitable subjects for investigation. It also files information for reference and distribution, and in every way endeavors to stimulate interest in all of the affiliated associations.

As in the past, a most important part of the work of the association will be that done by the various standing committees. These committees will consider such questions as are of broad and far-reaching influence among the street railway interests of the country. A committee of considerable importance in this connection will be the committee on papers, which will have the general supervision of all papers presented at the convention. It is expected that this will result not only in a large increase in the value of the papers presented, but also in a greater uniformity in the general character of these papers and their adaptation to the specific needs of the members of the association.

The annual conventions will be conducted along the same general lines as have been prevalent in recent years. The executive committee will select the place at which the convention is to be held, and will not depend upon the invitation of the local railway company to decide this question. As President Ely has remarked, the dignity of the association does not permit of its being dependent upon the invitations of the companies of various cities for a meeting place for its annual convention.

It is expected that with the reorganized association, and its affiliated associations, all working together, and with the committee on papers mentioned, that the conventions in the future will result in even greater good to the street and interurban railways of the country than they have in the past.

The various affiliated associations, as well as the American Association, have annual reports, which this year will each contain from 300 to 400 pages octavo. The reports of the affiliated associations are more or less technical, relating as they do to the specific fields of work for which these associations have been formed. The report of the American Association covers a broader field, and also contains the records of the general business of the convention. The editing of the proceedings of the 1905 convention has been carried on during the past two months, and it is expected that the various annual reports will be ready for distribution about the first of the year.

The idea of the establishment of an information bureau in connection with the work of the association has long been in the minds of many of the members who have been prominent in the work of the association. As far back as ten years ago, at the convention of the association held in Montreal in October, 1895, Joel Hurt, president at that time, in connection with some remarks relating to the saving of $200,000 for his company, due to certain information which he had received from various sources, made the following statement: "And it is as clear to me as the noonday sun that this institution needs a bureau of information."

The universal change to electricity as a motive power for street railways, in conjunction with other improvements in the industry, and with the general progress of the times, has resulted in a wide expansion of traction facilities in cities and a vast extension of suburban and interurban lines. This has in turn resulted in a readjustment of the attending conditions, with an ever increasing demand for information relating to the methods used and results obtained in conducting departmental work, and for statistics concerning investigations made in the interests of electric railway companies.

While the companies of greater mileage, for years past, have been accumulating information of much value along specific lines, the bureau will promote a more general interchange of such data between these companies than has been practicable up to the present time. Active investigations of such questions as insurance, taxation, franchise rights, municipal ownership, accident claims and statutory and municipal laws affecting electric railway companies are either now under way or will soon be taken up. The accumulation of data will be immediately available to all members of the association. The companies with greater mileage will thus be relieved of the constant inquiries by the companies with less mileage, and the information thus received, through the secretary's office, will be of greater value.

While the companies with less mileage can least afford to make experiments, they also can least afford to make mistakes. Although they may not be as vitally interested in municipal ownership, statutory laws, taxation and accident claims as are the companies with greater mileage, there will be available to them a large fund of information resulting from the long practical experience of such companies.

Active work has already been done on the subject of municipal ownership. The association will keep in touch with the municipal ownership investigating committee of the National Civic Federation. It is expected the work of this committee will be most comprehensive in its scope, and of great importance to the electric railway interests of the country.

The subject of insurance is now being considered, and the association has recently co-operated with the Fire Underwriters on the revision of the National Electric Code.

I cannot show the importance of these matters to greater advantage than to quote directly from the annual address of the president delivered by Mr. Ely at the St. Louis Exposition in 1904. The quotation is as follows:

A careful inspection of the proceedings of the conventions of the last few years reveals the fact that most of the time of each convention has been occupied with the reading and discussing of papers embracing subjects which, for the most part, relate to the small technicalities of the business, and nearly all of which might have been profitably committed to proper auxiliary and subsidiary organizations. Broad fields of co-operative effort in the most important lines of our work have remained almost untouched. It becomes immediately apparent upon investigation and discussion of the situation that we might profitably enter upon the discussion of the greater questions affecting our welfare. The confusion of laws throughout the country affecting our corporations is a matter to which we might well devote attention. There are also such great questions as taxation; municipal ownership of street railways; franchise rights and obligations; statutory laws affecting our class of companies; municipal laws and ordinances, and other questions of importance to which your minds will readily refer. The collection and preservation of data tending to throw light upon the problems of great importance that confront us is also a matter deserving of attention, and in this regard it would seem that through the medium of the secretary's office and of appropriate standing committees many invaluable collections of data could be made and permanently preserved in such form as to be conveniently accessible to any member of the association upon merely making request of the secretary. If the work of the secretary's office should be made continuous there would thus grow up in time a vast repository of valuable statistical and historical information, readily available as a matter of right to every member. This branch of the work alone, if properly prosecuted, would render membership in this association so valuable that it is difficult to understand how any street railway corporation would feel justified in remaining outside of this association.

It is the purpose of the association to issue bulletins at frequent intervals which will contain information concerning different matters of interest to members of the association. These bulletins will be the means of disseminating the data compiled at the association headquarters in connection with the various investigations carried on from time to time. They will be issued according to a standard size of page, which will be the same as that used in the annual reports. It is also proposed that suitable covers for the binding of these bulletins will be sent to the various members.

An important feature worthy of careful consideration is the scale of annual dues payable by active members. It is based upon the annual gross receipts, and represents the best judgment of the reorganization committee. While the new scale of dues is radically different from the old method of assessment, it has had the most careful consideration of the members of the association. It is believed to be fair and equitable to all classes. The association is taking its place among similar national organizations, and the new conditions of operation, resulting in increased usefulness, require larger expenditures than have been necessary in the past. Calculations based on last year's membership show that approximately $20,000 income may be expected the first year. This sum is none too large to carry on the important work now under way.

Before closing, I wish to say a few words in connection with the co-operation of the national association with the various State and sectional street and interurban railway associations. A number of associations of this general character have been organized at various times throughout this country and Canada, and many of them are now in a flourishing condition and are doing much work that is of great value. Prominent among these organizations are the State associations of Massachusetts and New York, the New England Street Railway Club, the Canadian Association and the interurban railway associations of Ohio and Indiana. A number of ways may be suggested in which these associations could co-operate with the national organization to the advantage of all concerned.

A scheme of interrelation which has worked out most profitably among other organizations having mutual interests is that of an association composed of the secretaries of the individual associations. By this scheme the secretaries of the various associations meet at stated intervals and discuss various matters of interest to the different associations. If such a scheme were launched in connection with the street railway associations it might serve as a general clearing house for carrying on various other schemes of interrelation, which will be considered later.

While many of the State associations have not yet arrived at the point where they have found it advisable to publish their annual reports, in many cases this will follow as a natural result of their future development. Several of these associations are now publishing their proceedings, a notable example being the New York State Street Railway Association. A scheme of interchange of the publications of the various associations might prove to be of great value to the members. This would be particularly true if some scheme of co-operation could be carried out with reference to the character of the papers presented at the meetings of the various associations. In like manner other information not in the nature of the annual report, such as bulletins showing the results of special investigations, might be interchanged to great advantage.

In order to make the papers of the various associations of greater value to electric railway people throughout the country, it would be well to have some general committee which would confer as to the papers to be presented and discussed at the meetings of the various associations. By this means important topics of vital interest would be considered and the different associations would not be overlapping each other's efforts, excepting where this would be deemed advisable.

Special investigations relating to different problems could be delegated to certain State associations, which would see that investigations were carried out and that the data obtained would be placed in proper form for publication. By means of bulletins this information could be sent to the members of the various associations. In this connection it might be possible to do some considerable work along the line of the interchange of legislative records and laws pertaining to street railway interests in the different sections of the country. If this could be done it would doubtless prove to be of great advantage to all concerned.

In connection with the general conference on papers, it could be arranged that certain special topics would be considered by the various associations at given meetings. It would not be necessary that these topics be the same for the different associations, but rather that the topics assigned should in all cases be such as are of special interest to the association given that particular topic.

To the end that the various associations might become more closely related, it would be advisable for each association to be represented at the annual convention of each of the other associations. It would also be highly desirable that the various associations send official delegates to the annual conventions of the American Street and Interurban Railway Association. These delegates should be prepared to present reports showing in brief the work which has been carried on by the various associations during the previous year.

In concluding my remarks on the association and the work to be done now and in the future, I wish to repeat what has been so forcibly brought to your attention by our president, that the American Street and Interurban Railway Association is now entering a sphere of greater usefulness than has heretofore been possible, and that it is vitally essential that its membership be largely increased, to the end that the greatest value and good be received by all companies.

The American Street and Interurban Railway Association does not belong to any one interest, or to any dozen interests. It is not the result of the ideas of one individual, or of the ideas of a dozen individuals. It is not the offspring of the president, although he has given much attention to it in the past, and is devoting much valuable thought and attention to it at the present period of its existence. Neither is it run for the benefit of any one interest or set of interests.

The reorganization of the association is the result of the labor of many persons throughout a period of more than two years; work undertaken and proceeded with throughout as of paramount importance to the street and interurban railway profession. Many busy men of large affairs have contributed greatly of their valuable time, and of their still more valuable experience and judgment.

The executive committee, the president and all associated with them stand ready to do everything in their power to make the work of the association of value to its members, but the success of their efforts must depend upon the street railway companies. It is your association. It is yours to make successful. It is yours to reap the benefits.

The Columbus Railway & Light Company expects soon to receive several cars equipped for the multiple-unit train control system, and it is the plan to operate two-car trains on several of the heaviest lines during rush hours.

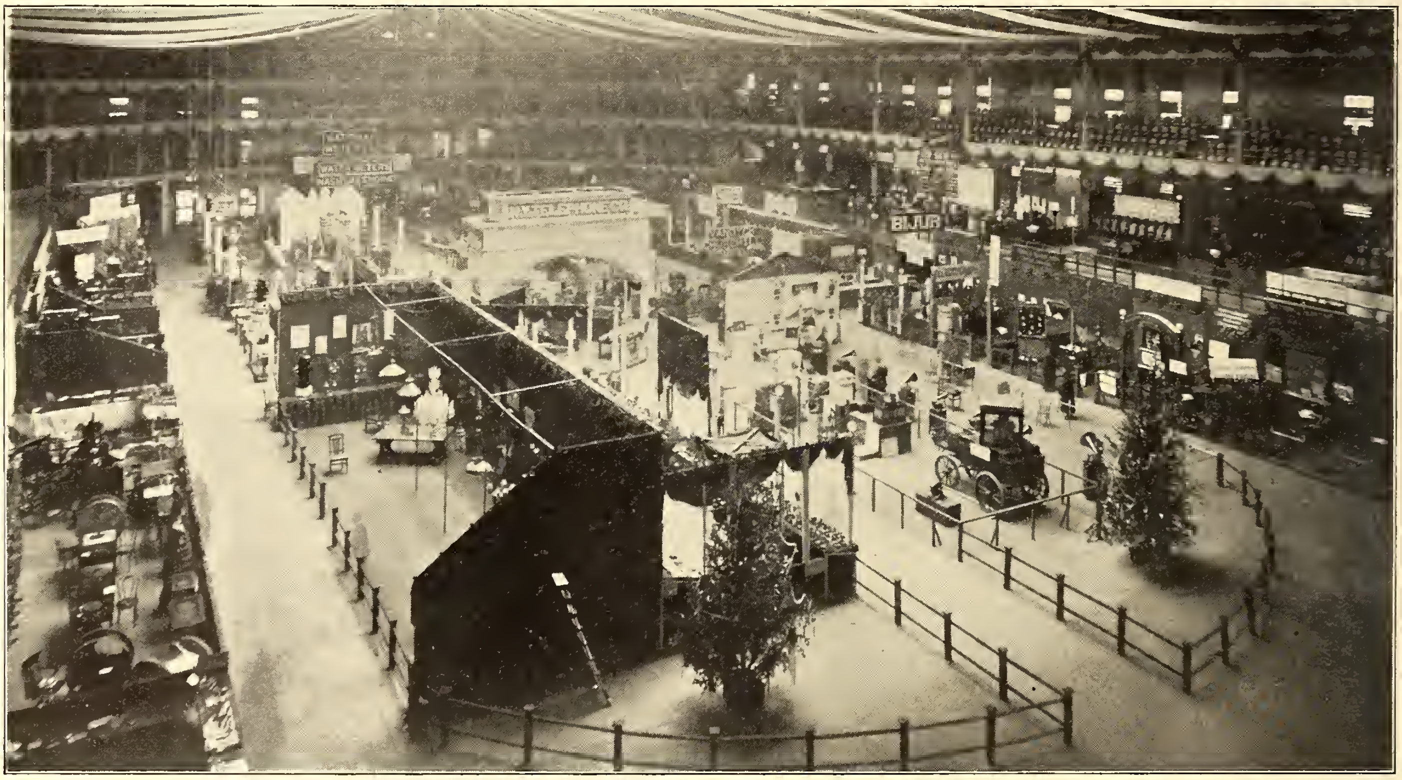
RAILWAY EXHIBITS AT THE NEW YORK ELECTRICAL SHOW

Among the many excellent exhibits at the New York Electrical Show, whose opening was mentioned in these columns last week, were a number of special interest to street railway men.

The exhibit of the General Storage Battery Company, maker of the Bijur storage battery, proved quite an attraction to the technical visitors, besides the many laymen who were desirous of becoming acquainted with the construction and application of storage batteries.

The Electro Dynamic Company's inter-pole motors provoked considerable interest among the technical men present. The company showed one of its inter-pole motors driving an inter-pole generator, the current being used to light the booth sign. Demonstrations were given showing how this type of motor stands 100 per cent overloads without sparking, even when instantly reversed under such abnormal conditions.

The Kinsman Block System Company, of New York, exhibited its emergency control device which is used in the New York Subway to prevent the express trains running past danger signals. An emergency control device for steam locomotives was also shown.



THE NEW YORK ELECTRICAL SHOW IN MADISON SQUARE GARDEN, AS VIEWED FROM THE MAIN ENTRANCE

The Gold Car Heating & Lighting Company showed some typical examples of its electric car heaters applied to car seating. Detached heaters were also exhibited.

The Clark Electric & Manufacturing Company displayed several of its clamps for high-tension transmission lines, such as are installed on important lines in Mexico, Brazil, Canada and other countries.

The National Battery Company made an interesting display of National storage batteries and accessories.

Guy M. Gest, the well-known conduit contractor, in common with the H. B. Camp Company and the American Vitrified Conduit Company, presented an exhibit of various styles of conduit, together with photographs of installations.

The National Carbon Company, of Cleveland, Ohio, made an exhibit of its dry and wet cells, as well as a number of carbon specialties. Its new expansion connection carbon brush, described in the Street Railway Journal of Oct. 28, was also shown.

Waterbury & Company were also on hand with a fine line of switchboard specialties, wires and cables.

The Magnet Wire Company and Peerless Electric Company had a combined exhibit of their electrical specialties.

JANUARY MEETING OF THE NEW YORK STATE ASSOCIATION

President R. E. Danforth, of the Street Railway Association of the State of New York, has authorized the official call for a meeting of the association to be held Jan. 10 next in the rooms of the Schenectady Railway Benefit Association, at the Fuller Street station, Schenectady, N. Y. The meeting will be called promptly at 9:30 in the morning, and will adjourn the same evening. It will be in the nature of a conference, and the entire day will be devoted to a discussion of topics included under Accounts Nos. 6, 7, 8 and 9, namely, Maintenance of Cars, Maintenance of Electrical Equipment of Cars, Maintenance of Miscellaneous Equipment, and Miscellaneous Shop Expenses.

All member companies and non-member companies in New York State, and electric railway companies outside of the State, are earnestly requested to have a responsible representative from their mechanical departments at the Schenectady conference in January. Representatives of operating departments, whether members or not, are also cordially invited. However, the supply men and representatives of manufacturing concerns are not invited, and are asked to refrain from attending.

At the Schenectady meeting there will be two short papers, one on "Cleaning and Handling Cars in Car Houses," and one on "Layover Inspection vs. Night Inspection." Leaders will be appointed to open the discussion on each of these and other topics, and the meeting will then be thrown open and the fullest opportunity will be given for asking and answering questions and an interchange of opinions and ideas relating to the maintenance of cars and equipment. Delegates and representatives are urged to bring their figures with them. These will not be published unless the speakers release them for publication.

THE DECEMBER MEETING OF THE INDIANA ELECTRIC RAILWAY ASSOCIATION

The December meeting of the Indiana Electric Railway Association was held in the palm room of the Claypool Hotel, Indianapolis, Dec. 14. Previous announcements had been sent out by Paul H. White, secretary of the association, stating that a large delegation from the Ohio Association was expected, and that lunch would be served to the guests and members. The Ohio delegation present consisted of about twenty members, headed by Edward C. Spring, president of the association.

The meeting was called to order by President Henry at 11 o'clock. After the minutes of the previous meeting had been approved, H. A. Nicholl, general manager of the Indiana Union Traction Company, read the following communication:

The second meeting of the representatives of the freight departments of the various roads was held Dec. 11, at 1:30 p. m. Present: Messrs. Henry, Reynolds, Nicholl, Hixson, Noveil, Graston, Fletcher, McNown and White. The following resolutions were passed:

Resolved, 1. That a freight bureau be established, but having no power or authority to fix rates; 2. That the general manager or representative of the several roads meet and formulate plans and rules to regulate the joint freight bureau; 3. That a joint freight agency at Indianapolis be established.

The following matters to be submitted for consideration and regulation to the general managers' committee:

1. Joint agency expense; 2. Rates, percentage, etc.; 3. Interchange of cars; 4. Inspection; 5. Carload and less than carload shipments.

The chair appointed a committee consisting of Messrs. C. C. Reynolds, White and Graston to submit suggestions for suitable trail cars. The general managers' committee, consisting of general managers and other representatives, to consider the above-mentioned matters, will meet in Mr. Henry's office, Dec. 18, 1:30 p. m.

The regular programme was then taken up, and P. J. Mitten, superintendent of motive power of the Indiana Union Traction Company, presented the following paper, entitled "A Desirable Car for Interurban Service":

A DESIRABLE CAR FOR INTERURBAN SERVICE

The economy of employing the longest car practicable is apparent in view of its ability to transport the greatest number of passengers per conductor. Because of the necessity for entering cities, a car of more than 60 ft. over the buffers is not desirable. The overhang with cars of a greater length than this becomes dangerous to pedestrians on sidewalks, at curves, and hampers operation on account of fixed or practically immovable obstructions frequently encountered at the curb intersection.

To my mind, therefore, a desirable car for interurban service should be 60 ft. over bumpers, 8 ft. 6 ins. wide over side sills, 9 ft. 3 ins. from floor to under side of ceiling, 10 ft. from the under side of sill to top of roof, and should stand 3 ft. 6 ins. from the top of the rail to the under side of the sill. In external appearances the car should resemble as nearly as practicable that of the standard Pullman.

It has been demonstrated that if the front end of the car be wedge-shaped, the air resistance is most easily overcome, but, on account of the location of the motorman's cab and the controlling apparatus, this shape is practically impossible. The nearest feasible approach is to give the forward part of the front end of the car a cylindrical form, this form to be limited by an angle of about 85 degs. and a radius of 3 ft. 6 ins. The corners of the car should be rounded off to meet the circle on an 18-in. radius. This has been shown to be the most practical and economical design for the front end of a high-speed car.

To allow for egress from the front vestibule it will be necessary to place a 26-in. door in the right-hand corner, which, allowing for sufficient room for the motorman and apparatus, will make the vestibule 4 ft. from the extreme point to the sliding door leading into the main body of the car.

The rear end of the car should be built on a one-half oval-shape, the platform to measure 5 ft. at the deepest point. The steps should be 40 ins. wide and of proper height to suit local conditions.

Doors in both front and rear vestibule should be so hung as to prevent slamming. This may be accomplished by employing a small track or rod on which the edge of the door slides when folding. Thus, when the door is open, the hinge between the halves will be toward the platform, while the two outside edges will be toward the outside of the car.

The interior divisions should consist of smoker, passenger, toilet and heater compartments. The obvious place for the smoking compartment is in the forward part of the car, and should comprise one-third of the seating capacity. The seats should be longitudinal, heavily upholstered in leather, with ample springs to furnish a good resilient cushion. The space beneath these seats may be used for the storage of hand baggage. The floor of the smoker should be covered with inlay linoleum of small, neat design. A sufficient number of low flat brass cuspidors should be placed in this compartment. The partition between the smoking and passenger compartments should be constructed with plate glass windows and door, so as to permit an unobstructed view ahead for the passengers.

In the passenger compartment we would have the seats of the high, stationary back type, upholstered in dark green figured plush, with all metal parts perfectly plain. In this, as well as in the smoking compartment, there should be placed parcel racks at least 14 ins. wide, thus affording ample room for parcels, and avoiding the danger of the larger pieces toppling over on the passengers.

There is much reasonable argument in favor of the various positions for the toilet and heating cabinets, yet, to the writer, the location at the rear end seems least objectionable. In considering the location of the heater and toilet cabinets, is it not universally acknowledged that they should occupy positions on directly opposite sides of the aisle? To facilitate firing and emptying ashes, and to obviate any liability of dust flying about the interior of the car, the heater door should open directly onto the rear platform. The expansion chamber, pressure and water gage should be placed inside of the heater cabinet, the safety valve being so piped as to deliver the expelled water below the body of car, thus preventing damage to varnish, etc. By placing the toilet room directly opposite the heater, as suggested, we overcome the objection which arises from the fact that many persons are much embarrassed when entering the toilet room in full view of the other passengers.

The heater cabinet space should be relieved by an oval window on the outside of the car, glazed with green opalescent glass. This style of window should also be used in the toilet compartment, but the sash of this window should be arranged to swing open a short distance for ventilation. The door of the toilet room should be hung on spring hinges, and a sufficient number of coat hooks be conveniently placed inside this compartment. The interior finish throughout the car should be selected mahogany with very simple inlay. Care should be taken in designing this finish to eliminate all extravagant ornamentation and to present as flat a surface as possible, still retaining an artistic interior, thus facilitating cleaning and renovating. The ceiling, of full Empire, should be painted a light green, with some neat gold striping. The deck sash should form a half ellipse and should be glazed with green opalescent glass. This glass should also be placed in the upper sash of the side windows. The window sash, following steam road practice, should lift in opening, and should be supplied with counterweights or springs. All of the sash and the sliding doors should be glazed with polished plate glass. In this climate it is advisable to use storm sash during the winter months. These may be constructed in one piece to cover the double window and the transom sash.

With the present system of car ventilation, which is accomplished by opening the deck sash, it is necessary to have these sash work freely, as considerable annoyance is caused by rain and snow blowing in through crevices. This system of ventilation is also very unsatisfactory, due to the prevalence of drafts, which almost invariably blow directly downward on the passengers. Some system of ventilation other than the deck sash should be employed, and these deck sash should then be sealed.

Gentlemen, I have carefully considered the various features of a desirable car, and I am free to admit that there is much reasonable argument in favor of views opposite to those which I have presented, and when I have employed the expression "should be"—the words "to my mind" are always to be understood.

The reading of the paper was followed by an interesting discussion opened by General Manager C. D. Emmons, of the Fort Wayne & Wabash Valley Traction Company. Mr. Emmons thought Mr. Mitten had left out of consideration a very important feature on an interurban car, that of a baggage compartment. He agreed that the toilet room should be in the rear of the car, but the heater, he thought, should be located in the rear of the baggage compartment. After a recent trip over the line of the Indianapolis & Cincinnati Traction Company, he had concluded the cars of that line met his ideas of an interurban car very well, but he did want a view ahead, which these cars did not afford.

Mr. Nicholl stated he had given much thought to a car with a middle entrance, similar in this respect to the private car "Martha" of the Indiana Union Traction Company. He would have the main passenger compartment in front of the middle entrance, the rear portion of the car to be taken up by a smoking compartment nearest the center and a baggage compartment in the rear. One objection to such a car, he thought, would be that since the side sills would necessarily be cut, in order to locate the steps properly, the car might not be as strong as the usual type. It would also be somewhat inconvenient for the conductor to get through the car to attend to the trolley on the rear end. One strong feature of such a car, however, would be that it would give passengers a clear view ahead.

Mr. Emmons, in commenting on such a car as Mr. Nicholl suggested, thought that it could be loaded and unloaded as easily as the present end entrance car. The toilet, he said, could be placed in the front compartment and the heater in the rear. Concerning the width suggested by Mr. Mitten, 8 ft. 6 ins. over sills, Mr. Emmons thought this too narrow. The present interurban seats, he said, were not quite comfortable. On his line, the Fort Wayne & Wabash Valley Traction Company, they had some cars 9 ft. wide, which were, he thought, hardly wide enough.

Paul H. White, secretary of the Indiana Association, and general manager of the Indianapolis & Martinsville Rapid Transit Company, thought that a car should be amply large to carry the desired schedule and yet have the least dead load. In a 60-ft. car it was necessary to embody a great deal more material than in a shorter car, and this meant dead weight to be carried by the power house. He thought that a 50-ft. car would, with hourly service, carry traffic on most interurban lines, and such a car would round all curves easily. His idea was to use a small car with a motor equipment heavy enough to permit of hauling trailers when traffic was heavy. The use of a trailer, he said, doubled the capacity without doubling the weight, and moreover, a trailer cost less than a motor car and the cost of maintenance was not so great. He made the point that the operation of trailers did not mix up the schedule as did the addition of trains to care for heavy traffic. He thought a 60-ft. car quite desirable for heavy traffic, but did not believe any interurban company running into Indianapolis had such traffic as would demand the use of such a car the whole year around. In addition to the initial expense and the increased maintenance cost of a long car, he thought they had a tendency to rack and twist, and this was a point against their use.

C. C. Reynolds, general manager of the Indianapolis & Northwestern Traction Company, the cars of which are the longest entering Indianapolis, said that there were times during the day and seasons of the year when it looked ridiculous to haul around such large cars, but there were other times when the cars were not half large enough. He said a long car did not have much greater cost of maintenance and first cost than a short one. He had, however, not had much experience with short cars and did not feel competent to judge. Concerning the rounding of curves, he said that their cars, which were 60 ft. 8¾ ins. long, rounded with ease a curve of 36-ft. radius at Twenty-First Street and Senate Avenue, Indianapolis, and he thought a double-truck car could go around any curve that a short car could if side clearance permitted.

Theodore Stebbins, general manager for the receivers of the Appleyard syndicate, of Columbus, Ohio, when called upon, said he had given a great deal of thought to the ideal interurban car, but had never had occasion to build one. He thought the power on a car should be proportionate to the weight. He remarked that the car suggested in Mr. Mitten's paper was designed for operation in one direction only, while on his own lines the tracks were so arranged that it was necessary to operate cars from both ends. Regarding Mr. White's suggestion of putting enough motor capacity on a car to haul trailers when travel was heavy, he thought this would be objectionable in that it necessitated carrying the extra weight around when a car was used without a trailer. He said that one road entering Columbus ran its cars in trains. He was afraid, should this practice be generally adopted, that objections would develop from the public. He agreed that cars should be built to accommodate baggage, but he did not think that side doors in a baggage compartment looked well. As to the disposal of the baggage, he said he would like to see a car constructed with a place for the storage of baggage underneath the body between the trucks. This would involve the question of construction, but it would certainly get the baggage out of the way of the passengers. He thought it was a mistake to put a solid partition in front of passengers to prevent a clear view ahead. He thought such a view promoted travel.

Will G. Irwin, general manager of the Indianapolis, Columbus & Southern Traction Company, felt that in the construction of an interurban car a compartment should be provided for light express material. He thought that the time was coming when it would be advantageous to establish frequent express service that would compete with the service of the present large express companies.

F. D. Carpenter, general manager of the Western Ohio Railway, believed that an interurban car should be constructed especially to fit the road on which it was to be operated. On his road he found it necessary to add a baggage compartment on cars originally constructed without provision for baggage. The cars were originally 44 ft. long; the sills were spliced and a baggage compartment built on one end, making the car 52 ft. 6 ins. long. This gave a three-compartment car, which he thought was of a size well adapted for general use. He said he found quite a difference in the riding between long and short cars, the long ones riding the more smoothly.

C. A. Baldwin, superintendent of transportation of the Indiana Union Traction Company, said that the car Mr. Mitten proposed was intended to be a passenger coach only. He thought that the passenger, freight and express service should be kept separate, and that a 60-ft. car was preferable for passenger service alone. Combination baggage and passenger cars should be sandwiched in between cars intended for passenger service only, running probably at two-hour intervals. During that portion of the day when traffic was heavy, he thought the carrying of baggage should be abandoned entirely. Out of Indianapolis, for instance, he said at 4, 5 and 6 o'clock in the evening the cars were always crowded with passengers and that no attempt should be made to carry baggage at these hours.

President Henry said that his first interurban cars were provided with end doors for passage from one car to another. They had a smoking compartment in addition to the regular passenger compartment, and the general design of the car had been followed to this day. Mr. Henry did not want to put a smoking compartment in a car, but said he was compelled to do so. Mr. Henry thought the heater should be put in the front vestibule, where the motorman could take care of it. He said such an arrangement kept the coldest part of the car warm. Regarding electric heaters, one objection he had to them was the fact that sometimes the power was shut off when the car was out in the country, and the passengers then suffered.

Mr. Henry said he had hoped to hear something about advertisements. For himself, he would like to have the money resulting from them, but he did not want the advertisements. He had noticed that the cars in the best service did not have them. He hoped that the design of a center entrance car would be worked out, but he had never found any way to do it. The length of the car, he thought, was of least importance. On a small road from Shelbyville to Indianapolis, where the power was light and prevented them running heavy cars, on last Fourth of July the receipts from three small cars was $669. He thought at times we were getting too much size and weight in cars. Mr. Mitten did not consider trucks. These, he said, were of first importance. He thought a 60-ft. car looked a little too large, and was afraid criticism would develop if the size of the cars were increased. His cars were 56 ft. long. It was his idea that a glass partition should be placed between the smoker and the passenger compartments. He had learned from experience that this would result in better behavior and less rowdyism in the smoker. He did not think it was a good idea to let passengers have a view ahead. They could then see everything that was done, and this had a tendency to develop objections to the methods of operating the cars. He liked the idea of running cars in trains rather than to haul trailers, because he had found that the regular schedule could not be maintained when trailers were added. There was, however, a certain class of rush traffic where it was not important that the schedule be maintained. He referred particularly to that occasioned by the State Fair at Indianapolis, saying that the people had been educated by the steam roads to be behind time on such occasions and did not seriously object. In summing up his ideas, he said he would have the best trucks, plenty of power, make provision for the baggage, put the heater in front with the motorman, and would have the smoking compartment in the forward portion of the car.

Mr. Mitten brought out a new idea in favor of permitting the passengers a clear view in front. He says that many people became ill on electric cars because of the rapidly passing poles so near to the windows. He related an incident where he had found an old lady in the passenger compartment sick. He took her into the front part of the car, giving her a seat where she could look out on the track ahead, and she recovered rapidly. One objection he had to Mr. Henry's idea of placing the heater with the motorman was that this tended to create a coating of frost on the inside of the cab windows, which was very objectionable.

Mr. White defended his idea of pulling trailers by saying that when cars were pulled in trains, the increased current consumption tended to pull down the voltage in starting, and this, of course, cut down the speed. He had found that he could operate with trailers on the same schedule as with double trains.

G. H. Kelsey, superintendent of power of the Indiana Union Traction Company, thought that Mr. Stebbins' idea of placing the baggage under the floor of the car might be worked out. He thought the heater should be placed in the baggage compartment, saying that the ashes were not as objectionable as when the heater was placed in the passenger compartment. As against placing it in the motorman's cab, he said the motorman had enough to attend to and his attention should not be distracted by the care of the heater. He urged that an open view to the front be given to passengers, saying that he had noticed that the passengers in the smoking compartment of the new cars of the Indiana Union Traction Company were always looking ahead. He said that the idea of operating longer and heavier bodies and not increasing materially the dead weight of the car was erroneous; the weight of the trucks should be increased proportionately. He liked the idea of operating single end cars. This permitted the floor of the front vestibule to be built on the same level as the car floor, making it possible to continue the car body sills through to the bumper on the front end. The rear vestibule, he thought, should drop to permit passengers being loaded quicker.

M. H. Evans, master mechanic of the Indianapolis city lines, favored running cars in one direction only. He thought the expense of putting in extra Ys and loops at terminals was counterbalanced by the decreased cost of maintenance of single end equipment. He thought the bottom framing of interurban cars should be constructed stronger and stiffer than at present. The sills should be run continuously from front to rear buffer. He saw no reason why interurban cars should be constructed with entrance doors on both sides. He favored putting such doors on the right side of the car only. He thought it necessary that by some concerted action standards for interurban equipment be developed. Already there were standard brake-shoes, brake-heads, bearings and journal boxes, but the list could be extended to advantage. He expressed himself in favor of a four-motor equipment for interurban cars, adding that it had been demonstrated that such equipment was maintained at the least cost.

Mr. Evans' remarks concluded the discussion of Mr. Mitten's paper. President Henry then called upon Edward C. Spring, president of the Ohio Association, to address the assembly.

Mr. Spring's talk dealt largely with the idea of combining the Indiana and Ohio associations and providing a permanent secretary for the allied organization. He said that at a meeting of the executive committee of the Ohio Association he had been asked to talk with President Henry, of the Indiana Association. President Henry had suggested that he express his ideas directly to the assembly.

At the present time, Mr. Spring stated, the interest in the Ohio Association had risen to a high pitch, and it must be maintained, not only for the good of the association, but also for the benefit of the public. To accomplish the most good it would be necessary to have a permanent secretary. He realized the allied interests between the interurban people of Ohio and Indiana and the lack of information the public had of interurban lines beyond their own locality. In Dayton, he said, the public knew nothing about the connections that could be made with Indiana, and did not realize that there were three different interurban routes into their neighboring State. On his trip over he had asked repeatedly of station agents concerning connections with other lines, and invariably found that they could not tell him anything. One important feature of the proposed allied organization would be to make the public acquainted with what the interurban lines were doing. A plan had been suggested that each of the roads pay $50 per year in $5 per month installments for the maintenance of a permanent office and secretary. He thought it would be the cheapest advertisement that the roads could obtain. The organization could put out a guide dealing with the connecting interurban roads and place them on sale, and the revenue obtained would in a short time go quite a distance toward paying the expenses of a permanent office. He said the New England Street Railway

Club had been organized on this basis and that after two years it became self-supporting, paying the secretary $1,500 a year and bearing other office expenses. If Indiana would ally interests, an office of immense power in two States could be established. The objection to the present arrangement was that all the officers of the association were men busy with other affairs, and that the interests of the association often suffered through the fact that the officers could not give proper attention to details because of other business.

At the conclusion of Mr. Spring's talk, F. D. Carpenter, general manager of the Western Ohio Railway Company, stated that he had been very much interested in the work of the Ohio Association, which originated in a meeting of the officers of several roads held to arrange for the exchange of mileage. If it had never done anything else than to put in operation the interchangeable mileage system, this alone would have been a sufficient recompense for the work done. He emphasized the fact that the work had grown to such an extent that a permanent secretary was necessary, and he felt that all of the roads could well afford to bear the expense of $50 or less per year to maintain one. He said a permanent secretary could take charge of the interchangeable mileage bureau, of advertising features, and arrange for meeting places and make permanent record of meetings. He closed by saying he was perfectly willing to drop the word "Ohio" from the name of the association if the associations of the two States could perfect a joint organization.

C. C. Reynolds moved that a committee of five be appointed to confer with a like committee from the Ohio Association on the question of a permanent organization. After the motion had been carried, the chair, at the suggestion of members, appointed the following to serve on the committee: Charles L. Henry, president and general manager of the Indianapolis & Cincinnati Traction Company; C. C. Reynolds, general manager of the Indianapolis & Northwestern Traction Company; C. D. Emmons, general manager of the Fort Wayne & Wabash Valley Traction Company; A. W. Brady, president of the Indiana Union Traction Company, and W. G. Irwin, vice-president and general manager of the Indianapolis, Columbus & Southern Traction Company.

G. H. Kelsey, chairman of the question box bureau, was then called upon to read the questions submitted. Only two had been sent in. The first was as follows: Is a conductor on an electric line liable for embezzlement if he finds a ticket in a car or on a street and gives it away to a passenger? The second, in substance, was as follows: What is the largest amount constituting legal tender in the payment of a fare? Is a conductor justified, when offered $20 for a 20-cent fare and having no change, in accepting the money and giving the passenger an order on a company for $19.80. The first of these questions was submitted to Arthur W. Brady for answer, and the second to General Attorney J. A. Van Osdol, of the Indiana Union Traction Company.

Before the adjournment of the meeting Mr. Henry announced that the arrangements for luncheon had been canceled the previous day, word having been received from the Ohio Association that its members had found it impossible to be present, and when a second notice was received to the effect that they would attend, it was too late to provide for luncheon.

The question as to whether the use and sale of a 1000-mile book by the steam roads at $20, and the sale of mileage books by the interurban roads at reduced rates is a discrimination in railroad fares within the inhibition of the Indiana law is a matter that may come before the Indiana Railroad Commission. It is pointed out that the Railroad Commission law expressly prohibits discriminations as regards rates, and it is quite probable the commission will be asked to take the matter up for consideration.

EXHAUST STEAM DIRECT-CURRENT TURBINE IN PHILADELPHIA

The Philadelphia Rapid Transit Company has just installed at its power station at Thirteenth and Mt. Vernon Streets an 800-kw Curtis low-pressure turbine, which takes steam from the engine exhaust. This station is equipped with four Wetherill-Corliss engines of 1500 nominal hp and one Wetherill-Corliss engine of 2200 nominal hp, and as it is practically midway between the Schuylkill and Delaware Rivers, has always been run without condensers. An Alberger condenser and cooling tower with 8000 sq. ft. have recently been erected, however, for the use of the low-pressure turbine. The cooling towers are 22 ft. in diameter and 41 ft. high, and the rotary pumps for circulating the water in these towers are directly connected to a 120-hp inter-pole electric motor, supplied by the Electro Dynamic Company, of Bayonne, N. J. The average vacuum attained in the condenser since starting a few days ago is 28 ins., although a vacuum of 29½ ins. has been secured.

The 1500-hp engines are each direct connected to a 1500-kw generator, which develops an average of about 2000 amps. at 575 volts. The turbine takes steam from the exhaust main at a pressure of, say, 1 lb. above the atmosphere, and is provided with four wheels, each with a single row of buckets. Exhaust steam from one engine when operated at 2500 hp or 2000 amps. is sufficient to secure an output from the turbine of 1300 amps. at 575 volts, with no increase in the back pressure on the engines. As about 150 amps. are required to operate the auxiliaries, the gain from the use of the turbine is from 1000 amps. to 1200 amps., or approximately 66⅔ per cent of the output of the original generating unit, instead of the 25 per cent usually expected from the introduction of a condenser.

The generator portion of the turbo-unit is also interesting, as it is a direct-current machine, but details are not now available, except that it has six poles and runs at from 1100 r. p. m. to 1200 r. p. m. The voltage is remarkably steady, in spite of the fact that no governor is used on the turbine.

The turbine was put in service Dec. 15, and tests are now being conducted to determine its steam consumption. When the turbine is receiving steam at atmospheric pressure without moisture and there is 2-in. absolute back pressure in the condenser, the guarantees provide that the steam consumption shall not exceed 36 lbs. per kw-hour at full load and 40 lbs. at half load. At 4-in. absolute back pressure, these figures are respectively 45 lbs. and 50 lbs. Recent tests on this machine made at Schenectady have shown that these amounts were met with a very large margin, indicating that low-pressure turbines can be used to great advantage where a comparatively large amount of exhaust steam is available. The Philadelphia Rapid Transit Company has already ordered from the General Electric Company a duplicate of the turbine installed, and from the data secured from these machines considerable light will be thrown on the advantage of low-pressure turbines.

By months, the earnings of the Twin City Rapid Transit Company in both gross and net, compared with 1904, show results as follows:

	Gross	Increase	Net	Increase
January	$351,120	$19,708	$175,806	$13,395
February	321,451	8,093	151,170	*2,436
March	361,732	18,430	188,966	10,071
April	355,213	17,811	184,405	7,806
May	389,425	35,779	216,921	24,047
June	392,529	22,388	214,676	18,173
July	435,105	49,326	248,052	41,962
August	422,051	32,854	246,512	35,912
September	454,062	70,118	278,030	70,103
October	420,981	52,824	228,043	30,224

* Decrease.

THE RELATION OF RAILWAY SUB-STATION DESIGN TO ITS OPERATION*

BY SYDNEY W. ASHE

This paper is limited to a consideration of sub-stations in which high-tension alternating current is received and converted into low-tension direct current. In the operation of a modern railway converter sub-station, reliability of service is of paramount importance, being more important than considerations of first cost, of depreciation and of maintenance; and in turn the reliability of service is affected to a marked degree by the length of time required to manipulate the various combinations of sub-station apparatus. The following factors will be noticed in this connection:

1. The best method of starting converters;
2. The protection of converters;
3. The use of oil switches when synchronizing;
4. The regulation of load;
5. The best arrangement of switch gear;
6. The operation of reverse current relays;
7. The adjustment of load between the sub-stations which feed the same circuit;
8. The noiseless operation of synchronous converters.

1. The Best Method of Starting Converters.—In considering the various methods for starting converters, it should be noted that an essential characteristic of every method is ability to start and synchronize a converter in the shortest time without affecting the system generally. The first rule that a sub-station operator must learn is to be ready at all times to carry upon the converters whatever load may come upon the sub-station, this load being limited only by the maximum carrying capacity of the feeder oil switches. Occasionally, as a result of congestion of traffic, excessive overloads come upon a station. In this case another converter must be started immediately, synchronized, and placed on the bus-bar. This calls for a convenient arrangement of switch gear, a rapid, reliable method for starting and synchronizing converters, and a quick and steady operator.

Three methods are usually employed for starting converters, namely:

A. From the direct-current side.

B. By means of a small direct-connected induction motor.

C. From the alternating-current side.

Method A.—The converter is started as an ordinary shunt motor, receiving its current either from a shunt-wound generator or from the direct-current bus-bar. A double-throw switch is usually provided so that the converter may receive current from either source. Ordinarily, when started by current from a shunt-wound generator, about 2 minutes are required to start, synchronize and connect a 1500-kw converter to the bus-bar. In emergency cases the machine is started by current from the direct-current bus-bar, and only a minute and a half are required to place it in service. The advantages of method "A" are the rapidity of starting and the smallness of first cost, since it requires but one starting set for all the converters, and the slight expense of maintenance.

The disadvantages of the method consist in a small factor of reliability and the possibility of a heavy surging of current during the process of synchronizing. The latter disadvantage, however, may be obviated by the use of a simple modification of the switch gear, devised by H. G. Stott. This device is now used in connection with the Interborough Rapid Transit Company's equipments. It consists in closing a local storage battery through the circuit breaker of the starting bus-bar a fraction of a second before the converter oil switch closes. The converter then runs practically free from the direct-current side, and self-excited at the instant the oil switch closes. The oil-switch motor and the tripping coil of the circuit breaker are in multiple with the battery when the control switch on the bench board has been closed. The oil switch requires only 0.4 second for complete connection, whereas the circuit breaker operates almost instantly.

When the converter is rotating slightly under or above its synchronous speed, and the pointer of the synchronism indicator is moving slowly round the dial, if the local storage-battery switch be closed just as the pointer is approaching zero, it is possible to connect the converter through the transformer to the alternating-current bus-bar without the operator being conscious of the fact excepting from the noise made when the oil switch closes.

Method B.—With this method, by means of a small induction motor mounted upon the main shaft of the converter, the converter is brought up to synchronous speed. The starting motor has fewer poles than the converter, and therefore a higher normal speed. A variation in speed may be obtained by placing a slight load upon the converter through the medium of a resistance shunted across the brushes, the converter being self-excited. Varying the resistance in series with the converter field coils will also cause a slight variation of load upon the induction motor.

The main advantage of this method is the increased factor of reliability, since each converter has its individual starting motor. For mechanically starting the converter armature it is common practice to install a motor somewhat smaller than the motor used for driving the exciter generator in method "A." As a result, a converter does not accelerate so quickly with this method as when started from the direct-current bus-bar. One of the disadvantages of this method is the fact that owing to the torque of the induction motor varying with the square of the impressed voltage, a very small drop of voltage will keep the motor from starting at all. For instance, if only 80 per cent voltage were received, as is sometimes the case after a bad shut-down at the power house, or on the system, due to a variety of causes, it is highly improbable that the converter will start. Another bad feature is, in case of a burn-out on a starting motor, the converter is crippled. Other disadvantages are the greater first cost and increased cost of maintenance.

Method C.—In this method two sets of taps on the low-tension side of the step-down transformers are commonly used. These taps are connected to a two-way switch, the middle terminals of which are connected to the converter slip rings. To prevent an excessive starting current, reactance is inserted between the converter slip rings and the low-tension windings of the transformer.

The converter is started as an induction motor by throwing the two-way switch so that the low-potential taps are connected. When the current has fallen sufficiently low—the converted speed increasing—the two-way switch is thrown in the opposite direction, connecting the converter directly to the normal voltage taps.

It is usual with this method to start converters of 300 kw or less, from starting taps giving one-half normal voltage. Converters varying from 300 kw to 1500 kw are started by voltages of one-third and two-thirds the normal voltage. On the one-third voltage taps, with 25-cycle converters, the current at starting is generally a little less than at full load.

Owing to the large ratio of the field turns to those of the armature, high electromotive forces are liable to be induced in the field windings when making use of this method of starting. It is common practice to provide a field switch which disconnects the windings at several points.

With this method no time is lost in adjusting the speed, as the converter builds up into synchronism, but an objection to this method is the large current drawn at starting. This, however, is generally at a power factor that yields a correspond-

* A paper presented at a meeting of the American Institute of Electrical Engineers, New York, Dec. 15, 1905.

ingly increased starting torque and brings the converter up to synchronous speed in a shorter space of time. Another important advantage is the large factor of safety due to the entire absence of starting sets and starting motors. The additional field switches consume, however, additional time for their manipulation.

The time ordinarily required to put converters in service when using this method is approximately as follows:

300 kw	45 seconds
1000 kw	75 seconds
1500 kw	120 seconds

It is possible to start these converters more quickly. The following times have been recorded, though they do not represent the minimum:

300 kw	16 seconds
1000 kw	40 seconds
1500 kw	65 seconds

This includes the time necessary to close the high-tension alternating-current switch of the converter transformer, the time of starting by means of air-brake lever switches, and the time included in closing the field switches, the direct-current circuit breakers and the line switch.

The chief disadvantages of the method are the high potential generated in the field windings at starting, the large starting current which may affect the regulation of the system and the necessity for a change in design. The two former disadvantages are minimized by the arrangements previously mentioned. The latter disadvantage, however, necessitates the elimination of the circular dampers embracing the entire pole piece. A converter constructed in this manner will "hunt" on the slightest provocation and ultimately trip itself out of the circuit. For instance, a short-circuit on some other part of the system, throwing a lagging current on the line, or some slight trouble in the governor of one of the engines supplying it, or anything which may happen to vary the angular velocity of the prime mover, is sufficient to start hunting in a synchronous converter. The starting current is approximately four times that used with methods "A" or "B" for the same capacity machine.

It should be noted when considering the time necessary to start converters that this time depends to a great extent upon the personal peculiarities of the operator. Moreover, the interval of starting for all methods, has been so far reduced as to be adequate to the demands of railway operation. When an excessively steady overload comes upon a station, the operator may easily trip a few of the section breakers while an additional machine is accelerating. The cars on the rail sections fed by this sub-station will receive slight power from adjoining rail sections, as the I^2R drop will be excessive. The cars will consequently slow down. When the power has been off the circuit for about 20 seconds and the speed of the converter is approaching synchronism, the circuit breakers formerly opened may be closed, and the other section breakers and switches opened. In this way trains may be kept moving during the time required to start, synchronize, and place on the bus-bars this additional machine. Passengers in the cars will hardly be conscious of what has occurred.

The Protection of Converters.—In the design and installation of circuit breakers, the inductance of the system is usually relied on to prevent an excessive rise of current during the interval of time elapsing between a short-circuit and the opening of the circuit breaker. This, however, is not sufficient protection; for an excessive short-circuit in the system, say during light load when only one machine is operating, will often cause a flash, accompanied by a shrill sound, around the commutator of the converter. At first one might think that a reactance coil of low ohmic resistance could be placed in series with the breaker to minimize this effect; but a coil of constant reactance, resistance or self-inductance could not entirely meet the conditions, owing to the variability of the time-constant of the circuit. For instance, the self-inductance and resistance would vary with the distance from the sub-station in which the short-circuit occurred. Proper conditions, however, might be approximated and a coil designed which would partially protect the converter.

Where sub-stations are equipped with storage batteries which float on the system, there is a tendency for the storage batteries to bear the brunt of the load, in case of short-circuit, permitting the converter circuit breaker to open, followed shortly by the opening of the battery circuit breaker. This, however, does not always prevent the converter from flashing over, owing to the fact that the velocity of chemical action at the electrodes of the battery and the limitations of the velocity of migration of the ions of the electrolyte are insufficient to prevent this action. Theoretically, the converter bus-bar voltage would drop, the battery carrying the peak of the load. As a matter of fact, the battery does not always perform this function.

The Use of Oil Switches When Synchronizing.—Much has been written of the superiority of oil switches over air switches for opening and closing alternating-current circuits. This superiority is due to several causes, namely, the smothering action upon the arc by the oil, the rupturing of the circuit at the zero point of the current wave, the absence of leakage between contact points, and the small dimensions of the switch. Electrically-operated oil switches, however, have a few disadvantages which, while not vital, are worth mentioning. It is not the intention of the writer in mentioning these disadvantages to criticise the use of oil switches over air switches, as the former are far superior to the latter for heavy traction work.

With an oil switch, the time required to close the circuit varies with the voltage of the local storage batteries. When this voltage falls below a certain point, the switch fails to operate. Such switches are guaranteed to operate over a considerable range of voltage, something like 125 volts to 70 volts, but several instances have been brought to the attention of the writer in which switches have not operated when the voltage has fallen below 95 volts. This characteristic is extremely objectionable, for it obliges the operator to resynchronize, inasmuch as the general sub-station rule requires the starting over again of all auxiliary apparatus when an oil switch fails to operate. Another objectionable feature is that sometimes oil switches fail to lock when closed by the switch motor, opening again and closing subsequently when the converter is perhaps as much as 60 degs. out of synchronism. This performance is characterized by operators as "looping the loop." One can readily imagine what happens when a converter that is considerably out of synchronism is closed upon the circuit, making what is termed "a bad shot." This may do considerable damage. These troubles, however, are not of frequent occurrence and an operator who is familiar with the "individuality" of each switch soon learns to test it frequently, as well as to keep his storage batteries well charged, and thus to minimize these disagreeable characteristics.

The Regulation of Load.—Railway operation does not call for as close a voltage regulation as is requisite for electric lighting circuits. Economic operation, however, demands that converters be run on as constant a load as possible. The general use of storage batteries for load regulating in railway work seems to have been retarded owing to their objectionable features; for instance, their acid fumes, the necessity for special wiring, and their heavy depreciation. In addition, their enormous first cost has placed them actually out of competition with synchronous converters and generating apparatus. The usefulness of storage batteries in railway work is being more and more appreciated, as evidenced by their recent applications. An interesting development in connection with storage batteries is a carbon regulator put to use during the last year. It consists of a variable carbon resistance which is used in connection with pilot cells and an exciter, to vary the excitation of the field coils of a booster.

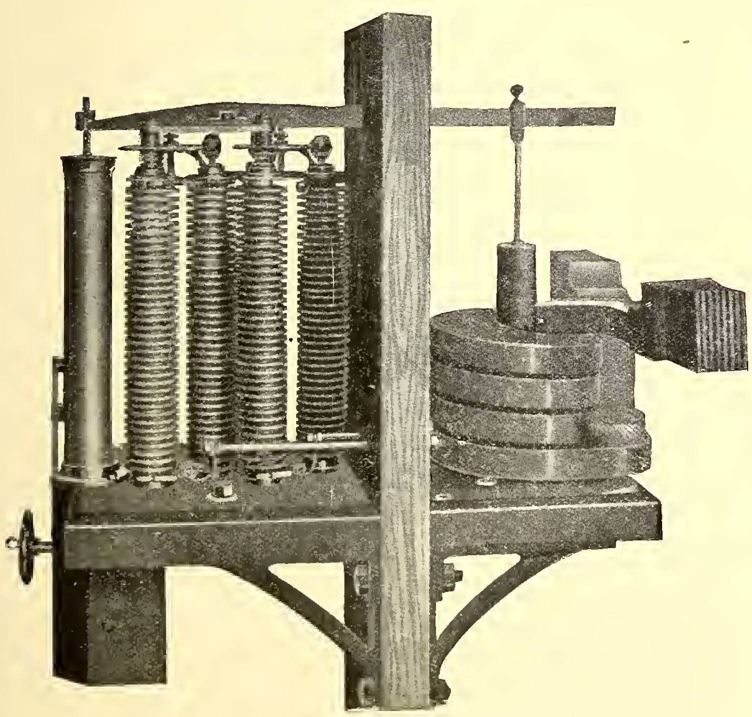
Referring to the diagram, *H* is a solenoid carrying the total generator load, which acts on a soft iron plunger suspended from the lever *A-B* of the carbon regulator. At the other end of the lever is a spring *S*, whose tension is adjustable. *K* and *L* are piles of carbon discs on the opposite sides of the fulcrum *C* of the lever. The resistance of these piles is altered by slight variation in mechanical pressure, produced by slight fluctuations of current in the coil *H*. The details of the electrical connections are self-explanatory. The battery booster is represented by *D*, *F* being its field coils. *E* is a small exciter, whose field coils, *M*, are connected to the carbon regulator as shown.

As the lever arm is raised or lowered, the resistance increases in one arm and decreases in the other, causing wide variations in voltage across the exciter field coils, the direction and intensity of the current in the coils varying accordingly. The action is somewhat analogous to that of Wheatstone's bridge.

With the polarity of the booster changing and its field excitation varying in intensity, it is possible automatically to charge the main battery or to raise the battery voltage so as to carry part of the load of the bus-bar. By limiting the motion of the lever arm it is possible to limit the load which the battery will carry under extreme conditions. With this system close regulation of the load on the converter is obtained.

The Best Arrangement of Switch Gear.—The most suitable arrangement of switch gear is obviously that which best facilitates the manipulation of sub-station apparatus with a minimum outlay.

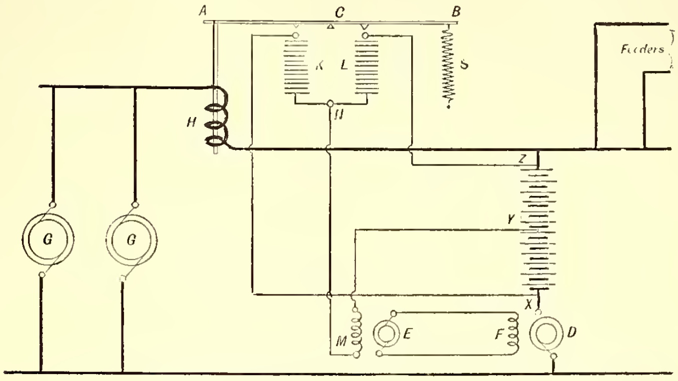
There are two distinct arrangements of switch gear, their adoption depending upon the capacity of the sub-station. With



REGULATOR FOR USE IN CONNECTION WITH STORAGE BATTERIES

one arrangement, which is especially applicable to small sub-stations, all of the switch gear is located upon the main floor with the converters and with the transformers. The other method, which is usually employed in stations of large capacity, consists in locating all the manually-operated switches, except the negative switches, in a switchboard gallery.

It is worth noting that in the first case, where all the switching apparatus is located on the same floor with the transforming apparatus, the station attendance is minimized, for the operator may also perform part of the duties of station foreman, and the converter tender may also perform the duties of janitor, thus dispensing with two men. But this system is not wholly advantageous. In the first place, it is difficult to keep the switch gear clean, and in case of trouble the operator is too near the converters to act with unconcern. On the other hand,



ELECTRICAL CONNECTIONS FOR STORAGE BATTERY REGULATOR

this system reduces the expense of wiring to a minimum, allows excellent ventilation and results in a very compact station.

Where a switchboard gallery is employed, the operator is able at a glance to scan the whole station, a great advantage in case of trouble. He is relieved of the fear of personal injury; he is less hampered and more comfortable, and can better perform his duties. But the expense of wiring is greater and the ventilation inferior.

It is becoming the standard practice to construct the switchboard in three distinct sections, namely, a controller board from which the oil switches are operated; a set of machine panels, and a set of distributing panels. The positive direct-current bus-bar forms a connecting link between the machine panels and the distributing panels. This system is sometimes modified in small stations.

Various arrangements of circuit breakers are employed; in some cases they are mounted directly upon the switchboard panels; in others distinct and separate compartments are used. The latter is preferable if the expense be justified, for it disconcerts an operator to see the flash of an opening circuit breaker.

It has become quite common to separate the negative switches from the positive switches, the reasons for which are obvious.

A feature worth mentioning is the arrangement of a circuit of lamps on the switchboard and their feeding from the local battery circuit, so that in cases of failure of power at the power house there may be sufficient illumination in the evenings for the operator to manipulate the board. Upon the same circuit a complete set of signal lamps should be installed to indicate whether switches and circuit breakers are open or closed.

The Operation of Continuous Reverse-Current Relays.—Much criticism has been directed against continuous reverse-current relays, owing to their sensitiveness, the amount of adjustment they require, and their inability to perform their service at all times. While these criticisms are partly warranted, the fact remains that such relays are better than no protection at all.

An operator is supposed to try the relay controlling the machine circuit breaker each time a converter is disconnected from the bus-bar. The field rheostat of the converter is cut in entirely, the converter dropping its load. The positive bus-bar voltage being slightly higher than the machine voltage, the reverse-current relay is energized, closing the local battery circuit through the tripping coil of the circuit breaker which should open instantly.

Sometimes when a converter is being placed on the bus-bar its voltage is slightly lower than that of the bus-bar, and consequently it "backs out," the circuit breaker being tripped by the action of the reverse-current relay. This feature is disagreeable, but it tends to make the operator more careful.

If reverse-current relays were not sensitive they would be practically worthless. Hence the features which appear to make the instrument objectionable are necessary elements of its successful application.

The Adjustment of Load Between Sub-Stations That Feed the Same Circuit.—Where all sub-stations are equipped with converters of the same capacity, it is desirable to have a definite rule governing the adjustment of power factor of converters, in order that the rail load may automatically distribute itself to the proper sub-stations. Such a rule requires the adjustment of the power factor of all converters so as to be unity at full load; but it fails where applied broadly, owing to the practical impossibility of finding any two converters of the same capacity, although manufactured by the same company, with identical characteristics and equal brush contact resistances. This rule is usually observed, however, with discretion by sub-station operators, and its observance yields good results. But if the rule be adhered to rigidly, the results are not altogether satisfactory.

For instance, assume two converters operating in multiple between a common alternating-current bus-bar and a common direct-current bus-bar. Assume also that the field resistances of the converters are adjusted for unity power factor at full load. When the load upon both machines is greater than the combined full load capacity of each machine, one converter may draw more than half the load. Also when the total load is less than the combined normal load of both machines, the other converter may absorb the greater proportion of the load. This condition is aggravated by the resistance of the converter field coils changing with the temperature, and also by the maintenance of the converter direct-current brushes.

When an individual converter in a sub-station is disconnected from the direct-current bus-bar it does not follow that the original station load will distribute itself over the remaining converters operating in multiple. Moreover, when an additional machine is connected to the circuit, the sub-station will draw more of the load from the adjoining sub-stations. The energy in this way surges back and forth with each operation. It is obvious, therefore, that it is practically impossible to frame a rule of this character which may be adhered to rigidly. If storage batteries are employed as a method of regulation, keeping the individual load upon the converters practically constant, this rule would apply more generally, but where the energy fluctuation upon the converters varies from quarter load to 50 per cent overload, and sometimes 100 per cent overload, it is obvious that the previous rule will not apply. The same reasoning holds good in the case of a sub-station equipped with machines of different capacities.

Noiseless Operation of Converters.—The operation of converters is usually accompanied by a shrill and disagreeable sound. It is not caused by the commutator, by the slip rings, or by air passing through the crevices of the armature as is usually supposed, but is purely an electromagnetic phenomenon. It is probably the result of vibrations set up in the armature core teeth by the varying electromagnetic conditions of the circuit.

That this tone is caused by magnetic action may be illustrated by the following simple experiment performed by the writer. A converter was driven by a separate belt-connected shunt motor, and the speed was adjusted to 1800 r. p. m. The converter was a four-pole machine, so that this corresponded to a frequency of 60 cycles. The converter field coils were unexcited and the machine operated practically without noise. Upon exciting the field coils this shrill tone became audible, and then increased in intensity until upon overexcitation it became very loud. This would seem to indicate that the phenomenon is purely magnetic, and that it might be obviated or at least modified by proper design. The desirability of such modification must be evident in the case of sub-stations located in residential sections.

SOME CONSIDERATIONS DETERMINING THE LOCATION OF ELECTRIC RAILWAY SUB-STATIONS*

BY C. W. RICKER

No attempt will be made in this paper to define the conditions under which indirect distribution, through the medium of transformer sub-stations, is more economical than direct distribution from one or more generating stations containing prime movers. It is assumed that because of the size of the railways to be considered, and the local conditions determining the cost of generating power, the indirect method of distribution has been selected as offering the best economy in commercial operation, and an attempt will be made to outline a general method for determining the number and location of sub-stations.

In many cases, perhaps the majority of cases, a general solution of this problem is quite impossible. Most of the large electric railway systems now in existence are the result of development not foreseen by their original projectors, and there is little reason to believe that future systems will be very widely different in this respect, but probably they will continue to grow by extensions and consolidations, depending upon the distribution and development of local centers of industry and population.

For convenience of discussion, electric railways large enough to require indirect distribution may be classified as follows:

1. Large simple networks, serving a single community.
2. Long single lines or groups of such lines, connecting separate communities or different parts of a very large one.
3. Complex networks, with connecting lines, serving a city and its suburbs.
4. Several networks, with long connecting lines, serving separated communities.

Railways of the last-named class are usually consolidations of the local systems of neighboring cities or towns, and interurban lines which frequently furnish power for lighting and general uses in the towns served. There are usually well-marked centers of load which together with local business conditions, determine the position and equipment of sub-stations.

Railways of class 3, those serving a large city and its suburbs, are also most often the result of the consolidation of separate lines and networks, and while the large central network belongs in class 1, the outlying districts present a difficult problem to the engineer, for he must anticipate the direction, character and sequence of growth so as to provide against it. This requires an intimate knowledge of local conditions, both industrial and social, and in addition he has need to be something of a prophet to foresee the changes which the building of new lines and the starting up of new works may produce. The problem is a local and particular one, and must depend mainly upon individual judgment for its solution.

Classes 1 and 2 can be treated more generally. Take first the case in which a large network, or long line or group of lines, is contained wholly within a large city, so that a fairly uniform schedule can be operated over the whole, and the mean load upon each mile of road is approximately uniform

* A paper presented at a meeting of the American Institute of Electrical Engineers, New York, Dec. 15, 1905.

throughout the system, at any given time. It is required to adjust the cost of losses in the primary distribution, the secondary distribution, including the track and the sub-stations, the fixed charges upon each of these three divisions and the cost of sub-station attendance, so that their sum shall be a minimum, with due regard to the conditions of regulation and continuity of service.

As the density of the load in such a system is very great, the unit of sub-station equipment may be made large enough, so that at the time of least load, one unit per sub-station may be operated at or near its best efficiency. Hence the sub-station losses per kw-hour may be considered constant.

The aggregate capacity of the sub-stations will equal the capacity of the generating station, plus the sub-station reserve capacity, if any is necessary, which will not exceed one unit per sub-station. The greater the distance between sub-stations, the larger the sub-station unit will be; hence the cost of sub-station apparatus will increase as the number of sub-stations increases, until the largest practicable unit is reached. The same is true of sub-station land and buildings.

The cost of sub-station attendance will depend only upon the number of sub-stations, as the same number of attendants is required in a small as in a large sub-station, unless the cost of land makes it necessary to double deck the sub-stations, which will cause a sharp rise in the cost of attendance when the number of units becomes greater than can be placed on one floor.

When direct-current motors are used, the secondary voltage is fixed by conditions of standard practice. The secondary conductors may be proportioned by Kelvin's law, subject to the limiting condition that the lowest potential shall be enough to allow the required acceleration. As the number of sub-stations increases, the cost of the conductors will decrease rapidly. The energy losses in the conductors may be constant or decreasing. The primary distribution in this case must be by underground cables. The primary voltage will be determined by the relative cost of copper and insulation, and should be as high as is consistent with safety. Hence the losses per mean kilowatt in the primary distribution may be considered constant. The total weight of primary conductors will be practically independent of the number of sub-stations, depending upon the total energy and the mean distance of distribution, and may be determined by Kelvin's law.

To obtain the greatest reliability of service, each sub-station should be fed directly from the generating station by at least three cables, and in the case of a wide difference in the number of sub-stations considered, the total cost of cables and conduits would be somewhat greater with the larger number of sub-stations, as more and smaller cables would be required. Otherwise the cost of the high-tension distribution, and the losses in it, may be considered constant.

Neglecting those quantities which are constant, the fixed charges on sub-station land, buildings and apparatus, and the cost of sub-station attendance increase as the number of sub-stations increases; the fixed charges on the secondary distributions decrease and the losses in the secondary distribution decrease or remain constant.

The various losses and charges upon which the solution of the problem depends may then be considered as constants or variables, dependent directly upon the number of sub-stations and inversely upon the distance between sub-stations. These quantities may be reduced to a common base of annual kw-hours, and curves representing them may be drawn with respect to the number of sub-stations as one co-ordinate, and a summational curve may be drawn which, if the premises are rightly chosen, will indicate the number of sub-stations at which the sum of the various charges is a minimum.

In a far greater number of railways the load is not uniform throughout the system. This is true especially of the long interurban railways using a comparatively small number of heavy train units. The load at any given time is concentrated upon parts of the system, or travels from end to end of the long lines. In such a system, the aggregate capacity of the sub-station apparatus in operation at any given time is greater than that of the generators; hence the load factor of the sub-stations is unfavorable, and in most cases the power factor of the system is low.

In a solution by the method outlined in this paper, several new curves must be drawn in addition to those named. The first showing the all-day losses in the sub-station apparatus, which will increase with the number of sub-stations. The second showing the losses in the primary transmission lines, which will also increase with the number of sub-stations, due to the greater length of lines and to the lower power factor. The third showing the fixed charges on the primary transmission lines.

The last two curves are relatively much less important. It is possible by compounding or automatic adjustment of fields, to keep the power factor of the synchronous converters very near unity, making the transmission losses more nearly constant and independent of the number of sub-stations. In such systems it is not usual, and seldom practicable, to use separate feeders from the generating station to each sub-station; and the primary distribution is usually by overhead lines, generally supported on poles which are used for other conductors as well. But with all the sub-stations along a single line of railway, or a group of such lines connected to one transmission line, the additional cost of extending the same for a greater number of sub-stations will usually be but a small part of the whole expense. So, for at least a preliminary consideration of the problem, the last two curves may be omitted and the same quantities used as are considered in the solution for a road having a uniform distribution of load, with the addition of one containing the all-day losses of the sub-station apparatus.

In systems consisting of long lines with infrequent train service, the cost of attendance and all-day losses in converter sub-stations often become so great that the regulation in secondary conductors economically proportioned for standard direct-current voltage will not permit the operation of the required schedule. The usual remedy is to set the sub-stations nearer together, though at the cost of operating economy.

If other conditions still make the use of standard direct-current equipment desirable, it would seem that better economy could be obtained by lengthening the sub-station sections and using boosters, just as has been found profitable in the supply of such lines of less length from direct-current generating stations. The fixed charges on and losses in the boosters should then be included in the curves of sub-station apparatus.

In the discussion of the method of treating the problem of sub-station location herein suggested, the usual type of converter sub-station, with direct-current, secondary distribution, has been kept in mind, but the method is no less applicable to a complete alternating-current system with static sub-stations, in which case the curves of sub-station losses, attendance and fixed charges all become flatter, while the higher trolley voltage available permits a wider spacing of sub-stations without exceeding the limiting conditions of regulation, all of which indicate a better efficiency of sub-station apparatus and secondary distribution, in roads of low and non-uniform load density.

Following the reading of the two papers on sub-stations, the discussion was opened by H. A. Lardner, who called attention to the fact that in rotary converter sub-stations of the average interurban railway the sub-stations are entirely shut down every night, and unless storage batteries are included in the equipment of these sub-stations, no direct current is available for starting the converters in the morning. Therefore, it becomes necessary to include one other method of starting converters. The method of starting the converters from the alternating-current side has many advantages; among them are great simplicity and the omission of special apparatus. The introduction of taps running from the middle points of the transformers is a very slight modification, and the double-throw switch required is also a small matter. Furthermore, the division of the field coils is not seriously objectionable. Where the size of rotaries is 500 kw and under it is desirable to use the alternating-current, self-starting method for placing the first converter in operation in the morning, when no direct current is available, and to use the direct-current method for the addition of other units at any time during the period of operation.

W. I. Slichter remarked that in addition to the method involving the application of an induction motor in starting rotary converters, there is another method of indirect starting by the use of a single-phase commutator motor. The alternating e. m. f. of a rotary converter is approximately the voltage which is suited for a single-phase commutator motor, and by putting a reactance in series with such a motor an easy means can be obtained for regulating the voltage and the speed. By this method it would be easy to secure the proper speed for throwing the converter into synchronism.

H. G. Stott thought the importance of the line drop had not been properly emphasized. When a synchronous converter is operated with a line drop of 12 per cent, there is difficulty in holding it in synchronism, and its operation generally will be unsatisfactory. This fact is of moment when a converter is started from the alternating-current side. If the line is fairly well loaded and there is a drop approximating 10 per cent if a converter of relatively large capacity be started, there may be such a drop as to start the other converters hunting, and to cause a flashing at the brushes. This fact also has a strong bearing on Mr. Ricker's paper. That is to say, the limiting conditions in the location of sub-stations is set by the line drop, and it must be borne in mind that a maximum of not more than 15 per cent drop can be allowed.

Professor R. B. Owens, of McGill University, called attention to the fact that the main consideration in connection with the location of electric railway sub-stations was omitted from Mr. Ricker's paper, namely, the voltage. Without going into the question of whether or not direct-current generators can be successfully designed of large size, for voltages of 1000 or 1500 or 2000, it is believed that the makers stand ready to furnish rotary converters of 1000 volts, may be more, and also at least bi-polar motors that will operate successfully at such voltages. If this is true it affects the whole question of sub-station location most materially, and materially interferes with the field which some people suppose the alternating-current motor system occupies. The gist of the whole matter depends upon the value to which the direct voltage can be increased. The solution lies in the design of direct-current machinery, in large units, at high voltage, to operate successfully under conditions met in traction work.

William McClellan thought the method proposed by Mr. Ricker would apply very well where trains move over the road without any particular points of congestion; but in any practical case it is necessary to consider the location of each sub-station in connection with the existing conditions.

Dr. C. P. Steinmetz stated his belief that for a long time to come, if not for ever, the largest number of railway sub-stations will remain converter sub-stations. It is proper, therefore, that much attention should be devoted to the rotary converter. The railway converter sub-stations can be divided into two typical classes: the sub-station in a large high-power distribution system and the sub-station in an interurban system. In the former class, the loss between generating station and sub-station and the drop of voltage between sub-stations is very small. The sub-stations contain a large number of large units, which run practically always at steady full load. The individual momentary variations of load are not perceptible in the sub-station to any great extent, and the daily changes of load are taken care of by varying the number of converters. In such sub-stations the possible variation of voltage due to line drop is insignificant. Automatic control of voltage for variations of load on the converter is not necessary, since the converters are maintained at fairly steady voltage. Therefore, automatic voltage controlling devices, as compound field coils and reactive coils, are not necessary, but the shunt-wound converter is suitable, and therefore it is undesirable to have in such sub-stations series field coils on the converters and reactive coils, since they are an unnecessary source of a possible danger, the danger of racing in case of the direct-current system feeding back into the converter sub-station, which danger, due to the small resistance between sub-stations, is greater than in the interurban sub-station, which is the second class of sub-station. In the interurban systems moderate-sized sub-stations with two or three units of converters of, say, 500 kw or less, are fed from long-distance, high-potential transmission lines with considerable drop of voltage in the transmission lines and very considerable resistance between the sub-stations. In these sub-stations systems the variation of load would be impracticably large for any ordinary methods of voltage control to be used. Therefore, these sub-stations utilize powerful series field coils and reactive coils. That is what has been called phase control. In the operation of a converter sub-station the most important matter is the starting of the converter. In the early days the first systems were started from the alternating-current side by throwing full voltage on the converter or synchronous motor and letting it get up to synchronism. The starting from the alternating side gives the severest jolt on the system, especially when started at full voltage. The converter is also started either by a special motor or from the direct-current side, and then synchronized. The methods of starting can, therefore, be divided into two large classes: those methods which require synchronizing devices and those which do not require these devices. There may be some difference in the time required to start; it may take a little longer time to synchronize, but in either case the minimum time is sufficiently short, so that either method would be suitable. The method of starting, which requires synchronizing devices, is the least severe on the system. A converter may be put into the system without any trace of disturbance. This method was introduced to a large extent to avoid shock on the system, but recently the tendency has been strongly away from it, and at least in interurban systems, it may almost be said that the methods of starting which require these devices have failed. They have failed because under just those conditions where the utmost rapidity of starting is essential, where there is trouble in the system or heavy overloads, where the direct voltage cannot be held up, and begins to sag down to nothing, and where in the alternating-current system the voltage goes up and down, the machines cannot be synchronized safely. These are the main reasons for reintroducing the alternating-current, self-starting method. It is true that a specially skilled operator might be able to get the converter in operation in this manner without throwing out the whole sub-station, by closing the switches not at equality of frequency, but when the two frequencies approached each other, while they are yet coming together, because it is impossible to synchronize them while they are together. The speeds cross each other at such rapidity that they are immediately again apart, and there is the danger of improperly estimating the time and thus of short-circuiting the system and throwing out the other converters just when they are most needed. In general, the proper moment for closing the switches is not when the machines are in step and in synchronism, but just a moment before they are in synchronism. That means that a direct-current starting is of exceptional usefulness in interurban systems. In the large metropolitan sub-stations the difficulty is largely reduced, because the voltage is steady on the alternating side as well as on the direct-current side. At the same time in these systems, if a machine is thrown in when out of synchronism the result is much more disastrous, because there is almost no resistance between the generating station and the sub-station or between the sub-stations, and all the momentum of the whole system feeds back into the converter, thus reversing the converter at full velocity. Even with the most skilled operator, that may occasionally happen. Assuming the efficiency of the operator as very high, that his liability to error is only one-hundredth of 1 per cent, that he will make a mistake only once in 10,000 times, if one considers a city like New York, where more than 100 converters of 1000 kw or more have to be thrown into the system daily, it will be seen that one in ten thousand means three times a year some big converter is thrown in wrong, and tears down the whole station, with the usual disastrous results. This fact gives the preference to starting from the alternating side by means of low voltage. A compromise of the direct-current and the alternating-current methods of starting has been developed to reduce the jolt on the system. The start is made from the direct-current side, and the machine is brought up almost to synchronism. The direct-current side is disconnected and the alternating-current switch is closed. The converter drops in step almost instantly, and there is hardly an appreciable jolt on the whole system. This method is not quite as simple as the one used when starting from the alternating side from rest, but it is sufficiently simple for a large system, where the risk is considerable.

In discussing the hunting of converters, Dr. Steinmetz stated that there are several modifications of the anti-hunting devices. One of the most effective is a squirrel-cage induction motor. That is the most effective anti-hunting device, and it is largely used in synchronous motors intended for very severe conditions, as for operating heavy fluctuating loads at the end of a long transmission line with heavy resistance losses in the line. It is obvious that such a squirrel-cage induction motor is of a great advantage in starting the converters. Two other devices are short-circuits around the field pole and short-circuits between the field poles, each depending for its operation on the shunting of the magnetic flux. When hunting, the magnetic flux vibrates across the field pole. The short-circuit current around the field pole is due to the change in the magnetic flux. The short-circuits between the field poles obviously cannot interfere with starting, but they act as self-starting motors, giving a quarter phase winding to the normal pole, and produce the effect of a quarter-phase motor. The other arrangement of short-circuiting around the field poles is used to a considerable extent in synchronous motors which are built that way, and they give no trouble, because there are many of them in use with synchronous motors. There seems to be no good reasons why they should not be very satisfactory in connection with rotary converters.

The storage battery is a very useful and desirable element in a railway system. The only and main objection to a storage battery which has practically killed its introduction in most railway systems, especially in interurban systems, is that the cost of the storage battery as a rule is so great that an interurban railway cannot pay for it, or cannot be sure to earn sufficient money to pay the interest on the investment in the battery.

General Passenger Agent Dittenhaver, of the Toledo & Indiana Railway, has a novel method of advertising shows and special attractions that appear in towns along his line. He sends a special car with a band to the various towns along the line, and after a band concert to draw a crowd, a "barker" announces the special features of the show to be held in the neighboring town. The plan has worked with great success in several instances of late.

THE ELECTRIFICATION OF THE PENNSYLVANIA RAILROAD BETWEEN CAMDEN AND ATLANTIC CITY

Up to the present time the principal advance in the electrification of steam roads has taken place at the terminal stations or upon branch roads, so that the recent decision of the Pennsylvania Railroad (announced in the Street Railway Journal of Dec. 16) to equip electrically a portion of its system between Camden and Atlantic City, N. J., is of the greatest interest. The developments which have taken place at New York under the direction of the New York Central and New York, New Haven & Hartford Railroad companies have focussed the attention of the engineering world on this branch of railroad engineering, and this further advance of electric traction, coming as it does when this phase of railroading is fresh in the minds of all engineers, marks another milestone passed in the substitution of electricity for steam for heavy railway service.

That portion of the Pennsylvania Railroad to be electrified comprises some 64 miles of steam road lying between Camden and Atlantic City, N. J., being a portion of the West Jersey & Seashore branch of the Pennsylvania system. It is proposed to utilize the Cape May line of this system from Camden as far as Newfield, this line being double-tracked with 100-lb. rails, and to build an additional track from Newfield to Atlantic City, making the lines double track throughout.

Over this roadbed an express service will be established. The initial installation will provide for a three-car train every 15 minutes between Camden and Atlantic City, making the 64 miles in 80 minutes without stops. The maximum speed of the cars will be between 55 m.p.h. and 60 m.p.h.

In addition to this through service to Atlantic City, a half-hourly schedule is planned, consisting of two-car trains between Camden and Millville, 40 miles, and 10-minute service of single cars between Camden and Woodbury, 8½ miles. Full service will call for fifty-eight cars in operation, each equipped with two 200-hp direct-current GE 69 motors. These motors will be similar to those now being manufactured by the General Electric Company for the equipments of the New York terminal of the New York Central & Hudson River Railroad. The motors will be controlled by the Sprague-General Electric multiple-unit system. Current will be furnished to the cars by the third-rail system, except on the sections between Camden and Woodbury, and Newfield and Millville, where the cars will obtain the necessary current by an overhead trolley. The speed on these sections is less than on the main line.

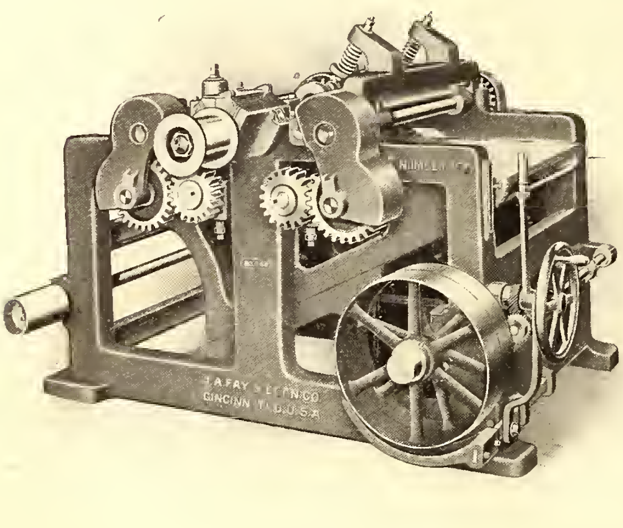
The power house will be located at Camden. Power for the operation of the cars will be furnished by three 2000-kw General Electric Curtis turbo-generators of the three-phase alternating-current type, having a frequency of 25 cycles. From this power house transmission lines will be run to six substations between Camden and Atlantic City, and a seventh sub-station at Millville to supply that section of the road lying between Millville and Newfield.

The transmitting potential will be 33,000 volts. At the substations a total capacity of 11,000 kw in rotary converters will be provided, delivering direct current to the third rail at 650 volts. The individual units will be of the standard General Electric type, and will have a capacity of 750 kw. They will be started from the alternating-current end by means of taps on the step-down transformers. The contract calls for the completion of this road by July 1, 1906, in order to take care of the heavy summer traffic. The total amount of money involved is about $3,000,000.

The Illinois Transportation & Tunnel Company, which controls the Chicago freight subway, has published a pamphlet showing that the amount of finished tunnel on Dec. 1 was 208,220 ft. as against 103,620 ft. on Nov. 1, 1904.

AN IMPROVED CABINET PLANER

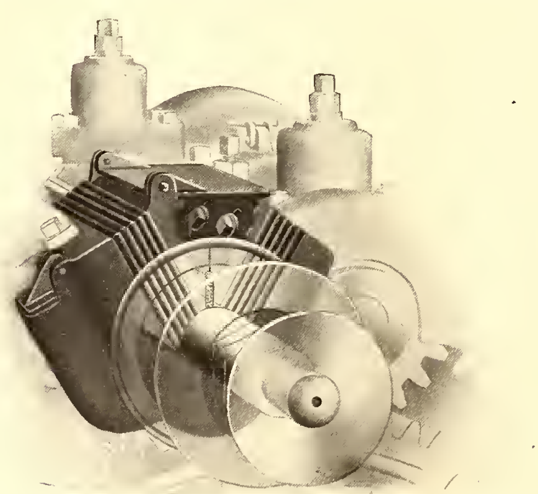
In one of the accompanying views is shown a new cabinet planer from the shops of the J. A. Fay & Egan Company, of Cincinnati, Ohio, especially designed for use in work wherever a fine, smooth surface is required. The heavy table is supported on a pair of inclines which run in gibbed ways on the



NEW CABINET PLANER

base of the machine, and are operated at the feeding-in end by a hand wheel and two parallel screws on ball bearings; at all times the points of support are directly underneath the feed rolls and the cutter head.

The feed mechanism consists of four 5-in. rolls, all driven downward by a system of gears said to be used only on Fay & Egan machines. All gears are keyed to babbitted shafts; the use of studs, with their consequent evils, is entirely avoided.



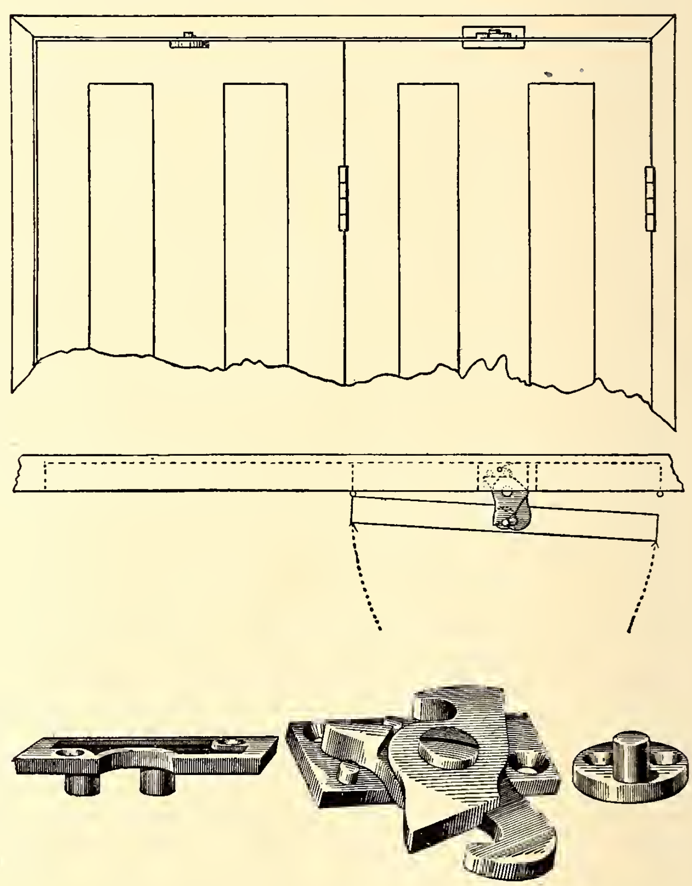
SECTIONAL CLAMP BEARING FOR CABINET PLANER

The infeeding roll is controlled by spring pressure, and may be either solid or sectional. The sectional feed roll is unique in its interior construction. Each section is 1½ ins. thick and drives independently, as if it were a separate roll. This feature is found an invaluable one when it is desired to plane at the same time a number of narrow strips of varying thickness.

The cylinder is tool steel of small cross section—two features essential to fine planing; the cutter head and journals are forged from the same piece. The sectional clamp bearings for the cylinder journals do away with the trouble of rebabbitting. The thin plates which form the cap bearings rest diagonally upon the upper surface of the journals and are clamped in place by bolts, shown in illustration. These plates take up their own wear, and any looseness of the journals may be taken up each day if desired. On either side of the cylinder are the pressure bars, set close to the knives and rising concentric with them. On the lower edge of the front bar is a spring extending from end to end, which rests upon the stock instead of the bar proper, and which is strong enough in itself to press all ordinary crooks out of a board and hold it firmly on the table.

AUTOMATIC LOCK FOR FOLDING VESTIBULE DOORS

In the accompanying illustration are shown the details and application of an automatic lock for folding vestibule doors which is made by the Frank Ridlon Company, of Boston, Mass. It has been found to be of great value in preventing glass breakage and the swinging of vestibule doors. The first half of a vestibule door can be opened while the second half remains



CONSTRUCTION DETAILS AND APPLICATION OF AUTOMATIC LOCK FOR FOLDING VESTIBULE DOORS

closed. This latter cannot be opened until the first half is folded back against the catch, which unlocks the second half and locks the two doors together automatically, upon which both can be swung back together and hooked. When this operation is reversed, the two halves remain locked together until, in closing, the second half strikes the catch; this releases the first half, the second half being locked also in its normal closed position. The first half is then free to be closed and locked.

Thus far this year up to Nov. 1 the interurban cars of the Detroit United Railway, together with the Rapid Railway System, have brought into the city 220,656 cans of milk. In four years they have contributed 803,237 cans to Detroit. That is 8,032,370 gallons, or 32,129,480 quarts.

WHEEL PRACTICE IN NEW BEDFORD, MASS.

A couple of years ago the Union Street Railway Company, of New Bedford, Mass., which had been using chilled cast-iron wheels for all of its cars, began experimenting with a number of different makes of steel-tired and fused-steel wheels. Up to the present time thirty cars have been equipped for the interurban cars, each car carrying eight wheels of the same manufacture to obtain a fair average life for each type of wheel. Despite the company's precaution in using the same wheels for a given car, one pair of wheels was found to require re-turning after running only 16,000 miles, while the six other wheels were still in first-class condition. At the same time it should be noted that a pair of steel-tired wheels of other manufacture has covered over 54,000 miles without requiring re-turning. In view of the comparatively short time that the company has been trying steel-tired and fused-steel wheels, E. E. Potter, the general superintendent of the Union Street Railway Company, does not think it proper to make any statement relative to the comparative economy of these wheels and the ordinary chilled iron type. Where steel-tired wheels are used, the cost of re-turning them naturally is a very important factor, and until the New Bedford company installs the necessary wheel lathe it cannot present conclusive data. The company's experience, however, appears to have brought out the peculiar phenomenon that after the first turning the steel-tired wheel seems to wear out at a greater rate than before.

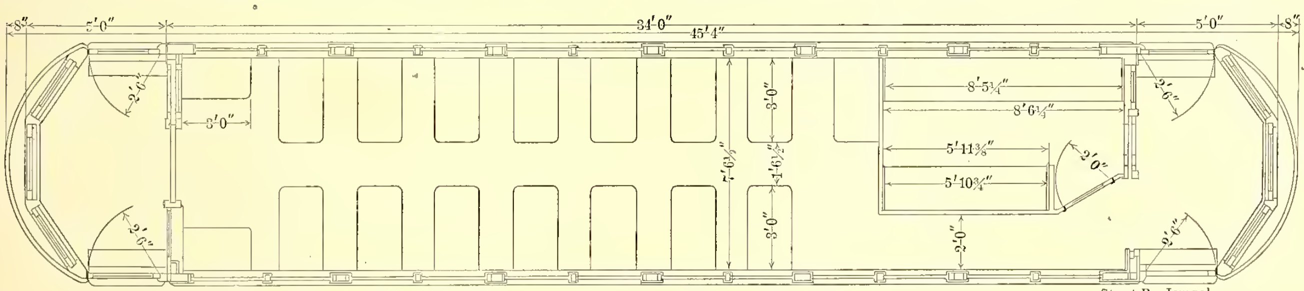
INTERURBAN CARS FOR YOUNGSTOWN AND VICINITY

The Pennsylvania & Mahoning Valley Railway, of Youngstown, has just received from the Niles Car & Manufacturing Company several very fine cars designed for the through limited service between Leavittsburg, Warren, Niles, Girard, Youngstown and New Castle. The local conditions were somewhat difficult to meet and the car was designed by the railway people in an effort to supply suitable service for the mill men in their working clothes and at the same time provide a compartment suitable for ladies. It was necessary to operate as a double-end car, with passenger entrance at each corner, and at the same time it was thought desirable to keep the smoking compartment entirely separate from the passenger compartment and not compel ladies to pass through the smoker when entering the car at this end. The plan drawing shows the seating and the arrangement of the passenger and smoking compartment, also the dimensions. The car is 45 ft. 4 ins.

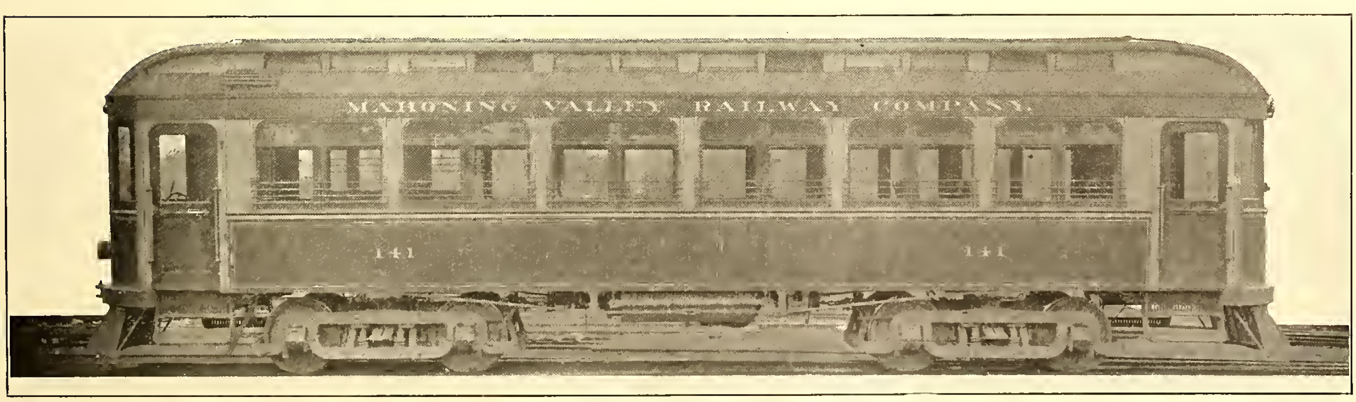
INTERIOR OF PENNSYLVANIA & MAHONING CAR

over the buffers, and extreme width is 8 ft. 6 ins. The bottom frame is composed of 6-in. I-beams in the center sills. The side sills are double, with heavy steel plates between all sills, extending the length of the car body only, both platforms being depressed about 6 ins. below the car floor.

The panels are smooth, without raised work, and outlined in neat inlay of colored woods. The interior finish is of solid mahogany throughout, and the ceiling of semi-Empire style, decorated in green and gold. The lamps are arranged in arches between the ceiling panels. Plate glass is used throughout except in the ventilator sash. Owing to the fact that many passengers are mill men riding in their working clothes, it was deemed advisable to upholster all seats in white woven rattan, but high roll backs with corner grip handles and of the reversible type are employed.



PLAN OF INTERURBAN CAR FOR THE MAHONING VALLEY RAILWAY COMPANY



ONE OF THE PENNSYLVANIA & MAHONING VALLEY RAILWAY COMPANY'S NEW CARS COMPLETELY EQUIPPED FOR OPERATION

STANDARD DIMENSIONS AND SEATING PLANS OF BRILL CONVERTIBLE CARS

In the Nov. 18 issue of the STREET RAILWAY JOURNAL was shown a series of diagrams giving the standard dimensions and showing the seating plans of several sizes of the Brill semi-convertible type of car. It was stated in the accompanying article that the large use of this car had resulted in the standardization of the dimensions for certain forms of service. This is also true of the convertible car of the same manufacture, and diagrams with dimensions of single and double-truck cars of what are usually considered to be the most suitable length for city service are shown herewith. This type of convertible car was introduced in 1898, and is now used in half the States in this country and in seven foreign countries. Over 100 convertible cars are being built on order by the J. G. Brill Company and its allied companies at the present time.

The recent improvement in the system of sliding the sashes and panels into roof pockets, known as the "grooveless-post system," has been described in these pages in connection with articles relating to cars of this type built for various railway companies, and has also become widely known to railway operators through a car of the type which was exhibited at the recent street railway convention at Philadelphia, and through advertising, etc. It will be noticed that there is a difference of 2 ins. in the width over the posts of the cars shown in the diagrams, and that the aisle width is the same in both. It is usually preferred to reduce the seat length rather than the width of the aisle. The levers of these seats, which support the backs, and by which the backs are moved from one side to the other, are arranged so as not to prevent the bodies of seated passengers from projecting over the ends of the cushions. The seating and aisle space will be found quite equal to that of a standard closed car. The distance between the side posts, 2 ft. 7 ins., has proved adequate for the requirements in every respect. In the longer car, shown in Fig. 2, it is not unusual to have panels between the double corner posts and the first side posts solidly built in, and with this arrangement longitudinal seats accommodating three persons each are used at the corners. The large clear space at the doors, which is obtained by the use of the longitudinal corner seats, is a useful feature in many places. Another modification of this longer car, which

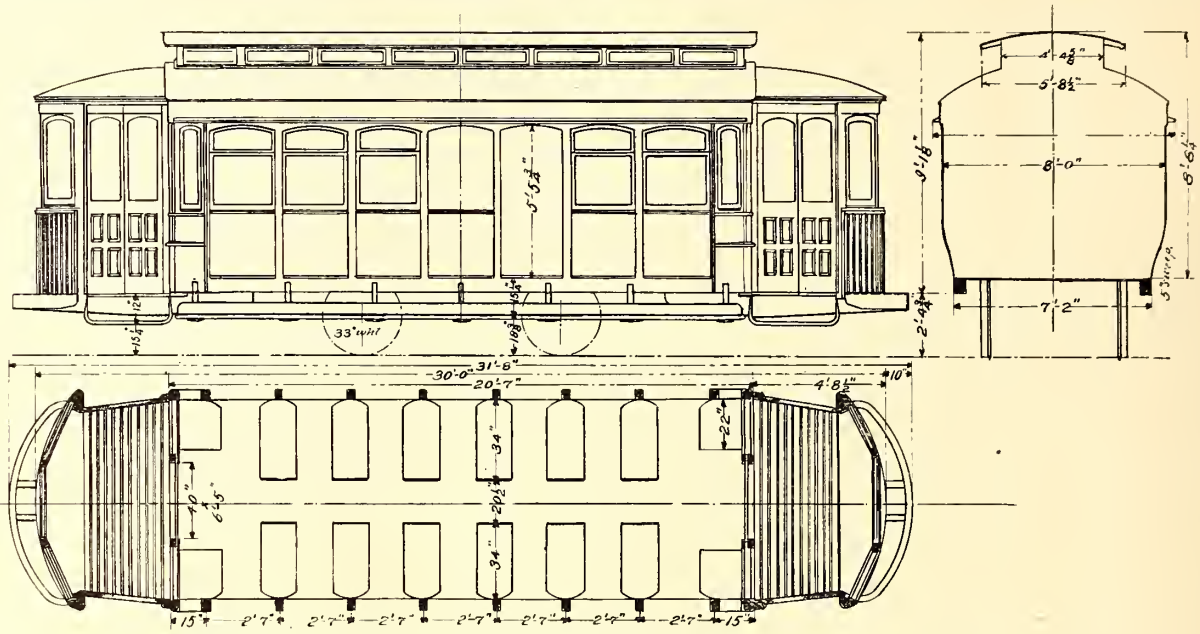


FIG. 1.—PLAN, SIDE ELEVATION AND END ELEVATION OF STANDARD SINGLE-TRUCK CONVERTIBLE CAR

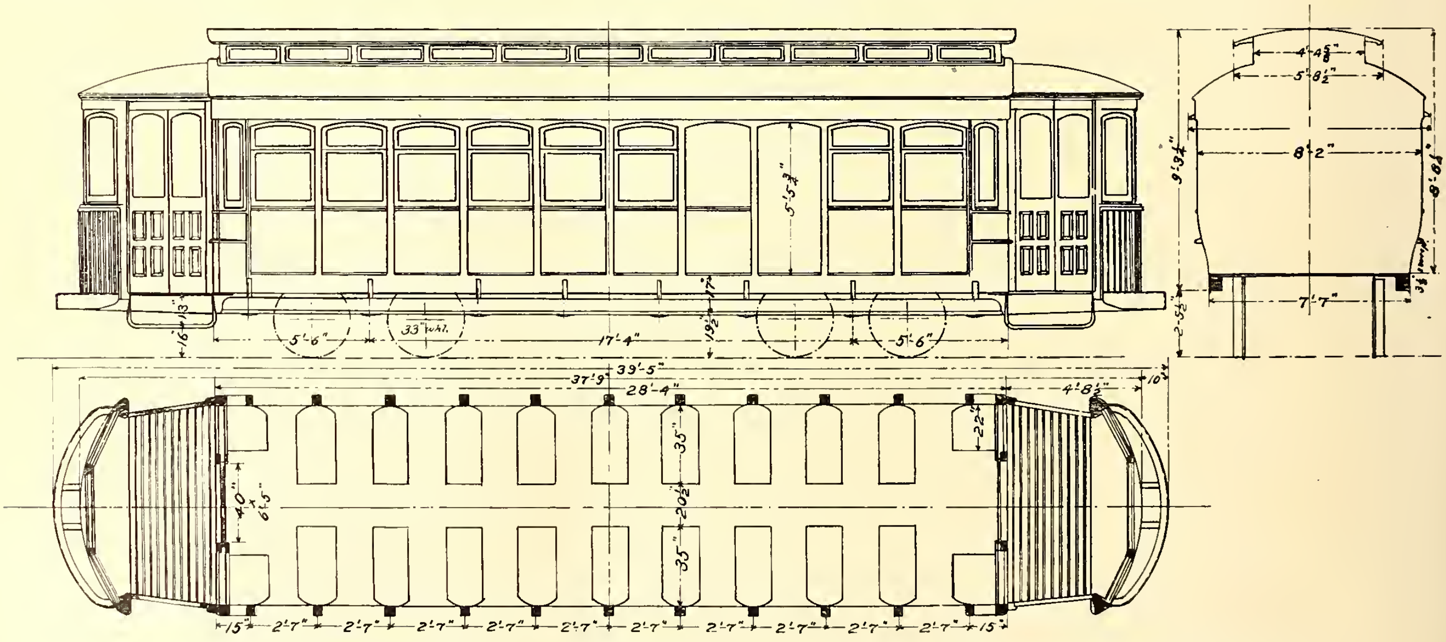


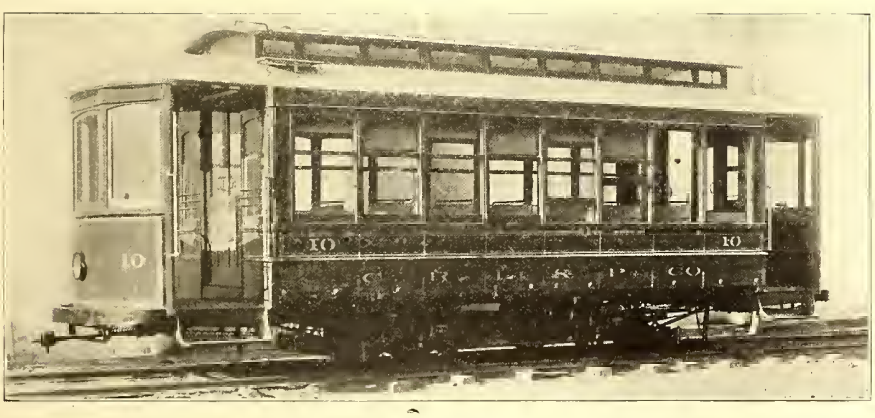
FIG. 2.—PLAN, SIDE ELEVATION AND END ELEVATION OF STANDARD DOUBLE-TRUCK CONVERTIBLE CAR

is considered wise in a number of respects, is the inclusion of the "Narragansett" type of sill step. This arrangement, as is well known, provides an upper step on the lower, outward extending flange of a Z-bar, which forms the sill, and which keeps this step within the line of the posts. It brings the running board down to the same level as the platform step and makes it easier and safer for the passengers to enter and leave the car at the side entrance. Attention is directed to the fact that the clear space between the ventilators of the monitor deck is not materially reduced by the provision of pockets in the side roofs for the sashes and panels, and also that the sweep of posts is not interfered with. The flexible metal panels are capable of assuming whatever curvature is necessary.

While the majority of orders received by the builder for cars of this type have the dimensions and seating plans shown, the adaptability of the type to suit special conditions will be evident to any experienced operator. The filler seats for the aisles have been successfully used by different companies, including the Ocean Electric Company, of Long Island, N. Y., and the Manila (P. I.) Electric Railways. A partition at the center is used in cars built for the Colorado Springs & Suburban Railway, so that passengers might have half of the car opened and the other half closed if they so desired. The Schuylkill Traction Company recently was supplied with cars having a smoking compartment at one end with longitudinal seats, and the panels were arranged to be made operative at any time the company should wish to use transverse seats in this compartment. A number of companies whose lines are laid out so that the cars run in one direction, with the entrances at one side only, have ordered cars with this convertible system for the entrance side.

GROOVELESS-POST, SEMI-CONVERTIBLE CARS FOR WILMINGTON, N. C.

In an article in the Street Railway Journal of Dec. 9, describing a number of Brill semi-convertible cars recently furnished to the Asheville (N. C.) Electric Company system, it was stated that Asheville was one of the first cities to install an electric railway system. The success of the undertaking was widely felt throughout the Southeastern States and led to the electric equipment of a number of lines in other cities in North Carolina within a short period. The electric line at Asheville was first opened in January, 1889, and on May 1 following, electric cars commenced operation in Wilmington.



SINGLE-TRUCK, DOUBLE-VESTIBULE, SEMI-CONVERTIBLE CAR FOR THE CONSOLIDATED RAILWAY, LIGHT & POWER COMPANY OF WILMINGTON, N C.

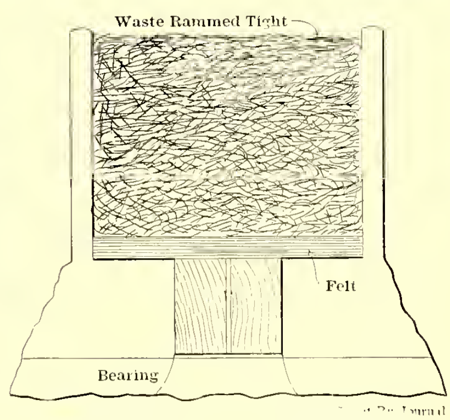
The J. G. Brill Company has recently shipped three cars of its grooveless-post, semi-convertible cars to the Consolidated Railway, Light & Power Company, of Wilmington, which are the first of this style of car to be used in that city. The railway company has 17 miles of trackage and twenty-four cars. It connects Wilmington, Wrightsville and Wrightsville Beach, and reaches two popular amusement parks.

The cars are 4 ins. wider than is usual in the single-truck type and measure 8 ft. 4 ins. over the posts at the belt. This permits the seats to be 36 ins. long and the aisles 24 ins. wide. The seats are of the builder's manufacture, and have wooden hand rails extending across the top of the backs. The seating capacity of the car is thirty-two. The illustration shows two of the windows at the rear of the car, raised up into the roof pockets, and two held at different heights. The arm rests, which may be seen on the window sills, are necessary on account of the lowness of the sills. To keep the platforms free of water in rainy weather, they are covered with transversely placed boards having spaces between through which the water runs off at either side. The mild winters of Wilmington do not require that the platforms be entirely enclosed, therefore doors are omitted from the platform entrances.

The general dimensions are as follows: Length over the end panels, 20 ft. 8 ins.; over the vestibules, 30 ft. 1 in., and over the bumpers, 31 ft. 9 ins.; height from the under side of the side sills over the monitor roof, 8 ft. 11¼ ins.; width over the sills, 8 ft. ½ in., and over the posts at the belt, 8 ft. 4 ins.; distance between the centers of the posts, 2 ft. 5 ins.; thickness of the corner posts, 3⅝ ins., and the side posts, 2¾ ins. The side sills are 3⅜ ins. x 5 ins., with 12-in. x ⅜-in. sill plates inside. The end sills are 3½ ins. x 5¾ ins.; the wheel pieces, 4 ins. x 4½ ins., and the crossings, 3½ ins. x 4¾ ins. The height from the floor to the top of the window sill, 25 ins., and from the sill to the center of the arch over the window, 2 ft. 6⅜ ins.; from the platform step to the platform, 13 ins., and from the platform to the car floor, 6⅜ ins. The angle-iron bumpers, radial draw-bars, platform and signal bells, seats, steps and other specialties are of the builder's manufacture.

USE OF OIL IN GREASE BOXES AT KANSAS CITY

The accompanying sketch shows a cross section of a plan which is being adopted on the cars of the Kansas City Railway & Light Company, which were designed for grease lubrication with grease boxes, and which are being changed for oil lubrication. The scheme is very simple, but in the opinion of G. J. Smith, master mechanic, who has tried a great many different

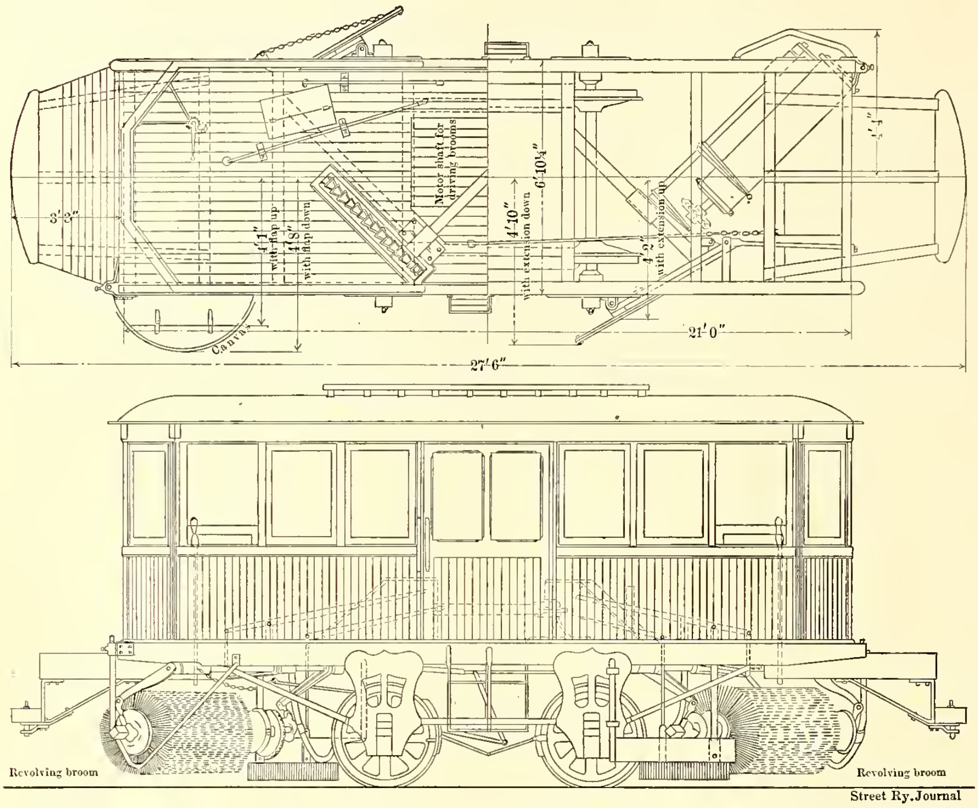


CROSS SECTION OF GREASE BOX ADAPTED FOR OIL

plans to accomplish this end, it is the most satisfactory yet tried. No special oil box is used. The oil is put directly into the regular grease box of the motor. Into the hole in the bottom of the grease box a wooden plug is driven. In this plug is a ⅛-in. hole. On top of the plug is put a layer of felt. The box is then nearly filled with waste. The rule is to put two tablespoonfuls of oil into the boxes every day. The waste is rammed into the box as tightly as possible and brought up to such a height that it is difficult to get more than two tablespoonfuls of oil into a box at once without running it over and making the fact evident upon a casual inspection of the motor.

NEW SNOW-REMOVING EQUIPMENT FOR THE PHILADELPHIA RAPID TRANSIT COMPANY

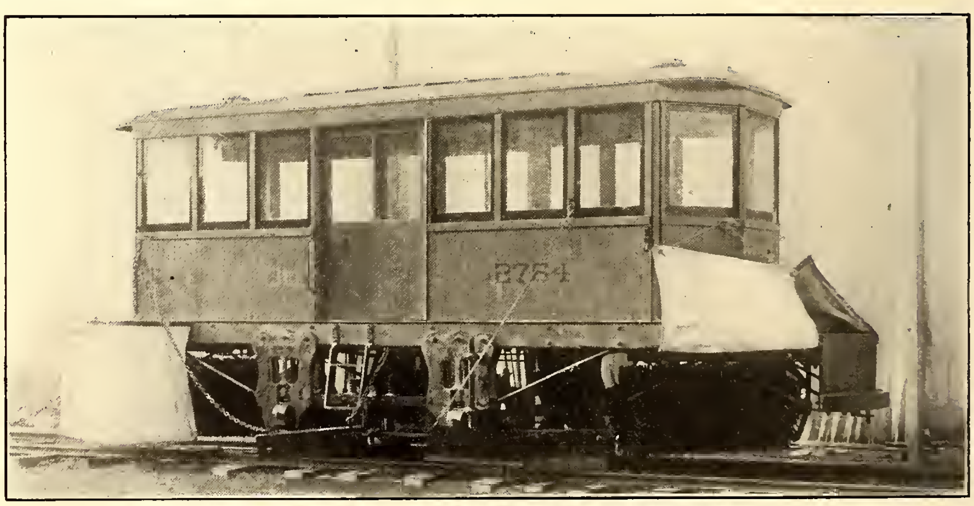
Like other street railways in its vicinity, the Philadelphia Rapid Transit Company had its hands full last winter in the



FLOOR PLAN AND SIDE ELEVATION OF PHILADELPHIA SNOW SWEEPER, SHOWING THE LOCATION OF THE SNOW-FIGHTING APPARATUS, BRACING AND OTHER DETAILS

endeavor to cope with the conditions produced by the unusual number of snow storms. The company has a large number of sweepers, and two years ago obtained fifty snow plows of a powerful type from the J. G. Brill Company; but the trackage, which is 544 miles, the longest of any electric railway system in the world, with many miles of track through narrow streets, made the situation extremely difficult. The company has had fifty-seven of its old type of sweeper equipped with the Brill standard broom, such as are shown under the car in the accompanying engraving. The installation of these brooms has recently been made and the sweepers put in A1 condition for the winter's work. The company has also delivered to the Philadelphia Rapid Transit Company within the last week or two, seven of its standard sweepers. The builder claims that the short brooms, which are used with this sweeper, have several advantages over brooms which extend the full width of the track. It is stated that the long or double brooms pile the snow up in front, where they must come in contact with it again; also that short brooms work and wear more evenly and are easier to handle, and are capable of independent adjustment, so that they can be made to conform to the curvature of the pavement between the rails.

The brush board and wing, which are shown in their lowered positions, also the leveler near the side step, keep the track on their side of the car sufficiently free of snow, and the revolving broom at the rear takes up what is left and leaves a clear pavement. The diagrams show the convenient location of the handles for raising and lowering the brooms and brush boards. A shaft at the center of the car, with sprocket wheels at either end, is revolved by a 25-hp motor. The sprocket chains are of the builder's manufacture, and the link are composed of drop-forgings. Gear trucks carry the sweepers and have a 40-hp motor to each axle. The dimensions are as follows: Length over the cab, 21 ft.; length over the bumpers, 27 ft. 6 ins.; width over the sills, 6 ft. 10¼ ins.; height over the trolley board, 11 ft. 6 ins.; height to the sills, 3 ft. 6 ins.; length of the brush board, 3 ft. 2 ins., and length of the wings, 2 ft. The weight without motors is 13,800 lbs.



ONE OF THE NEW PHILADELPHIA SNOW SWEEPERS READY FOR SERVICE

A NOVEL SITUATION IN STREET RAILWAY TAXATION

An interesting question has arisen in connection with the payment of an excise tax to the town of Charlton by the Worcester & Southbridge Street Railway Company. The State law provides for the payment by street railway companies of an excise tax based on the gross earnings for the year, collectable in the various cities and towns through which it operates, in proportion to the number of miles of track in those towns. The town taxed the company for the number of miles operated in the streets, assessing the amount on total earnings on the entire line. The Selectmen are now trying to find out whether they should not figure their proportion from the number of miles operated through streets of the various towns, which would make their share greater than of the total number of miles operated.

The Mexican Electric Tramways, Ltd., has adopted steel-tired and steel wheels as standard instead of the chilled-iron wheel. The company purchases most of its wheels in the United States, although a few have come from England. The rail used permits the employment of a 1¼-in. flange and a 2-in. tread. This tread will later be increased to 3 ins. in width.

FINANCIAL INTELLIGENCE

Wall Street, Dec. 21, 1905.

The Money Market

Somewhat easier conditions prevailed in the local money market during the past week. The return movement of funds from the interior in progress at the close of last week, has continued upon a fairly large scale, and has materially strengthened the position of the New York City banks. Instead of a deficit of $1,246,529 reported by the clearing house banks on Dec. 2, the same institutions last week reported a surplus reserve of nearly $4,000,000. In addition to this the banks have gained a substantial amount of cash in their operations with the sub-treasury, and with a continuance of the inflow of money from out of town, which now seems assured, the local banks will be in a good position to meet the January 1 interest and dividend payments, which promise to break all previous records. About the only unfavorable development during the week was the failure of three Chicago banks. This necessitated the transfer of substantial amounts of cash to that city, which otherwise would have remained here, but apart from this the embarrassment of the institutions referred to had no important bearing upon the local situation. Sterling exchange has ruled decidedly strong, the heavy demand for remittances in connection with the end of the year settlements abroad resulting in a sharp advance in demand bills to near the gold export point. Shipments of the yellow metal, however, were averted by a rather liberal supply of bankers' bills. The bank statement, published a week ago, made a satisfactory exhibit. Loans decreased $11,756,800, due to the operation of interior banks and foreign houses in the local money market. The reserve required was $2,086,800 less than in the previous week, which, together with the increase in cash of $3,120,800, resulted in an increase in the reserves of $5,207,600, thus wiping out the deficit of the preceding week, and establishing a surplus of $3,961,075. In the corresponding week of last year the surplus was $14,546,625, compared with $14,025,500 in 1903, $8,093,600 in 1902, $5,785,325 in 1901, and $9,497,100 in 1900. The European markets have ruled firmer, discounts at all the principal European centers ruling fractionally higher than those prevailing at the close a week ago.

Money on call in the local market has loaned at 12 per cent and 3 per cent, the average for the week being about 8 per cent. Time money has ruled firm. Sixty-day funds were obtainable at 7 per cent, three and four months at 6 per cent, and five and six months at 5½ per cent. Commercial paper has been extremely quiet and unchanged, at 5½ and 5¾ per cent for the best names. At the close the market ruled firm, and, according to leading bankers, there is not likely to be any material easing off in rates until after the January interest and dividends have been disbursed.

The Stock Market

Practically the only thing which served during the past week to check the rising current of values on the Stock Exchange was the unexpected announcement, on Monday last, of the suspension of three Chicago financial institutions. This news gave quite a chill to speculation, and occasioned some sharp declines in prices, but as soon as it became known that the trouble was to be entirely localized, the general market immediately resumed the upward course, and in not a few instances prices before the close of the week were higher than at any previous time of the year. There were other events during the week of a more or less unsettling nature, such, for instance, as the action of the Rock Island directors in reducing the dividend on the preferred stock, preparatory to passing it altogether at the time for the next declaration; the continued close working of the money market, the rise in sterling exchange to practically the gold exporting point, and the publication of the Southern Pacific's annual report, showing plainly that there is very little prospect for a dividend in the company's stock for some time to come. As intimated above, however, these matters failed of any material influence upon the general speculative situation, chiefly for the reason, no doubt, that the professional element, now so conspicuously in control, still maintained a decidedly bullish attitude, in which position they were fortified by some of the principal banking interest of this city. There were comparatively few developments of a character calculated to cause any pronounced upward tendency in values. The reports of railroad earnings received invariably made better exhibits than those issued of late, and continued unprecedented strength marked the copper metal industry, while in all branches of the iron and steel trade orders were again far in advance of the supply. The Russian situation was regarded as somewhat improved, inasmuch as it did not reach the really critical stage, while the action of the Missouri Pacific Railway directors in, declaring the usual semi-annual dividend was looked upon in a favorable light, in view of the recent reports of a reduction of this dividend. However, the speculative community was inclined to regard no news as good news, and in consequence of this sentiment prices mounted upward, except for the temporary halt ocasioned by the unpleasant disclosures made concerning the Chicago banks referred to. As in most weeks of late the speculation ran largely to shares of industrial corporations, conspicuous instances of which were Colorado Fuel, Tennessee Coal, National Lead, sugar, the copper stocks, American Smelting & Refining and the United States Steel stocks. Nevertheless, the more stable railway shares, as was the case last week, occupied a position of growing importance in the activity and advance, the most notable cases in point being Union Pacific, St. Paul, New York Central, Reading, Pennsylvania, Great Northern preferred, and Northern Pacific. The Rock Island shares were exceptionally heavy, for reasons already set forth.

In the general setback which the market received on Monday last, the stock of the Brooklyn Rapid Transit Company suffered quite a severe break, but apart from this the tendency of prices for the local traction stocks throughout the week was upward, with the demand somewhat improved over that of the previous week. One of the reasons for this condition of affairs was the decision of the Appellate Court favorable to the present incumbent of the Mayor's chair; but a much more potent one was the continued expanding revenues of all these properties which is enhancing their intrinsic value.

Philadelphia

There was a material falling off in the dealings in the local traction shares during the past week, and although the general movement of values was downward, the net losses were in most instances limited to the fractions. Philadelphia Rapid Transit was again the active feature, upward of 14,000 shares changing hands. At the opening prices advanced ½ to 33 on good buying, but subsequently there was a gradual decline to 31, on renewed agitation of 3-cent fares. At the close the price recovered slightly to 31¼, which represents a net loss for the week of 1¼ points. Another feature of the trading was the purchase of 10,796 shares of Railways General in one block at 6¼, by parties already having a large interest in the property. Later the price rose to 7. In all about 11,500 shares were traded in. Philadelphia Company was less active, about 7500 shares selling at prices ranging from 52⅛ to 51½, the latter showing a gain of ½ point. The preferred stock was practically neglected, a few small lots changing hands at 49⅞ and 50. Union Traction declined a point, about 600 shares selling at 62½ and 62. Philadelphia Traction lost ⅝, to 100¼, on the transfer of 160 shares. Other sales included American Railways at 52⅝ and 52½, United Companies of New Jersey at 271 and 270, Consolidated Traction of New Jersey at 82⅞ and 82½, and Ridge Avenue passenger at 302.

Baltimore

Very little interest was manifest in the traction issues at Baltimore during the week. The demand for them was limited, and in the absence of any marked pressure to sell, the price changes were, as a rule, without significance. United Railway issues were extremely dull, $38,000 of the 4 per cent bonds brought 92½ and 92⅜, and $12,000 of the free incomes sold at 64⅞ and 64½. Trust receipts, representing income bonds deposited, sold at 64 for $8,000. Other transactions were: $2,000 Baltimore Traction 5s at 110¼, $1,000 Knoxville Street Railway 5s at 107, $2,000 Lexington Street Railway 5s at 103¾, $4,000 Norfolk Railway & Light 5s at 95, $3,000 City & Suburban 5s at 112½, and $12,000 Charleston Consolidated Electric at 95½ and 96.

Other Traction Securities

The Chicago market was dull and featureless, North Chicago sold at 83 for twenty-five shares, and 300 Chicago Union Traction brought 11¾ and 12. The elevated issues were irregular. South Side opened at 97, and ran off to 95, but later recovered a point. Metropolitan Elevated common changed hands at 27½ and 28, while the preferred declined from 70¾ to 70. Northwestern sold at 24½ for a small lot. The feature of the Boston market was a loss of 3 points in Massachusetts Electric preferred, from 61 to 58, on the exchange of about 600 shares. The common also was weak, 250 shares bringing 15. Boston Elevated ruled strong, the price rising from 153 to 154½, and closing at 154. Boston & Worcester common brought 28, while the preferred brought 73 and 75½. Boston & Suburban preferred changed hands at 63. West End common sold at 98 and 98½, and the preferred stock at 113½ and 114. In the New York curb market, Interborough Rapid Transit developed considerable activity and strength, upwards of 27,000 shares being traded in at from 210 to 224, and back to 218. New Orleans Railway issues also displayed decided strength, 1800 shares of the common selling at from 38 to 38¾, while several hundred shares of the prefered brought 85 and 86.

Little activity in Cincinnati. Cincinnati, Newport & Covington once more lead in the trading, about 900 shares selling with an advance from 48¼ to 49¼. The preferred advanced from 96½ to 97¼. Cincinnati Street Railway sold at 146¾ to 147. Toledo Railways & Light sold at 32¾.

Northern Ohio Traction & Light continues its upward move in Cleveland on reports of dividends and the sale of a large block of the securities in Montreal. Nearly 3000 shares sold with an advance from 32 to 34 (buyer 60 days.) Aurora, Elgin & Chicago common and preferred moved up on indications that the merger with Elgin, Aurora & Southern is soon to be carried out. The common advanced from 32 to 36½ and the preferred from 92 to 99½; this stock is not yet paying any dividends, yet it sold for more than the 5 per cent bonds—98¼. Elgin, Aurora & Southern advanced from 45 to 49¼. Lake Shore Electric issues continue active, the common advancing from 16 to 17 and the old preferred from 68 to 68½. Western Ohio receipts joined in the upward movement from 18⅛ to 19. Cleveland Electric Railway came in for considerable activity on intimation that the dividend might be increased to 5 per cent, and it sold up from 82½ to 83½. Inquiries for large blocks of Cleveland Electric stock and the recent visit of Randall Morgan and W. Kesley Schoepf, who made a personal inspection of the Cleveland Electric properties, add strength to the reports that the so-called Widener-Elkins syndicate is again seeking to buy or lease the Cleveland city properties. This syndicate made a bid for the property four years ago at the time of the Everett-Moore embarrassment. It is believed that the syndicate will not attempt to enter the Cleveland field unless the franchise controversy can be cleared up on a satisfactory basis. Mayor Johnson has held several meetings with the Philadelphia people, but the officials of the road state that they have not been approached on the subject of sale or lease.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Dec. 13	Dec. 20
American Railways	52½	52
Boston Elevated	153	154
Brooklyn Rapid Transit	86	88
Chicago City	200	198
Chicago Union Traction (common)	11¾	12⅛
Chicago Union Traction (preferred)	—	—
Cleveland Electric	83	80
Consolidated Traction of New Jersey	81	81
Consolidated Traction of New Jersey 5s	107½	107½
Detroit United	94¼	94¼
Interborough Rapid Transit	*210	218
International Traction (common)	35½	36¾
International Traction (preferred) 4s	75½	75½
Manhattan Railway	163	163
Massachusetts Electric Cos. (common)	15	14
Massachusetts Electric Cos. (preferred)	60	58
Metropolitan Elevated, Chicago (common)	27½	27
Metropolitan Elevated, Chicago (preferred)	70	68
Metropolitan Street	118⅝	120⅞
Metropolitan Securities	73½	75⅝
New Orleans Railways (common), W. I.	38	37½
New Orleans Railways (preferred), W. I.	84½	85
New Orleans Railways, 4½s	91	90½
North American	100	99
North Jersey Street Railway	25½	25
Philadelphia Company (common)	51⅞	51¾
Philadelphia Rapid Transit	32½	31
Philadelphia Traction	100¾	100¼
Public Service Corporation 5 per cent notes	95	95½
Public Service Corporation certificates	66	66
South Side Elevated (Chicago)	97	97
Third Avenue	121	124
Twin City, Minneapolis (common)	114¾	116½
Union Traction (Philadelphia)	62	62
West End (common)	98	98
West End (preferred)	113½	113½

* Ex-dividend. W. I., when issued.

Iron and Steel

The "Iron Age" confirms the report that the United States Steel Corporation has on its books orders aggregating 7,300,000 tons. No one fact could better serve to show the condition of the steel works and rolling mills of the country, since it is well known that the other large companies are similarly committed for their full capacity for a long period to come. The scarcity of steel is indicated by the fact that the Ohio works of the Carnegie Company will be taken off from rails and put on sheet and tin plate bars in January. It was hoped that the wire trade would slacken this month so that steel could be diverted, but the pressure on the wire mills is too great. The structural trade is working under tremendous pressure, the open winter facilitating outdoor operations. A very heavy tonnage is coming up for bridges for railroads. There is a heavy export business in progress. The cast-iron pipe industry continues to flourish.

NEW YORK CENTRAL HOLDING COMPANY INCREASES CAPITAL

A certificate of increase of capital stock of the Mohawk Valley Company, which was incorporated last February, has been filed with the Secretary of State, raising the capital from $100,000 to $10,000,000. The report is persistently circulated that Horace E. Andrews, president of the Syracuse Rapid Transit Railway Company, the Utica & Mohawk Valley Company, controller of the Cleveland railways and of the Vanderbilt-Andrews syndicate, which recently acquired the electric railway and lighting plants of Rochester, will leave Cleveland interests and devote himself to the management of the electric railway projects of the New York Central, William K. Vanderbilt, Jr., to continue in charge of the financial end of the projects. It is credited among street railway men that the increase of the Mohawk Valley Company means a decided movement toward the accomplishment of the trans-State electric railway by the Andrews-Vanderbilt syndicate, which controls practically all the important electric railway systems between Buffalo and Albany, including the Rochester, Syracuse, Utica and Schenectady systems.

AURORA, ELGIN & CHICAGO AND ELGIN, AURORA & SOUTHERN TO CONSOLIDATE

Plans for consolidating the Aurora, Elgin & Chicago Railway Company and the Elgin, Aurora & Southern Railway Company are being worked out by the Mandelbaum-Wolff interests, of Cleveland, which control both of these properties. It is stated that a new company, with a capital stock of $6,000,000, divided equally between preferred and common stock, will be formed. Aurora, Elgin & Chicago preferred stockholders are to receive $1,800,000 of the new preferred stock, and the Elgin, Aurora & Southern stockholders will receive $1,200,000 of the new preferred. The common stockholders of the Aurora, Elgin & Chicago will receive 100 per cent in the new common stock. The bond issue will probably be $5,000,000, equal to the combined issues on the two properties, and a second mortgage issue will be authorized to take care of floating debt and provide for needed improvements. The net earnings of the two properties this year will be about $495,000. Fixed charges on bonds, preferred stock and taxes will amount to about $447,500, leaving about $47,500, or about 1¾ per cent for common stock. The mileage of the Aurora, Elgin & Chicago consists of 56 miles, not including the terminals in Chicago, but including 21 miles of double track, total mileage, therefore, of 82 miles. The Elgin, Aurora & Southern has 69 miles of single track. The former is a third-rail system, while the latter is equipped with the overhead trolley system. Meetings of the stockholders to decide on the consolidation will be held about Feb. 1, and the merger will undoubtedly become effective soon thereafter.

OPENING OF WEST SHORE ELECTRIFIED SECTION BETWEEN FRANKFORT AND HERKIMER

The electrified section of the West Shore Railroad between Frankfort and Herkimer, N. Y., was officially opened on Dec. 14, when a party of 100, including visiting railroad men, officials of Utica, Little Falls, Frankfort, Ilion, Mohawk and Herkimer, and representatives of the daily and technical press, made a trip of inspection over the route as the guests of C. Loomis Allen, general manager of the Utica & Mohawk Valley Railway Company. The electrified section was described in the last issue of the Street Railway Journal. The installation is one of the few examples in this country of a stretch of track used jointly for steam and overhead trolley operation. The section from Frankfort to Herkimer is 3.17 miles long, and will be used jointly by steam trains of the West Shore Railroad and electric cars of the Utica & Mohawk Valley Railway. It forms a very important "cut-off" in the through route of the latter company between Rome and Little Falls, thereby reducing the time by from 10 to 40 minutes between Utica and points east on the Utica & Mohawk Valley route.

For the official opening three of the large interurban cars were provided for the party, and a quick trip was made from Utica to Little Falls and return. The cars left the station in Utica at 2:49, reached Herkimer at 3:22, and arrived in Little Falls at 3:36, the actual running time being 47 minutes. At Little Falls a short stop was made while the guests enjoyed the hospitality of General Manager Allen. Returning, the cars left Little Falls at 4:04, arriving in Utica at 4:52, a brief stop having been made at the West Shore station in Ilion. The regular schedule over the cut-off went into effect Dec. 15.

As stated in the last issue the overhead line on the cut-off is built with catenary suspension, supported on bracket side-pole construction. The Ohio Brass Company furnished the brackets and insulation for the catenary, and the Westinghouse Company supplied the suspensions.

HUGH J. McGOWAN RESIGNS FROM INDIANAPOLIS TRACTION & TERMINAL COMPANY TO BECOME HEAD OF MERGER COMPANY—R. I. TODD, OF PROVIDENCE, HIS SUCCESSOR

Hugh J. McGowan has announced that on Jan. 1 he will retire from the management of the Indianapolis Traction & Terminal Company, in order to devote his attention to perfecting the merger of nine Indiana and six Ohio interurban companies, plans for which have been making for some time. Mr. McGowan will, however, retain his position of president of the company, in which capacity he will be at all times in touch with the affairs of the company without the close application to details that the duties of manager forced upon him. Mr. McGowan announced his successor as R. I. Todd, of Providence, general manager of the Rhode Island Company.

Mr. McGowan's career is familiar in all its details to most of the readers of the Street Railway Journal, through an extended character sketch of him which appeared in the issue of April 20, 1901. Briefly, it is this: Born at Liberty, Clay County, Mo., Jan. 25, 1857, of Irish parents. Migrated when 18 to Kansas City, where he secured a position in the Wabash Railroad Company's yards. Later he accepted service as a stable boy with the Corrigan brothers, who owned a mule line in Kansas City. This marked his entrance into street railroading. Then came his appointment to the position of conductor. Later he accepted private service with the president of one of the local banks. This position he was forced to relinquish and return to the farm, because he fell sick. On his return to Kansas City, Mr. McGowan pursued a course in a local business college in Kansas City, and later became a car accountant with the Missouri Pacific Railroad. Then followed a connection with the police force of Kansas City, which carried him from the berth of patrolman to acting captain of police. Then he entered politics, and was elected to the position of marshal for the county. In his next connection, that of representative in Kansas City of the Barber Asphalt Company, Mr. McGowan first made the acquaintance of the financial and business interests with which he is at present connected. His territory with this company was finally extended until it covered all the Central West. In 1895 Mr. McGowan straightened out the gas fight in Kansas City for the United Gas Improvement Company. He secured a new franchise for thirty years, with gas at $1.00 a thousand, and brought about the consolidation of the Kansas City and the Missouri Gas Companies. In 1899, Mr. McGowan assumed the management of the affairs of the old Indianapolis Street Railway Company, and harmonized the interests of the State, the city and the company. His achievements in this instance were the securing of a franchise which does not expire until 1934 and the consolidation of the different lines operating in the city.

Mr. McGowan's connection with the new company will be as president of the Indiana companies. For the Ohio companies W. Kesley Schoepf, of Cincinnati, will act in a similar capacity.

The career of Robert I. Todd, who is to succeed Mr. McGowan as manager of the Indianapolis company, is the direct antithesis of that of Mr. McGowan. Mr. Todd has been in charge of the properties in Providence, Pawtucket, Central Falls and other places which are in control of the Rhode Island Company for several years, and has made an enviable record as regards efficient management. Mr. Todd is a native of New Jersey, having been born at Lakewood, Nov. 29, 1869. In 1893 he was graduated from John Hopkins. Soon thereafter began his connection with the street railway industry, his first position being as assistant superintendent of the Eckington & Soldiers Home Railway and the Belt Railway, of Washington. These companies were subsequently consolidated as the City & Suburban Railway Company, and Mr. Todd was made general superintendent and electrical engineer. In the spring of 1899 Mr. Todd resigned from this position, to take charge of the experimental work of the Compressed Air Company in New York. The following year he became mechanical engineer of the Consolidated Traction Company, of Pittsburg, and a year later he became general manager of the Cincinnati Traction Company. Subsequently he was made second vice-president of the company. In the summer of 1902 he became connected with the home office of the United Gas Improvement Company, in Philadelphia, and later was appointed as manager of this company's properties at Providence, combined as the Rhode Island Company.

Other announcements just made in connection with the new merger are to the effect that E. D. Peck will become first vice-president of the Indianapolis Traction & Terminal Company; that Chas. Murdock will become first vice-president of the Indiana systems, and that C. C. Reynolds will be general manager of the Indiana systems. Mr. Peck is at present general manager of the Indiana Company. He has been associated with Mr. McGowan since the latter came to Indianapolis from Kansas City. He had charge of the erection of the new traction and terminal building and the construction of the tracks forming the belt inside the city. Mr. Murdock is one of the directors of the Indianapolis & Northwestern line, and is interested in the Indianapolis Traction & Terminal Company. Mr. Reynolds is at present general manager of the Indianapolis & Northwestern lines.

COURT DECISION IN CLEVELAND THREE-CENT FARE FIGHT

Two important court decisions were handed down recently in the long-drawn controversy in Cleveland over the building of 3-cent fare lines. The Supreme Court of Ohio handed down a final decision in favor of the so-called 3-cent fare company in a suit brought by a property owner, enjoining the company from operating on Dennison Avenue, on the ground that the franchise had been illegally granted. Heretofore the chief battle between competing applicants for a franchise has been to secure "consents" of property owners and induce the withdrawal of "consents" given by a rival company. The question has been fiercely contested as to the particular stage of the game when the withdrawal of a consent can no longer be legally made. This question was settled by the Supreme Court. Under a recent State law the city is obliged to grant the franchise to the party making the lowest bid, providing it has the required number of consents. The court in this decision holds that the required "consent" is for a street railway without regard to the corporation obtaining it, and that if the "consents" of rival companies added together make the required majority, the city must grant the franchise to the lowest bidder. The decision settles a long series of legal fights over the securing of "consents," and the Forest City Railway Company may now operate over the 2 miles of track which have been buried in the mud of Dennison Avenue for the past three years.

The Cleveland Electric Railway scored a point in the Central Avenue case. Some time ago the company's grant on this street was declared to have expired, and a grant was made to the Forest City Company. The Circuit Court has now affirmed the decision of a lower court, which decided that the franchise of the Forest City Company is not valid, because it was granted under a law providing for a renewal of a franchise. The court held that a renewal of a grant must be to a company already operating the line. The injunction prohibiting the Forest City Company from using the line remains in effect. The city may now readvertise for bids on this street.

FIRE DESTROYS MT. LOWE PROPERTY

The Pacific Electric Railway Company on Saturday, Dec. 9, suffered a severe loss by mountain fire on its famous Mt. Lowe line. Every building on Echo Mountain excepting the astronomical observatory was destroyed, including the power house that served the incline railway, the Casino and the company's hotel. The Mt. Lowe extension and the famous searchlight were also consumed. The power house and all the valuable machinery it contained are a total loss. The loss is estimated at about $200,000. The fire started in Rubio Canyon, and quickly swept the mountain side all but clean. Because of the difficulty encountered in the construction of buildings above the incline, where every stick of timber must be raised by laborious effort, the expense of rebuilding will be far greater than if the work were to be done in the valley.

CHICAGO TRACTION MATTERS

At the meeting of the Chicago City Council, held Dec. 20, a communication, signed by President T. E. Mitten, of the Chicago City Railway Company, was received, to the effect that Mr. Mitten's company would not accept the franchise ordinance now under consideration if material changes were made in it. The communication was as follows:

In view of the fact that the pending ordinance in regard to the street railways of the Chicago City Railway Company requires that the company should assent to it and become bound by its provisions as a contract, it is perhaps due to your honorable body that the company, as one of the parties to such proposed contract, make known its position in advance of action upon the same in the Council.

The company, for the purpose of determining what it was possible for it to do under the conditions imposed by the proposed ordinance, secured the services of the well-known street railway experts, Ford, Bacon & Davis, of New York, who have now completed a most thorough and comprehensive investigation of the property, and the conclusion arrived at, resulting from such investigation, has been that the company could not, under any circumstances, make greater concessions or assume greater obligations than those now required by the terms of the pending ordinance.

I beg leave, therefore, on behalf of the company, to say that the company could not accept the ordinance if the terms and conditions imposed upon the company are made more onerous or burdensome than those contained in the ordinance as it now stands. Respectfully yours,

T. E. MITTEN, President.

Judge Grosscup, as receiver for the Union Traction Company, has appointed John Maynard Harlan as one of the counsel for the Union Traction Company, to represent the people of Chicago in the pending discussions over franchise ordinances. Judge Grosscup states that in addition to the interests of the traction companies and those of the bondholders, the receivership also represents the interests of the public, and to take care of these Mr. Harlan was appointed.

ERIE TO BUILD AN ELECTRIC LINE

Following closely the announcement last week that the Pennsylvania had let a contract for equipping with electricity one of its Philadelphia-Atlantic City lines, came a statement from the Erie Railroad of plans which it has developed for building an electric railway from Binghamton, N. Y., to Corning, a distance of 76 miles. The new line will parallel the present line of the Erie between these two points, and is intended to care for local passenger traffic. The surveys for the line are to be made immediately, and the contracts for the construction work will be let probably in January.

The Erie management, in building this line from Binghamton to Corning, is forestalling the construction of lines between those points by outside interests. By being the first to occupy this particular territory with electric lines, the Erie believes that it will prevent the competition from such lines with which the other roads mentioned have been obliged to contend. The cost of the electric line, it is understood, will be provided out of the proceeds of the recently authorized $12,000,000 issue of convertible bonds.

The Erie's new line from Binghamton to Corning will be built along the present right of way, making a third standard track adjoining the two tracks which the Erie now has in operation between these points. The line will be so constructed that it will be available for the operation of the company's regular trains should occasion arise for such use of the new tracks. If the traffic on the new line warrants it, a fourth track, also equipped electrically, may be added.

The line, starting from Binghamton, will run through the towns of Union, Owego, Southboro, Waverly, Chemung, Elmira and Horse Heads, ending at Corning, where the northern line of the Erie diverges from the main line. There will be considerable local passenger traffic along the new line, and it is hoped to relieve the Erie's main tracks of its burden, leaving them to be used for through trains and freight. It is probable that trains will be run on the electric line at intervals of an hour, or perhaps even closer together.

No decision has yet been reached by the Erie officials in regard to the electrification of its suburban lines running out of Jersey City. It is the ultimate intention of the management to electrify these lines, but how soon and in just what manner has not been determined.

It is altogether possible that the further electrification of the Erie's lines will be undertaken at various points before the work is begun on the road's lines in New Jersey.

ELECTRICITY ON THE CUMBERLAND VALLEY RAILROAD

If the conversion of the Dillsburg & Mechanicsburg branch of the Cumberland Valley Railroad Company into a combined steam and electric line should prove a success—and of this Superintendent G. H. Bartle, of the Valley Traction Company, who is directing the work, has not the slightest doubt—the company will next proceed with the transformation of the Waynesburg branch into an electric line. This line is 13 miles long, whereas the Dillsburg & Mechanicsburg is but 9 miles. The work of bonding the latter line is completed, and a passenger coach of the Cumberland Valley Railroad has been remodeled and fitted for trolley service at the railroad company's shops in Chambersburg. The Dillsburg & Mechanicsburg line has been resurveyed for the planting of the poles, some of which are in position. These poles are cemented into the ground at a depth of 5 ft. or more. They are placed 8 ft. from the rail, and have an arm 6 ft. long. Wire is strung at a distance of 1 ft. from the end of the arm. The stand for the trolley pole is placed on the side instead of the center of the car, and a 0000-wire is used instead of the usual 00-wire. It is the company's purpose to continue the use of steam as a motive power for the freight traffic on the Dillsburg & Mechanicsburg as well as on the Waynesboro branch.

All the wire has arrived for the sub-power stations, to be erected at Trindle Springs and Carlisle, and when these are completed the present small plant at Carlisle will be abandoned. The sub-stations will be equipped with 300-kw generators, transformers and switchboards. The company will then have about four times the power now needed, and expects to cut down the schedule of through cars between Harrisburg and Carlisle from 2 to 1½ hours.

The two 44-ft. semi-convertible cars recently received from the J. G. Brill works have given so much satisfaction that the company has placed an order for four more of the same type, to be delivered by April 1, 1906. These cars are the largest and most modern of any now in use in inland Pennsylvania. They are 32 ft. long inside, with a 6-ft. platform at each end, and are equipped with two Brill 27-G. 1. trucks, with 4½-in. axles, 33-in. wheels, with 2½-in. tread and ⅞-in. flange; have the Lehigh Car Wheel Works wheels, four 101-B Westinghouse motors, having a capacity of 40 hp each; 28-B controllers, automatic circuit breakers, No. 6 trolleys, Westinghouse air-brakes, Crouse, Hinds & Company Imperial arc headlights, Adams & Westlake Company markers (showing red, white and green lights), Heywood Bros. & Wakefield Company 36-in. rattan seats, with revolving foot rest; leaving a 25-in. space for aisle, with longitudinal seats at either end. The cars are lighted by three series of eight incandescent lights each, arranged along the sides of the roaf, have electric push buttons, twelve Consolidated electric car heaters under the seats, bow-window sills with arm rest.

One special feature of these cars is that the windows are pushed up into the sides of the car instead of dropped during warm weather. There are no fender gates, but doors, so arranged that the upper portion can be removed in the summer time. The signal and fare register cords are suspended through the center of the car, allowing the conductor to use them without reaching over the heads of passengers. International fare registers are used. The cars also have rolling waterproof blinds, and the roof extends out over the platforms and sides, all the plates for sills and roof being of steel. The body of the car is made of oak and the inside finish is poplar. The cars are painted in Tuscan red with cream yellow trimmings. The use of the markers on these cars (are at each end) has reduced the percentage of accidents to a marked degree, and greatly facilitates the placing of blame upon an employee in case of accident.

It is confidently believed that inside of a few years the Valley Traction Company will extend its system as far as Chambersburg, thus relieving the Cumberland Valley Railroad Company (owner of the system) of much local passenger business that now hampers the increasing freight business of the line. The acquirement of another electric railway in the territory now occupied by the Valley Traction Company is also expected before long.

GOULD IN SOUTHERN CALIFORNIA INTERURBAN

The Pasadena, Verdugo & San Fernando Railroad Company has been incorporated in Los Angeles with a nominal capitalization of $25,000. According to reports, the company eventually is to be heavily financed by Gould interests, and is to build a line to parallel the Huntington electric railways to Pasadena, and to secure for Gould a possible gateway to the Pacific Coast. The directors of the new company are M. A. King, Gilbert S. Wright, C. J. Fox, R. H. Brown, Martin C. Marsh, Dr. H. B. Wing, Fred. L. Sexton, W. S. Brent and E. S. Jones. Since the organization of this company, Mr. Huntington has ordered proceedings rushed on his Eagle Rock line to cut out the rival road and preserve his right of way, which was recently presented to him by the citizens of that district. Several carloads of steel have been piled up near the city limits, and officials of the company declare that work will start within two weeks. Meanwhile, the Salt Lake road has announced that it will start work shortly on an extension of its line north through the San Fernando Valley.

CLEVELAND-CHICAGO CONNECTION

Clevelanders have let contracts for an electric railway to connect Cleveland and Chicago. The road they are building is the Chicago, Lake Shore & South Bend Railway, and it is one of the essential links in a chain of Cleveland-controlled roads reaching from Cleveland to Chicago. Edwin Hanna and J. B. Hanna are interested.

Out of Cleveland the Lake Shore Electric will be used through to Toledo, or to Fremont, where connection will be made with the extension of the Western Ohio, which will carry the line to Lima. From there a road is projected through to Fort Wayne, Ind., which is to be completed this coming year. There is yet a gap covering part of Allen County, Whitley County and a part of Kosciusko County. The Hanna lines take up the thread there. The present extension of the Hanna lines is to extend from Warsaw through Marshall, Laporte and Porter Counties to a connection with the Hanna road already in operation, which extends from Indiana Harbor to South Chicago. At the latter point connection will be made with the Illinois Central at Kensington Street. Another possible connection for the new road is the Lake Shore Electric through to Toledo and the Toledo & Chicago line to Warsaw, and the Hanna lines on to the west. This line is already projected for an extension into the Chicago territory. During the past few months stories have been abroad that the connecting link between the Hanna lines at Warsaw and the line into Fort Wayne is to be built, but these have not reached the stage of definite announcement. Plans are expected before the opening of spring. It is announced that the Hanna lines will begin construction in the spring. The completion of the new line will also make direct connection between the Western Ohio and the Cincinnati, Dayton & Toledo, which will give a traction line from Cincinnati to Chicago. More than half of the traction lines are already in operation. The Hanna line and the Fort Wayne line from Lima will be completed before the close of 1906. It is now believed that the through cars will be running from Cleveland to Chicago before the end of 1907. The delay will be in the construction of the links between Fort Wayne and Warsaw.

NEW BRIDGE TERMINAL PLANS

Detailed plans for the underground terminal at the Manhattan end of the Williamsburg Bridge, New York, have been presented to the Municipal Art Commission. They involve many changes in the bridge proper, and very material changes in Delancey Street. The plans, as drawn, provide that the cars from the Manhattan lines shall continue to run on the surface. Only the Brooklyn trolleys and elevated cars will have a terminal underground.

It will be necessary to reconstruct the elevated roadway to the bridge for a considerable distance. The structure holding the elevated tracks will be lowered so that they can be brought under what is now the roadway of the promenade. This roadway, which now slopes gently to grade at the end of the bridge, will be raised so that it will practically become a second story. It will be laid out as a plaza, surrounded by an ornamental rail.

The approach to this plaza will be up a stairway of ornamental design, which will occupy the space where the Brooklyn trolleys now have a terminal. The treatment of this terminal wall will be highly artistic.

On Delancey Street there will appear two long stations between Norfolk and Suffolk Streets. These will be the entrances to the underground terminal. The Manhattan surface cars will be run close to the curbs of these stations, thus taking them from the side of the street where they are now.

There will be eight trolley loops underground for the Brooklyn cars and separate stairways will lead to each loop. The elevated trains will run in to the side of the trolley tracks, and ample provision for switching facilities is made in order that there will be no delay in that particular. Just as soon as the Art Commission has approved the plans the bridge department will invite bids.

NEW LINE BETWEEN LOWELL AND BOSTON

Promoters of the project for an air-line electric railway between Lowell and Boston are beginning to show some activity before the local authorities in the cities and towns through which they propose to run their line. A short time ago they had a hearing in the town of Burlington on the question of a 4-mile location there; and last week they took up almost 2 hours of time before the Aldermen of the city of Somerville urging their claims to a location. It developed at this last hearing that they propose to run their line from the Sullivan Square terminal of the Boston Elevated Railway as far as the limits of Somerville, on an overhead structure. They make the plea for this method of construction on the ground that Somerville is thickly built up, and that only on an elevated road could high speed be attained. Prof. William L. Hooper and Secretary Henry G. Chase, of Tufts College, were present at the hearing, and spoke in favor of the project. The line as projected would run close beside the hill on which Tufts College is located. The form of roadbed proposed for the elevated structure is 6 ins. of crushed stone instead of wooden sleepers, and the claim was made that this would enable the company to operate trains with practically no noise. The Somerville board took the matter under advisement, after giving an opportunity for remonstrance and not hearing any.

Charles F. Remington, the promoter of this line, has been interested in times past in other similar projects in the Southeastern part of the State. Lowell men understood to have become interested in it are Paul Butler, Congressman Butler Ames, George M. Harrigan and George Fifield; with Major Thomas Talbot, of Billerica, and Oakes Ames, of Easton. The Remington plan is a double-track railway from Somerville through Arlington, Lexington, Woburn, Burlington, Bedford, Billerica and Lowell, with not a single grade crossing, with no grades of more than 2½ per cent, and no curves of more than 2½ degrees, with a small fireproof concrete station at every cross-road, and a Lowell terminus at Tower's Corners, in Williams Street. The plan is to run 15-minute trains of three cars, multiple-unit system, and to cover the distance between terminals in 43 minutes. The line as projected is said to be more than a mile shorter than the straightest route by the Boston & Maine Railroad.

BROOKLYN EMPLOYEES ENTERTAINED

Another of the special winter entertainment features of the Brooklyn Rapid Transit Employees' Association was given at the main club house at East New York on Thursday evening, Dec. 14. There was a concert by the regular association band, composed of employees of the company, a series of moving pictures and a series of illustrated songs. The practice of the association in making entertainments of this kind free to employees and their families was followed in this instance, and the appreciation of the men was evidenced strongly by the goodly number in attendance. Upward of a thousand persons are estimated to have been present at the entertainment.

Five numbers, all programme music, were first given by the band, after which followed the illustrated songs and the moving pictures. All of these were up to the standard of excellence set by the association on previous occasions of this kind. Bandmaster Mygrant was several times compelled to repeat numbers, so persistent was the audience in its applause. The moving pictures and the songs were equally as well received.

During the entertainment the association announced that it had arranged to give, some time in January, an entertainment for a week similar to that given last year at the club house. At that time an excellent vaudeville programme was arranged, made up of the best talent showing in the city, and there was given a run of a week, which afforded every employee and his family an opportunity to attend. On the occasion of the theatrical last year the company provided free transportation to and from the club house.

What, with its regular educational work, its bowling tournaments, its band concerts, its special entertainments and other features, there always is something doing along social lines for the employees. Best of all, these things are carried out with the end in view of making them equally available to every employee, no matter what may be his hours of service.

THE DES MOINES FRANCHISE CONTROVERSY

The first stage in the hearing of the quo warranto proceedings brought by the Des Moines Civic League and the County Attorney against the Des Moines City Railway and the Interurban Railway, attacking the franchise rights of the two companies, was completed recently, and the decision of the judges was a mixed victory for both the Civic League and the companies. The judges heard arguments on the demurrer of the companies, the attorneys for which contending that the Civic League had no authority to bring the suit and that the whole proceedings should be thrown out of court, on the ground that the companies had not been served with notice. The attorneys for the Civic League contended they had authority to bring the proceedings by virtue of the waival of the County Attorney, and that notice was not required in quo warranto proceedings under the laws of Iowa. The feature of this hearing was the appearance of Jefferson S. Polk, president of the Des Moines City Railway Company, in court as an attorney for the two companies. His argument was considered the best of the series, although he had not appeared as an attorney in any case for forty years. The judges rendered their decision on the demurrer Dec. 9. The following is a synopsis of their findings:

"The court has jurisdiction to determine on motion whether the relators (the Civic League) shall be permitted to maintain action. That the privileges exercised by the two railway companies are franchise privileges as distinguished from mere easements. That quo warranto is the proper remedy to test the rights of the defendant companies to such franchise privileges. That the wrong sought to be redressed is a public wrong, as distinguished from a private injury, and that the Civic League have no interest therein other or different from the public, and that, therefore, the action must be maintained in the name of the State of Iowa, on relation of the County Attorney, and not by private relators."

The court also states that the County Attorney may secure legal assistance in pushing the quo warranto proceedings, so while the Civic League is ruled out of court, the attorneys for the League will probably be retained by the County Attorney. The hearing on the quo warranto proceedings proper will probably be held during the January term of court. Under agreement between all parties there will be no appeal from the above decision.

The movement to secure an agreement between the Des Moines City Railway Company and citizens of Des Moines has been progressing quite rapidly during the past ten days. A meeting, attended by the officials of the two companies, the officers of the Commercial Club, the members of the City Council and other prominent citizens, was held several days ago, and a sub-committee of fourteen was appointed to draw up an agreement in the shape of a franchise, which would be acceptable to all parties, and have this ratified by a mass-meeting of the citizens, and then voted on at a special election. If it carries, this franchise is to take the place of all others held by the two companies during the term of twenty-five years, even if the courts should finally hold that the Turner franchise is a perpetual franchise. The committee has now been at work several days, and the following are the main provisions of the contract, or franchise, which have been agreed upon by the officials of the company and the members of the committee:

1. The contract, or franchise, is to be in force for a period of twenty-five years.

2. That the Des Moines City Railway Company pay to the city of Des Moines, for the use of the streets and in lieu of all other taxes and assessments, a percentage of its gross earnings, as follows: Six per cent annually for a period of five years, 7 per cent annually during the next five years, 8 per cent annually during the next five years, 9 per cent annually during the next five years, and 10 per cent annually during the last five years, which sum, so paid, shall be devoted as follows:

A. A portion in lieu of general taxes, which shall be apportioned to the State, county and school districts, and the general fund of the city in the proportion provided in the general law for the distribution of direct taxes collected.

B. A second portion to pay for paving between the rails of said railway company on streets ordered paved by the city, and the surplus of said fund to be devoted to repair of paving outside of the rails of said street railway company on streets traversed thereby.

C. The third portion to be applied to a sinking fund to be invested at interest and applied by the city to the purchase of the property and all rights of the Des Moines City Railway Company, such purchase to be effected at the option of the city at such time and as may be agreed upon, and at a price to be fixed by a disinterested board of three appraisers, to be appointed by the judge of the United States District Court of the district in which Des Moines is situated, such purchase to be approved by the electors of the city at a special election, called for that purpose. In the event of such purchase, the city is to operate same under leases to an operating company, at a rental thereof of a percentage of the gross receipts or a fixed sum in cash. Such leases to be for limited terms.

3. That during the period of the agreement the Des Moines City Railway Company shall grant to all interurban railway companies equal rights and privileges in the matter of connections, interchange of business and entrance of their cars into the city of Des Moines over their tracks.

4. That the present custom of selling tickets at the price of six for 25 cents and a free transfer of passengers from line to line be preserved without restriction, unless the company, after paying the percentage of gross earnings above provided for, does not have sufficient money left from the net earnings to pay the interest on its bonds, in which case the company can charge a fixed fare of 5 cents. (This concession was incorporated at the request of N. W. Harris, of Chicago, who has floated all the bonds of the street railway company, and who came to Des Moines to take part in the drafting of the contract or franchise.)

5. That the Des Moines Street Railway Company shall furnish to the executive of the city an adequate amount of tickets for transportation over its lines, such transportation to be distributed among the various employees of the city, for use while in the discharge of their duties, and that all free transportation in excess thereof be prohibited.

It is the general opinion of all interested that a contract or franchise with the foregoing provisions incorporated therein will be ratified and adopted by the people. The object of clause 5 and sub-clause *b* under clause 2, is to remove all causes for the street railway company from taking such an active part in city politics. The company has always considered that it had to take a hand in order to protect its interests. The adoption of this contract, which grants the company an extension of twenty-five years, provides for the city to pay for the paving between the rails and compels the company to give free transportation to the city officials, will remove all reasons for the company interfering in city politics. The officials of the company have agreed to all the provisions set out above, and they will offer no opposition to the adoption of this contract or franchise. What they want is a tangible settlement of present difficulties, so they can assure the bondholders and others interested that the property of the company is safe. The quo warranto proceedings will be pushed to a conclusion, and the company will try to prove that the Turner franchise is a perpetual one. If the company loses the case, they have the new franchise to fall back on; if they win they have a property with a greatly enhanced valuation on account of the perpetual franchise, and they will thus secure more money for it when sold to the city. It is estimated that the 6 per cent of gross earnings will amount to from $36,000 to $40,000 annually, that the general taxes of the company will amount to $15,000, and the special paving assessments from $10,000 to $12,000 annually, so there will be left from $10,000 to $15,000 annually to be turned into the sinking fund, which will at the end of twenty-five years be used to purchase the rights of the company for the city. The amount turned into this fund will increase each year aside from the increase every five years due to the graduated percentage provision.

TRACTION RIGHTS DENIED IN ILLINOIS

Judge Thompson, in the Superior Court, sitting in Chicago, has handed down a decision concerning rights of street railway companies to condemn land, which, if sustained by the Supreme Court, will seriously affect the plans of the different interurban companies now operating and being formed in Illinois. Judge Thompson denied the petition of the Chicago & Southern Traction Company to condemn private property along its proposed right of way between Chicago and Kankakee. The attorneys for the traction company maintained their right to condemn private property along the right of way under the right of eminent domain given to railroads under the general railway act. The company was incorporated under the general railway act to construct and operate a street railway between Chicago and Kankakee, and had asked the Superior Court to condemn several pieces of property which it was said was necessary for the construction of the street railway. In refusing the petition Judge Thompson took the position that the incorporation of the traction company under the general railway act to conduct a street railway, when there is a specific act of the Legislature for the incorporation of the latter class of railways, was wrong, and the company could not ask for the privileges of a regular railroad while enjoying the immunities of a street railroad. The court further held that the Chicago & Southern Traction Company could not exercise the right of eminent domain in the present case without presenting the proper cause for the condemnation of the lands.

QUESTIONS ON SUBJECTS TO BE DISCUSSED AT THE MILAN CONVENTION

The International Street & Interurban Railway Association (Union Internationale de Tramways et de Chemins de Fer d'Intérêt Local) has issued from its headquarters in Brussels a list of questions for five of the topics to be discussed at the Milan Convention next September. To all of these questions the members of the association are expected to reply. The other questions will follow later:

II.—MECHANICAL BRAKES

Reporters: M. Petit, engineer and division superintendent of the Société Nationale des Chemins de fer vicinaux, of Belgium, and M. Scholtes, general manager of the Tramways of Nuremberg-Furth. Note—By mechanical brakes only electric, magnetic and air brakes are to be considered. The replies are to cover only those systems of brakes in permanent use. In the case of electro-magnetic brakes, specify if the brake is used only as an emergency brake. Where exact replies are impossible, give approximate data, and state the basis for the approximation.

1. For how many years has your system been equipped with electric traction?
2. What is the length in kilometers of route?
3. What is the gage?
4. What is the maximum grade, its length, the total length of the grades between 3 per cent and 5 per cent, the length of the grades over 5 per cent?
5. Number of motor-car kilometers and trail-car kilometers run during the last fiscal year.
6. What is the minimum headway and for what length of line is this minimum headway in use?
7. Give total number of motor cars, number of single and double-truck cars, number and type of motors, weight of cars empty, number of cars equipped with electric brakes, number of brake points on controller and their resistance in ohms, number of cars equipped with short-circuiting brake, disc brake and solenoid brake, number of cars equipped with air brakes, air-brake system, whether a hand-brake is also used, and whether the air compressor is motor or axle driven?
8. Give total number of trail cars, number equipped with single and double trucks, weight empty, number equipped with disc electric brakes, solenoid brakes and air brakes. Indicate in each case the number of axles braked.
9. Were the brakes installed when the cars were purchased or later? Reply both for motor and trail cars.
10. Was the braking system selected by yourself or required by the authorities?
11. Have you made any comparative tests of braking systems? If so, give results, specifying rate of acceleration, weight of cars, state of atmosphere, whether rails dry, slippery or wet, number of trail cars, test on level and on grade.
12. Are sand-boxes used? State system and whether they sand both rails or only one.
13. If air brakes are used, what is the consumption of energy required to compress the air? Note—As the data on this subject vary greatly, it would be very desirable for all systems using air brakes to observe the following points: (a) Previous tests have shown that where grease lubrication is used the results are not sufficiently satisfactory; all tests should therefore be made with oil lubrication on all bearings. (b) The wattmeters should be connected in series. (c) The different tests should be made on the same car; the air compressor should be then disconnected and hand-brake and electric brake tried. (d) The different tests should be conducted under the same conditions, moreover, all outside conditions, such as atmosphere, rails, etc., should be the same.
14. What is the annual expense of maintenance of the braking system per car year for motor and trail cars? Also per car kilometer, motor and trail cars?
15. What is the first cost of braking equipment for a single and double-truck trail car?
16. Has electric braking increased the repair charge to the motors? Has it had any effect on the commutators? Have you noticed any other extra wear on motors, gears or other parts?
17. Have you had any trouble with air brakes from freezing, non-operation of the compressor, etc.? Have the tires shown any additional wear? Does the braking system require more frequent overhauling than other braking systems?
18. Which braking system do you recommend from the standpoint of safety and from that of maintenance?
19. Have you had any collisions between motor cars? If using more than one kind of brake, with which system have the most accidents occurred?
20. Which braking system do you consider most desirable for trail cars? Do you lay much stress on uniformity of equipment?
21. What has been the average consumption of energy during the last two years per car kilometer, estimating one motor-car kilometer equal to two trail-car kilometers, also per ton-kilometer, exclusive of load?
22. What is the maximum speed (a) on suburban lines? (b) on lines of medium traffic? (c) on lines of heaviest traffic?

III.—DESIGN OF CARS, ESPECIALLY AS REGARDS SIZE

Reporter: M. Geron, manager of the Cologne Tramways Company (in liquidation), Brussels.

1. What are the main dimensions of your cars as required by your franchise or by municipal enactment, especially as regards over-all width
2. Are these requirements the same for all kinds of cars, viz.: closed and open, motors and trailers, etc.? Accompany your reply with a copy of the ordinance-franchise clause.
3. What reasons are given for these requirements, especially in regard to over-all width?
4. Do you consider these requirements proper at present? Give reasons for your reply.
5. What are actually the over-all heights and widths of your different kinds of cars? Submit a cross-section showing the over-all profile, including all projections, also plan showing position of seats, form of the seat back and width of aisle.
6. What dimensions would you desire to adopt for height and width? What arrangement of seats do you prefer, longitudinal or cross? What form of back, width of seat and width of aisle? Give your reasons for your reply.
7. Do you consider a wide car accelerates the ingress and egress of passengers?
8. What is the gage of your track? What is the width between track centers on straight track and curves?

IV.—MAXIMUM SPEED FOR INTERURBAN LINES ON THEIR OWN RIGHT OF WAY OR ON THE HIGHWAY

Reporter: M. Krasa, general manager of the Bukowina Railway Company, of Czernowitz, Austria.

1. Is your interurban line operated by steam or electricity?
2. Is your traffic passenger, freight, or both?
3. What is your average speed between two consecutive stations? (a) On your own right of way? (b) On country highways? (c) On highways with medium congestion? (d) On more congested highways
4. What is your average speed between termini on the four classes of routes mentioned?
5. What is the rate of braking?
6. What is the braking distance?
7. How is the braking equipment of your trains affected by any statutes, especially as regards peculiarity of profile, speed, etc., on the four different classes of routes mentioned?
8. What is the maximum speed on these four classes of roads?
9. Is the speed governed in any respect by a statute? If so, by what authorities? Submit copy of the law.
10. What maximum speed do you think could be attained by your trains without danger? Give your reasons for your reply.
11. What maximum speed do you think could be attained economically if your trains were equipped with efficient braking apparatus on your own right of way? On country highways? On highways with medium congestion? On more congested highways

V.—TRACK CONSTRUCTION.

Reporter: C. de Burlet, general manager of the Société Nationale des Chemins de fer Vicinaux, of Belgium.

1. What size of ties do you use?
2. Why did you adopt this size?
3. Are you satisfied with this size?
4. What experience have you had with Falk or Goldschmidt or any other type of welded joint?
5. Do you use opposite or broken joints?
6. What has been your experience with opposite and broken joints?
7. Do you use lock nuts on your angle-plate bolts, and do you think it desirable to use them?

X.—ADVANTAGES AND DISADVANTAGES OF SECTIONALIZING THE DISTRIBUTION SYSTEM

Reporters: M. Fiazzoli, manager of the lighting and tramwaay company of Palermo, and Mr. Rasch, professor of the Polytechnic School at Aix-la-Chapelle.

1. Do you sectionalize your distribution system into several zones? Submit a diagram to scale showing position of the feed-in points and section insulators.
2. If you use sections, are they insulated from each other, or are they connected by fuses or circuit breakers?
3. If no sections are used, how do you locate a fault or short circuit?
4. Why did you adopt the system which you employ?
5. If sectionalized, do you obtain an economical use of all of your copper?
6. What is the maximum drop in voltage, and what the current density in your underground feeders?
7. What are the advantages and disadvantages of the two systems of distribution mentioned in the case of two tramway systems in the same city supplied with current from the same power station?

LOS ANGELES PACIFIC TO STANDARDIZE ROAD

The Los Angeles Pacific Railway Company, according to authentic reports, is making active preparations to standardize its entire system in and out of Los Angeles, comprising several hundred miles of narrow-gage track. While the officials of the company do not care to discuss their plans in detail, it is known that the company proposes to float a bond issue of from $10,000,000 to $15,000,000, part of the proceeds of which will be used for this purpose. Other noteworthy improvements involving the expenditure of vast sums of money are also contemplated. With one portion of the bond sale the company will extend and perfect its various tributary lines and local systems in San Monica and Ocean Park, and will probably construct more lines to Venice and other resorts. The scope of plans is very extensive, and many localities at present handicapped by lack of complete traffic facilities will be developed

CONSOLIDATED RUSHING WORK ON NEW LINE

The Consolidated Railway Company is pushing the work on the system which will unite Melrose, Rockville, Vernon and all intermediate points with Hartford by a trolley system which will reduce the time from the City Hall, Hartford, to Rockville to an hour. The cars will run over the tracks of the Hartford Street Railway Company, from the City Hall to a point in East Hartford just opposite the eastern end of the East Hartford freight yard, and from there over the steam tracks of the Highland division of the Consolidated Railroad to Vernon. From the Vernon station the cars will run on the steam tracks of the Rockville division to Rockville, thence on to Melrose.

The scheme will provide a double-track trolley service all the way to Vernon with the exception of a short stretch over the temporary bridge across the Connecticut River and another short stretch over in East Hartford. It will permit the operation of a service as frequent as the traffic demands.

The Consolidated Railway Company was anxious to furnish a high-speed service over the Rockville line, so that without increasing the speed west of the Connecticut River the entire distance from the City Hall to Rockville could be made in 40 minutes, but there are two factors which, at present, render it impossible to get the running time below an hour.

The first of these, as given out by the Consolidated Railway Company, is, that in order to run with the same margin of safety, the flanges of the wheels of the trolley cars must be increased in depth, according as the speed is increased. The old agreement with the city of Hartford, which President Mellen has directed shall be observed, requires the road to use the Hartford grooved rail, in which the available space for the wheel flange is limited. This fact precludes the use of cars with deep flanges on the wheels and consequently prevents the cars being run at as high speed as would be necessary to make the run to Rockville in 40 minutes.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED DEC. 12, 1905

806,761. Railway Crossing; Charles A. Alden, Steelton, Pa. App. filed May 20, 1905. Relates to a hard-metal wear-plate for street railway crossings which may be readily removed and renewed.

806,767. Ice-Removing Track Cleaner; Francis M. Bancroft, Lowell, Mass. App. filed March 22, 1905. A cutter bar provided with removable teeth is arranged diagonally in front of the car.

806,809. Semi-Convertible Car; William H. Heulings, Jr., Philadelphia, Pa. App. filed May 27, 1903. Sash pockets are formed in the side walls of the car and between the stanchions, which extend within the side sills and adjacent to the lower edges, so that the car windows may be made of maximum length, and when the car is in its open condition these sashes will be entirely inclosed and protected in the sash pockets.

806,867. Trolley Contact; Ira J. Bradshaw, Waukegan, Ill. App. filed Sept. 21, 1905. Relates to means for making electrical connection with annunciators for trolley cars designed to be located in waiting rooms for passengers, and comprises a rocking frame pivoted above the trolley and having a ball therein, which rolls from end to end when the frame is moved by the impact of the trolley wheel, thereby making the suitable connections.

807,009. Safety Apparatus for Railways; Samuel L. Adelson, New York, N. Y. App. filed June 29, 1905. At the end of each block section is placed a post having a pair of contact springs. The train has lateral arms, adapted to contact therewith, and ring a local alarm to indicate the condition of the block.

807,029. System of Electric Railways; Joseph H. Hoadley, New York, N. Y. App. filed Sept. 16, 1904. The air inlet of a gas engine is connected to the trolley pole so that when the pole is lowered the gas engine may be started to operate a separate generator.

807,053. Switch Signal; John C. Wigman, Greenbay, Wis. App. filed April 6, 1905. When the switch is opened the movement of the switchpoint closes an alarm circuit to thereby indicate the condition of the switch.

807,063. Switch-Operating Mechanism; George J. Curran, Plymouth, Pa. App. filed Oct. 14, 1905. Involves devices wherein a four-pointed star-wheel is engaged, and turned a half-revolution by a bifurcated shifting bar depending from the car platform, and adapted to be operated therefrom, a disc or eccentric being mounted on the shaft carrying the star-wheel and connected with the point-rail or switch point by a lever or system of levers.

807,089. Electrically-Driven Suspended Railway; Rudolf Pfaffenbach, Leipsic, and Herman Muller, Leipsic-Gohlis, Germany. App. filed Jan. 13, 1904. An automatically-engaging and disengaging cable system for assisting cars up a steep incline.

807,152. Car Fender; Eli Campanari, New York, N. Y. App. filed Aug. 11, 1905. Comprises a main frame, a foldable fender mounted thereon, an arm having swinging connection with the main frame, a toggle-link connection between the arm and the fender frame, a lug on the upper member of the toggle-link and a hook on the main frame for engaging with the lug.

807,171. Switch-Operating Device; Willson E. Hubbard, Dennis, Tex. App. filed April 19, 1905. A long lever extending parallel and between the track rails is attached to the switch point at one end, pivotally mounted in the roadbed, and adapted to be engaged at its other end by a cam on the car.

807,199. Magnet-Controlled Third-Rail System; Henry J. Palmer, Philadelphia, Pa. App. filed Oct. 3, 1904. An underground conduit system in which the iron cable is inclosed in a conductor rail. When the car passes the iron cable is magnetically drawn up so as to make contact with a sectional rail over which the car is passing.

807,217. Rail-Bond; William G. Stuart, Newburyport, Mass. App. filed July 14, 1904. A laminated rail-bond having its ends bent rearwardly and formed into loops and rails provided with counter-bores in which the loops are seated.

807,287. Signaling and Train-Controlling System for Railways; Frank E. Kinsman, Plainfield, N. J. App. filed April 18, 1905. A pair of contact-rails are placed along the usual track rails so as to complete a train-stop circuit on the locomotive, including a pneumatically-operated brake and power release. The rail sections are in circuit with devices controlled by the usual semaphore signals, and serve to enforce the warning displayed by the signals.

807,386. Signaling and Train-Controlling System for Railways; Frank E. Kinsman, Plainfield, N. J. App. filed July 24, 1905. A train-stop system is placed in circuit with the usual semaphore signals, and a continuously-moving recording tape is made to receive a record of the movements of the signals.

PERSONAL MENTION

MR. FREDERICK UHLMANN, formerly president of the Brooklyn Elevated Railroad, is dead.

MR. J. C. ROTHERY, division superintendent of the International Railway Company at Niagara Falls, N. Y., has resigned.

MR. FRANK W. FRAUVE has resigned as president of the Indianapolis & Eastern Traction Company, which has passed into the hands of the new consolidated company.

MR. N. C. DRAPER has been chosen general manager of the Eastern Wisconsin Railway & Light Company, of Fond du Lac, Wis., to fill the vacancy caused by the resignation of Mr. T. F. Grover, who moved to Chicago recently.

MR. P. E. FANSLER, of J. G. White & Company, was elected president of the Purdue Alumni Association of the City of New York, which was organized on Monday, Dec. 18, by about forty alumni of Purdue University living in and about New York. Mr. L. M. Grant, of the C. W. Hunt Company, was elected secretary-treasurer of the association. The association will meet on the second Wednesday of each month. The list of charter members numbers about 100.

MR. A. I. CULVER, second vice-president of the Delaware & Hudson Railroad, has been elected vice-president and a director of the United Traction Company, of Albany, N. Y., recently acquired by Delaware & Hudson interests, to succeed Mr. Francis N. Mann, Jr., resigned. It is expected that at the meeting of the board of directors of the United Company on Jan. 13, the formal entrance of Delaware & Hudson Company interests will be signalled by the election of other representatives of that company to the directorate of the United Company and to important executive positions.

MR. S. R. DUNBAR, passenger agent of the Indiana Union Traction Company, has resigned from the company, and will become associated with E. K. Dunbar & Company, of Boston, Mass., dealers in investment securities. Mr. Dunbar entered the service of the traction company about three years ago, when he went from the East to become purchasing agent of the road. Upon his arrival, in order to become perfectly familiar with his future work, he assumed the duties of storekeeper for a period of six months. On May 1 last, when Mr. H. A. Nicholl became general manager of the Indiana Union Traction Company, Mr. Dunbar was appointed passenger agent. Previous to his coming to Indiana, Mr. Dunbar was associated with Mr. A. E. Appleyard for a period of more than four years, acting in the capacity of financial agent.

CORRESPONDENCE ON DIRECT VS. SINGLE-PHASE ALTERNATING CURRENT FOR THE NEW YORK CENTRAL TERMINAL

The following correspondence has recently passed between W. H. Newman, president of the New York Central Railroad, and George Westinghouse, president of the Westinghouse Electric & Manufacturing Company. It was given out for publication as this issue was on the press, but is of such interest that the forms were opened to present it to the readers of this paper:

Oct. 27, 1905.

W. H. Newman, Esq., President,
New York Central & Hudson River Railroad Company,
Grand Central Station, New York:

Dear Sir.—There can be no more important questions before you and your officers than those involved in the present electrification plans for your New York terminal and adjacent suburban lines. When your company, under public pressure and legislative enactment, undertook the change in your terminal facilities involving the use of electric power for your cars and trains, there had been no such development of the single-phase system now actively under discussion as could warrant its adoption, and therefore the selection of the continuous-current system by your commission of engineers was an obvious outcome of the situation as it then existed, notwithstanding there had been enough progress made with alternating-current single-phase traction to warrant frequent references in my conferences with you and your officials to the possibility of that system being perfected in time for a change in your plans.

The business relations existing between your company and those I represent, and the consideration you and your officials have always given my personal views on the subject of the electrification of your railway, seem to demand the prompt fulfilment of my recent promise to set out to you in a letter the reasons why, because of the possible much greater use of electricity upon many of your lines of railway, your company could and should now change your plans providing for the use of the continuous-current, third-rail equipment, to those employing the alternating-current single-phase overhead system.

These are some of the controlling facts as they have been developed:

1. Motors can be as successfully and economically operated by single-phase alternating currents as by continuous current, with the advantage in favor of the use of the alternating current, in that the great variations in speed requirements of a railway can be more easily and economically met thereby than by continuous current.

2. Single-phase electric locomotives larger than you require have already been constructed and operated by current from overhead lines.

3. Electro-pneumatic multiple-unit control has been perfected whereby trains fitted with alternating-current motors can be better operated than those propelled by continuous current.

4. Both locomotive and car equipments with multiple-unit control have been evolved, whereby either the alternating or direct-current systems of distribution can be used.

5. If there is any desire for the use of the storage-battery system, such batteries can, with rotary transformers, be as well utilized in connections with the single-phase system as with the direct-current system.

COMPARATIVE COST

Bearing upon these great questions are the comparative costs of the line equipment of the two systems.

As an example, the comparative cost of line and sub-station installation for alternating-current single-phase and direct current to meet the conditions of traffic now existing on the section of the New York, New Haven & Hartford Railway from Woodlawn to Stamford, based on the following:

(a) Single-phase alternating current, high-tension transmission, transformer, sub-stations, 6000-volt overhead line supported by catenary construction from bridges spanning four tracks.

(b) Direct current employing high-tension alternating-current transmission, rotary converter sub-stations and third rail at 600 volts.

COMPARATIVE COST PER MILE OF FOUR-TRACK LINE

	Single-Phase Alternating System	Direct-Current System
Sub-stations	$1,714	$16,150
Contact line	12,436	18,872
Transmission line	1,815	2,181
Track bonding	308	308
	$16,273	$37,511

Difference per mile in favor of a. c., single-phase, $21,238.

COMPARATIVE COST PER MILE OF DOUBLE-TRACK LINE

	Single-Phase Alternating System	Direct-Current System
Sub-stations	$1,542	$13,840
Contact line	6,750	9,436
Transmission line	1,815	2,181
Track bonding	154	154
	$10,261	$25,611

Difference per mile in favor of a. c., single-phase, $15,350.

These figures mean, assuming that your company may in the near future electrify its main lines from New York to Buffalo, that the extra cost of the line equipment with the continuous-current system for 450 miles of four-track road of the New York Central main line would amount to $9,000,000, and for the double-track of the West Shore road, $6,750,000. From these figures you can easily compute what the additional cost would be upon the entire mileage of the New York Central's other lines east of Buffalo and those west of that point.

This great difference in the first cost of the continuous-current system, with the almost absolute certainty that traffic depending upon the third rail will be subject to many interruptions during your severe winter months, coupled with the constant danger from live third rails upon the surface, would seem to make most fortunate the advent at this moment of the complete system of overhead single-phase apparatus, before any great quantity of car and locomotive apparatus has been constructed on your order, or the line and overhead construction has been begun under your extensive plans.

Stated briefly, your situation seems to be this: Your power house and its equipment now under construction is suitable, without substantial change, as are also your sub-station rotaries and storage batteries, for the operation of single-phase equipment. Orders have been placed for 35 electric locomotives, costing, say, $900,000, and 180 electric car equipments with multiple-unit control, involving an additional $775,000. Neither the locomotives nor the cars and equipments will be needed before September of next year, according to your present desires, but most probably not before April in the year following, because of the inevitable delays in the carrying out of so important a work as you now have in hand.

Had the order for the locomotives and equipment been placed with the Westinghouse Electric & Manufacturing Company, that company would have been very glad to have taken up with you a change in programme on a reasonable business basis, and I assume that your contract relations with the General Electric Company are of such a character that you can also ask them to discuss the change in the character of equipment or arrange with them for a specific sum to cover the amount they have already expended, with such profit as they are likely to make from the completion of the work. Such sum ought to be an unimportant item as compared with the costs which may result from the completion of the work along the lines of your present plans. We are aware that the General Electric Company have admitted their inability to produce locomotives of the character which the Westinghouse Company has contracted to supply the New York & New Haven Railway, but such admission on their part does not really affect the question of the Westinghouse Company's ability to produce such apparatus in the necessary quantity and in the time required.

You know of the diametrically opposed views and interests of the Westinghouse and General companies and of the strife between them. You also know of my full recognition that the works of the former company being upon your line at Schenectady, it is natural that your company should give the General Electric Company at least a preference in the placing of contracts for electrical machinery.

The greatest difficulty in arriving at a conclusion is likely to be due to the commercial rivalry between the two electric companies, but there seems to be no good reason why your company should be a victim of such commercial strife. I feel confident that my recommendation that you now take steps to effect the change from your present plans will be found to be based upon the best of reasons, and that that recommendation will in all probability prevail if the matter is most carefully investigated, as I am sure it will be.

I am sending Mr. Wilgus a letter with some technical correspondence, of which I have pleasure in enclosing you herewith a copy, with a hope that you may find time to read the same.

Inasmuch as many of your directors know only the one side of this important situation, am I asking too much of you to have my letter placed before them? I ask this because of my very great desire to have my suggestion that your company now make a change fully understood and appreciated by your associates. Believe me, Very truly yours,

Geo. Westinghouse.

The letter inclosed by Mr. Westinghouse follows:

Oct. 27, 1905.

Mr. E. M. Herr, First Vice-President:
Westinghouse Electric & Manufacturing Company,
Pittsburg, Pa.

I have noted H. H. Westinghouse's letter addressed to you, in which he gave the result of a conversation with Mr. Wilgus, of the New York Central, in which Mr. Wilgus brought forth certain reasons, which, in his opinion, militated against the use of single-phase apparatus in the New York Central terminal.

It would appear, from the statements advanced by Mr. Wilgus, that he had drawn his conclusions on incomplete or unreliable information, as we have not yet given out sufficient data to anyone except our customer that would enable comparisons of this nature to be drawn which would be of any value.

While the comments in Mr. Westinghouse's letter are under certain more or less definite heads, for the purpose of clearer discussion, I will set forth my views under somewhat more general headings:

LOCOMOTIVES

As to Production.—It has been assumed in the communication referred to that owing to the apparent novelty of the design of the New Haven locomotives, insufficient time is available to produce a successful single-phase locomotive in order that it may be ready for the date set for the proposed operation by electricity of the New York Central terminals. Our opinion on this matter is that this single-phase locomotive operated as a direct-current equipment comes much nearer to standard, well-accepted direct-current practice than the locomotive adopted by the New York Central for its service.

The type of mechanical construction, using swivel trucks, is very similar to that universally used on heavy electric traction cars, while the method of control, involving series parallel operation of the motors, is common practice everywhere.

The type of motor used is not a radical departure from direct-current practice except in minor features of construction. The motors are extremely well protected from dirt and moisture, and they possess certain features which make them superior to any large direct-current motors yet built by any concern, more especially as regards entire freedom from "flashing," "bucking," and difficulties of commutation, not to speak of the great advance which has been made in the application of forced ventilation.

If the Westinghouse Company had been asked to build passenger coaches fitted with four motors of the capacity used on this locomotive, these motors to be operated with the usual electro-pneumatic series parallel-control system, there would have been no hesitancy in undertaking the contract, and it would not have been considered necessary to have made a long test on a trial equipment. The problem would have been considered as merely a further development of the type of equipments now operated on the Pennsylvania, New York & Long Island Railroad.

On the other hand, the long time taken by the New York Central Railroad for testing and experimenting was but a natural precaution, in view of the many radical departures from standard practice which were incorporated in their locomotive. For instance, the type of motor used on the New York Central locomotive is entirely open, and exposed to dirt and weather conditions. This construction is a radical and questionable departure from what experience in railway work has taught us in good practice, and it would have been folly to have attempted to put such machines in operation without very long and extended tests. Aside from the mechanical features of this equipment, the motors electrically and magnetically are such as had never been tried out by the experience gained by long service.

The result of all previous experience in electric traction has apparently been abandoned in the New York Central type, and I consider that that locomotive is an infinitely greater experiment than any that the Westinghouse Company could be considered as offering in the New Haven type.

In the course of our consideration of this problem, nothing has developed which leads us to have any doubt as to our entire ability to meet the requirements of delivery with an entirely successful locomotive.

As to Operation.—It is interesting to note that these locomotives have been pretty generally referred to as "single-phase" or "alternating." We, among ourselves, have used these terms, and perhaps are responsible for the nomenclature. In reality, however, the equipment of these locomotives is simply a high-class direct-current arrangement adapted for operation on alternating current as well.

The motors are not primarily designed for alternating current and adapted for operation on direct current, but knowing the problem which we had to meet, they were in reality designed for the very highest class of direct-current service, and they will operate successfully on alternating current. In accomplishing this result, the fundamental features which make for a good direct-current railway motor have not been slighted, but on the contrary they have been amplified in order that the motors may work successfully on alternating current. We may take it as a fundamental condition in this class of work that in order that a motor work successfully on alternating current it must be an extremely good direct-current motor.

Method of Control.—It has apparently been assumed, although the example of many of our single-phase roads is to the contrary, that a multiple-unit system of control is not possible or feasible with the types of equipment which we are building for the New Haven road. This is, of course, an error, but it is probably brought about by the fact that only the electric system of multiple-unit control has been kept in mind, whereas the system which we use is the electro-pneumatic. It has further been assumed that with any system of control duplicate apparatus is necessary for d. c.-a. c. operation, which, of course, is another misconception, as the type of control which we are building for the new locomotives, and which is also in use on other of our installations, involves the employment of the same controller for both alternating-current and direct-current service.

This assumption has also called forth criticisms of the complications and difficulties in passing from direct current to alternating current, or the reverse, and much stress has been laid upon the awkwardness of having to employ two systems of control. As a matter of fact, roads now using this system pass from one current to the other at speeds as high as 50 m. p. h. without the slightest delay or any indication to the passengers that such a change has been effected. The whole mechanism to accomplish this is of the utmost simplicity and reliability.

It should be borne in mind that when multiple-unit control is referred to, we do not mean that form which depends for its operation upon the use of the line current, but upon the form used successfully and exclusively by our company, namely, the electro-pneumatic system, which depends for its operation upon the use of compressed air.

The type first mentioned, that is, the straight electric control, is obviously but ill-suited to use on a. c.-d. c. systems without additional prohibitive complications.

If the New Haven road should decide that it wishes to operate its suburban or any other service by multiple-unit trains, there is no reason why we cannot furnish entirely suitable equipments for d. c.-a. c. operation.

POWER CONSUMPTION

Locomotives.—In Mr. Westinghouse's letter it is stated that the single-phase locomotive, when used on d. c. and running at low speed, requires double the amount of energy compared with a locomotive designed for direct current only. This statement, when read by itself and without any other consideration of the conditions, is apt to lead to very erroneous conclusions. The statement is true only when the d. c.-a. c. locomotive which we have sold to the New Haven road is compared to the case of a d. c. locomotive equipped with four d. c. motors, where all four can be thrown in series on the low speeds. Where the ordinary series-parallel control is used, such as on the Interborough system and the New York & Long Island road, and which also is proposed for the New York Central multiple-unit cars, there will be no essential difference in current consumption between the d. c.-a. c. and the straight d. c., provided the equipments are designed for the same normal car speeed.

In criticising the apparent disadvantage in economy of the d. c.-a. c. locomotive at low speeds, it would be only fair at the same time to show its superiority on higher speeds, which, I will point out later, more than offsets this apparent disadvantage in power under which it operates at the very low speeds.

It is true that the d. c.-a. c. locomotive, equipped with four motors, will, at certain very low speeds, consume what appears to be a large percentage excess of current over the straight d. c. locomotive equipped with four motors, but it should be remembered that this condition of lowest speed also means the point of least power consumption. This being kept in mind, it can readily be seen that a large percentage increase of current actually means only a small increase in power requirements.

At higher speeds the conditions, when comparing the two types of locomotives, is exactly reversed, the locomotives which we are building being of greater economy at the various higher speeds than those with which they have been compared to their disadvantage.

At one-fourth speed the total power consumption of the d. c.-a. c., or the straight d. c. locomotive, is in no sense a controlling feature. It is the power required to accelerate the locomotive up to its full speed that is of importance, and also the power consumption when running at high speeds.

The New Haven service up to Woodlawn may be considered as consisting of three sections: First, a short section where the speed may possibly be 6 m. p. h.; a second section where the speed may possibly be 26 m. p. h., and a third section, where the speed may possibly be 45 m. p. h. The total power consumption of a train on the first section, whether with d. c.-a. c. or straight d. c. equipments, will be small, due to the shortness of this section of the tracks, and to the fact that the input of the motor at these lower speeds is a minimum.

On the second section the d. c.-a. c. will be very nearly at a par.

On the third section, where a high-speed service is required, the d. c.-a. c. locomotive, as designed for the New Haven road, will present considerable economies over the straight d. c. as adopted by the New York Central.

It should be remembered that the higher economy gained with the utilization of larger amounts of power will offset a very large per cent loss in economy at the low speed when very small amounts of power are required.

The results of a comparison of a typical run on the New Haven service, showing in the first case the d. c.-a. c. locomotive which we propose to furnish, and in the second case, a straight d. c. four-motor locomotive adapted to handle the same train service, are shown in the table below.

NEW HAVEN LOCOMOTIVE

Speed M.P.H.	Time, Seconds	Kw.	Distance, Feet
0 to 6	13	654	59
6	58	150	570
6 to 21.5	36	654	....
21.5 to 25	12	654-420	1715
25	52	240	3632
25	Momentary	720	3632
25 to 45	240	720-324	17470
45	88	303	....
45 to 25	14	0	23749
25	25	240	24649
25	Momentary	720	....
25 to 32	28	720-486	....
32 to 25	5	0	25906
25	23	240	26761
25	Momentary	720	26761
22 to 46.6	404	720-312	....
46.6 to 0	262	0	62357

30 Watt-hours per ton mile

FOUR-MOTOR D. C. LOCOMOTIVE EQUIVALENT TO NEW HAVEN

Speed M.P.H.	Time, Seconds	Kw.	Distance, Feet
0 to 6	13	327	59
6	58	75	570
6 to 9.5 9.5 to 21.5	29	654	....
21.5 to 25	12	654-420	1517
25	52	240	3632
25	Momentary	420	3632
25 to 36	209	420-210	....
36	182	210	....
36 to 25	8	0	23749
25	25	240	24649
25	Momentary	420	24649
25 to 29	28	420-304	....
29 to 25	4	0	25906
25	23	240	26761
25 to 44.8	45	1392	....
44.8 to 61.4	183	1392-570	....
61.4 to 0	382	0	62357

30.1 Watt-hours per ton mile

From which it appears that the actual energy per ton mile required by the d. c.-a. c. locomotive is almost identical with that required by a straight d. c. locomotive under the same conditions of service.

Effect on Power House and Sub-stations.—If reference is made to the foregoing table, which shows the relative power requirements of the two types of locomotives at various speeds, it will be seen that as regards the fluctuation in the power supplied the d. c.-a. c. will represent an easier condition than the straight d. c. locomotive, as the load will be very uniform. While the minimum load will be greater than the straight d. c., the maximum or peaks will represent less power. Such a condition is in reality more ideal and much easier on the power house or sub-station than one where the same total power represents greater maximum and minimum values. The ideal condition as regards efficiency at generating and sub-stations would be a constant power or a constant load, and we come nearer to this condition with our d. c.-a. c. locomotive than is obtained by the New York Central type, on the basis of the same total power consumption in each case.

In conclusion, I believe that the statements made herein are a sufficient refutation of the views set forth in Mr. Westinghouse's letter. The New Haven road, however, in adopting apparatus adapted for single-phase operation, are looking further than the limitations imposed by the terminal requirements. The engineers of the New Haven road recognize that the extension of electric operation was absolutely prohibited, both for physical reasons and reasons of economy, if direct current were adhered to.

The necessities of economical high-speed railway service require that power shall be drawn by the system in proportion to the work it has to do. The trains must at times run at full speed, at intermediate speed, and in emergencies at extremely high speeds, to make up for loss of time. The single-phase a. c. locomotive or equipments are the only feasible type which draw power in exact proportion to the work to be done. Direct-current equipments have but two or three points of maximum economy. They have no ability to go beyond a certain maximum speed, which is a frequent requirement of railway service. At all other speeds, except these few economical points, power is wasted in regulating the speed. The single-phase a. c. equipments utilize power at all speeds at maximum economy. I believe that this feature alone is sufficient justification, aside from the many other advantages of the system, for its adoption by the New Haven Railroad.

B. G. LAMME,
Chief Engineer Westinghouse Electric & Manufacturing Company.

As bearing on this general subject, Mr. Westinghouse also contributes the following letter to the current issue of the "Railroad Gazette":

THE SINGLE-PHASE ALTERNATING AND THE DIRECT-CURRENT SYSTEM

111 Broadway, New York, Dec. 19, 1905.

To the Editor of the "Railroad Gazette":

The railroad officials of the country are so deeply concerned in all that relates to the electrification of their lines that I deem it important now to take notice of an article which appeared in your issue of Oct. 20, as well as of the article in the STREET RAILWAY JOURNAL of Oct. 21, written by Frank J. Sprague, one of the important engineers upon the Electrical Commission of the New York Central, which thereby precipitated a far-reaching controversy as to the relative advantages and disadvantages of the two systems of electric traction, namely, the alternating single-phase, which can be operated with overhead conductors, and the direct-current system, which, for railroad purposes, requires a third rail.

In dealing with this subject, it is well to recall that when the alternating-current system was first introduced into this country by the Westinghouse Company in 1886, the advocates of the direct-current system, feeling that their particular business and their efforts to secure a monopoly of the electric light and power industry of the country might, as they really have, become abortive, left no stone unturned to accomplish the suppression of this new and comprehensive electric system. Legislatures in several States were invoked to pass laws to prohibit any use whatever of the alternating electric system, and the present method of killing criminals in New York State was the direct outcome of the organized efforts of the business rivals of the Westinghouse Company, who were also enemies of the public, to use that company's make of alternating-current generators for this base purpose in the hope that their legislative efforts referred to might be crowned with success.

The triumphant success of the alternating-current system, without which none of our great railroads could have had the benefit of electric traction, needs no words of mine to emphasize it; but there are arrayed to-day against the alternating-current single-phase system of electric traction many of the same men and the same interests, actuated by the same commercial spirit and using the same methods and tactics as were employed by them in the days referred to when they began their "peculiar" opposition to the alternating electric system.

Public discussion and the facts already demonstrated will bring discomfiture to that organization which has made a long and losing fight to acquire a monopoly of the electric light and power business of the country, and will insure the acceptance in this country of the single-phase system as the only solution of the electric traction problem on main railroads, as has already been the general result of a most intelligent consideration of the subject in Europe.

In 1886 it was said by some influential people that I was making a mistake in attaching so much importance to the efforts being made at that time to discredit the alternating system. The beneficial results which have followed my efforts in that and other cases, in the true interests of users of electric apparatus, impel me to believe that I would be remiss at this moment to accede to like suggestions which have been recently made to me.

Mr. Sprague, while disclaiming that he was speaking officially for the New York Central Company, seems to have left no doubt in the minds of a large number of people that his views were those of the members of the New York Central Electrical Commission. In his haste to create for his clients a strong public opinion calculated to induce the officials of the New York & New Haven Railroad to give up their plan to use the single-phase alternating system and to take exactly the same kind of apparatus as the New York Central had already contracted for, namely, the third-rail direct-current system, and in pleading the great need for uniformity, Mr. Sprague forgot to inform the public, probably as he would have done had he had more time, that he is receiving a very large retainer under a contract of years duration, whereby, though he may become consulting engineer for a railroad, yet he cannot do so if, in the opinion of the officials of the General Electric Company, such work or obligation may be in conflict with the interests of that company; and having a particular personal interest in his own form of control, which is suitable for direct currents only, he equally overlooked the fact that the electro-pneumatic multiple-unit control made by the Westinghouse Company had been fully perfected for the operation of locomotives and multiple-unit trains when operated by the alternating single-phase or the direct current.

Your article above referred to also tended to mislead its readers upon most important railroad questions, because it seems to have been written with a knowledge of only one side of a situation, and thus under an impression that the action of the New York, New Haven & Hartford road might prove not helpful, as it will, but rather disadvantageous to electric traction in general.

Believing that a great effort had been inaugurated to fasten upon the railroads the direct-current third-rail system as a standard, through a specious appeal in this particular case for uniformity, and knowing that nothing more harmful could happen to railroad interests than to extend that system, I wrote a letter, after a conference on the subject, to President Newman, of the New York Central, and inclosed therein a letter from Mr. B. F. Lamme, chief engineer of the Westinghouse Electric & Manufacturing Company, in criticism of observations made respecting the action of the New York, New Haven & Hartford Railroad. Copies of these letters are inclosed herewith for your perusal and publication.

An intelligent public discussion of these important questions cannot fail to be of the utmost benefit, and in saying this I have in mind the rather harsh criticisms made of my letter published in the "Railroad Gazette" of Jan. 17, 1902, written in a spirit of friendliness and helpfulness to the New York Central officials, who were, in my opinion, being misjudged with reference to the accident which had shortly before occurred in the New York Central tunnel. The result of that discussion has, as all know, been the development of the steel car, so that there are now a number of firms ready to supply non-combustible cars, which are superior to the old form; in fact, the Interborough, the Pennsylvania, and the New York Central have all ordered steel cars in large numbers, and no one would now think of doing otherwise.

In conclusion, I wish to say that the single-phase alternating-current system not only equals the direct-current system in every particular, as fully set out in Mr. Lamme's letter, but in several respects has advantages of supreme importance, two of which I will particularly refer to.

No problem is of higher importance than that relating to the avoidance of the destruction by electrolytic action of all underground metallic work, such as employed in the great improvements of the New York Central, the Interborough and other underground work yet to be undertaken, and the water and gas pipes of New York. These works have been created, not to last a decade, but are intended to, and should, endure for ages. It has been shown fully and completely that the direct current is working all of the time in the destruction of some of the metallic structures, especially water and gas pipes, adjacent to electric conductors, which metallic structures invariably act as conductors for some of the current escaping from the uninsulated rails forming part of the electric circuit in railroad operations.

In illustration of this electrolytic action of continuous currents, I enclose a photograph with memorandum of explanation showing the electrolytic action due to the leakage of electric current from a street railway line in East Pittsburg. I do not pretend that the rapidity of action in his case is likely to occur, except under extraordinary conditions. However, had the alternating current been used, there would have been no electrolytic effect whatever. This electrolytic difficulty is a well-known one. It cannot be hid or covered up and must be surmounted, because the sum involved in this phase of the electric problem is so great as to justify every possible effort to avoid its rapid depreciation or loss.

In the matter of the regulation of the speed of trains upon standard railroads, the single-phase system will have it all its own way, because with the continuous current no speed can be attained greatly in excess of the predetermined one. In railroad practice it often happens that speeds of 70 m. p. h. and 80 m. p. h. are necessary to make up for time lost. If the direct-current motors are constructed for this speed, then at the ordinary speeds of 40 miles or 50 miles there would have to be introduced a dead resistance in the motor circuits to reduce the voltage, which condition can be maintained only for a short time, and is in effect not unlike applying a brake to hold the speed down. The only other way to maintain an average low speed would be to put the current on and off, an intolerable and uncomfortable practice one frequently observes when a motorman is obliged to move a street car at a slow speed. In the single-phase system, the auto-converters used in connection with the locomotive and car equipments provide for continuous running at any desired speed in a manner equivalent to the placing of the throttle and reverse lever in appropriate positions.

My references to Mr. Sprague and his article and his interests are reluctantly made, and are not to do him an injustice but to prevent an injustice being done to vast interests by the forgetfulness referred to.

Geo. Westinghouse.

The electrolytic action referred to in the preceding communication of Mr. Westinghouse occurred in one of the natural gas wells on the property of the Westinghouse Electric & Manufacturing Company in East Pittsburg. The action was found to be due to electrolysis, caused by stray currents from the street railway system. This gas well was in operation for several years with 2-in. tubing, consisting of bare steel pipe with no preservative or other protection. The well suddenly gave out, and upon pulling the tubing it was found that for 30 ft. or 40 ft. above the rubber packing (located about 1800 ft. down for preventing access of water to the gas-bearing strata), the pipe was greatly reduced in thickness, more or less uniformly, but broken entirely through in several places, thus causing the well to be "drowned out." As the well goes through salt-water strata and there is some sulphur in the surface waters, this was believed to be the cause. As a supposed remedy, new tubing was installed, protected by a japanned coating inside and outside, known as "Loricated" tubing. Photographs of this tubing, taken after thirty days' use, show numerous pit holes. The action was immediately diagnosed as electrolytic entirely, and was, of course, aggravated because a very slight defect in the coating concentrated electrolytic action at these spots, thus causing an aggravation instead of a remedy. To cure the trouble, careful observations were made as to the source of current, and a slight flow of current was found at all times with very heavy flows during the busy hours of the street car line. After installing the new tubing, several insulating joints were inserted in the casing in the hope that these will prove a remedy.

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Of this issue of the Street Railway Journal 8000 copies are printed. Total circulation for 1905 to date, 424,350 copies, an average of 8161 copies per week.

The Westinghouse Correspondence

The letters hastily inserted in our last issue form the most notable as well as the spiciest contribution to the polemics of engineering that we have had the pleasure of publishing for many a year. They are flavored with the fine odium theologicum of the early days to which Mr. Westinghouse feelingly alludes, and if some interesting rejoinders are not soon in evidence we shall be greatly surprised. We note with some satisfaction the frank endorsement by Mr. Westinghouse of the position which we took at the time of the New York Central decision, i. e., that under the existing circumstances, and without prejudice to the alternating-current system, the choice of continuous-current equipments was a logical conclusion. By the action of the New York, New Haven & Hartford Railroad, the question has now been reopened in its largest aspect, and must be considered again upon its merits, whatever they may be. There is much to be said on both sides of the question. As we have again and again reiterated, the larger railway work depends on the successful use of high voltage upon the working conductors. To go to such voltages as are desirable, most probably means the abandonment of the third rail, which we have repeatedly characterized as a dubious blessing, however valuable it may be under favorable circumstances. These judgments have no necessary bearing on the particular form of alternating equipment advocated by Mr. Westinghouse. They stand in favor of any system capable of successfully utilizing some thousands of volts on the working conductor, and do not in the least reflect upon d. c. traction, save as the experience of the past tends to discourage high-voltage direct-current equipment.

The possibility of the use of high voltage direct current has recently received the powerful advocacy of Mr. Sprague, who, as our readers are aware, has put himself on record as believing that d. c. traction can be carried up to 1500 volts or higher. We have already expressed our great pleasure at this announcement, although until some of the manufacturers agree to build and guarantee such equipments, they are not entirely free from the general objections not unjustly urged against non-standard apparatus. On the other hand, it is claimed that alternating-current series-motors have two intrinsic disadvantages: the intermittent delivery of energy, which affects the capacity of the motors, and cannot be gotten rid of, and the difficulty of commutation with alternating current, which is a question in which the magnitude of the unit plays a very important part. In other words, the complete success of a 50-hp motor does not insure against failure in a 500-hp motor, in the same way and for much the same reason that a 5000-volt arc machine may run beautifully, while no one has had the temerity to build a generator for the same voltage at 100 amps. or more. The possible success of the a. c. locomotive on a large scale is a matter not of theory, but of fact. Upon this point we should have data before long. So far as the steam railroads are concerned, their policy is one of readiness to adopt either system. Give them a successful high-voltage trolley system, and they care not what kind of current is chosen for operating it. Along the so-called "standard" lines of practice, large railway work is hopelessly handicapped outside of suburban service. It is merely a question as to what the forward step should be and how soon it may be taken.

Testing New Equipments

One of the most perplexing problems in electric railway work is the question as to how extensively new equipment should be tested before it is finally approved and accepted by the executive officers of the road concerned. Practice on different systems varies widely in this respect. Some roads make no tests whatever, other than the more or less conclusive one of putting the equipment into actual service, while others spend large sums of money annually in the effort to evaluate every physical characteristic of their apparatus which can be extracted by the ingenuity of the technical staff. Between these two extremes lies an economic medium which, in the great majority of cases, probably represents the trend of the best practice, judged by modern operating conditions.

Most electric railway managers agree, we believe, that apparatus involving untried or experimental features should be placed in commercial and multiplied service throughout a system only after searching tests have demonstrated its fitness for the work in hand. Certainly the acceptance of new equipment, often involving the payment of many thousands of dollars to the manufacturers, is rarely consummated on large systems without some pretty definite information in the management's hands as to the way in which the specifications have been fulfilled. Tests may have been made at the manufacturer's works for the reason that while service conditions can be duplicated on an experimental track, it is often impossible to carry out experimental work on an operating system without embarrassing the movement of paying traffic. The equipment may have been "tried out" by introducing one or two new units into regular service and noting their behavior under fire, so to speak; or tests by independent engineers and laboratories may have been made for the purpose of determining capacities, temperature rises under various conditions and other limiting characteristics. The essential point is the ability of the new equipment to perform the required service with reliability and economy. On small roads having moderate resources, all but the service test must often be dispensed with; but as a general proposition one cannot learn too much about the actual performance of a new type of equipment under the trying conditions of street railway service. Companies with ample financial strength may well spend money liberally upon the expert analysis of the behavior of their apparatus in seven-days-per-week operation, for the information thus gained is often of the utmost value, not only in reducing the cost of maintenance, but in furnishing a rational basis for new and more efficient designs of machinery at the manufacturers' hands. Even the small road can help itself and others in this work by keeping careful records of maintenance, although the services of testing experts can frequently be secured only in combination with other companies operating in the same general part of the country.

As for standard equipment—apparatus which the manufacturers have found worthy of confidence and which they stand ready to produce in any desired quantity on either a large or a small scale—it is difficult to know where to draw the experimental line. If a company has had experience with a given equipment there is often little object in subjecting it to exhaustive tests departing to any great extent from the service requirements, unless each individual piece of apparatus is exceedingly expensive in itself. A street railway buys, for example, twenty car equipments costing $3,000 each. These equipments are standard; similar ones are in the company's service operating satisfactorily upon long established routes. Certainly there is little advantage in subjecting each one of these equipments to elaborate tests. The main point is that they must perform the given service, whether on new routes or old, without undue temperature rise or excessive wear and tear. If the service has been accurately specified to the manufacturers it is not a very serious matter to make the few service tests necessary to establish the ability of the motors to fulfil the requirements. The regular staff of the road should be equal to such a problem without the necessity of specialized advice from outside. In some cases the specification of maintenance guarantees is worth thinking about.

Suppose, however, that the same company buys a 3000-kw turbo-alternator, costing in round numbers $100,000. In such a case as this the amount of money invested is so large, and the importance of the unit so great in the power supply of the system, that the most thorough tests are justified in order to make sure that the specifications have been met. If the machine falls short of the requirements the proper deduction to be made from the contract price will probably far exceed the cost of the test; but, although this condition is seldom presented with the scientific designing and manufacturing practiced to-day, it is of the greatest importance to know exactly what such a machine is capable of doing. Units of this and larger sizes supply power on the wholesale plan, and the possibility of bettering the guarantees by bringing service operation nearer test conditions carries with it a potential saving in the fuel account which is not to be scoffed at. The large system can afford to specify with greater detail than the small road, although in standard equipment the service requirements are the rub of the whole question, and a wise engineer will not pin the manufacturer too closely on constructional details.

The Abuse of Automatic Circuit Breakers on Interurban Cars

Interurban cars are often fitted with controllers which do not have the ability to break the current under all conditions without destructive arcing. To avoid this arcing and burning of the controller, the motormen are frequently forced to use the automatic circuit breaker for purposes other than those intended in its design. We refer to the habit of using the breaker as a starting switch. Such use of a circuit breaker soon destroys its value as a means of protecting the motors from overload. The frequent flying out under heavy load burns and blisters the contacts and loosens the adjustment and other parts so that the apparatus is not reliable as an automatic breaker. This is probably the chief cause of trouble with a considerable percentage of the circuit breakers on heavy interurban cars. If tests were made, no doubt the station switchboard breakers would often open before those on the cars.

The writer once had occasion to notice a test of the breakers on several interurban cars. These breakers were placed up over the motorman's head within easy reach, and were frequently used to start and stop the car. In following behind slow-speed city cars it was a common practice to let the controller remain on the first notch and keep the car running at a slow speed by closing and opening the circuit breaker at intervals. Of ten or fifteen cars tested, but one breaker was found that would automatically trip at a reasonable load. In several instances the power house breaker was blown without affecting the car breaker. When there are no fuses in the car circuits and the breakers are out of order, the result in case of a short circuit or grounded armature can readily be imagined. Instead of one or two armature coils being injured, the excessive current simply continues to flow until a considerable number of coils are so burned as to necessitate their removal.

A car should always be provided with a good reliable circuit breaker. If certain railway systems would give proper attention to this one piece of apparatus on their cars they would, at the end of the month or year, find account No. 7, or that of electrical repairs exceedingly low.

The suggestion seems rather out of the ordinary, but nevertheless it would, no doubt, be a good plan in many instances where hand-operated drum controllers are used on heavy cars, to put two circuit breakers in series in the line. One, automatic in action, might be placed somewhat out of reach of the motorman. The other need not have the automatic feature and should be located where the motorman could use it merely as a line switch and a means for protecting the controller from excessive burning of the segments and fingers. In such an instance the automatic breaker should be tested at intervals by connecting an ammeter in series, throwing on the brakes and then turning the controller to successive notches until the proper current for opening the breaker is obtained. Such a method would of course be hard on the resistance if the current were allowed to continue to flow for any length of time, and of course the operator must use care in this respect.

Where there are several cars to be tested, however, we believe it a good plan to rig up a permanent testing outfit, consisting of a water resistance and a means for readily connecting the circuit breaker of the car in the line.

Operating With "Roadmasters" in Toronto

In the fall of 1902 the Toronto Railway Company instituted a new grade of service among employees in its operating department, and to the positions created in this grade gave the title of "roadmasters." For some reason or other this innovation has never been given the attention outside of Toronto which it very justly merits. As outlined elsewhere in this issue, the system consists in promoting certain of the older motormen on each line to the positions of roadmasters and bestowing upon them considerable authority and responsibility with reference to operating details. The novelty of the scheme consists chiefly in the fact that although these men fill most of the duties of street inspectors they perform their duties while operating regular cars as regular motormen. It would appear that the maintenance of this arm of the service offers immense possibilities in the direction of effective organization. As the superintendent of the Toronto Railway expresses it: "These men enable us to keep our fingers on the pulse of our business and form an indispensable link between the management and the rank and file of the men"—a link, he might have added, that sometimes seems to be missing on some roads in the States. The idea is so simple it is surprising the possibilities have not received greater consideration in this country. The term "roadmaster" is not a good one in view of the duties of the positions, but the idea itself would appear, in the vernacular of the street, to be "all to the good."

In the first place, the roadmasters make the regular trips over their respective lines throughout the day, and are therefore in intimately close touch with all the little every-day details of the service. They know what of the company's rules are good and what are bad, and they know what rules are being broken, because they have the same temptation to break them as do the other men. They hear all the "gossip" and small talk of the business and have opportunities for getting sidelights on the internal workings of the organization. They mingle with the employees at the car houses and during the reliefs, and to all intents are regular motormen, and are therefore in a position to judge the service from the standpoint of an employee. On the other hand, the responsibility delegated to them makes them virtually officials, or at least semi-officials, of the company, and as such they are in a position to handle conditions from the standpoint of an official. They are not secret spotters, and are not so regarded either by the company or by their fellow employees. But they are men who by reason of long and faithful service have been advanced one step in the ladder and enjoy a somewhat closer confidence with the management for the good of the service. In attempting to carry out this phase of organization care would have to be exercised to avoid any feeling of "chestiness" on the part of the men advanced to the higher grade. This is prevented in Toronto by careful selection and by constant reiteration that the roadmasters are not given their position to domineer over or spy upon their fellow employees, but are aids or lieutenants of the management in the work of improving the service and securing the greatest good for all concerned.

The Toronto roadmasters are given a thorough training in the shops and are competent to make all manner of repairs to cars on the streets. And here comes in another advantageous element. It is manifestly more satisfactory to take a few picked men from the best of the rank and file on each line and give them a thorough schooling as to the mechanical details of the equipment than it is to attempt to pass all of the motormen, good and bad indiscriminately, through the shops in the endeavor to make mechanical men of them. An otherwise good motorman may make a poor mechanic, and it is but a waste of time to attempt to give him a mechanical training. In promoting a man to the position of roadmaster, his aptitude for mechanical training is taken into consideration. This works out in practice as follows: A motorman is having trouble with his car, due, perhaps, to some fault in the controller, or the car may be braking badly. Instead of attempting to remedy the trouble himself, he limps along as best he can until he meets the regular car in charge of his roadmaster. The two men immediately change cars and the motorman of the cripple works out the run of the roadmaster, while the roadmaster repairs the defect if possible or else runs the defective car into the car house. In other words, there is always a motorman running somewhere on each line who is competent to take charge of any situation or emergency that may arise.

The transportation department also derives great assistance from the information received from the roadmasters regarding the volume of traffic at certain hours. These men are riding over the line at all hours of the day, and their reports as to whether too many or too few cars are being operated to accommodate the travel are of prime value in making and altering schedules.

Another of the moral benefits derived is the creation of several positions open to the rank and file of the men, which are in the nature of a step higher in promotion. The men in the ranks who feel they never could hope to rise to the position of street superintendent or inspector may very well aspire to a position as roadmaster with considerable promise of eventually getting and keeping the place.

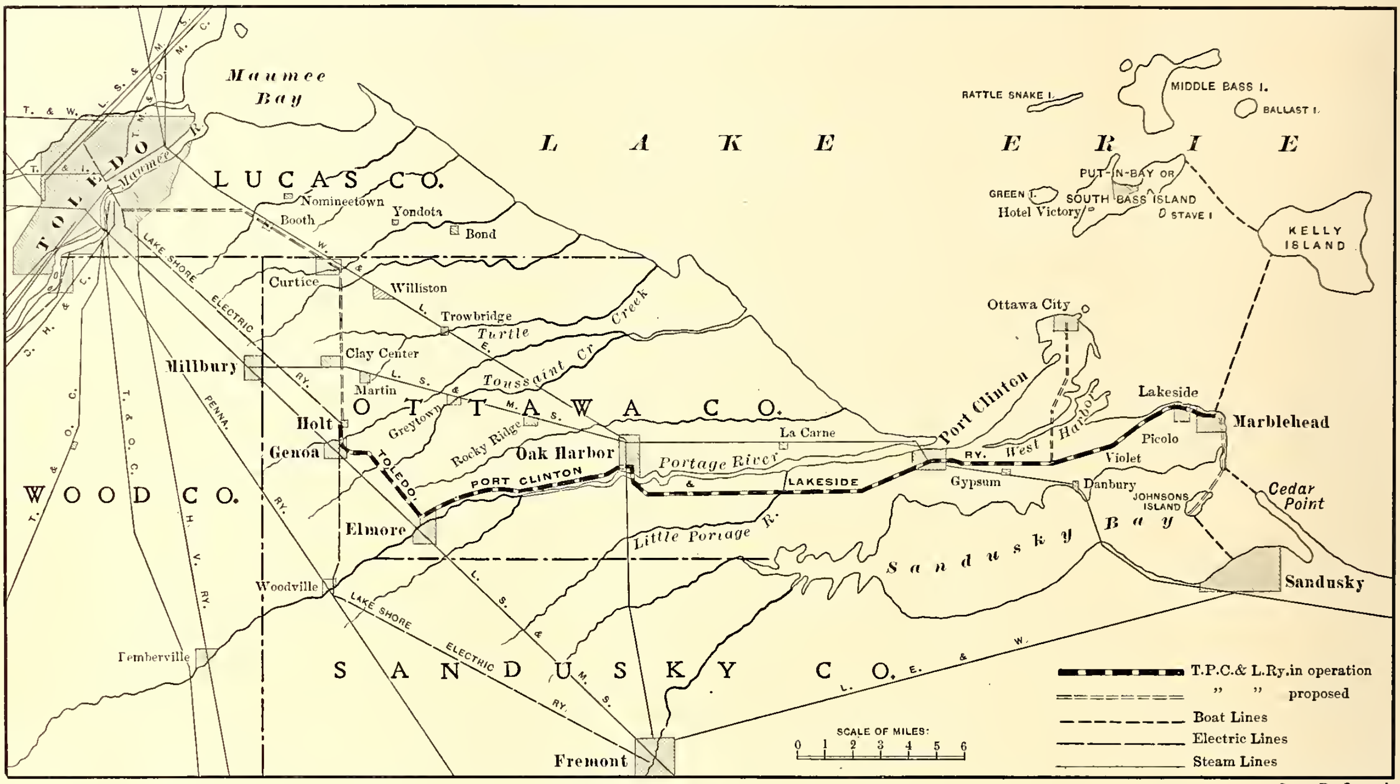
As to the cost to the company of maintaining the "roadmaster" system, it may be said that the expense will be about the same as with a full complement of street superintendents or inspectors, for the reason that, although roadmasters are paid from a third to a half more than the regular motorman, each roadmaster while filling the duties of inspector is also earning his wages as a regular motorman of a regular car.

THE TOLEDO, PORT CLINTON & LAKE SIDE RAILWAY

The Toledo, Port Clinton & Lakeside Railway, recently completed in Northern Ohio, presents an interesting example of a line which has opened up territory heretofore handicapped by inadequate transportation facilities. It is also especially interesting from an engineering standpoint, being the first interurban road in the Central West to be equipped throughout with apparatus furnished by the Allis-Chalmers-Bullock combination of steam and electrical interests.

ROUTE AND TERRITORY

The company operates cars from Toledo to Marblehead, Ohio, 52 miles, the line extending the full length of the Marblehead Peninsula, a point 30 miles long, bounded on one side by Lake Erie and on the other by Sandusky Bay. Near the



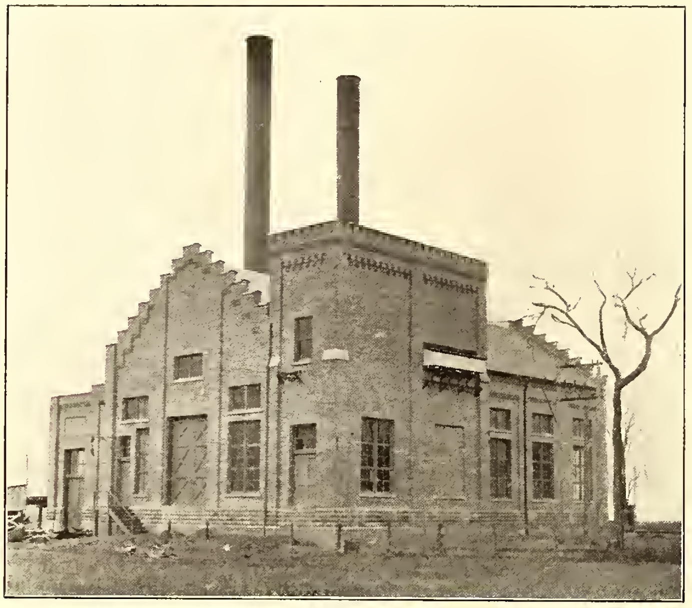
MAP OF THE TERRITORY SERVED BY THE TOLEDO, PORT CLINTON & LAKESIDE RAILWAY, BETWEEN TOLEDO AND LAKESIDE, OHIO

VIEW SHOWING THE COUNTY COURT HOUSE IN PORT CLINTON, THE TEMPORARY WAITING ROOM OF THE TOLEDO, PORT CLINTON & LAKESIDE RAILWAY IS AT THE LEFT apex of this point is a large group of islands, chief among which are Kelly's Island, famous for its lime products, and Put-In-Bay Island, noted as the scene of Commodore Perry's victory against the British in 1812. This district is literally the garden spot of Northern Ohio, and features which go to make an interurban line successful are peculiarly combined here. Enormous quantities of fruit are raised on the islands and peninsula, shipments of grapes and peaches from the town of Port Clinton alone amounting to $750,000 annually. Wine is produced in great quantities and heavy shipments are made. The farmers all through this district are wealthy and progressive, and the road affords them a convenient method for handling their products. The islands and peninsula are of limestone formation, and there are several large establishments for the production of lime, cement and gypsum. The company has installed standard freight cars, and it will undoubtedly derive considerable tonnage from the products mentioned. Few roads have such excellent prospects for summer traffic. The summer population and excursion business at the islands are very large. The line passes directly through Lakeside, a summer encampment city, which is the headquarters of the Ohio Methodist Conference, and from 75,000 to 100,000 people spend their summer vacations or attend the meetings there.

CAR LEAVING THE MARBLEHEAD TERMINUS OF THE TOLEDO, PORT CLINTON & LAKESIDE RAILWAY. THE CONCRETE SUB-STATION AT THIS TERMINAL IS SHOWN AT THE RIGHT

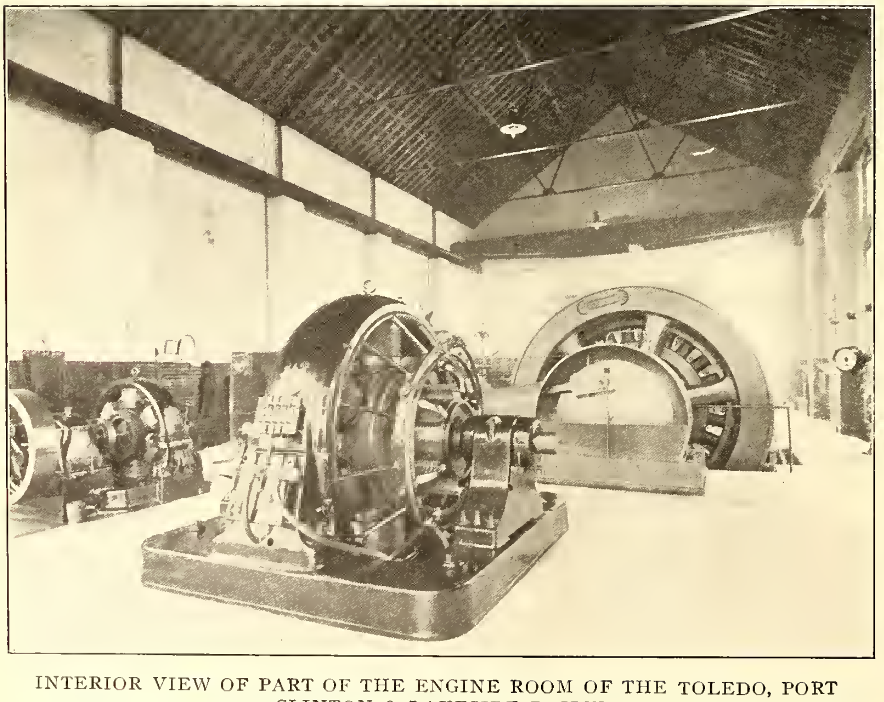
VIEW OF SWING BRIDGE AND TRESTLE AT OAK HARBOR, SHOWING ALSO THE HIGH-TENSION TOWERS CROSSING THE STREAM

Cedar Point, opposite Marblehead, is a famous pleasure resort, while Hotel Victory, on Put-In-Bay Island, is one of the largest summer hotels in the country. There is a tremendous flow of traffic between these points, and the company will operate steamers between its terminus at Marblehead and the various resorts mentioned. It is also planning to build an ex-



EXTERIOR VIEW OF THE POWER STATION OF THE TOLEDO, PORT CLINTON & LAKESIDE RAILWAY AT PORT CLINTON

tension around to the end of Marblehead Point bridge, across the shallow bay for a distance of about 1000 ft., and build on to Johnson's Island. This is another famous summering place and noted as the location of one of the Federal prisons during the Civil War. By operating a ferry from Johnson's Island to Sandusky and Cedar Point, the company believes it can secure a considerable portion of the through traffic between these



INTERIOR VIEW OF PART OF THE ENGINE ROOM OF THE TOLEDO, PORT CLINTON & LAKESIDE RAILWAY

points and Toledo. There is also a plan to build a spur line to Catawba Island, reaching Ottawa City, and providing a shorter route to Put-In-Bay. During the fall months the road derives much traffic from hunters. Duck and geese abound in the marshes surrounding the islands and bays, and there are numerous club reserves, so that the sport is protected.

At present the company operates cars from the Toledo city limits to Genoa—10 miles—over the tracks of the Lake Shore Electric Railway, and it has its own traffic arrangement with the city company for entrance to Toledo and use of the terminal station. The arrangement with the Lake Shore Electric gives that company all the fares while the cars are on its tracks, the Lake Shore assuming the liability and paying the crews. It also pays a small rental per car-mile for the use of the cars. As the Lake Shore is a single-track line and has a heavy traffic of its own, the Port Clinton Company believes that its summer traffic will be handicapped, and is arranging for an independent entrance into Toledo, being confident that it will prove a profitable addition to its holdings. Accordingly, it has secured a private right of way from the present junction, north to the village of Curtice, thence to Booth, and into Toledo by way of a city line, which it is claimed will give a very short route to the center of the city. This line will be built early next spring, and it is claimed that it will open up a farming district and oil territory near the city which will make it a profitable line in itself.

The line was built to Elmore and Oak Harbor two years ago, and last summer it was extended to Port Clinton and Marblehead. The original portion was operated by a temporary power station at Genoa. The new power station at Port Clinton, which will operate the entire line and proposed extensions, was completed about Oct. 1 of this year.

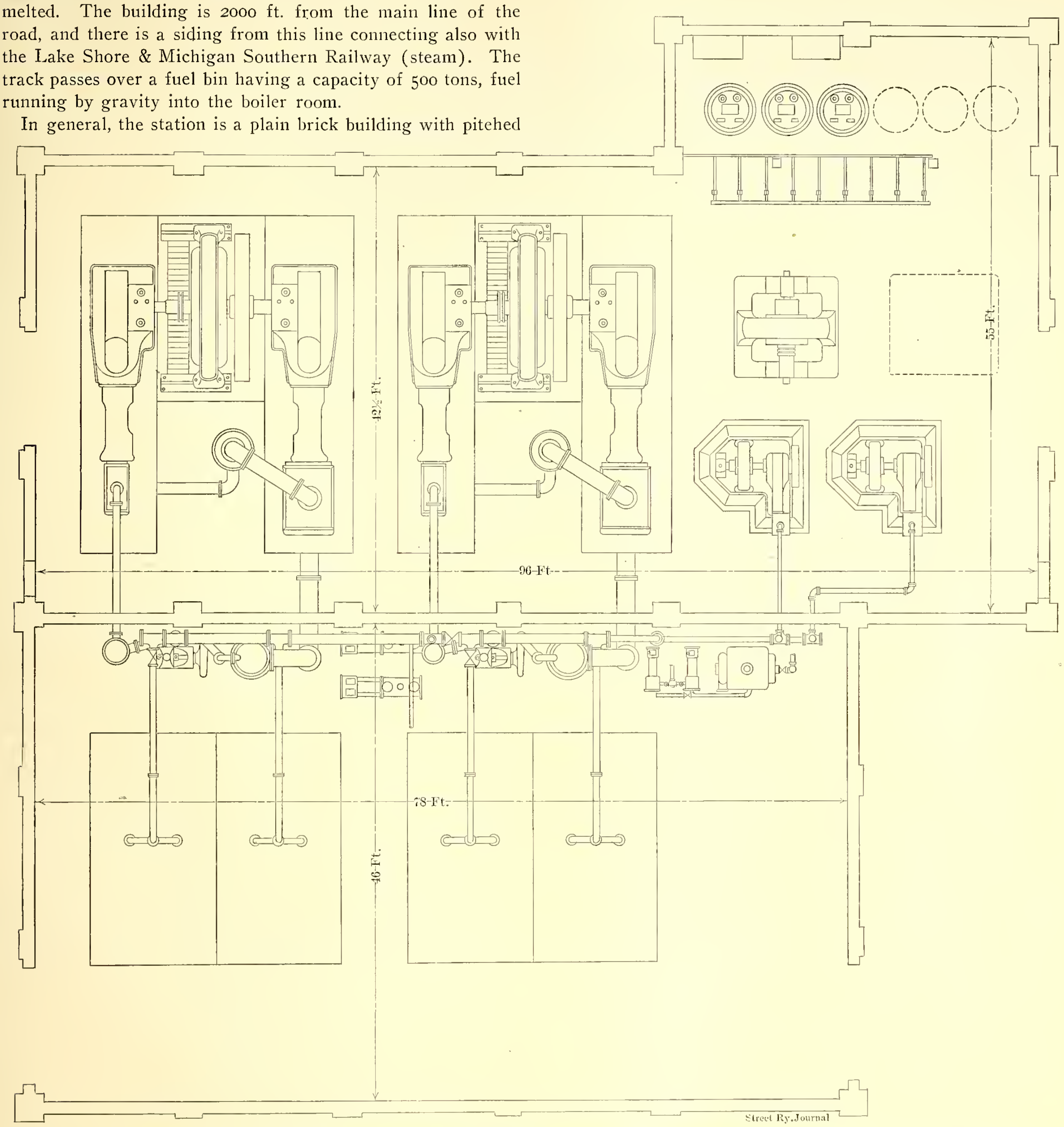
POWER STATION

The station is located on the lake front, so that a permanent water supply of the best quality is assured. The land is only a few feet above the lake level, and the lake is shallow at this

BOILER ROOM OF THE TOLEDO, PORT CLINTON & LAKESIDE RAILWAY

point. Consequently a channel 600 ft. long and 7 ft. deep was dredged to within 200 ft. of the house. A 24-in. line conveys the water by gravity to an 8-ft. well, 12 ft. deep, adjoining the house. Next spring it is the intention to extend this pipe to 1000 ft. and build a crib with a bed of crushed stone for a filter. The condenser discharge can be emptied into the channel, and gates are provided to keep it from contaminating the intake water. During severe weather, when needle ice is likely to accumulate in the intake, the supply can be taken from a point near this outlet, which has sufficient warmth to keep the ice melted. The building is 2000 ft. from the main line of the road, and there is a siding from this line connecting also with the Lake Shore & Michigan Southern Railway (steam). The track passes over a fuel bin having a capacity of 500 tons, fuel running by gravity into the boiler room.

In general, the station is a plain brick building with pitched slate roof and steel trusses. At one corner is a two-story wing for the high-tension apparatus, while the boiler room is a one-story wing. The dimensions are shown in the accompanying plan. The building has a large area of glass surface, a second row of windows being placed sufficiently high to permit a large amount of ventilation. The engine room is covered by a 15-ton hand-operated crane with a lift of 25 ft., which was furnished by the Northern Engineering Works. The floors are concrete and expanded metal. Great care was used to secure solid foundations for the building and engines, and over 1000 tons of concrete were used in this work.

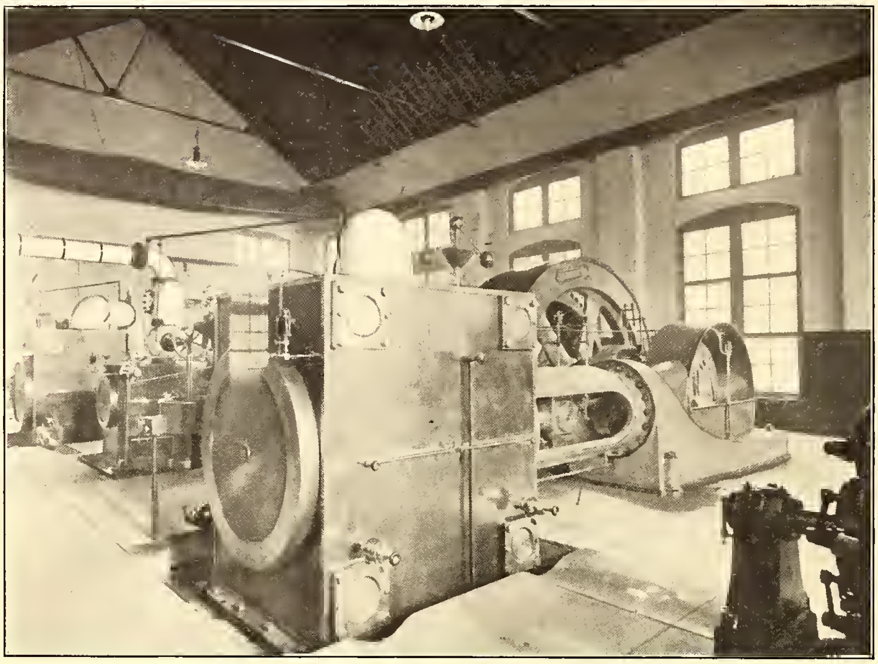


PLAN VIEW SHOWING THE GENERAL ARRANGEMENT OF BOILERS, PIPING, GENERATING SETS, ETC., IN THE POWER PLANT OF THE TOLEDO, PORT CLINTON & LAKESIDE RAILWAY COMPANY

STEAM AND ELECTRICAL EQUIPMENT

The main units consist of two horizontal cross-compound condensing Allis-Chalmers engines direct connected to 800-kw Bullock revolving field, engine type, alternating-current generators delivering current at 375 volts, three-phase, 25 cycles. The engines are designed for a normal load of 1280 hp when operating at 26 ins. vacuum and 150 lbs. pressure. The engines are of the standard Allis-Chalmers heavy-duty type. They have a gravity automatic oiling system, Allis-Chalmers safety stop valve, Reynolds-Corliss valve gear, special anti-friction metal on low-pressure piston, and operate at 125 r. p. m.

The boilers are four 400-hp Erie City water-tube boilers with plain hand-fired grates, and are designed for a working pressure of 150 lbs. They are arranged in two batteries, and each battery has a 120-ft. steel stack, well braced and guyed. The pumps and auxiliaries are arranged back of the boilers. The feed-water pumps are two Fairbanks, 6 ins. x 5¾ ins. x 6 ins. These take either cold water from the cold well outside or hot water from a hot well, and pass it to a 1000-hp Cochrane feed-water heater. The boiler feed-pumps are two Fairbanks duplex, 8 ins. x 5 ins. x 10 ins. All drips from steam lines and auxiliaries discharge to the heater, which supplies water to the boilers at about 210 degs. The condensers are two 18-ft. Tomlinson barometric type, supplied with water by two 6-A Lawrence centrifugal pumping engines. The main steam header is mounted on brackets supplied with rollers, and it may be divided into three parts, making it possible for any boiler to supply any engine. The lines to the exciter engines are by-passed, and it is possible to cut off the separators and take steam for the auxiliaries through an auxiliary header. In case it is desired to cut out the condensers, the engines may exhaust through exhaust heads provided with Jenkins automatic relief and back-pressure valves.



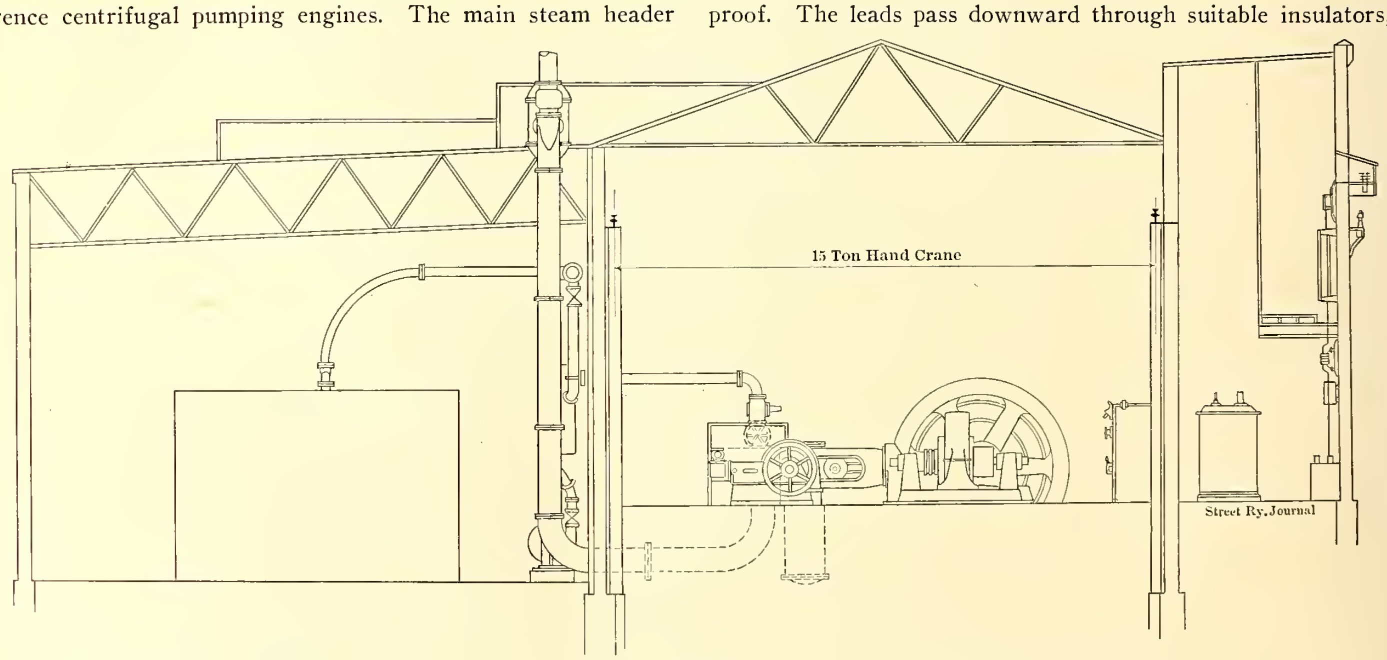
ANOTHER VIEW IN THE ENGINE ROOM, SHOWING THE ENGINE SIDE OF ONE OF THE HORIZONTAL DIRECT-CONNECTED GENERATING SETS

The exciter units consist of 10-in. x 10-in. Erie City engines connected to 50-kw, 120 volts, d. c. Bullock generators. Each is capable of supplying either or both the main generators, and in addition, taking care of the station lighting. The building is well illuminated by Adams-Bagnall 110-volt, d. c. arc lamps located back of the board and in the basements, as well as in the engine room and boiler room.

HIGH-TENSION EQUIPMENT

Current from each large generator is lead through six 1,000,000-circ. mil rubber-insulated cables, through the switchboard, to three 500-kw, 375-20,000-volt, oil-filled water-cooled Bullock transformers placed back of the switchboard. The transformers have smooth surfaces. Cold water is circulated by the heater pumps through coils in the transformers. It circulates at the rate of about 1 gal. per minute, and there is a tell-tale device in the discharge pipe at the side of the engine room which indicates that the water is circulating. The transformers are guaranteed not to heat above 30 degs. under full load, and there is a thermostatic alarm gong on each transformer. Westinghouse type E oil switches are provided between the high-tension sides of the transformers and the outgoing lines. They are hand-operated from the board and are provided with automatic trips. The outgoing lines are protected by suitable lightning arresters and choke coils, which are accessible from a balcony, consisting of a large slab of reinforced concrete. The outgoing lines pass through a hood extending outside the building about 2½ ft. and about 40 ft. from the ground; this hood is so constructed that it is thoroughly waterproof. The leads pass downward through suitable insulators, through the bottom of the floor of the hood, and to an anchorage 5 ft. below. This anchorage is fastened on the outside of the building wall and leads from it directly to the main pole line. The inside run of high-potential wiring is designed to be as short as possible, extending only about 25 ft. from the high-potential side of the transformer to the anchorage hood.

Directly beneath the three transformers is a large metal tank of sufficient capacity to receive the entire quantity of oil re-

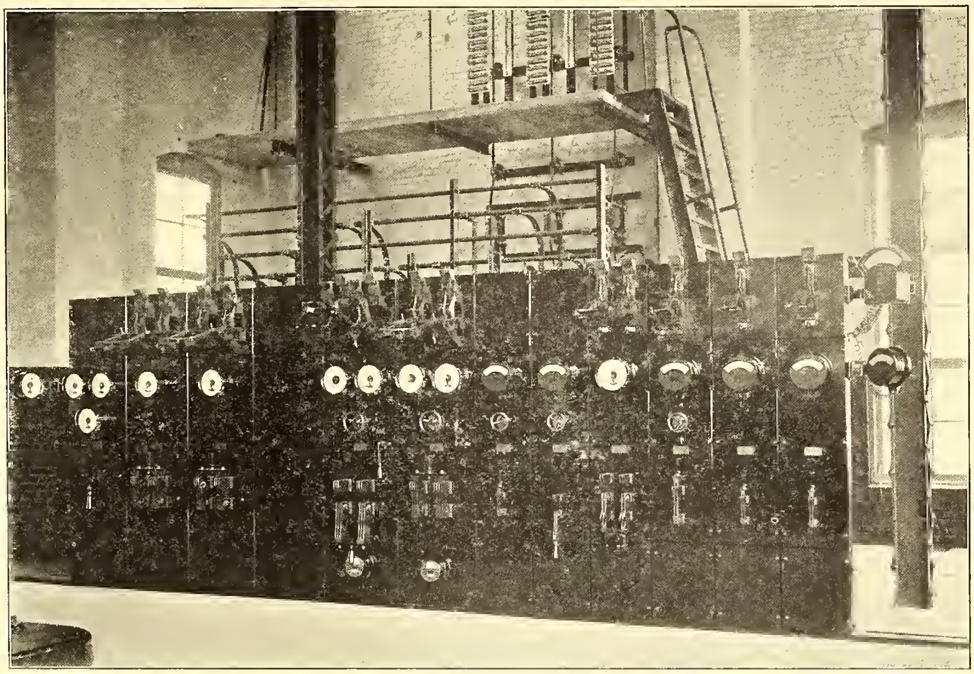


CROSS-SECTION OF POWER STATION, SHOWING THE TYPE OF ROOF CONSTRUCTION, PIPING FROM BOILER TO ENGINE, POSITION OF HIGH-TENSION APPARATUS, ETC.

quired for the transformers and reactive coils, the latter being located in the basement. The large cables running from the rotaries, generators, exciters and transformers are run in the basement and are suitably mounted on porcelain metal rack insulators.

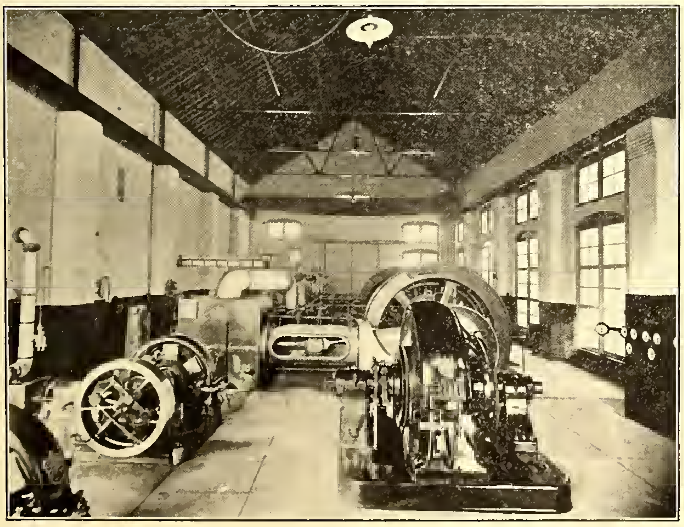
At present there is installed in the station a 400-kw rotary converter sub-station outfit, and provision is made for a second converter of the same rating. The rotary is provided with the Bullock electrical oscillator. Current applied to the converter is taken from the main generator bus-bar at 375 volts a. c., and delivers d. c. at 600 volts. The generator bus-bars, located back of the board, are solid rolled copper, wrapped with seine twine, covered with black insulation varnish.

The switchboard is black enameled slate, consisting of thirteen panels, on which all instruments are black. The switchboard equipment consists of the following panels: One high-tension panel, two transformer panels, two generator panels, two exciter panels, one a. c. rotary panel, one d. c. rotary panel and two feeder panels. The panels are equipped with Weston and Westinghouse instruments, and Cutter I-T-E circuit breakers are used on all panels except the high-tension and exciter panels. The board rests on insulated stringers, and the cable openings are slate-covered.

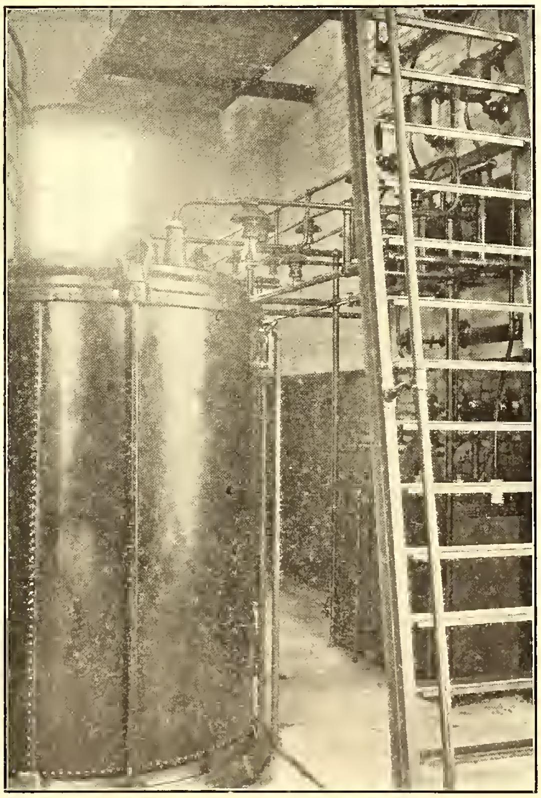


SWITCHBOARD, BUS-BARS AND CONCRETE LIGHTNING-ARRESTER GALLERY IN TOLEDO, PORT CLINTON & LAKESIDE RAILWAY COMPANY'S POWER STATION

At present there are sub-stations at Genoa, Oak Harbor, Port Clinton and Marblehead, and a fourth will be installed near Toledo, giving an average distance between stations of 13 miles. Each is equipped with a 400-kw rotary and suitable step-down transformers and boards. The Toledo sub-station will probably be installed in a car so that it may be used as a portable sub-station. The Marblehead station was placed at the extreme east end of the road, as it is the intention to supply several manufacturing establishments with current, and a second rotary may be installed there. The sub-station buildings are built of concrete block, and two of them contain waiting rooms and freight-handling facilities.



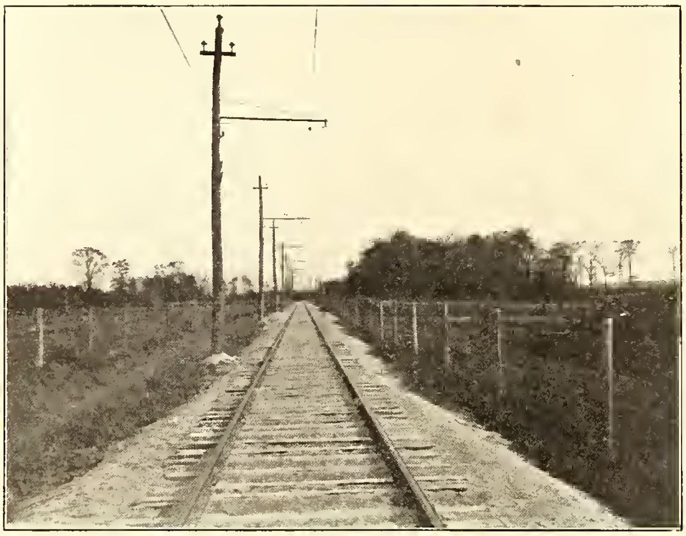
ENGINE-ROOM VIEW, WITH EXCITER AND ROTARY CONVERTER IN THE FOREGROUND



WATER-COOLED, OIL-INSULATED TRANSFORMERS AND OIL SWITCHES IN POWER STATION

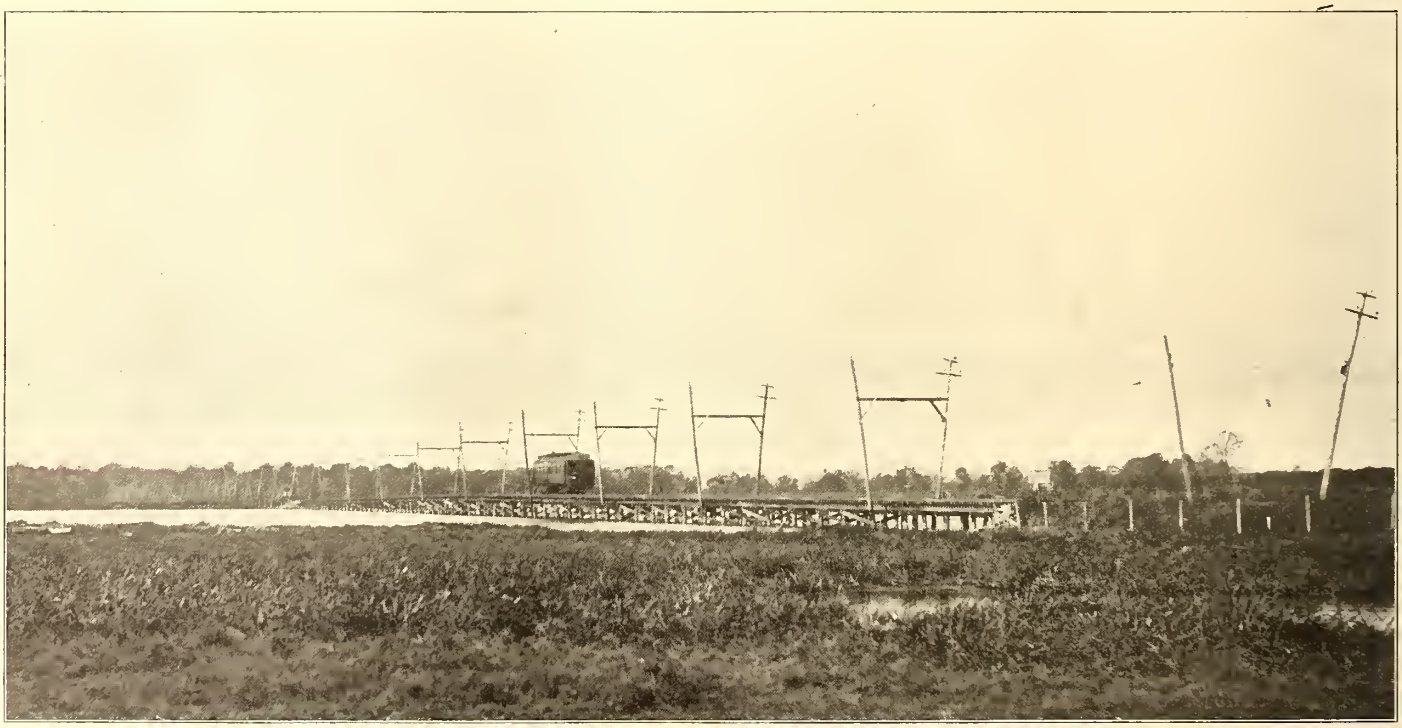
TRACK AND OVERHEAD CONSTRUCTION

The district traversed by the line is fairly level. At Elmore the line strikes the Portage River and parallels it on the north side through Oak Harbor, where it crosses it, and continues along the south side of the river to Port Clinton. The first portion contains numerous curves, caused by the meanderings of the river, but the balance is fairly straight. The maximum curvature is 14 degs. and the maximum grade 2 per cent. There is a ruling grade of 1 ft. in 100 ft. and an average grade of .3 per cent. The track is 70-lb. T-rail, joined by four-bolt angle bars with Ohio Brass Company's soldered bonds. The ballasting is rather out of the ordinary, advantage being taken of the limestone quarries in this district. Nine inches of broken stone is used under the ties, and it is then filled even with the tops of the ties and around the ends with limestone screenings, a fine grain material which, thoroughly soaked and operated over for some months, packs down like concrete, giving a most substantial foundation for the track. Two-inch broken stone costs 50 cents on the tracks, and the screenings 35 cents per ton. Poles are 35 ft., with 7-in. tops. The first portion of the road was built with span construction and a double line of poles set with a decided rake. On the newer portion it was decided to adopt the side-arm construction, as the limestone formation necessitated drilling and blasting in setting poles. On portions of the line the cost averaged $4 per hole. The brackets are Ohio Brass Company's Richmond type, 9-ft. 2-in. pipe with flexible suspension. Garton lightning arresters are placed on poles, three to the mile, and grounded to a metal plate surrounded by charcoal. Two 0000 trolley wires are used, and a 0000 feeder extends the full length of the line. The three-phase transmission line is No. 4 and No. 6 B. & S. gage copper. There is a single cross-arm at the top of the pole, and 7-in. Locke insulators are mounted on Fletcher steel pins. The ridge pin is a Fletcher roof bracket extended several inches down the side of the pole, and secured to the sides and ridge by four lag screws.



TYPE OF BRACKET SUSPENSION AND POLE FITTINGS USED ON THE TOLEDO, PORT CLINTON & LAKESIDE RAILWAY

Several rather extensive bridges were erected, crossing lowlands, streams and railroads. Over the Portage River at Oak Harbor it was necessary to erect a swing bridge, as the river is navigable beyond that point. The bridge, which is illustrated herewith, has two steel spans, the center one turning and operating by a motor. In order to get the high-tension lines above the masts of boats, three steel towers were erected on the bridge. The tower over the center span has a pole set on a revolving center, so that while the bridge revolves, the pole remains stationary. A pile trestle about 1200 ft. long is illustrated. It will be noted that on the trestles a double set of trolley poles are used and the trolley wire is suspended from a cross timber which is braced on either side, making a very strong structure. The overhead crossing near Port Clinton is S-shaped, with trestle approaches, with two spans, one a through truss 153 ft. long over the Lake Shore & Michigan Southern tracks and the other 66 ft. long over the company's power house track, a riveted half-deck truss.



A LONG TRESTLE AND FILL ALONG THE LINE OF THE TOLEDO, PORT CLINTON & LAKESIDE RAILWAY

ROLLING STOCK

The original rolling stock consisted of four 50-ft. cars, containing passenger and smoking compartments, built by the Kuhlman Car Company. These were described and illustrated in this paper some months ago. They are unusually wide for an interurban car, and have wide, comfortable seats, but it is difficult for two of them to pass on city streets, so the new cars recently received from the Niles Car & Manufacturing Company were made narrower. There are four of these, 51 ft. long and 8 ft. 8 ins. wide over all. Two have passenger and smoking compartments, and the others are three-compartment cars, there being a 9-ft. baggage compartment continuous with the front vestibule. The cars are finished in quartered oak, have semi-Empire roof, leather seats in smoker and plush with high head rolls in the passenger compartment, continuous parcel racks and Pullman-shaped windows with art glass above. They are provided with quadruple motor equipments, Peckham

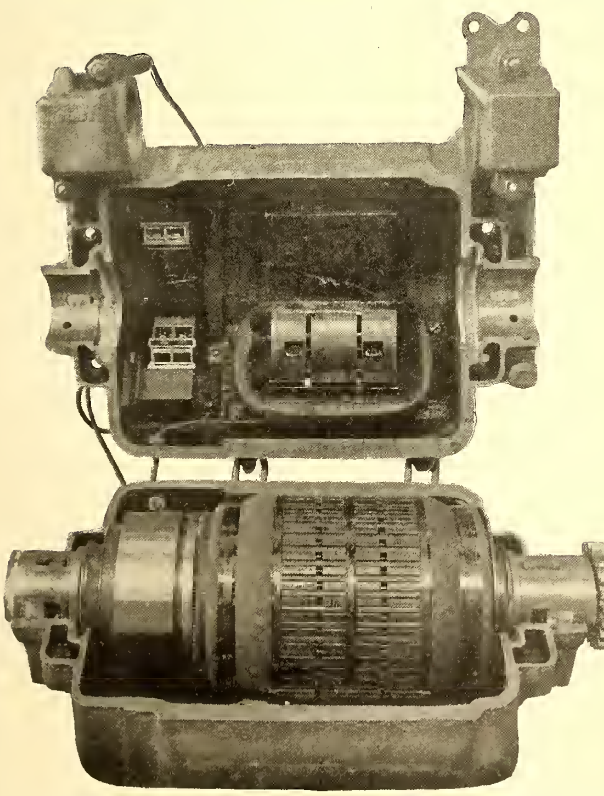
40-A trucks, Nichols-Lintern air sanders, Westinghouse individual compressor air equipments, and the Lintern system of markers and classification lights. On the rear end are marker lights over the rear vestibule windows, while on the front end on one side are classification lights with white and green lense. These lights are operated by separate switches and are controlled by the motorman.

For express service there is a 45-ft. car with two large doors on either side. It has monitor deck and closely resembles the passenger cars. The company also owns one electrically-equipped work car for locomotive use and several standard box cars, flat cars, etc.

MOTORS AND CONTROLLERS

The motor and controller equipments are all of Bullock manufacture. The motor is known as R-50, and is of liberal design, with ample bearings. It is rated at 50 hp, but is claimed to be capable of a considerable overload without heating. It has a continuous capacity of 45 amps. at 500 volts, showing no more than 75 degs. C. rise in shop test. The field frame is of steel castings, divided horizontally through armature and axle bearings. A liberal center distance is allowed between these bearings so that a maximum axle of 6 ins. in diameter may be used. The pole pieces are of laminated iron secured to the frame with through bolts. There are four poles, each provided with a coil, which is securely held in place by the projecting tips of the pole pieces. The pole pieces are provided with ventilating ducts, which correspond with the ducts in the armature, allowing air to circulate through the pole piece and around the coil. The armature core is built up of soft steel laminations, annealed after punching. The coils are machine wound and thoroughly insulated. They fit accurately in the slots and are held down by band wires, which are well below the surface of the core. The commutator is 11½ ins. in diameter and 4½-in. face. It is built up of hard-drawn copper bars and insulated with the best mica. The commutator has a wearing depth of about ⅞ in. The brush holders are of cast brass secured to a specially treated wood block. This block is in turn bolted to the end of the upper field frame fitting an accurately babbitted seat. Each holder is secured to its block independently of the other, and carries two carbon brushes; an independent pressure finger is provided for each brush. The bearings are of cast iron with babbitt lining. The pinion end armature bearing is 3½ ins. in diameter and 9½ ins. long, and the commutator bearing is 3 ins. in diameter and 7¼ ins. long. The axle bearings are 5½ ins. in diameter and 9½ ins. long. Cast-steel cut gears of split pattern are used. They are of No. 3 teeth diametral pitch and 5-in. face. The pinions are of forged steel, fit the armature shaft on a taper seat, and are securely keyed to same. The gear ratio is 24 to 65. Lugs are provided on the top field frame for bolting to the suspension bar.

ONE OF THE COMBINATION PASSENGER AND BAGGAGE CARS OPERATED ON THE TOLEDO, PORT CLINTON & LAKESIDE RAILWAY


VIEW OF THE GENERAL INTERIOR ARRANGEMENT OF THE NEW 50-HP MOTOR USED ON THE TOLEDO, PORT CLINTON & LAKESIDE RAILWAY

The controller used is of the series-parallel type. The main drum makes the rheostatic and motor combination for the four motors. The reverse drum is provided with contact for each motor and is interlocked with the main drum. A cut-out switch is provided for cutting the motors out of circuit. The cut-out switch can be thrown without removing the controller cover by using the reverse lever. A special main handle is used, requiring at least a short stop at each point when feeding it. There are seven points in series and five in multiple. A magnetic blow-out is used to protect the contacts. The arcing is also reduced at the open circuit position by inserting an extra section of resistance before breaking.

BUILDINGS

The company has neat frame stations in each town, containing ticket office, waiting room and baggage room. A temporary station of this character erected at Port Clinton is shown. This will be removed shortly to another town, as the company plans to erect a handsome two-story stone station on this site, the lower floor containing the usual passenger and freight facilities and the upper floor the general offices of the company. This is on the Public Square of the town, and the land was donated for the purpose by the city and county authorities. The building will be of stone to harmonize with the fine county court house recently erected. This illustrates the friendly feeling which the citizens of this district bear toward this company, which met with unusually liberal treatment in building the road.

THE COMPANY

The company is composed largely of wealthy local and Toledo people who have interests in this district. The road was built by the Toledo Interurban Construction Company, which was formed for the purpose by the leading stockholders of the company. T. R. Wickenden, chief engineer of the company, had entire charge of locating and building the line, purchasing the equipment and supervising the work. The entire contract for the equipping of the power station, sub-stations and cars was given to the Allis-Chalmers Company. The officers of the Toledo, Port Clinton & Lakeside Railway Company are:

Theodore Schmitt, president; A. E. Klauser, vice-president and general manager; H. R. Klauser, treasurer; H. T. Shunk, secretary; H. C. Warren, general superintendent; C. N. Hawley, auditor; T. R. Wickenden, chief engineer; C. Pollett, electrical engineer; O. R. Sterzinger, master mechanic.

PROPOSED ELECTRIC RAILWAY IN HAMBURG

The railways of Hamburg, like so many others in large cities, have to face the problem of handling a suburban traffic far beyond their normal capacity. After a rapid transit campaign extending over ten years, the City Senate, or Council, has been led to consider building five lines, which will be of mixed underground and elevated construction. The heaviest grades are not to exceed 2½ per cent and the curves are not to be sharper than 100 m (328 ft.) in radius.

There will be fifty cars, each supplied with three 120-hp, 750-volt, 25-cycle, single-phase motors. The trolley wire will be supplied with current at 6600 volts, a car transformer being used to reduce the voltage for the motors. The latter are four-pole machines running at a normal speed of 600 r. p. m. Each motor weighs 2700 kg (5940 lbs.) alone, or 3000 kg (6600 lbs.) complete with gears. The main car transformer weighs about 1000 kg (2200 lbs.) and the regulating transformers about 200 kg. (440 lbs.). The total weight of the electrical equipment will be about 16.5 tons per car, and the total weight of the double cars used will be, including the average load of forty to forty-five passengers, about 75 tons. The total seating capacity of each double car is 140 persons. Current will be taken through two trolleys of the bow type. The overhead line will be of the catenary construction, using a grooved conductor of 80 sq. mm in cross section and a single steel suspension wire 6 mm in dia. The conductor will be supported from the catenary at intervals of about 3.5 m. (11 ft. 5 ins.). The height of the conductor above the rail will be 5.5 m (18 ft.) normally and 4.8 m (15 ft. 9 ins.) under bridges. Each train will be made up of two or three double cars controlled by a multiple-unit system. The circuits to the motors are opened between adjacent running points. The schedule speed is to be 27 km (16.2 miles) per hour, with fifteen stops of 30 seconds each, approximately ½ mile apart.

It is intended to divide the contracts for the construction and equipment between the Siemens & Halske Company and the Allgemeine Company, both of Berlin. The total cost of building and equipping the lines is the sum of 41,143,600 marks (approximately $10,285,000). Two lines are to be built within five years, and the remaining three within the following five years. It is proposed to turn the system over to an operating company for forty years, the municipality receiving a definite percentage of the gross earnings and later a portion of the net profits. All changes in street piping required to permit the construction of these lines will be carried out by the city.

THE LIGHTING SYSTEM AND OVERHEAD CONSTRUCTION IN THE PHILADELPHIA SUBWAY

The opening of the new subway of the Philadelphia Rapid Transit Company was announced in the issue of the STREET RAILWAY JOURNAL last week. At that time an account was given of the track construction, provisions for ventilation and the lighting system. Further particulars of the latter and of the overhead construction are presented in this issue.

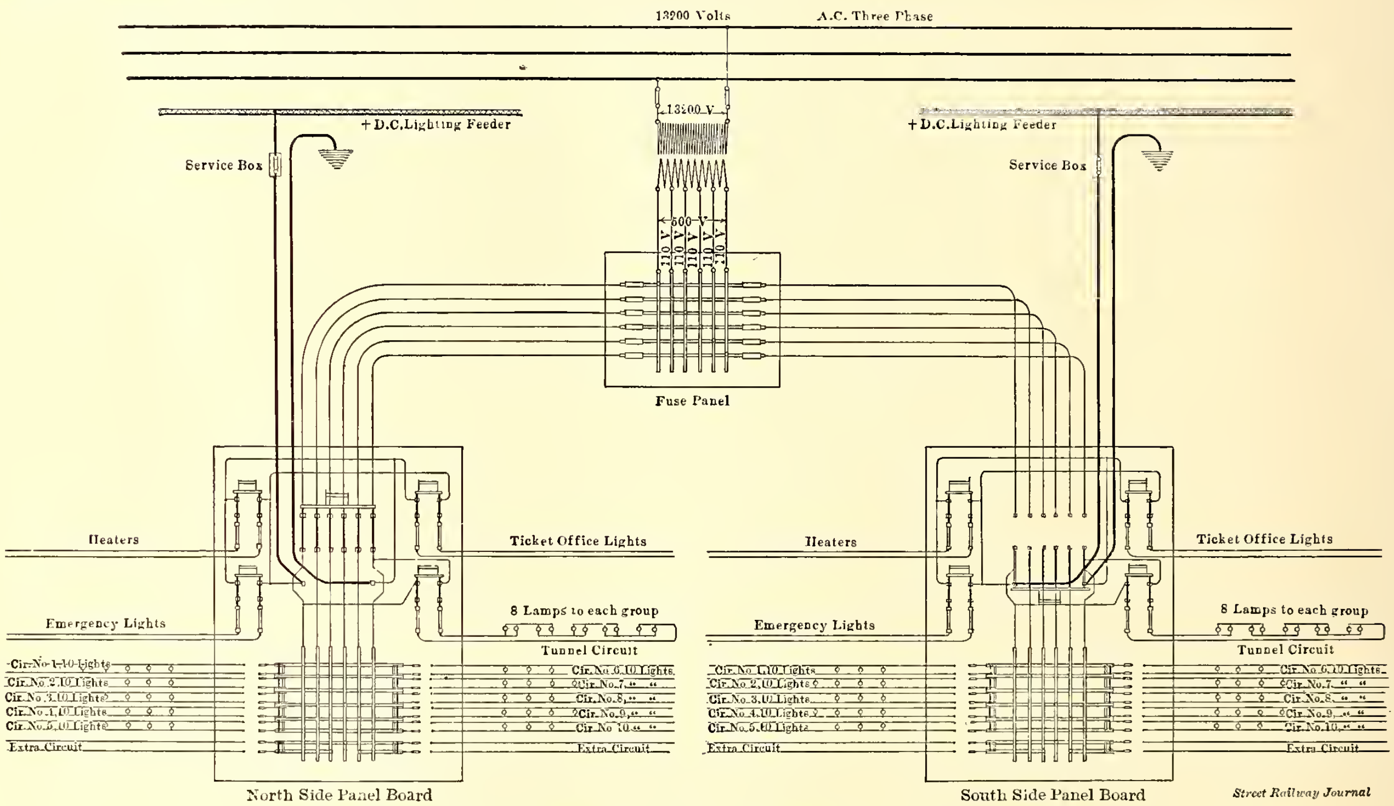


FIG. 1.—SCHEMATIC DIAGRAM OF LIGHTING SYSTEM AT EACH PASSENGER STATION

Fig. 1 shows the general scheme of light wiring. The distribution system is divided into as many lighting sections as there are stations and the lights in each station and in the section of subway adjoining it are controlled from a panel in the station. The system is arranged with two distinct methods of supply. The first is by a direct-current feeder from the nearest power house or sub-station which will supply 550 volts direct current. The other, which is the main source of supply, is by a three-phase cable supplying alternating current at 13,200 volts, 25 cycles, from an independent lighting generator installed in the main station. This cable connects to the transformers in the various subway stations.

One subway station is connected to the A and B phase, the next to the B and C phase, and the next to the A and C phase, so as to make the load as nearly balanced as possible. Fig. 1

shows the transformer connected to the A and C phase. Each transformer is wound for 13,200 volts on the high-tension side and gives 550 volts on the low-tension side, with taps at every making 100 lights for the south side of the Ninteenth Street station.

The six-pole switch, shown in the diagram, when thrown up,

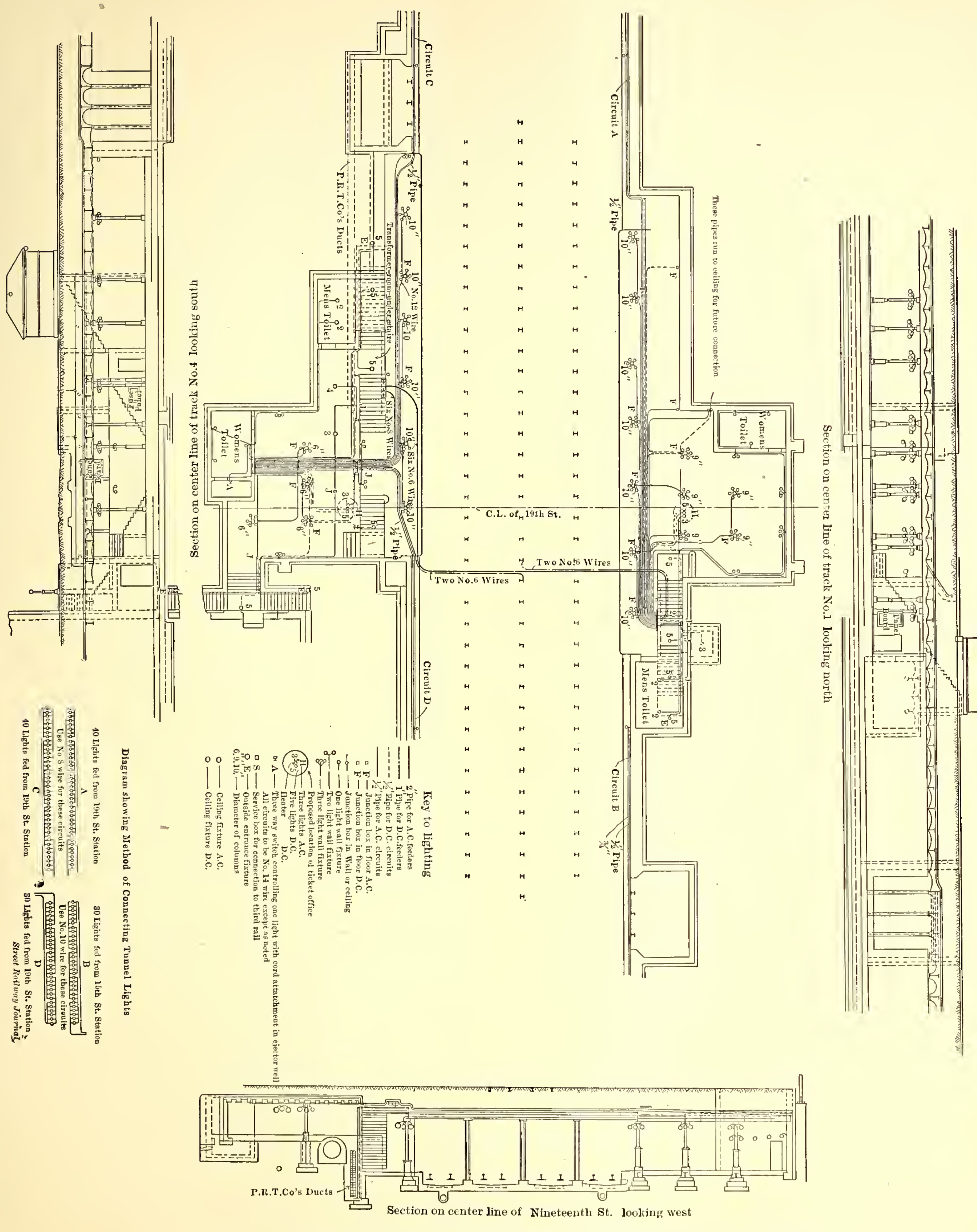


FIG. 2.—GENERAL LIGHTING SCHEME OF THE NINETEENTH STREET STATION

110 volts. These taps are connected to the fuse panel, from which the distributing cables connect to the panel boards of the north and south stations, respectively. Small switches on the panel board control an equal number of lights; in the Nineteenth Street station there are ten switches of ten lights each, connects the transformer to the various circuits; when thrown down it disconnects the transformer entirely and connects the two outside circuits, one to the direct-current feeder and the other to the negative return. The plan of the company is that under ordinary conditions the six-pole switch will be in its

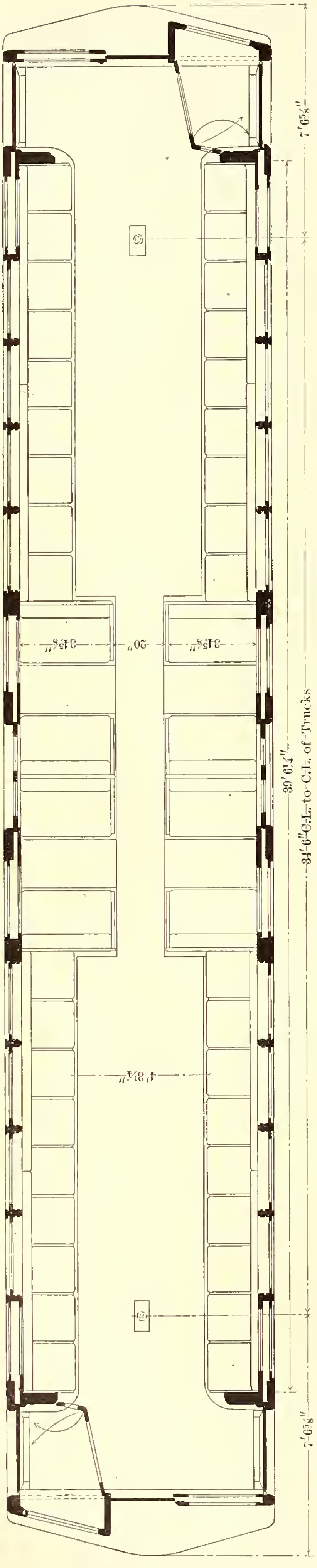


FIG. 3.—PLAN OF STEEL CAR TO BE USED IN EXPRESS TRAINS

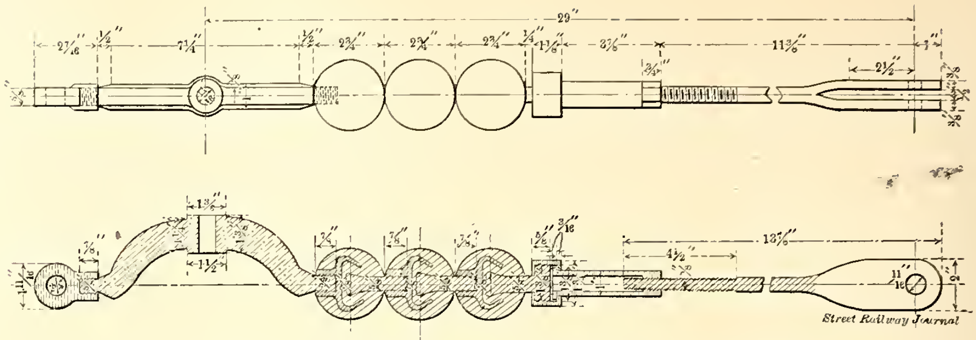


FIG. 4.—OVERHEAD CONSTRUCTION FOR SURFACE LINE UNDER ELEVATED STRUCTURE

"up" position. It is then possible to throw in any light circuit desired by closing any of the small double-pole switches. In the event of a burn-out of the transformer or of the supplying cable, however, the six-pole switch is thrown down. The lamps are then connected in two sets of five in series and ten in multiple, making it possible to burn all the lights from the 550-volt direct-current cable, or half the lights if so desired. In the latter case half the lights need not necessarily be those controlled by switches 1 to 5, or those controlled by switches 6 to 10, but can be any combination of five switches as long as no two switches are directly opposite; for instance, switches 1-7-3-9-5 may be thrown.

The tunnel lights are connected to the two outside bars on the panel board, and are connected in series multiple. Where there are four tracks there are two circuits of lights, one between the first and second tracks and the other between the third and fourth tracks. One of these circuits is fed from the panel board at one station and the other from the panel board at the next station.

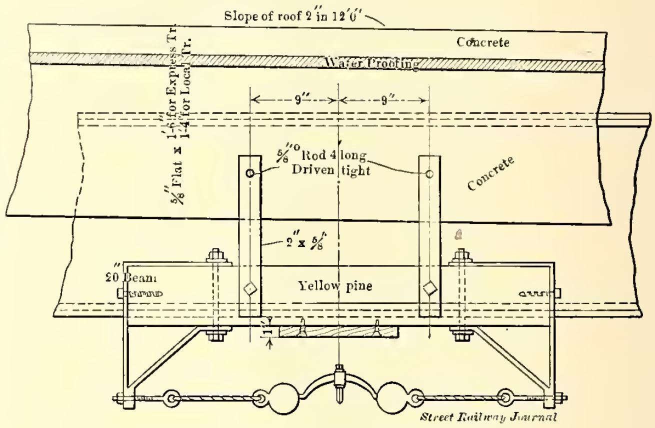


FIG. 5.—OVERHEAD CONSTRUCTION FOR SUBWAY LOCAL TRACKS

Fig. 2 shows the general lighting scheme of the Nineteenth Street station. The principal lights are arranged to be supplied from the lighting transformer, but on each platform and on every stairway there is one circuit more supplied from the direct-current lighting cable. The switches for these circuits, as will be noticed, are marked on the wiring diagram as "emergency lights." The purpose of putting these lamps on the power circuit was that if there was trouble in the lighting transformer or supply cable at night time, the station would not be left in complete darkness, but these lamps would give sufficient light for the station attendant to open the six-pole switch and throw it down, connecting the arc lights to the direct-current cable. Arthur B. Stizer, electrical engineer of the company, had charge of the design and installation of the lighting system of the subway.

Fig. 3 presents a plan of the pressed steel express car to be used in the subway and on the elevated railway system. As will be seen, the car is provided with side

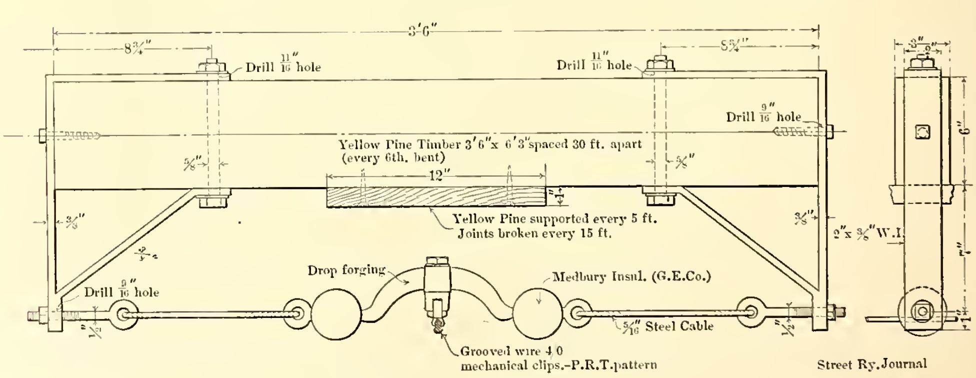


FIG. 6.—ENLARGED DIAGRAM SHOWING FLEXIBLE HANGER ON LOCAL TRACKS

doors in the center as well as end doors. These side doors will not be used at present, and the seats are located regardless of them. At a later date, if the traffic conditions of the subway require it, these seats can be removed.

The overhead construction used on the local tracks was described briefly in the issue of last week, but engravings, Figs. 5 and 6, showing the methods and apparatus employed, are presented herewith. As will be seen, the trolley wire is grooved, No. 0000 in size, and is held in a mechanical clip. The double pull-off has a drop forged yoke and two globe strain insulators and is supported from its two supporting brackets by a 5-16-in. cable with ½-in. bolts and nuts. The brackets supporting the span are attached to a yellow pine timber, 3 ft. 6 ins. x 6 ins. x 3 ins., spaced 30 ft. apart, or on every sixth bent. Directly above the span wire and a distance of 2½ ins. from the top of the hanger bolt is a yellow pine guard-board which is supported every 5 ft. The construction differs from that usually followed in cases of this kind in which the insulator is attached directly to the guard-board. It is thought that the construction adopted with a 3-ft. 6-in. span, will give all the flexibility required to produce smooth and noiseless operation.

Fig. 4 shows the method of suspending the trolley wire under the elevated structure.

THE "ROADMASTER" SYSTEM IN TORONTO

One feature of the operating organization of the Toronto Railway Company, of Toronto, Can., is deserving of special comment, and although the practice has been followed in Toronto since 1902, it will probably be new to most managers in the United States. The scheme consists of picking two of the best motormen on each line of the system and promoting them to positions known as "roadmasters." These roadmasters have their regular runs on the cars and fill all the duties of the regular motormen, but in addition they have delegated to them considerable authority over the other employees and over the various details of operation. They fill many of the duties which in the United States usually devolve upon officers known as street inspectors or street superintendents, but instead of watching the operation of the line from street corners or riding on an occasional car, the Toronto roadmasters fill these same duties while working as motormen on regular cars. These men are virtually working deputy superintendents.

Two roadmasters are appointed for each line, one as a regular and one as a relief, so that there is a responsible roadmaster somewhere on every line at every hour of the day while cars are in service. Primarily, the roadmasters are held accountable for the conditions on their respective lines with regard to regularity of service, obedience to rules, meeting emergencies and operation in general. For instance, if a car develops a defect while in service, the motorman of the crippled car either moves along as best he can or, if necessary, has the next car push him along, and in the meantime keeps a sharp lookout for the car upon which the roadmaster is running. The roadmasters have their regular runs, and all employees are required to know these runs. When the crippled car meets the roadmaster's car the roadmaster immediately takes charge of the situation. All of the roadmasters are given a thorough mechanical training and are competent to remedy ordinary faults. The roadmaster changes places with the motorman of the crippled car, this motorman going on with the roadmaster's regular run, while the roadmaster either repairs the defect or else orders the car to the car house. If a collision or other emergency happens on the line, the roadmaster takes steps to reach the scene as soon as possible and takes charge of the situation.

The roadmasters have considerable latitude in performing their duties. They are free to change cars with any motorman they may happen to meet, and they do this frequently so as to get back over the line at times when they are not always expected. They keep close watch on the travel and make recommendations as to whether the schedule in force is properly meeting the conditions of traffic, and if cars are running too full or too light they recommend suitable changes.

It is their duty to make to a head roadmaster daily reports in writing covering all the conditions on their lines and making any suggestions they may deem advisable. These daily reports give the management an insight into details on the property that can be obtained in no other way. Roadmasters have no authority to hire or discharge employees, but they are required to report any infraction of the rules or practices that are not conducive to good service.

Another important duty is the regulating of late runs. It has been found that crews on late runs are often tempted to run recklessly and frequently get into the car house 10 or 15 minutes earlier than the schedule calls for in order to get through their work a little sooner. This is avoided by giving the relief roadmaster the car that is due in at the car house the first of the night runs. This relief roadmaster after turning in his car in the evening stays at the car house and checks up all the other night cars as they arrive to see that the men are not coming in earlier than the schedule calls for. He stays on duty until the last car has been turned in.

Another advantage is in the handling of the sweepers during the winter. Each sweeper is placed in charge of a roadmaster, who is given a competent crew, and thus the sweepers are always in charge of a responsible official. It is believed that when the sweeper crews are picked from the regular men there is sometimes a temptation to shirk some of the duties, especially when the sweepers are out at the ends of the lines, and the crews find it more comfortable to take unscheduled layovers instead of keeping right up to the work. The roadmasters are all men who have been thoroughly trained and tested, and as they are virtually officials with considerable authority and responsibility, they are well fitted to take charge of the sweepers and handle the snow-fighting work. The roadmasters are always promoted from the ranks and are paid by the month instead of by the hour. They receive from $15 to $20 a month more than the full-time regular motormen on the same lines. As a badge of authority, each roadmaster wears a special cap with the word "Roadmaster" in gold braid on the band. The Toronto Railway is now operating eighteen separate lines of routes, and there are therefore about thirty-six roadmasters. They report to the head roadmaster, who is virtually the assistant superintendent of the road.

The roadmasters do not absolutely supplant street inspectors, as the company has about eight inspectors in addition to the roadmasters. The duties of these inspectors, however, are confined largely to checking the cars and looking after trouble when the roadmaster does not happen to be on the ground.

In its plans for the protection of its property, the Consolidated Railway Company, of New Haven, has erected on its lines a total of 2500 ft. of storm fence, which is planned to keep much of the snow off the tracks during the winter. These fences have been built in the open country on the East Haven, Branford and Woodmont lines, and it is planned to put out more of this sort of protection on the Mt. Carmel line, where the company suffers most during the heavy snow storms. On Curtiss Hill, on the East Haven line, a place where the wind has full sweep and drives the snow onto the trolley tracks, a long stretch of storm fence has been built. Another long stretch of track, an open section just this side of the trolley terminus at Branford, is similarly protected, and the same thing has been done near what is known as Chapel Street at Woodmont. These fences are 5 ft. high and of a special design for the purpose which they are to serve. They are situated about 25 ft. to 30 ft. from the tracks.

COST OF GENERATING ELECTRIC POWER

BY F. A. GIFFIN

The cost of power is dependent upon so many variable and uncertain factors that it is impossible to arrive at any theoretical results which will be strictly applicable to individual practical cases, but it is possible by making certain assumptions to calculate a series of cost curves which will approximately represent the cost of power per kw-hour under various conditions and whose relative values will be fairly reliable.

While some of the assumptions which have been made in reaching the final results of this paper may be erroneous and may not accurately represent average conditions, yet it is believed that any errors which may creep into one assumption may be offset by errors in the opposite direction in some other assumptions. This feature of the tendency of the errors made in one group of assumptions to counteract those made in another group is of considerable generality in engineering estimates, and may in many cases be laid down as a law. As a well-known illustration of the principle, may be cited the close agreement which usually obtains between estimates of the cost of an engineering project when made by independent engineers. It frequently happens that the estimated costs of component items differ as much as 100 per cent, yet the sum of the cost of all items will give a total cost frequently within a few per cent of the average of all estimates. Moreover, it is a frequent experience of engineers to find the actual cost of a project agreeing within a few per cent of the estimated cost, in spite of the fact that unforeseen extra expenses were involved.

The following formulæ and figures are intended to be applicable to a modern power station containing four 1000-kw units, and the following assumptions will be made regarding the manner in which the efficiency of each piece of apparatus varies with the load:

It is assumed that the transformers have a full load efficiency of 98 per cent, and that the maximum efficiency occurs at full load. It follows that 1 per cent of the full load rating of the transformers is a constant loss at all loads, and that 1 per cent varies as the square of the load.

The generators are assumed to have a full load efficiency of 95 per cent. Three per cent of the full load rating of the generators is assumed to represent the losses which are constant at all loads, the remaining 2 per cent varying as the square of the load. In other words, the maximum efficiency of the generators is assumed to occur at about 22.5 per cent overload.

The mechanical efficiency of the engines at full load is assumed to be 90 per cent, and it is also assumed that the mechanical losses, which amount to 10 per cent of the full load rating of the engines, are constant at all loads. It is also assumed that 10 per cent of the steam supplied to the engines at full load is lost by condensation, and that this condensation is a constant quantity, independent of the load.

It is assumed that the piping has a full load efficiency of 95 per cent. Since the minimum loss in steam piping occurs when the loss due to friction is one-fifth of the loss due to radiation, it is assumed that one-sixth of 5 per cent of the full load losses varies as the square of the steam velocity—that is, as the square of the load, and that five-sixths of the full load losses, namely, that due to radiation, is constant at all loads.

It is assumed that 20 per cent of the steam input in the main piping is consumed at full load by the auxiliaries; that one-quarter of this steam is constant at all loads, and the remaining half varies directly with the load.

It is assumed that the boilers consume a minimum amount of coal per pound of water evaporated at full load. It is also assumed that at one-half load and at 50 per cent overload the efficiency of the boilers is 90 per cent of the full load efficiency, and the efficiency at other loads may be obtained by passing a circle through the three points above mentioned. If P denote the load expressed as a fraction of full load, then the ratio of the efficiency of the boilers at load P to their efficiency at full load will be given by the expression:

$$\sqrt{.69 + 2P - P^2} - 0.3.$$

Since the efficiency of boilers differs greatly in individual cases, the above assumption is probably the most questionable of all that have been made, but is believed to represent a fair average of what experience has shown. In general, the falling off of boiler efficiency at light loads is due to radiation losses, and the falling off at overloads is due to the imperfect combustion of the fuel when the boilers are forced.

Summing up all the above losses, it is found that for the 4000-kw station 2028 kw represent the losses which are independent of the load; 296 kw represent the losses which vary directly with the load, and 176 kw represent the losses which vary directly with the square of the load.

By using these figures the coal consumption per kw-hour expressed as a decimal fraction of the consumption at full load has been computed, and the results have been found to conform closely to the following empirical formula, in which P represents the average station output expressed as a decimal fraction of rated output:

Cost of fuel per kw-hour expressed as a decimal fraction of

$$\text{cost at full load} = .3435 \frac{P^2 + 2.32}{P + 0.14}$$

The following table may be considered as representative of the average distribution of the several items going to make up the total cost of power when bituminous coal may be had at about $2.25 per ton:

	Per Cent
Coal	50
Wages	33
Repairs	10
Supplies	5
Water	2
Total	100

Since the water consumption is proportional to the coal consumption, 52 per cent of the cost of generating power will vary according to the above empirical formula. It will be assumed that wages are a quantity independent of the load, also that 40 per cent of the cost of supplies will be a constant quantity independent of the load. The remaining percentage is assumed to vary directly with the load.

The following table is a reclassification of cost of power according to the manner in which the various items vary with the load:

52 per cent varies according to fuel formula.
39 per cent constant.
9 per cent proportional to load.

Total, 100 per cent.

The 39 per cent which is constant will be divided by the average output of the station to obtain the cost per kw-hour due to this item.

There are thus two kinds of load which must be distinguished in discussing the cost of power per kw-hour, namely, P, the average load upon the machines in use, which determines the efficiency of the machinery; and F, the average output from the station expressed as a decimal fraction of the rated capacity of the station, which has a direct bearing upon the labor item.

Collecting all these results, and letting C represent the cost of fuel in dollars per ton, the cost of power per kw-hour may be expressed by an empirical constant times:

$$\left[.0763\,(C + 0.09)\frac{P^2 + 2.32}{P + 0.14} + \frac{0.39}{F} + 0.09\right]$$

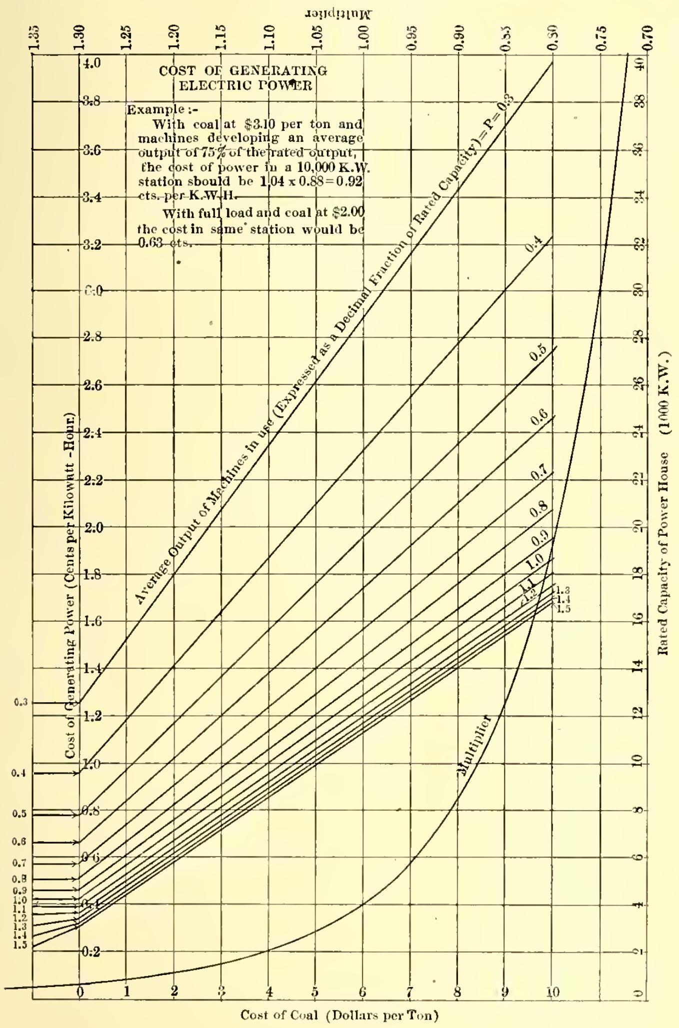
This empirical constant must be so chosen that the formula will express the correct cost of power as determined by past experience.

If the actual time each machine is in use is known, F may evidently be expressed in terms of P. In calculating the following curves, F has been taken equal to 71.6 per cent of P, this representing about average conditions with a railway or lighting load.

Making this substitution and representing the empirical constant by a proper value, the formula for the cost of power per kw-hour finally becomes:

$$\text{Cost} = 0.05 \frac{(P^2 + 2.3)\ C + 0.1P^2 + 1.2P + 7.36 + 1/P}{P + 0.14}$$

This formula applies only to a modern generating station with a rated capacity of 4000 kw and within the limits indi-



cated on the curve sheet, namely, between P equals 0.3 and P equals 1.5. To make the curves plotted from this formula of general use, the results must be multiplied by a correction factor where the rated capacity of the station is other than 4000 kw. The vertical curve intersecting the straight lines on the curve sheet below is believed to give approximately true values for this correction factor for stations ranging in capacity from 400 kw to 40,000 kw, since the results obtained from its use have been checked by a large amount of published data upon the cost of generating power under widely varying conditions.

While the reader may not find that the actual values derived from these curves conform to his own experience, it is hoped that the relative values are fairly reliable, so that he may multiply any value obtained from these sheets by a constant correction factor to make the results agree with his own experience:

APPLICATION

Since the assumptions underlying the foregoing results have been stated, by exercising a reasonable amount of judgment the curves may be used in solving quite a variety of economic problems which are constantly occurring in engineering practice.

Probably the most important factor in the cost of generating power is the personal equation of the operators so that a skilled power house staff may be able to turn out power at two-thirds or less of the cost obtained by an unexperienced staff. The cost of power expressed by the above curves is intended to represent the cost which can be obtained commercially in a well-designed station with a reasonably efficient operating staff.

The use of the curves may be illustrated by solving an example. Let it be required to find the cost of generating power in a station whose rated capacity is 10,000 kw, the average load on machines in use being 75 per cent of their rated output and bituminous coal costing $3.10 per ton. Following up from the lower horizontal scale to a point about midway between the straight line marked 0.7 and the one marked 0.8 over the point corresponding to $3.10 per ton, the figure 1.04 is found on the left-hand vertical scale. Following to the left from the right-hand vertical scale along the 10,000-kw line to its intersection with the curve marked "multiplier," the figure 0.88 is read upon the upper horizontal scale. The product of the two figures thus obtained, 1.04 times 0.88, gives 0.915 cent per kw-hour as the probable cost of power.

If the average output of the machines in use is equal to their rated capacity, and coal can be had at $2 per ton, the cost of power would be only 0.63 cent per kw-hour.

GAS ENGINES

If anthracite coal or any other fuel is burned instead of bituminous coal, the cost of power may be obtained from the curves by reducing the cost of the fuel used to its equivalent in dollars per ton of bituminous coal, the reduction being accomplished by considering the relative number of heat units in the respective fuels and any difference which may exist in the furnace efficiencies. As an example of this principle, let it be required to find the cost of power where gas engines are the prime movers, under the supposition that the coal consumed by a gas engine per unit of power generated, is one-half of that consumed by a steam engine and that coal costs $2 per ton. Under this assumption coal at $2 per ton for a steam engine is equivalent to coal at $1 per ton for the gas engine, so that a 10,000-kw plant with the machines in use running at rated capacity should generate power at a cost of 0.5 cent per kw-hour, as against a cost of 0.63 cent per kw-hour for a similar plant using steam engines as the motive power.

If the average load on the station during 18 hours of operation per day is 71.6 per cent of its rated capacity, the total output per day would be 128,880 kw-hours, which with the saving effected by the gas engine over the steam engine at 0.13 cent per kw-hour would amount to $167.54 per day, or about $61,000 per year. Assuming interest and depreciation on both plants at 10 per cent per annum, this is equivalent to $610,000 extra capitalization, or $61 per kw, which it would be economical to pay as an extra price per kw-capacity for the gas engine installation.

WATER POWER

Assuming roughly that the labor in the boiler room of a steam plant is about the same as the extra labor in maintaining the intake and piping system of a water-power plant, the cost of generating power by water can be found from the above curves by assuming that coal costs nothing. In other words, the cost of generating power in a water-power station of 10,000-kw capacity when the machines in use are running at their rated capacity would be about 0.35 cent per kw-hour.

CONSIDERATIONS DETERMINING THE LOCATION OF ELECTRIC RAILWAY SUB-STATIONS*

BY C. W. RICKER

To show more clearly the method of treating the problem of sub-station location suggested in the original paper, a simple problem will be discussed by means of it. A typical interurban railway consisting of one long line has been selected, because it suffices to exhibit the method without an excessive amount of labor.

No attempt has been made to determine the quantities used exactly, but only to make them consistent, as in any particular problem they must be determined for the particular conditions encountered.

Assuming the following data, there is required the number of sub-stations to obtain the best operating economy.

Distribution, a.c.-d.c.

Length of line, 60 miles.

Service, hourly in both directions, 20 hours per day.

Schedule speed, 30 miles per hour.

Stops per single trip, 10.

Cars on the line, 4 for 18 hours, 2 for 2 hours.

Car-hours per day, 76.

Weight per car (approximate) 30 tons.

Mean amperes per car, 135.

Mean square amperes per car, 35,000.

Running current, multiple, per car, 200 amperes.

Starting current, multiple, per car, 400 amperes.

Track, single, 80 rails.

Track resistance per mile, .0313 ohm.

Sub-station power factor, 1.

Resistance of copper per mil-mile, 54,750 ohms.

Weight of copper per mil-mile, .016 lbs.

Price of copper per lb., $0.15.

Rate of interest, 5 per cent.

Annual fixed charges on sub-station buildings and land, 7 per cent.

Annual fixed charges on sub-station equipment, 15 per cent.

Cost of energy at sub-station a. c. bus, $0.0125.

The secondary copper is assumed continuous and of uniform section from end to end of the line.

The sub-stations are arranged so that the drop in the secondary copper and track is the same at points midway between sub-stations and at the ends of the line, the end sections being three-fourths the length of the intermediate sections.

Assuming this line fed through different numbers of sub-stations, it is desired to draw the following curves, with the number of sub-stations as abcissæ and the total annual cost in dollars, as ordinate.

Annual charges on sub-station buildings and land.

Annual charges on sub-station equipments.

Annual charges on secondary conductors.

Annual cost of sub-station attendance.

Annual cost of sub-station losses.

Annual cost of losses in secondary conductors and track.

*A paper supplementary to a paper by the same author, presented at a meeting of the American Institute of Electrical Engineers, Dec. 15, 1905, and published in the STREET RAILWAY JOURNAL for Dec. 23, 1905.

The cost and loss in the primary distribution are assumed to be nearly enough constant so that they may be neglected in a primary discussion, but if desired curves representing them may be added to those enumerated.

These quantities have been computed and the curves drawn, for the number and arrangement of sub-stations shown in the following table.

Sub-Station Capacity.—With the service outlined, the maximum load of any sub-station will be that due to the starting of two cars at once, 800 amperes, lasting for a few seconds. With the largest number of sub-stations, the capacity of each has been made equal to one-half of this, allowing a momentary overload of 100 per cent in case the whole load falls upon one sub-station. With the smallest number of sub-stations, the capacity of each has been made equal to the maximum load. In the intermediate arrangements, the capacity of each is graded between these limits in the proportion of the combined line and track resistance between adjacent sub-stations, which is very nearly proportional to the distance between the same.

TABLE I.—SECONDARY COPPER BY KELVIN'S LAW

Sub-Stations					Daily Total Input Kw-H.	All Day Efficiency	Cost Kw-H. D.C. Bus.	Annual Charges on			Annual Cost of			Totals
No.	Distance	Capacity	Computed Capacity	Total Capacity				Real Estate	Sub-Stat'n Equipm'ts	Secondary Copper	Sub-Stat'n Attend.	Sub-Stat'n Losses	Secondary Copper Loss	
6	10.9	260	250	1,560	8,500	77.6	1.61	840	8,550	4,480	8,640	8,730	4,530	35,770
5	13.3	281	300	1,400	8,410	79.3	1.58	700	7,780	4,550	7,200	7,960	5,450	33,640
4	17.1	315	300	1,260	8,185	81.7	1.53	560	6,225	5,480	5,760	6,920	6,110	31,055
3	24.	377	400	1,131	8,070	82.7	1.51	420	5,220	6,450	4,320	6,400	7,625	30,435
2	40.	520	500	1,040	7,926	84.3	1.48	280	3,900	8,690	2,880	5,750	10,420	31,920

Sub-Station Losses and Secondary Copper.—The mean all-day efficiency of the sub-stations of each arrangement was obtained by dividing the total output of the sub-stations by the total input. The total output was assumed constant at 6.669 kw-hour. The efficiency of each sub-station at the mean load of one car and at the mean load of two cars, was computed from typical efficiency curves of rotary converters and transformers, allowing 6 per cent for losses when running idle. From these the mean rates of input and the total input were computed. From the all-day efficiency the cost of energy at the direct-current bus was computed, for use in proportioning the secondary conductors by Kelvin's law.

The exact computation of the losses in the secondary conductors is very laborious, so to approximate the same, the load was assumed to be fixed at its mean distance from the sub-tation, one quarter section, and the resistance of the secondary copper multiplied by the car hours per section and the mean square current per car.

TABLE II.—SECONDARY COPPER BY LIMITING DROP

No. of Sub-Station	Annual Charges Secondary Copper	Annual Cost of Secondary Copper Loss	Totals
6	4,460	4,560	35,780
5	5,850	4,560	34,050
4	8,380	4,560	32,405
3	15,120	4,560	36,040
2	76,400	4,560	93,770

The annual cost of the secondary copper was taken at 6 per cent to cover interest and cost of reclaiming.

The secondary copper was proportioned by Kelvin's law, for each arrangement of sub-stations as follows:

$$\frac{35{,}000 \times \text{car hrs. per year} \times \text{Res. per mile copper} \times \text{length section} \times \text{cost kw-hour}}{4000}$$

$$= \frac{\text{wgt. mil-mile} \times \text{Res. mil-mile} \times \text{length section} \times 15 \times 6}{\text{Res per mile copper} \times 10{,}000}$$

$$\text{Res. per mile copper} = \frac{.95}{\sqrt{\text{Car hrs. per year} \times \text{cost kw-hour}}}$$

The annual loss in the secondary conductors and tracks was computed in the same way. The annual loss in the sub-stations' apparatus is given by the difference between the total input and output. In computing the cost of these losses the cost of power at the sub-station alternating-current bus should be used.

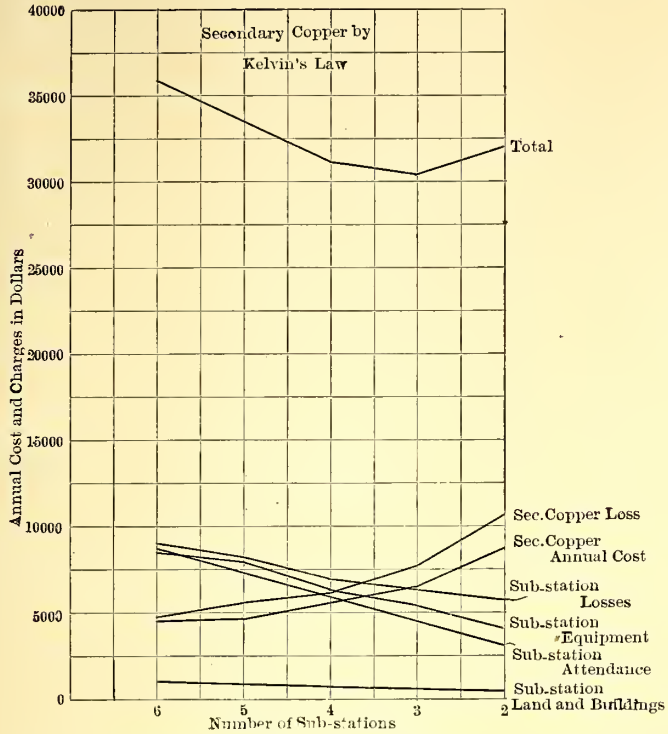


FIG. 1.—CURVE SHOWING RESULTS OF COMPUTING SECONDARY COPPER BY KELVIN'S LAW

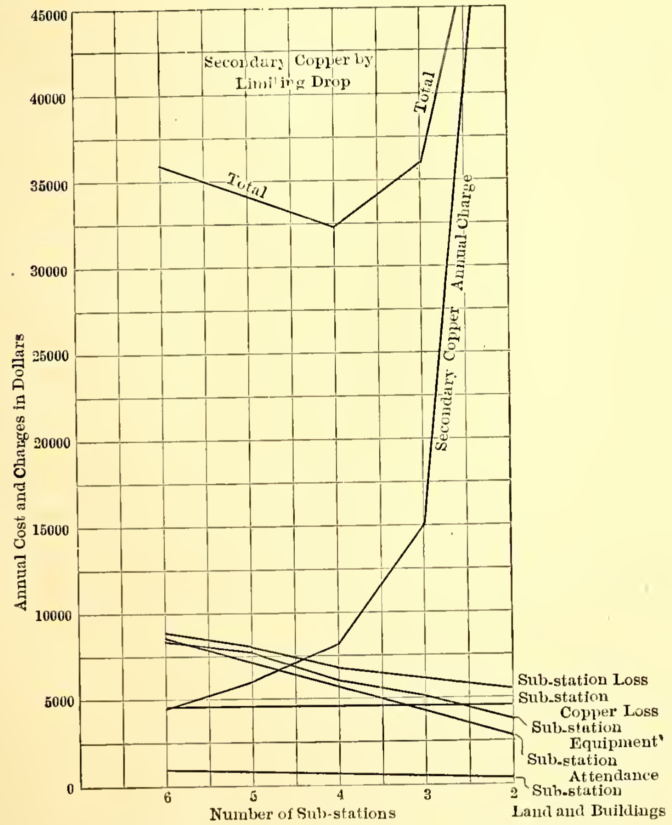


FIG. 2.—CURVE SHOWING RESULTS OF COMPUTING SAME PROBLEM BY LIMITING DROP METHOD

Cost of Sub-Stations.—The cost of sub-station buildings and land was taken at $2,000 each. Switchboards and wiring were estimated at $2,500 per sub-station. The nearest commercial sizes of rotaries and transformers were used in estimating the cost of sub-station equipments at prices varying from $21 per kw. for 500 kw. to $38 per kw. for 250 kw.

Table 1 and Fig. 1 show the results of this computation, with a minimum operating expense at three sub-stations, spaced 24 miles apart, and secondary copper, 746,000 cir-mils, which is evidently impossible to operate without the use of boosters in the sub-stations.

Table 2 and Fig. 2 show the results of recomputing the same problem with the secondary copper proportioned to permit a maximum drop in line and track of 300 volts, about the worst condition in which operation is practicable.

It is apparent that economy of operation is usually sacrificed to regulation.

LONDON, BRIGHTON & SOUTH COAST RAILWAY ADOPTS SINGLE-PHASE

One of the most interesting decisions that has recently been made has been that of the directors of the London, Brighton & South Coast Railway Company, with reference to the electrification of the portion of the suburban line in the southern suburbs of London, about which reports have already been published in these columns. It will be remembered that Phillip Dawson has been the consulting engineer for the line, and that some time ago he decided upon the single-phase system and recommended it to the directors of this railway. Tenders were accordingly asked for the work, and the directors have now decided that they will place their contract with the Allgemeine Elektricitats-Gesellschaft, of Berlin, who will work in conjunction with the British Thomson-Houston Company. The system to be adopted is that known as the Winter-Eichberg. Considerable excitement has been aroused in the English daily press by the fact that such an important contract should be given to Germany, but both Mr. Dawson and the British Thomson-Houston Company state that only a comparatively small portion of the work will actually be done in Germany. It is true that the first motor equipments will be made there, as the German company has had considerable experience in making this type of motor, and can furnish it more quickly than it could be procured in Great Britain, but thereafter all of the other equipment and all of the electric switch gear and necessary apparatus will be manufactured in the British Thomson-Houston Company's works at Rugby. The whole of the overhead construction, a type of work which has not yet been seen in Great Britain, will be done by Robert W. Blackwell & Company, of London, and it is also understood that the cars will be manufactured by the Brush Electrical Engineering Company. It will therefore be seen that, after all, a very small portion (about £20,000) of the total amount of the work, which will amount to about £250,000, will be done out of Great Britain. The experiment will be looked forward to with intense interest by engineers in England as well as elsewhere, and when completed, undoubtedly there will soon thereafter be a large development in electrification of suburban railways, leading in a few years to the electrification of some of the longer and more important lines.

In an unguarded moment recently, General Superintendent Robert Lee, of the Cincinnati Traction Company, expressed the opinion before several newspaper men that a fortune awaited some one who could invent a transfer that could not be "worked." His wants were published, and within a week he had hundreds of letters, not only from points in Cincinnati and vicinity, but from people all over the country, asking for plans, specifications, plots and explanations.

OCEAN SHORE RAILWAY

The largest electric railway project being carried out on the Pacific Coast at present is that of the Ocean Shore Railway Company, which is building between San Francisco and Santa Cruz. The road will be double-tracked throughout, and the main line will be 81 miles in length. The San Francisco terminal will be at Army and Illinois Streets, on the south waterfront of the city. Here sufficient property has been secured to afford ample facilities for handling freight, convenient connections being made with the Southern Pacific, Santa Fe and the new Western Pacific tracks. Leaving Army and Illinois Streets, the road will run through the Islais Creek district in the southern part of the city on a private right of way, all grade crossings of streets being avoided by subways or culverts. Proceeding in a generally southwestern direction, the ocean is reached at a point about 3 miles south of the Cliff House, and the road then hugs the coast all the way to Santa Cruz, passing by San Pedro Point, Half-Moon Bay, Purisima, Pescadero and Scott's Creek. A branch line about 3 miles long, which will be used principally for passenger traffic, will run north from the main line along the beach through the Richmond district, as shown on the accompanying map, across Golden Gate Park and terminate at Fulton Street and Eleventh Avenue. There connection will be made with the lines of the United Railroads of San Francisco.

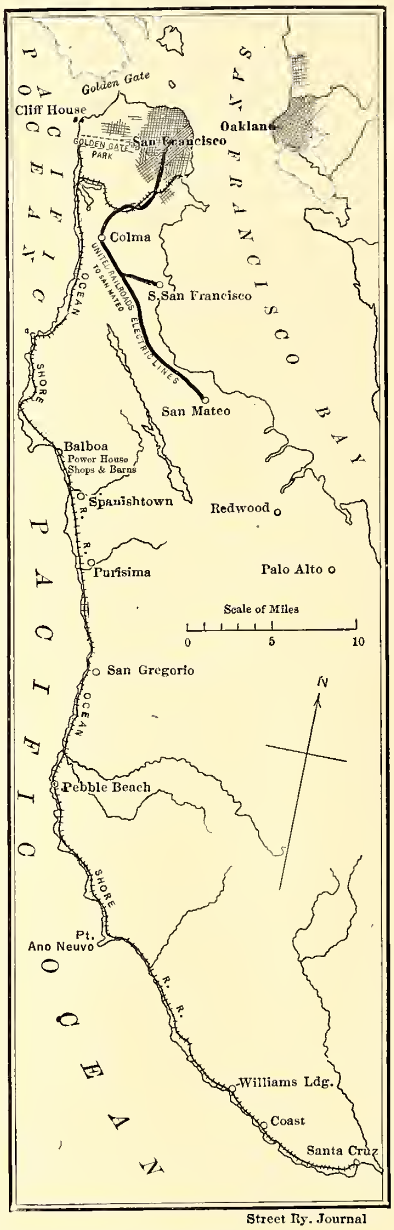
A private right of way has been secured for the entire length of the road, and it will all be double-tracked at the start, as the business and traffic in sight could not be satisfactorily handled by a single track. The maximum grade on the road will be less than 2 per cent, and although the survey carries the line over several rocky points, only one tunnel, 400 ft. in length, will be necessary. Several heavy fills will be required, however, and it is planned, instead of bridges, to build temporary wooden trestles, filling them in afterward for a permanent roadbed. The track will be laid with 70-lb. A. S. C. E. standard section rails, and well ballasted with disintegrated granite quarried on the right of way.

The scenic features of the line will be unusually attractive, as during the trip from San Francisco to Santa Cruz the cars will be in sight of the Pacific Ocean for over 60 miles. Santa Cruz is already one of the best known coast resorts in the State, and with the improved transportation facilities (something it has not had with the present round-about steam road) it will undoubtedly rapidly increase in popularity.

The Shore Line Investment Company, the land company allied with the railway corporation, owns over 3500 acres of land at different points on the line, and it expects to develop the property for resort purposes. On Half-Moon Bay, a pleasantly situated body of water 22 miles south of San Francisco, this company owns 1300 acres of land. It is laying out a new town to be called Balboa, where will be located one of the largest and most modern watering places on the Pacific Coast. A large tourist hotel is planned, also a recreation pier, various amusements and games will be provided for, while one of the best attractions will be an immense salt-water bath pavilion, larger than any now in existence. Hot water for the baths will be obtained from the condensing plant of the Ocean Shore power house which will be located at Balboa. The proximity of Balboa to San Francisco, and the ease with which it can be reached over the new railway, will undoubtedly result in building up a very popular resort. The land is being platted and sold for residences, as this will be an all-the-year-around resort.

The power house at Balboa will be a concrete structure, built so that it will admit easily of future enlargement. It will be a steam plant and have an initial capacity of 6000 hp. Crude oil will be used for fuel, storage capacity being provided by two 28,000-barrel tanks. The oil will be unloaded from ships and pumped through an 8-in. pipe line directly to the storage tanks. This pipe will extend out into the bay for ½ mile, and as a pier of that length would detract from the picturesqueness of the bay, it will be secured in position by dolphins. The boiler equipment will consist of five Babcock & Wilcox water-tube boilers, provided with special oil burners. A steel reinforced concrete stack 125 ft. in height and 15 ft. in diameter will be built.

The main generating units will consist of two McIntosh-Seymour vertical compound condensing engines, each driving a 2000-kw, 2300-volt, three-phase, 25-cycle, fly-wheel type generator. One 200-kw exciter will be driven by a Harrisburg engine, and a second exciter will be motor-driven. Two Wheeler admiralty surface condensers will be installed, the condensing water being exhausted into the bathing pavilion tanks as mentioned above.



MAP OF TERRITORY TO BE TRAVERSED BY THE OCEAN SHORE RAILWAY

The 2300-volt current will be stepped up to 30,000 volts for transmission to the sub-stations by seven 1000-kw transformers (one spare). Ten sub-stations will be installed, located about 10 miles apart on the southern end and 8 miles apart on the San Francisco end. The sub-station equipment will consist of a 500-kw rotary converter and three 185-kw step-down transformers, this equipment being doubled where the load will be heavy. Two cars will probably be built for portable sub-stations. The transmission and feeder lines will be of copper, and the trolley No. 0000 grooved. The trolley will be hung with a catenary suspension, and will probably be insulated for 6000 volts, so in case it is decided to install a single-phase system later it can be done with little extra cost.

There are no other special features connected with the electrical installation except that special precautions will be taken to make both the low-tension and high-tension lines as fog-proof as possible. Considerable trouble has been experienced from the ocean fogs by transmission companies along the coast. Profiting by this experience, the Ocean Shore engineers have designed the insulation of their lines with a high factor of safety, and will probably introduce special devices to avoid any possible break-down.

The General Electric Company has secured the contract for all the electrical equipment of the power house and sub-stations, and the engines, pumps, condensers, boilers and other steam equipment will be installed by Charles C. Moore & Company, of San Francisco.

An order has been placed with W. H. Holman, of San Francisco, for forty passenger cars. These will be 50 ft. in length, and about half of them will have three separate compartments, for ladies, smokers and baggage. Two toilets will also be provided. The cars have been designed by the Ocean Shore Company, and will be of a specially strong construction, with four I-beam sills and enclosed vestibules for the motorman. Four 125-hp GE 66 motors will be mounted on each car, and they will be arranged for multiple control in case the management wants to run trains for special occasions. The regular service will be maintained with single car, and it is planned to make the 81-mile trip between San Francisco and Santa Cruz on a flyer service, with stops at Balboa and Pescadero, in 2 hours and 15 minutes. As all the cars will be operated at high speeds, a special form of trolley, other than the wheel trolley, will be installed on the cars. All cars will be equipped with the new type of Westinghouse combination straight and automatic air brake, arranged for quick control.

A complete freight equipment will be procured, as that end of the company's business will undoubtedly prove to be very profitable. The territory adjacent to the road contains rich agricultural lands, and at the southern end is one of the largest redwood forests in the State, so the outlook for a good freight business is excellent. The company at present has two steam locomotives and forty freight cars, and is doing all handling of its own freight and construction materials.

C. E. Loss has the contract for the construction of the road, and active work is now in progress at several points. From Santa Cruz north 16 miles has been graded and 6 miles of track laid. Six steam shovels are being employed and between 1000 and 1200 men are at work. The grading, bridging and track work will all be carried along together.

All sub-stations and permanent buildings will be constructed of concrete. Passenger stations of a neat frame design will be constructed at principal stopping points, including three or four prominent street stations in the city on the main line.

At Balboa will be located the principal car house, and also the company's shops, which will be suitably equipped for repairing and building cars complete.

The Ocean Railway Company is composed entirely of local capitalists and the bonds have all been taken in San Francisco. The company is capitalized for $5,000,000 and bonded for an equal amount. The following are officers of the company: President, W. E. Dean; vice-president and general manager, A. D. Bowen; vice-president, J. Downey Harvey; secretary and treasurer, Burke Corbett; directors, the above officers and Charles Carpy, Charles C. Moore and Charles Webb Howard. Sidney Sprout is mechanical and electrical engineer, and J. B. Rogers is chief engineer. Cory, Meredith & Allen, of San Francisco, are consulting electrical engineers, and Sargent & Lundy are also retained as consulting engineers.

RECENT WORK OF THE HUDSON RIVER ELECTRIC POWER COMPANY

The Hudson River Electric Power Company, which owns and operates extensive water power plants on the upper Hudson River, at Spier Falls, Mechanicville, Schoharie Falls, and on the Sacandaga River (the latter in course of development), is rapidly extending its sphere of activity in the eastern portion of New York State. The company is now supplying most of the electric power used in the cities of Albany, Troy, Green Island, Watervliet, Ballston, Saratoga, Glens Falls, Schenectady and Amsterdam, and includes among its more important customers the United Traction Company, of Albany; the Schenectady Railway Company, the General Electric Works, at Schenectady; the Fonda, Johnstown & Gloversville Railroad, and the Hudson Valley Railway. About 40,000 hp is at present being distributed in this and adjacent territory, and contracts to the extent of 50,000 hp are under consideration.

One of the more recent extensions to the company's service is the supplying of power for the operation of all the traction lines operated by the Utica & Mohawk Valley Railway Company. The power company has been furnishing current to the Utica & Mohawk system since July 1, 1905, and has just been notified by the latter company that it will require additional power next year as the result of the electrification of the West Shore Railroad between Utica and Syracuse, which is controlled by the same interests.

To meet the present needs of the Utica & Mohawk Valley Railway, the power company has erected a modern 5000-hp steam turbine generating plant at Utica. The plant will have an ultimate capacity of 10,000 hp, and will include the latest apparatus. Steam turbines of the Curtis type are used with Deane condensers, and in the boiler room are installed Franklin and Babcock & Wilcox water-tube boilers. The boilers are fitted with a balanced draft system, by means of which the blower and damper are automatically controlled, and the heated gases are retained and consumed before they escape to the flue. This system embodies several new features in steam boiler engineering, and the results so far have been very satisfactory. It is said a much cheaper class of fuel can be used and better results obtained with this system than could be secured with stokers and a very high grade of coal.

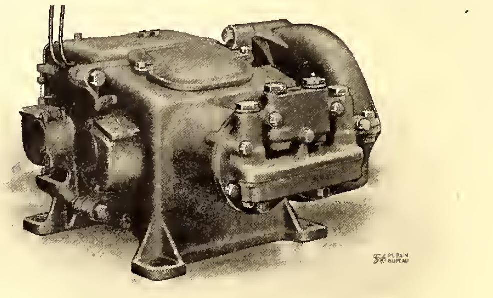
Power from the Utica plant is being delivered to the Utica & Mohawk Valley Railway Company at Utica, Frankfort, Little Falls and Oriskany for the operation of the entire railway system. The station will soon be connected by transmission lines with the water-power plants owned by the power company at Spier Falls, Mechanicville and Schoharie Falls, and ultimately with the proposed development on the Sacandaga River above Spier Falls. By reason of having plants located in different parts of the country and operating as a unit, the power company is therefore enabled to maintain a high class of power service, for if any of the individual plants are affected temporarily, a complete shut-down will not occur on the system, as the other operating stations can take care of the load until the plant affected can be put in service again.

In connection with its present service, the Hudson River Electric Power Company is constructing a 60,000-volt transmission line from Ballston to Utica, via Amsterdam. This line will be supported entirely on steel towers, doing away with the old-style wooden poles. The towers are to be 50 ft. high and will consist of structural iron or steel. The foundations will be made of concrete and crushed stone, and the base of the towers will be bolted to these foundations. The towers will be set about 550 ft. apart, or ten to the mile, and will be arranged to carry two three-phase circuits. The security of the tower system over pole lines is claimed to be considerable, as the towers will not be affected by lightning discharges, as with wooden structures. Special towers are being designed for long crossings and for river work. The first of these towers will be tested in the power company's testing yard at Watervliet in a few days, and after receiving the engineers' approval, the work will be started at once on the line extending from Ballston to Amsterdam and from there to Utica.

A magnificent parlor car, built by the Niles Car & Manufacturing Company for the Detroit, Monroe & Toledo Short Line, will soon be placed in operation on limited service between Toledo and Detroit. The car has chair seats, twenty-five in the passenger compartment and seven in the smoker; observation end, wash room, toilet room and handsome interior finish.

DIRECT-CURRENT MOTOR AIR COMPRESSORS

Realizing the need of a reliable and durable air compressor, the General Electric Company has recently put on the market a direct-current motor-driven machine embodying these characteristics, as well as those of compactness and quiet operation. While intended primarily for the operation of air-brake systems, these compressors are readily adapted for any service requiring air under pressure. As the illustration shows, this compressor is very compact and self-contained. The construction is thoroughly dustproof, while at the same time every



DIRECT-CURRENT MOTOR AIR COMPRESSOR

essential part is easily accessible. All bearings are supplied with dustproof doors, providing perfect protection from dirt and affording immediate access for inspection. In addition to these features, the motor frame is bolted directly to the compressor frame by body bound bolts, which insure perfect alignment and mesh of the gears. This makes it possible to remove and replace the motor without skilful readjustment. All motors and all compressors of the same size are duplicates and perfectly interchangeable. Careful provision has been made for the lubrication of all bearings, and the enclosed construction affords complete protection from water and dust.

The motor on these compressors in every detail is made strictly in accordance with the standard practice of the General Electric Company in railway motor construction. The four-pole cast-steel magnet frame extends in both directions to form a complete box-shaped covering for the armature and field coils. In one end is a removable head which permits the insertion and withdrawal of the armature, and a dustproof spring door allows ready access to the commutator and brushes. For the same reason the pole pieces are secured to the magnet frame by two bolts, the heads of which are on the outside of the frame, where they are accessible when it is necessary to remove a field coil.

The armature core is of the laminated construction, with liberal air ducts for ventilation. Form-wound coils are used, carefully insulated from the core with a very durable fabric of high insulating properties, and great care is given to the insulation of the connections of the commutator leads. The windings are protected from oil by large deflecting shields at the ends of the shaft which revolve in ring-like enclosures, adapted to receive the deflected oil and deliver it into pockets outside the motor.

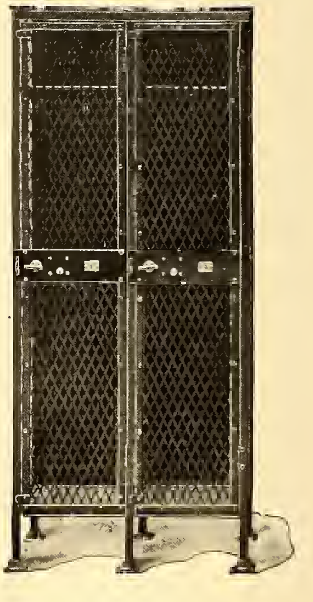
Bolted close to the side of the motor is the compressor frame, giving the assembled machine a rectangular shape. A large opening, fitted with a cover, allows ready inspection of the crank-pins. At one end, the drain, filling pipe and air vent are located, and at the other end of the frame there is a large opening through which the crankshaft may be removed. On the side furthest from the motor are twin air cylinders cast integrally with frame. These project outward horizontally side by side, in a position most favorable for radiation of the heat of compression. Each cylinder head contains one outlet and one intake valve. These valves operate in a vertical position and are of the tubular type. Special attention has been paid to make these valves as simple and as cheaply renewable as possible. Before the air reaches the vales it is filtered through curled hair and copper screens, which effectually prevent foreign substances from clogging the valves.

In this compressor all bearings are liberal in size and have removable and renewable linings, and the crank bearing is split and provided with a hinged cap so that it may be easily adjusted. With the exception of the crank and wrist-pins, the oil waste method of lubrication is used. This method has proved most successful for street railway service. The gearing consists of a gear and pinion having accurately cut herring-bone teeth. Both gear and pinion are secured to their respective shafts by a taper fit, and means are provided so that they may be easily removed. To protect the gearing, a case is furnished, split in two pieces, so that it can be opened conveniently. The two parts are bolted together and rigidly secured to the motor and compressor frame, forming an oil-tight compartment in which the gears run.

The compressors are manufactured in several sizes to meet the requirements of all classes of operation. For controlling their action, the company makes a small and reliable governor, which will open and close the circuit positively, maintaining a constant predetermined pressure in the receiving tank. No starting box or external resistance is required, and the outfit is compact, serviceable and reliable. In this connection the company also manufactures complete air-brake equipments of both the regular air and automatic air types, suitable for all classes of electric railway service.

METAL FURNISHINGS FOR CAR HOUSES AND OFFICES

In view of all the efforts being made to minimize the fire danger by employing fireproof or slow-burning materials for building construction, it seems rather curious to find that many corporations do not realize that the fire risk is due more to the presence of inflammable furnishings in the building rather than to the construction of the building itself. However, there is no longer any necessity for using wooden shelving, partitions, closets or lockers, because so many improvements have been made in recent years in the manufacture of metal furnishings for the same purposes. It is hardly necessary to state in how many respects expanded metal construction is superior to wood, but it suffices to point out that it is not inflammable, is far more sanitary, retains its neat appearance indefinitely, easier to transport and costs practically nothing to maintain.

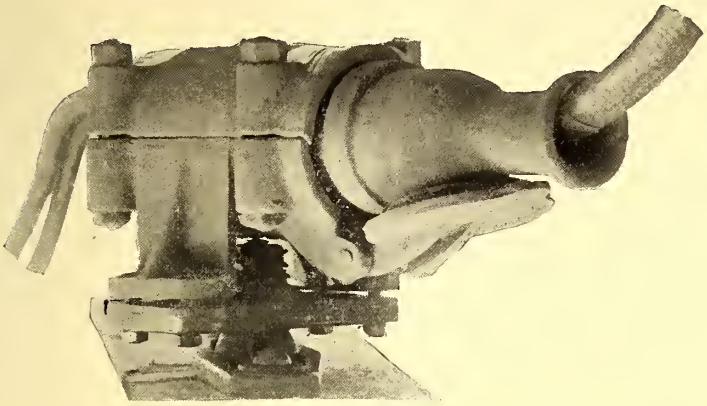


LOCKER MADE OF EXPANDED METAL

A complete line of expanded metal furnishings, known as the "Pen-Dar" system, is made by Edward Darby & Sons' Company. of Philadelphia, these manufactures including such specialties as metal lockers, shelving, partitions, tables, etc. A characteristic example of this company's work is the metal locker shown in the accompanying illustration. The locker is built up of sheets of steel plate, which are cut, expanded and then rolled in such a manner that they present smooth surfaces, entirely free from rough edges or corners. This style of locker allows a free circulation of air, and therefore is thoroughly ventilated. Each locker is equipped with one shelf, three nickel-plated coat hooks, individual brass number plates and special three-point locking device, which securely fastens the door at the top, center and bottom with a single turn of the locking lever.

A NEW CHARGING RECEPTACLE

The extensive use of electrically-operated vehicles and the varied application of storage batteries for train lighting, small electric locomotives, storage battery cars, etc., has created a demand for convenient and durable accessories, one of the most important being a charging receptacle that will withstand hard usage and can be handled without danger of short-circuiting the line when inserting or removing the plug. With this idea in mind, the Westinghouse Electric & Manufacturing



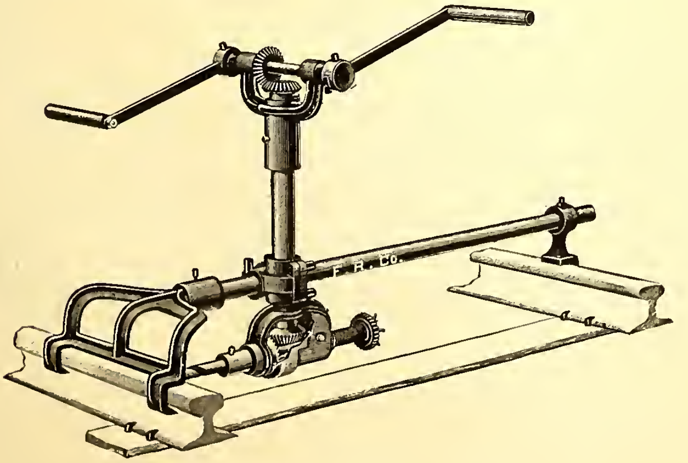
CHARGING RECEPTACLE, WITH CABLE ATTACHED

Company has developed and placed upon the market a charging receptacle to meet the most rigid requirements.

It consists of a cast metal case, circular in form, that occupies a minimum amount of space. Within the case are suitably mounted contacts for receiving the plug. A hinged lid at one end, held normally closed by a coiled spring, affords access to the interior. The receptacle being entirely enclosed, effectually protects it from dirt and water. The plug and contacts within the receptacle are so designed that it is impossible to cause a short-circuit when inserting or withdrawing the plug. The receptacle may be provided with a swivel attachment, conforming to standard railway practice, which is a decided advantage, as it admits the pulling out of the plug when the vehicle or car starts, the receptacle swinging in line with the cable and allowing the plug to pull out without danger of breaking the cables or contacts. The construction is rugged and all parts are well made, insuring a long period of service.

TRACK DRILL FOR HEAVY RAIL

As the result of experience gained in drilling the holes for bonding the rails on the recent extension of the Boston Ele-



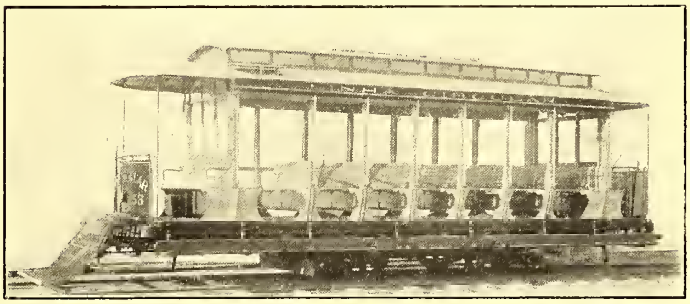
RAIL DRILL APPLIED TO TRACK

vated Railway, the Frank Ridlon Company, of Boston, has developed an improved track drill capable of drilling ⅞-in. bonding holes in heavy rails day after day without breaking down. The machine, as now constructed, weighs 185 lbs., and when once adjusted may be quickly set in place for each new hole. The gearing is of cut steel. As shown in the illustration, the drill is designed to be run by two men, and is of such height that they can do this standing. The handles are long and may be grasped by both hands.

An automatic friction feed is provided with this drill to make adjustments for fast or slow feeding. This also acts as a quick return of the spindle by reversing the cranks, and the drill backs out much faster than could possibly be done in any other way. The frame is adjustable in every way that is required of a track drill and may be worked directly over a tie. This company also manufactures a lighter track drill if desired.

OPEN CARS FOR BAHIA, BRAZIL

A number of ten-bench open cars, mounted on the No. 27-E type of single truck, has just been shipped by the J. G. Brill Company to the Linha Circular, of Bahia, Brazil. The order for these cars was obtained through the car builder's Brazilian agents, Guinle & Company, of Rio Janeiro. Bahia, which is the capital of the State of Bahia, is situated on the coast, 800 miles north of Rio Janeiro. It has a population of 200,000, and is one of the chief shipping ports of South America. The business part of the city, 3 miles long, lies on a narrow strip of land following the shores of the bay, and but little above the level of the water, while the residence portion is built on a bluff



VIEW OF ONE OF THE NEW TEN-BENCH OPEN CARS SENT TO BAHIA, BRAZIL

which rises back of the business section, 120 ft. to 150 ft. in altitude. The two parts of the city are connected by a sloping street, inclined railways and hydraulic elevators. The lower city has a tram line which was electrified nearly ten years ago. The lines of the Linha Circular, which were electrified recently, are about 10 miles in length, and are in the upper city, or residence section, which is finely laid out on a plateau of considerable extent, and has wide streets lined with handsome villas.

As the illustration shows, the cars are of the standard open type of the builder, with bulkheads at each end, having seats on either side. They are 28 ft. 8⅜ ins. long over the crown pieces and 30 ft. 4⅜ ins. over the bumpers; the width over the sills, including the sill plates, is 6 ft. 3 ins., and over the posts at the belt, 7 ft. ½ in.; the length from the center of the corner post over the crown piece is 4 ft.; from the corner post to the first side post is 3 ft. 5 ins., and the distance between the centers of the side posts is 2 ft. 8 ins.; the height from the track over the running board is 17⅛ ins., and from the running board to the car floor, 15 ins.; from the car floor over the monitor deck, 8 ft. 1¼ ins. The side sills are 3¾ ins. x 7 ins., with 7-in. x ½-in. sill plates on the outside. The thickness of the corner posts is 3⅝ ins., and of the side posts, 2¾ ins. The trucks have a 7-ft. wheel base and run on 33-in. wheels. The round-corner seat-end panels, platform gongs, signal bells, brake handles, draw-bars, angle-iron bumpers, sand boxes and other specialties are of the builder's manufacture.

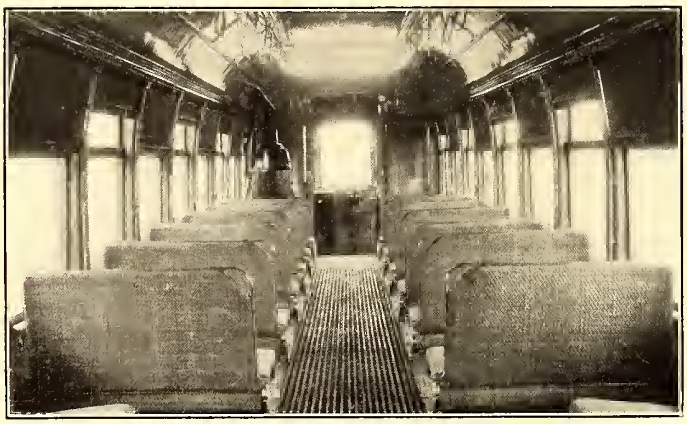
THE PRIME MOVER OF THE FUTURE

At the meeting of the Western Society of Engineers held in the Monadnock Block on the evening of Dec. 1, Charles E. Sargent gave an address entitled "The Prime Mover of the Future." This, according to Mr. Sargent, is the gas engine, which in the larger sizes, he says, has a thermal efficiency of 20 per cent to 24 per cent, as against 12 per cent in the steam engine. Mr. Sargent stated that so far as initial cost was concerned, a complete gas engine installation, including producers, buildings and all necessary parts, was about the same as a steam installation when boilers, pumps, buildings and stacks were considered. Points of advantage possessed by the gas engine were that it could be started and gotten under load much quicker than a steam engine, and that the "stand-by" losses were not so heavy as in steam installations.

In the discussion, certain members expressed dissent with this view, and believed that the steam turbine would be the prime mover of the future.

MORE SEMI-CONVERTIBLE CARS FOR WHEELING, W. VA.

Ten semi-convertible cars have just been added to the equipment of the Wheeling (W. Va.) Traction Company, which were built by the G. C. Kuhlman Car Company, of Cleveland.

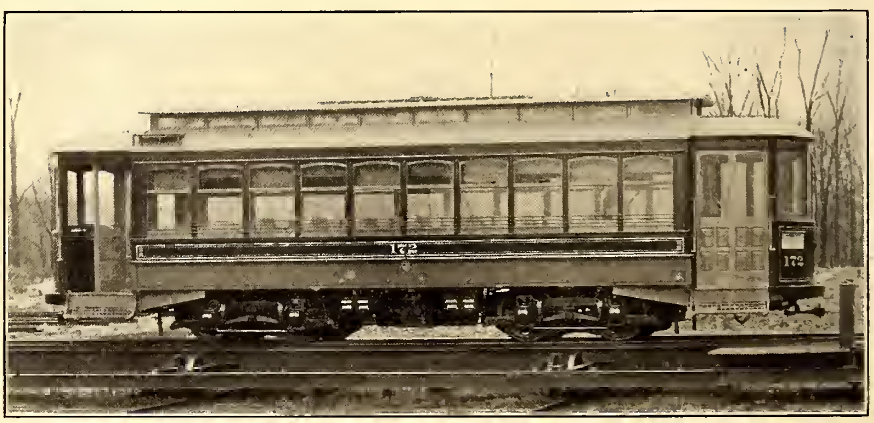


INTERIOR OF WHEELING SEMI-CONVERTIBLE CAR

The Wheeling Traction Company has 50 miles of track and operates 130 cars. The city of Wheeling has a population of 40,000, and is the leading industrial and commercial center of the State. It is noted for its nail factories, and has large tobacco works, blast furnaces and breweries. The company's lines reach Moundsville Camp Ground.

The cars are 28 ft. long over the bodies and 39 ft. over the vestibules, and are 8 ft. wide over the sills, including the panels, and 8 ft. 3½ ins. over the posts at the belt. The sweep of the posts of these cars is 1¾ ins.; the distance between the centers of the posts, 2 ft. 8 ins.; the height from the floor to the ceiling, 8 ft. 5 ins.; the height from the track to the under side of the side sills, 2 ft. 8¼ ins.; the height from the under side of the sills over the trolley board, 9 ft. 3¾ ins.; from the track to the platform step, 16⅛ ins.; from the step to the platform, 14½ ins., and from the platform to the car floor, 8 ins.; size of the side sills, 4 ins. x 7¾ ins.; center sills, 3½ ins. x 4¼ ins.; end sills, 5¼ ins. x 6⅞ ins., and the sill plates, which are on the inside of the side sills, are 12 ins. x ⅜ in.; thickness of the corner posts, 3⅝ ins., and side posts, 3¼ ins. The seats are 36 ins. long, while the width of the aisle is 23½ ins.

The cars are of the "grooveless-post," semi-convertible type, built under the patents of the J. G. Brill Company. The seats, door-controlling mechanism, angle-iron bumpers, sand boxes, platform steps and other specialties are also of that company's manufacture. The Wheeling Traction Company has operated semi-convertibles for a number of years, the J. G. Brill Company having supplied it with three lots of cars practically the same as those just furnished by the Kuhlman Car Company, and all have been mounted on the Brill No. 27-G type of truck. which is the standard truck of this system.



NEW DOUBLE-TRUCK VESTIBULE CAR FOR WHEELING, WEST VIRGINIA

WEIGHTS OF ELECTRIC LOCOMOTIVES

On Dec. 14 S. T. Dodd, of the railway department of the General Electric Company, delivered an address before the local branch of the American Institute of Electrical Engineers in Pittsfield, Mass. The subject covered was "The Design of Electric Locomotives for Heavy Railway Service." Making a comparison between steam and electric operation of trunk lines, the speaker discussed the subject under the head of comparative cleanliness and convenience, reliability of service, overload capacity, cost of operation and maintenance.

Discussing the advantages and disadvantages of the various types, the speaker pointed out that it was too early to say what the final limits of weight and cost would be, but that from such designs as had been made up to the present some approximate figures might be quoted. The weight of mechanical equipment, including cab, trucks and running gear will probably be from one-half to two-thirds of the total weight of the locomotive, depending on the type of locomotive and its requirements. A fair comparison may be obtained by comparing the weights of electrical equipment with various locomotives.

The direct-current locomotive has been built with electric equipment running from 50 lbs. to 80 lbs. per horse-power, while for the high-speed bipolar gearless type of motor, as illustrated on the New York Central locomotive, the electric equipment is as low as 25 lbs. per horse-power. The disadvantages of this type of locomotive are the presence of the commutator and the limitation of voltage which it imposes. The polyphase locomotive is built with electric equipments weighing about the same as the d. c. locomotive. The disadvantages of this type are the multiplicity of overhead wires and the small air gap of the motors, entailing greater cost of maintenance. Single-phase locomotives are built with electric equipments running from 85 lbs. to 110 lbs. per horse-power. The disadvantage of this type is the presence of the commutator, which it shares with the d. c. locomotive, and the small air gap, which it shares with the a. c. polyphase locomotive. Motor-generator locomotives of the Ward-Leonard type can probably be built with electric equipments weighing in the neighborhood of 55 lbs. to 100 lbs. per horse-power. The disadvantage of this type is the complication of switching apparatus for starting and operation.

FINANCIAL INTELLIGENCE

Wall Street, Dec. 27, 1905.

The Money Market

There has been a decided change in the local money market during the past week. The tone was strong throughout, despite the unexpected gain in cash reported by the New York City banks last week, and the improved condition and outlook at Chicago. Money on call loaned as high as 90 per cent, the highest price attained for this class of accommodation in nearly six years. The advance was due to the active preparations by the banks, usual at this time of the year, in connection with the Jan. 1 interest and dividend disbursements, while another important influence was the urgent demand for funds resulting from an active speculation in stocks. Money for fixed periods was in limited demand, many of the larger stock and mercantile houses being well supplied with time funds for two and three months ahead. Nevertheless, there was no disposition on the part of lenders to press their funds upon the market. Sixty-day money continued to command a premium of ½ per cent, making the total charge for that maturity about 6½ per cent, while three and four months' funds were obtainable at 6 per cent. For the longer periods 5¼ per cent was freely bid for six months' accommodation, with little obtainable under 5½ per cent. Commercial paper has ruled steady at 5½ and 6 per cent for the best names. The amount of prime material coming upon the market, however, is very small, merchants as a rule obtaining assistance direct from their respective banks. Foreign exchange has ruled strong until near the close, when demand sterling broke sharply on rather heavy offerings of loans bills, the proceeds of which were employed at the high rates for money prevailing in the local market. The European markets have been extremely quiet, owing to the Christmas holidays, but money and discount rates have not changed materially. The bank statement, published last week, was unexpectedly favorable. The increase in loans was much smaller than generally anticipated, amounting to only $1,543,-100. Cash increased $483,300, but as the reserve required was $284,975 more than in the previous week, the surplus was increased by $198,325. The surplus reserve now is $4,159,400, as against $15,247,225 in 1904, $12,574,625 in 1903, $6,549,200 in 1902, $7,891,350 in 1901, and $11,525,900 in 1900.

The Stock Market

The closing week of the year is always a period of greater or less disturbance in the money market, and the present one is no exception to the rule. Throughout the entire week call money on the stock exchange ruled at very firm figures, and toward the close rates soared to the highest point attained in several years. However, stocks were not visibly affected by this evidence of stringency until very late in the week, and then only to a comparatively limited extent. In consideration of the previous sharp advance in prices for stocks generally, many issues having not only touched the highest of the year, but also the highest in their history, the reaction that took place in response to the big jump in the money rate was indeed slight, and the main influence of the disturbing element noted was rather in the direction of curtailing business than in any other. The market having emerged from the Chicago bank troubles, without showing any ill effects of the same, it was in a position to respond to any and all developments of a favorable character that transpired during the week under review. Thus, while these were not of a momentous character, they were sufficient to carry stocks of nearly all classes to a materially higher level. Of course, the deplorable state of affairs in Russia, the Christmas holidays and the present low state of the reserves of the clearing house banks, tended in a measure to check buying for the bull account, particularly on the part of outsiders. Nevertheless, the same powerful and mysterious buying power that has been under the market for months past, and which is popularly supposed to represent some of the largest banking and other interests in this country, again materialized, with the result as previously stated. Sensational advances were scored in some of the copper stocks, notably Anaconda, which was partly explained by the increase in the latter's dividend and partly by the immense strike of new ore made at the company's mines. The steel stocks moved into a position of greater prominence, and the common sold higher than in years, while the preferred made a new high record · explanation for the advance being the immense amount of unfilled orders now on the company's books. Many other industrials moved up sharply, but at the same time the standard railway stocks were by no means laggards, a number of them attaining decidedly higher figures. The most striking cases were Union Pacific, St. Paul, Reading, Atchison, Southern Railway and the trunk line stocks.

The great development of the week in reference to the local traction stocks was, of course, the consummation of the deal whereby the Interborough Rapid Transit Company secures control of the Metropolitan properties, thereby giving to the former virtual ownership of the traction facilities in the Borough of Manhattan. In response to the highly important news, the shares of all the companies directly interested made pronounced advances, and in the case of Interborough on the "curb" a new high record was made. Disappointment was manifested in some quarters on account of the fact that the Brooklyn Rapid Transit system was not included in the gigantic transaction, and in consequence thereof the stock of the latter did not participate in the buoyancy of the other shares. However, it is felt in usually well informed circles that Brooklyn Rapid Transit will eventually be included in the combination, and this sentiment, together with the present unprecedented earnings of the property, prevented any genuine liquidation.

Philadelphia

Increased dullness characterized the market for the traction shares during the past week, and although prices moved with more or less irregularly, the net changes were unimportant. In the early dealings values displayed a declining tendency in sympathy with the weakness prevailing in the general securities market, but toward the close the market became firmer, and in most instances the early losses were more than recovered. Railways General was about the only stock to show weakness at the close, about 1000 shares changing hands, at from 7½ to 7, and closing at the lowest. It is understood that the company has sold its interests in the Michigan Traction Company, but no details of the sale has been made public as yet. It is stated, however, that the minority stockholders will receive the same terms as the majority holders of the stock. Philadelphia Rapid Transit opened at 30¾, and ran off to 30, on selling by New York interests, but later the price rallied to 31¼. About 11,000 shares changed hands. Philadelphia common was comparatively quiet, upwards of 3500 shares being traded in at from 51⅞ to 51½ and back to 52¼. Small lots of the preferred brought 49¾ and 50. Other transactions included Consolidated Traction of New Jersey at 82½, Philadelphia Traction at 100¼ and 100⅝, Union Traction at 62 and 61¾, and United Companies of New Jersey at 271.

Baltimore

The Baltimore market has been very quiet but strong. United Railway issues were in better demand than of late, but offerings at the present prices appeared to be limited. About 200 shares of the free stock sold at 14 and 14½, while 150 of the deposited stock brought 15½, an advance of ½ point. The 4 per cent bonds rose ⅝ to 93 on the purchase of $29,000, and $27,000 of the free incomes changed hands at 65¼ and 65½, an advance of a full point over last week's closing figure. Trust receipts for income bonds deposited brought prices ranging from 64½ to 64 for $21,000. City & Suburban 5s sold at 112½. Other sales reported were: $2,000 Baltimore City Passenger 5s at 105½, $2,000 Baltimore City Passenger 4s at 101½, and $1,000 Lexington Street Railway 5s at 104.

Other Traction Securities

Trading in the Chicago market was extremely quiet, and prices generally displayed weakness. West Chicago declined from 55 to 54 on the exchange of 25 shares, and North Chicago lost 2 points to 81 on the sale of 10 shares. Northwestern Elevated was sold rather freely, upwards of 1000 shares changing hands at from 26 to 25½. Metropolitan Elevated preferred sold at 68½ and 69¾ for 52 shares. The Boston market was quiet but firm. Odd lots of Boston Elevated brought prices ranging from 154 to 154½, an advance of ½ point. Boston & Worcester sold at 28. Massachusetts Electric were less active but firmer, 250 common selling at 15, while several hundred shares of the preferred brought 57½ to 58½. West End common sold at 98 and 98½, and the preferred stock sold at 114. In the New York curb market Interborough developed considerable activity and strength. Opening at 219 the price advanced to 221, and on the announcement of the deal, whereby the company acquires control of the Metropolitan system, the price advanced sharply to 240⅝, the highest price at which the stock has ever sold. Subsequently there was more or less selling to realize profits, which caused a reaction to 236. About 40 shares changed hands. The securities of the new company to be formed to take over the Interborough and the Metropolitan Companies were traded in for the first time on Wednesday, and displayed considerable animation and irregularity. The new common stock, when issued, sold to the extent of 7000 shares, at from 65 to 58⅝, and back to 59¾, while upward of 3000 shares of the new preferred stock brought prices ranging from 102 to 100. The new Consolidated 4½ per cent bonds rose from 95 to 98¼, but later there was a reaction to 97½. About $400,000 changed hands. New Orleans Railway & Light issues also displayed pronounced strength, both the common and preferred making new high records, the first named selling at 40 and the preferred at 86½. The directors have declared a quarterly dividend of 1¼ per cent on the preferred stock, payable on Jan. 15, to stockholders of record on Dec. 30. This is the first dividend declared since the reorganization of the property. The 4½ per cent bonds sold at 91½.

Intimations of the plan to increase the dividends on Cleveland Electric Railway caused heaving trading in that stock in Cleveland last week. Nearly 5000 shares changed hands, with an advance from 84 to 88½; late in the week, however, it declined to 86½, and on Tuesday of this week there was a further decline to 85, due probably to franchise conditions. Northern Ohio Traction & Light was very active, with a slight advance to 32⅛, and another advance to 32⅜ on Tuesday. Aurora, Elgin & Chicago had another upward movement on announcement of the plan for consolidation with the Elgin, Aurora & Southern; over a thousand shares sold, with an advance from 35½ to 37½ for the common and 97½ to 99¼ for the preferred. Lake Shore Electric moved up from 16½ to 17, and on Tuesday of this week advanced to 17½, on sales of several hundred shares. The new preferred stock advanced to 60. Western Ohio receipts advanced to 19, Elgin, Aurora & Southern to 50¼, and Toledo Railway & Light to 32⅝. About $100,000 of Aurora, Elgin & Chicago 5s sold with an advance from 98 to 98¾. Western Ohio 5s sold at 87½.

Cincinnati, Newport & Covington continues to feature in Cincinnati, about 1500 shares selling up from 48⅝ to 51⅛. The preferred sold at 97 to 97½. Cincinnati Street Railway sold at 146 and 146½, a fractional decline. Detroit United was active at 95½ to 96, a gain of 2 points from last week's high.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Dec. 20	Dec. 27
American Railways	52	52½
Boston Elevated	154	155
Brooklyn Rapid Transit	88	89
Chicago City	198	200
Chicago Union Traction (common)	12⅛	12⅞
Chicago Union Tracton (preferred)	—	—
Cleveland Electric	80	80
Consolidated Traction of New Jersey	81	81
Consolidated Traction of New Jersey 5s	107½	107
Detroit United	94¼	94¾
Interborough Rapid Transit	218	235½
International Traction (common)	36¾	37
International Traction (preferred) 4s	75½	75
Manhattan Railway	163	163
Massachusetts Electric Cos. (common)	14	14
Massachusetts Electric Cos. (preferred)	58	58
Metropolitan Elevated, Chicago (common)	27	27
Metropolitan Elevated, Chicago (preferred)	68	69
Metropolitan Street	120⅞	*126½
Metropolitan Securities	75⅝	80¾
New Orleans Railways (common)	37½	39¾
New Orleans Railways (preferred)	85	86½
New Orleans Railways, 4½s	90½	91
North American	99	100
North Jersey Street Railway	25	25
Philadelphia Company (common)	51¾	52
Philadelphia Rapid Transit	31	31
Philadelphia Traction	100¼	100½
Public Service Corporation 5 per cent notes	95½	95½
Public Service Corporation certificates	66	67½
South Side Elevated (Chicago)	97	96
Third Avenue	124	129
Twin City, Minneapolis (common)	116½	117¼
Union Traction (Philadelphia)	62	61¾
West End (common)	98	98
West End (preferred)	113½	113½

* Ex-dividend.

Iron and Steel

According to the "Iron Trade Review," the Carnegie Steel Company last week booked the heaviest tonnage of structural steel of any week in its history, in spite of the fact that it was unable to promise delivery on any of the material before three or four months, while in some instances shipments will be delayed fully six months. Sales of rails during the past ten days aggregate nearly 200,000 tons, a remarkable total in view of the heavy orders already on the books. The Eastern bar iron manufacturers have reaffirmed their official price of $30 for bar iron, but are exacting premiums of from $5 to $10 per ton. Considerable activity in pig iron is reported at Pittsburg. There is a strong demand for basic iron in the East.

BASIS OF THE SALE OF THE AUGUSTA PROPERTIES

In the Street Railway Journal of Dec. 16 brief mention was made of the sale of the properties of the Augusta-Aiken Railway & Electric Company, of Augusta, Ga. Since then a statement has been secured from official sources to the effect that the control of the stock of the company, preferred and common, was deposited with a committee, consisting of R. L. Williams, of Middendorf; Williams & Company, Baltimore, Md.; C. G. Goodrich, cashier, Georgia Railroad Bank, Augusta, Ga.; Thomas Barrett, Jr., Augusta, Ga.; Henry Buist, Esq., Charleston, S. C., and John Blair MacAfee, Philadelphia. William T. Van Brunt, of New York City, made an offer to purchase all of the stock that these gentlemen held as a committee (which the depositors had given authority to sell) as well as all of the bonds represented by the committee and depositing stockholders. The stock was transferred on Saturday, Dec. 16, to Mr. Van Brunt, who paid $30 per share for the preferred and $15 per share for the common stock. The bonds were sold to him for 85 and interest. Approximately, 4000 shares of preferred and 9000 shares of common stock were transferred. The officers and directors of the Augusta-Aiken and underlying companies tendered their resignations, and new officers and directors were elected, Mr. Van Brunt being made president. Approximately, $600,000 of the bonds changed hands.

SALE OF THE MICHIGAN TRACTION COMPANY—OTHER TRACTION MATTERS IN MICHIGAN

The Michigan Traction Company, which extends for about 27 miles from Kalamazoo to Battle Creek, and including city lines has a total mileage of 54 miles, has been sold by the Railways Company General to a syndicate composed of Myron W. Mills, president of the Lansing & Suburban Railway Company; George G. Moore, vice-president, and James R. Elliott, general manager of the same company. These gentlemen also have a controlling interest in the Lansing & Suburban Traction Company and the Lansing-Jackson Railway Company (the latter is now under construction), besides being interested in the Jackson & Battle Creek Traction Company, and it is understood that an affiliation will be made with the Jackson & Ann Arbor Traction Company. The latter company has recently been reorganized, with W. A. Boland, of New York and Jackson, Mich., as president. With him are associated Henry R. Carse, cashier of the Hanover National Bank, of New York; Charles W. Osborne, who is connected with Russell Sage and Silas B. Dutcher, also of New York. Plans are under way to complete in the spring the Jackson & Ann Arbor line through to Detroit by way of Ypsilanti and Plymouth. Mr. Boland is director of the Jackson Consolidated Traction Company and of the Jackson & Battle Creek Traction Company, in which the Mills-Moore syndicate is interested. It is likely, therefore, that sooner or later all of these lines will be placed under one management, with the result that through electric service will be given from Kalamazoo to Detroit. The statement is made by parties in interest that it is unlikely that any combination will be made with the Detroit, Ypsilanti, Ann Arbor & Jackson Traction Company.

TRACTION MERGER IN NEW YORK

The interest of Thomas H. Ryan and his associates in the Metropolitan Securities Company and the Metropolitan Street Railway Company, of New York, controlling all the surface lines in the boroughs of Manhattan and the Bronx, has passed to the Interborough Rapid Transit Company, operating the subway and the elevated lines in Manhattan and the Bronx, through purchase made by August Belmont & Company. An early rumor was to the effect that Brooklyn Rapid Transit was included, but this was shown to be without foundation when the official statement was issued at 6 p. m., Dec. 26, from the office of August Belmont & Company. The plan adopted provides that for Interborough stock there will be issued 200 per cent in 4½ per cent collateral trust bonds and 90 per cent in the common stock of a new holding company; Metropolitan Street Railway stock will be exchanged for 100 per cent in 5 per cent cumulative preferred stock of the holding company and 50 per cent in common stock. Metropolitan Securities stock, after the payment of an additional call of $25 a share, will get 85 per cent in the common stock of the new holding company. Under the terms of the traction merger the new common is underwritten at 60. The Metropolitan Street Railway stockholders can get $30 per share in cash and $100 in new preferred stock per share of Metropolitan.

The total capitalization of the combined property will aggregate about $374,000,000.

The new capitalization provided for in the proposed plan will be as follows:

NEW CAPITALIZATION

		Charges
Stock to be Issued in Exchange—		
Preferred 5 per cent cumulative	$52,000,000	$2,600,000
Common	83,000,000	
Bonds to be Issued in Exchange—		
Collateral trust 4½ per cent	70,000,000	3,150,000
Total	$205,000,000	$5,750,000
Common stock to be issued for cash	17,000,000	
	$222,000,000	

OLD CAPITALIZATION

		Present Dividends
Metropolitan Street	$52,000,000	$3,960,000
Metropolitan Securities (50 per cent paid)	30,000,000	....
Interborough	35,000,000	2,800,000
Total	$102,000,000	$6,760,000

NEW WORKING CAPITAL PROVIDED

Call on Metropolitan Securities—25 per cent	$7,500,000
$17,000,000 new common stock (if issued at 60)	10,200,000
Total	$17,700,000

The official statement reads as follows:

Mr. Belmont and Mr. Ryan, after consultation with their respective associates, have approved a plan for the union of the Interborough and Metropolitan interests, which will be formally submitted to the stockholders of the corporations involved as soon as the lawyers have completed the necessary papers. The plan contemplates the organization of a new company, which shall issue its securities in acquiring the shares of the Interborough, Metropolitan Street Railway, and Metropolitan Securities Companies, upon the following terms:

For every share of Interborough stock:

New collateral trust 4½ per cent bonds, secured by the deposit of Interborough stock	$200
New common stock	90
For every share of Metropolitan Street Railway Railway stock:	
New 5 per cent cumulative preferred stock	100
New common stock	50
For every share of Metropolitan Securities stock (with $75 per share paid):	
New common stock	$85

It is confidently believed that the proposed arrangement will not only be beneficial to the stockholders of the corporations involved, but that it will be advantageous to the city and to the public. It is admitted in this connection that the transportation facilities in this city are already superior in rapidity, comfort, character of equipment and low cost of travel for long distance to those of any other city in the world. Yet they should be further greatly improved by reason of the greater opportunity now offered to co-operate harmoniously with the city in providing for important extensions and additions to the facilities of travel within the boroughs of Manhattan and the Bronx.

Rumors of such a deal as that put through have been current from time to time for years. The consummation of the project, it may be said, however, came when all were off guard. That such was the case is probably due to the fact that the Metropolitan Street Railway interests prepared themselves to enter on a large scale upon the construction of new subways, which would compete with the Interborough lines for the long-haul traffic. Only last spring Mr. Ryan secured the services of Paul Morton as the head of his proposed subway undertaking. Later, after Mr. Morton had been chosen chairman of the Equitable Life, the Ryan interests secured the services of John B. McDonald, who constructed the present subway.

Having established an extensive department especially adapted to care for the construction of subways, the Metropolitan interests, in competition with the Interborough Company, set out to secure franchises for new subways. These franchises have not yet been awarded, and now the Interborough Company will be the only traction company in the field prepared to bid on new underground lines.

Since the opening of the subway a year ago last October, the Interborough Company has been competing keenly with the Metropolitan surface lines, and the reports of the two companies have indicated clearly that the Metropolitan lost a large amount of traffic to the Interborough. It has lost apparently not only on the long haul but on the short-haul traffic as well. The earnings for Metropolitan have not been sufficient to meet the 7 per cent dividend guaranteed on the stock by the Metropolitan Securities Company, and the latter has been obliged for several years to make good deficits which have now reached a total exceeding $5,000,000.

The Metropolitan Street Railway Company for several years prior to 1900 controlled practically all the traction lines in old New York City, with the exception of the Third Avenue Railroad Company. In that year, after the famous stock market episode in Third Avenue Railroad stock, in the course of which the Third Avenue road was thrown into the hands of a receiver, the Metropolitan Street Railway Company secured control of that road, including all its controlled lines. After control was secured, the Third Avenue road was leased to the Metropolitan for 999 years, the Metropolitan agreeing to pay dividends on a sliding scale from 5 per cent up to 7 per cent. After July, next year, the Metropolitan will have to pay 6 per cent on Third Avenue stock for four years, and 7 per cent thereafter.

In 1901, when the Interurban Street Railway Company was formed, the Metropolitan Street Railway Company controlled all the traction lines in Manhattan Borough as well as the Union Railway running in the Borough of the Bronx. Subsequently the Interurban Street Railway Company assumed the present name of the New York City Railway Company. The financial operations through which the Metropolitan lines passed in 1901 included the leasing of the Metropolitan Street Railway Company and all the traction lines controlled by it to the New York City Railway, then the Interurban Company, for 999 years at a fixed rental of 7 per cent on Metropolitan Street Railway stock. The payment of this dividend was guaranteed by the Metropolitan Securities Company, which was formed with a capital stock of $30,000,000, half of which was paid in when the company was organized.

All the stock of the New York City Railway Company is held in the treasury of the Metropolitan Securities Company, which thus controls all the surface traction lines of the two boroughs. In addition to the stock of the New York Railway Company, the Metropolitan Securities Company also holds all the stock of the People's Traction Company and of the New York, Westchester & Connecticut Railway and $3,379,200 of Third Avenue Railroad stock.

In September, of this year, the Inter-State Tunnel Railway Company was formed with a capital of $7,500,000 to build a tunnel from Jersey City to Chambers Street, Manhattan. The New York City Railway Company has a half interest in this company.

THE INTERSTATE COMMERCE COMMISSION'S STATISTICS OF RAILROADS

One of the publications annually issued by the Interstate Commerce Commission is a brief report on the income accounts of operating roads, which is intended to show, at the earliest practicable date, the principal items included in railway income accounts. The preliminary report for the past fiscal year includes returns for 752 companies, representing an operated mileage of 214,477.82 miles, which is presumably about 99 per cent of the mileage that will subsequently be covered by returns in the final report for the same year. The gross earnings of the railways for the year ending June 30, 1905, on the mileage just stated were $2,073,177,325. This total comprised earnings from the passenger service, $572,109,366; earnings from the freight service, $1,449,182,702, and miscellaneous earnings, $51,885,257. According to this preliminary report, the gross earnings from operation averaged $9,666 per mile of line. The final report for the year ending June 30, 1904, showed that the total gross earnings of the railways on 212,243.20 miles of line for that year were $1,975,174,091, being equivalent to $9,306 per mile. Of the gross earnings per mile of line, the passenger service contributed $2,667 and the freight service $6,757. The operating expenses of the railways embraced in the current preliminary report amounted to $1,383,584,404, thus averaging $6,451 per mile of line. For the year ending June 30, 1904, the operating expenses reported finally were $1,338,896,253, or $6,308 per mile. This advance report gives the ratio of operating expenses to earnings as 66.74 per cent. The final report for the year 1904 gave 67.79 per cent. The preliminary report shows that the net earnings of essentially the same roads were, for the year ending June 30, 1905, $689,592,921, and for the year ending June 30, 1904, $634,674,561.

The railway companies for which returns are included in this advance report also received $114,636,642 in the form of income from investments in the stocks and bonds of railway and other corporations and from other miscellaneous sources. The net earnings increased by this sum give a total income of $804,229,563. The aggregate deductions chargeable against this income were $713,994,800. The principal items included in such deductions were interest on funded debt, rents of leased lines, permanent improvements charged to income, taxes (which were $58,533,381) and dividends. Thus the surplus resulting from the operations of these roads, which the preliminary report covers, was $90,234,763. The complete report for the year ending June 30, 1904, covering both operating and leased roads, showed a surplus of $56,729,331, and the like report for 1903 a surplus of $99,227,469.

CHRISTMAS FESTIVAL IN JERSEY

The employees of the Paterson division of the Public Service Corporation, including the lines in Jersey City, Hoboken and Paterson, held a Christmas festival in the club room of the car house of the company at Paterson, on the evening of Wednesday, Dec. 27. This room the men decorated at their leisure with greens, and arranged two Christmas trees, which were electrically illuminated with 8-candle-power lamps. The room as well was tastefully illuminated with colored electric lights, some 700 of which were used. The wiring was done by employees of the United Electric Company, a subsidiary of the Public Service Corporation, without cost.

The programme of entertainment for the evening consisted of nine numbers, all vaudeville. Music was furnished by a special string quartet, whose efforts were roundly applauded. During the evening each child present was presented with a box of candy and an orange, at the expense of the company. The men themselves, to lend to the spirit of the occasion, each contributed from 10 cents to 15 cents for a prize. The contents of these packages were unknown, and much fun was caused when they became known, as they savored mostly of the ridiculous. In connection with the distribution of the boxes to the children, Mr. Bolen, superintendent of the division, early conceived the idea of having the boxes modeled after a trolley car. The result was that each box was a tasteful souvenir modeled along the lines mentioned, and so arranged that the car windows, after the removal of the candy, could be adjusted to permit of the lighting of car by means of candles placed inside.

This is the second entertainment of its kind that has been held on this division. To expedite the movement of those in attendance special cars were provided by the company, four of which left Hoboken for Paterson loaded with merrymakers.

The officers of the company all entered heartily into the spirit of the entertainment. In addition to Mr. Bolen, to whom was entrusted the details, these were present: Albert Stanley, general superintendent; Col. Hine, assistant to the president; Division Superintendents Dust, of Newark; Williams, of Jersey City; Bliss, of Hoboken; Duck, of West Hoboken, and Albert Eastman, superintendent of employment of the company.

ROCHESTER STOCKHOLDERS NOTIFIED OF SALE OF THE PROPERTY

Stockholders of the Rochester Railway Company, the sale of which to New York Central interests was noted in the STREET RAILWAY JOURNAL recently, have been officially notified by circular, through E. W. Clark & Company, of Philadelphia, and Hodenpyl, Walbridge & Company, of New York, of the sale as follows:

"We have entered into a contract to sell to the Mohawk Valley Company all of our holdings of the common stock of the Rochester Railway & Light Company for one hundred and twenty-five dollars ($125.00) per share, stock to be delivered and paid for on or before Feb. 1, 1906, at the office of the New York Central & Hudson River Railroad Company in New York City. The contract of sale provides that the purchaser shall take at the same price, all of the said common stock that may be offered, provided, however, that in order to bind the purchaser to take any such additional shares of common stock, the vendors must give to the purchaser, on or before the 15th day of January, A. D. 1906, notice in writing of the number of such additional shares of the common stock which they propose to sell under the terms of this contract. The common stock of the Rochester Railway & Light Company is liable to 30 per cent assessment, and in the contract of sale it is set forth that the purchaser does hereby undertake and agree to protect and save harmless from and against all such assessment and liability, the vendors and any and all holders of said common stock who may sell the same under and by virtue of the terms of this contract."

REPORT OF THE BOSTON ELEVATED RAILWAY

The comparative income account of the Boston Elevated Railway for the year ended Sept. 30 is given below, together with the balance sheet:

Sept. 30	1904-05	1903-04
Gross receipts	$12,689,676	$12,436,594
Operating expenses	8,617,653	8,631,553
Earnings from operation	$4,072,023	$3,805,041
Other income	51,893	....
Gross earnings	$4,123,916	$3,805,041
Charges	3,288,831	2,975,268
Balance	$835,084	$829,773
Dividends	798,000	798,000
Surplus	$37,084	$31,773

ASSETS

Sept. 30	1904-05	1903-04
Construction	$9,031,994	$7,313,099
Equipment	1,951,156	1,845,500
Real estate	5,479,967	5,337,145
Subway and tunnel construction and equipment	389,065	319,578
Cash on hand and in bank	7,733,580	3,564,190
Stocks, bonds and miscellaneous	2,920,019	2,044,859
Bills and accounts received	725,884	....
Sinking and other special funds	481,566	....
Total	$28,713,235	$20,423,859

LIABILITIES

Capital stock	$13,300,000	$13,300,000
Funded debt	7,500,000	....
Audited values and accounts	353,144	288,530
Salaries and wages	140,794	131,329
Divisions not called for	7,873	12,835
Matured interest coupons unpaid	36,095	20,017
Rentals unpaid	339,123	333,873
Outstanding tickets and checks	26,618	25,037
Interest accrued not due	256,679	114,513
Taxes accrued not due	1,036,563	908,456
Rentals accrued not due	146,895	142,849
West End lease account	1,207,201	1,207,202
Sinking and special funds	1,708,800	1,579,750
Surplus	2,673,445	2,359,462
Total	$28,713,235	$20,423,859

The items which make up the total charges of the Boston Elevated are as follows:

Sept. 30	1904-05	1903-04	1902-03
Taxes	$1,047,333	$925,419	$917,019
Rentals leased roads	1,233,199	1,852,643	1,817,645
Rental of subway	228,540	197,206	197,892
Interest on funded debt B. E. & W. E.	779,757	....	....
Total	$3,288,831	$2,975,268	$2,932,556

Boston Elevated passenger statistics for the year make this comparative showing:

Sept. 30	1904-05	1903-04	1902-03
Revenue miles	$48,069,404	$48,317,981	$47,476,702
Revenue passengers	246,941,776	241,681,945	233,563,578

The average persons employed by the Boston elevated were 7471; single surface trackage is 428,471 miles; elevated, 16.015 miles. Total additions to property during the year amounted to $2,036,862, and the cost of removal of snow was $190,139. Damages paid for injuries were $460,167. Legal expenses were $311,628. Wages paid were $3,851,891.

INTERCHANGE OF FREIGHT IN INDIANA

The freight agents of the interurban roads entering Indianapolis have been asked to attend a meeting next week, called by a committee appointed by the Indiana Electric Railway Association, to consider means whereby freight may be received at any point on any electric line and shipped through by interurban. All of the electric lines have some system of carrying light freight, but no traffic agreement has ever been made whereby a transfer to other lines could be effected. It is proposed that a rate agreement be made on a percentage basis between the lines, according to the miles of transportation given by each line. If such an arrangement is made it will mean much to shippers, as a cheap rate will be provided for produce and market stuffs, as well as for heavier freight.

THE BUFFALO-ROCHESTER PROJECT REVIVED

The Buffalo & Rochester Railway Company, which some time ago was denied by the Railroad Commission a franchise to build an electric railway from Buffalo to Rochester, has dissolved, and the directors are organizing the Buffalo & Rochester Traction Company to buy its own private right of way and build the road despite opposition of steam railroads. The capitalization is $3,500,000, and the same Philadelphia and Buffalo names that appeared in the first proposed road are in the new road. On Nov. 23, 1904, the first road was incorporated. On June 21, 1905, it was denied the right to build because its proposed route was along highways. In September it obtained a court writ to dissolve on Dec. 13. There is about $60,000 in the treasury to be distributed. Surveyors engaged indicate that the only difference in the new route will be a shifting from the highways to the farm lands. The western terminus of the road will be at Depew. It will enter Rochester over the Genessee street route. Between these points it will tap Looneyville, Crittenden, Grimsville, Wende, Pembroke, Alden, Corfu, Batavia, Stafford, Le Roy, Caledonia, Mumford, Wheatland and Chili. The directors are: Henry H. Kingston, J. Andrew Harris, Jr., John J. Collier, Horatio A. Foster, T. Henry Dixon and Samuel Welch, all of Philadelphia, and William B. Cutte, George A. Ricker and Herbert P. Bissell, all of Buffalo.

LYNCHBURG TRACTION & LIGHT ASSOCIATION'S YEAR

The annual meeting of the Lynchburg Traction & Light Company's Employees' Benefit Association, was held in the rooms of the association a few days ago. The report of the treasurer showed that during the year the sum of $4,318.27 had passed through his hands. Of this amount $1,317 was paid to members for sick and death benefits, and after all expenses had been paid for the year there remained on hand the sum of $467.79. This report showed that the net income from the "Penny Arcade" at Rivermont Park, which was operated last summer by the association, was nearly $1,500.

The report of President Apperson, which follows, was received with great enthusiasm by the members:

Gentlemen—It is with a great deal of pleasure that I submit herewith the third annual report of your association.

This has been the most prosperous year of our existence. While the receipts from dues were less than last year, our total receipts from all sources exceed our expenditures, and leaves quite a satisfactory balance on hand, notwithstanding that we have paid almost twice as much in sick benefits as was paid last year.

It is very gratifying to be able to report that our membership is larger than at any time since our organization.

The success of our venture in operating the Penny Arcade and bowling alleys at the park is better shown by the treasurer's report, attached hereto.

I fully appreciate the assistance and interest shown by each individual member, and I trust that all of you will continue to show in the future the same unselfish interest in the association's affairs that you have shown in the past.

The treasurer's detailed report shows fully the assistance and relief extended to our members.

With my best wishes to you all, and for the continued prosperity of the association, I am very respectfully,

R. D. Apperson,
President.

The election of officers for the ensuing year resulted as follows: R. D. Apperson, president; A. E. Anderson, vice-president; A. T. Powell, secretary and treasurer; Drs. Martin and Taliaferro, surgeons; Rev. James M. Owens, chaplain; R. L. Stabler, W. H. Crutchfield, O. W. Gettle, A. J. Cochran, A. J. Kohler and J. J. Thornhill, board of trustees.

LAYING FOUNDATION STONE OF ENGINEERS' CLUB IN NEW YORK

The foundation stone of the new building of the Engineers' Club, on West Fortieth Street, New York City, opposite Bryant Park and the new Public Library, was laid Dec. 23, at 2:30, by Mrs. Andrew Carnegie, whose husband declared the task well and truly done. The ceremony was quite informal, but the club was well represented by its officers and committees, including President W. H. Fletcher and Past President John C. Kafer. The architects, Messrs. Whitfield & King, were also present. Fortunately the weather cleared during the afternoon, and thus the party were enabled to inspect the building, now up to the ninth story in the steel work and to the third in marble and brick casing. The records deposited in the stone included a Bible of 1905, a club book of 1905, copies of the "Herald," "Tribune," "Sun" and "Times" of December 23; a copy of the certificate of incorporation, a booklet of the old club house at 374 Fifth Avenue, a half dollar, quarter dollar, dime, nickel and 1 cent; a card of W. L. Crow, the builder; a copy of Mr. Carnegie's letter of gift to the Engineering Societies and the Engineers' Club, a chronological history of the club, a list of members elected since the publication of the club book this year, a list of the incorporators of the club, the programme of competition for the selection of architects for the two buildings, and floor plans of the new house.

HEADLIGHTS CAUSE PROTEST IN MASSACHUSETTS

So much inconvenience has been occasioned to people who walk or drive in Washington Street, in Wellesley, Mass., lately, by the powerful lights in use on the cars of the Natick & Cochituate Street Railway, that the townspeople took their complaint before the Railroad Commissioners. The board heard the objections and announced that they had been considering the matter of headlights for street cars, and were intending to issue a general order soon after Jan. 1 covering the use of lights on all street railways. In general, the country districts favor the lights, and the more thickly populated suburban districts find them a great annoyance. The Railroad Commissioners recognize the fact that the companies have been led to introduce the lights in place of the old headlights, because the introduction of high-speed cars has made it necessary to throw a beam of light far enough ahead to enable the motorman to see an obstruction in time to stop; also, that the companies go to an expense in providing the lights, and that their prime motive is the safeguarding of people using the highways as well as people traveling in the cars. In their general order, they will try to cover all cases, in a general way; but even after the issue of that order they expect that special conditions may necessitate special rulings.

The complaint from Wellesley comes chiefly from the central part of the town, along Washington Street. Richard Cunningham, chairman of the Selectmen, said the beam of light from the cars was a quarter of a mile long, and on curves often swung out 50 ft. or 60 ft. across the roadway. The glare blinds both horses and drivers, often frightening a horse so that it will crouch in his tracks, apparently helpless. Bicycle riders and automobilists also had complained of great inconvenience from the headlights. Acetylene lights on autos make less trouble for users of the street, for the reason that they are placed well down toward the ground, whereas, the big lamps on the cars are placed above the ordinary headlight. He had seen the searchlights shut off, sometimes, as the car approached a horse and carriage, apparently indicating that the motorman regarded the effect of the light as dangerous. Mr. Cunningham realized that the searchlights were needed only on high-speed cars, but said the Natick line had been restricted to a speed of 15 miles in Wellesley. He thought the motormen should shut off the searchlights through the center of the town. To A. D. Claflin, president of the Boston Suburban Railway Company, owners of the Natick line, Mr. Cunningham said another company (the Boston & Worcester) was now using the searchlights on Worcester Street, but Worcester Street had little driving traffic, and the cars ran on a double-track reserved space much of the way, with carriage travel on either side. Several others also testified as to their experiences when suddenly confronted by the new lights.

For the railway company President Claflin said there was no desire to inconvenience the public, but the lights had been introduced because the company believed that there was greater safety for everybody concerned with the lights in use than without them. The motormen were instructed to turn off the lights in the square and also on signal from anybody encountered on the road. H. A. Plimpton, who presented the case for the town, made a brief summing up, and the matter was taken under advisement.

REMOVAL OF PHILADELPHIA OFFICE OF "STREET RAILWAY JOURNAL"

The Philadelphia office of the Street Railway Journal, which for so many years has been located at 929 Chestnut Street (in the City Trust Building), will, on Jan. 1, be removed to the Real Estate Trust Building, Broad and Chestnut Streets.

NEW PUBLICATION

Year Book of Legislation, 1904. Published by the New York State Library; 596 pages. Price, $1

This book is divided into three parts; the first is a digest of the messages of the governors of the different States, including selected topics in the President's message; the second is an index of legislation briefly indexing or summarizing 2190 laws and constitutional amendments; the third is a review of legislation, made up of the contribution of different specialists from all parts of the country. Then Prof. B. H. Meyer, of Wisconsin, discusses the legislation in 1904 in transportation, and includes a review of the laws passed by the different States affecting electric railways. The book is well supplied with indices and provides a most convenient method of maintaining a general survey of current legislation.

STREET RAILWAY PATENTS

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

UNITED STATE PATENTS ISSUED DEC. 19, 1905

807,431. Electric Controlling Mechanism for Railway Appliances; Walter J. Bell, Los Angeles, Cal. App. filed June 3, 1905. A contact wire is stretched between a pair of bell-crank levers, which are connected to the trolley wire. When a car passes, the trolley wire is pressed upward and imparts such motion to the bell cranks as will permit the contact wire to sag and make connection with a suitable contact on the car, thereby completing a circuit by which signals, switches, etc., may be operated.

807,461. Car Fender; Edward C. Haynes, Portland, Ore. App. filed Aug. 23, 1905. Comprises parallel bars spaced one above the other and extending transversely of the car, resilient fingers secured to the upper bar and extending downward in a curve in front of the lower bar, and springs connecting the fingers with the lower bar.

807,477. Trolley; Allen P. Lord, Bradford, Pa. App. filed Jan. 9. 1905. Consists of a pair of guard arms journaled on the outer ends of the trolley wheel axle, and having counter-balanced lower ends. When the arms contact with an obstruction, they will be depressed to permit the obstruction to pass, after which they swing back to their normal upright position.

807,486. Switch-Operating Mechanism; John A. McCaskey, Hubbard, Ohio. App. filed April 17, 1905. Comprises a stub-shaft vertically mounted in the roadbed, and having a crank connected by a lever to the switch point. Fingers fixed on the upper end of the shaft and adapted to be engaged by a suitable operating lever on the car.

807,490. Car Fender; Frederick W. O'Connor, Toronto, Can. App. filed May 8, 1905. Details of construction of a fender and means for automatically maintaining the same at a constant height above the roadway.

807,520. Controller; Ferdinand Volk, Pittsburg, Pa. App. filed Feb. 4, 1905. The usual controller has detents upon its upper surface with which a dog upon the controller arm engages at the successive notches. The handle must be slightly turned independently of the arm, in order to release the dog and pass the next notch.

807,564. Conveyor; Pierre Lorillard, Tuxedo Park, N. Y. App. filed April 10, 1905. An escalator made up of laterally-adjacent conveyor sections and means for moving the same in closed paths, each having a flat portion along which the effective movement of the corresponding section takes place, the movements of alternate sections along their respective paths being similar in direction but opposite in phase.

807,565. Conveyor; Pierre Lorillard, Tuxedo Park, N. Y. App. filed April 10, 1905. An escalator made up of laterally-adjacent conveyor sections extending spirally from one elevation to another, and means for operating the same to impart a continuous forward movement to a passenger supported thereby.

807,653. Trolley for Electric Railways; Walter J. Barron, Brooklyn, N. Y. App. filed June 6, 1900. V-shaped guiding fingers for readjusting the trolley wheel on the wire.

807,656. Rail-Bond; Leonard B. Buchanan, Woburn, Mass. App. filed Nov. 30, 1904. Comprises a pair of caps which may be placed over the terminals of the usual rail-bond and filled with solder, so as to make an additional connection.

807,707. Electric Railway Signal; Henry A. Ammann and Albert D. Campbell, Spokane, Wash. App. filed Oct. 4, 1905. A contact finger inclosed in a housing supported between two closely-adjacent insulators, and adapted to be engaged by the trolley wheel and actuating signal circuit-controlling switches within the housing.

807,777. Car Brake; Charles Remelius, Newark, N. J. App. filed June 10, 1905. Employs co-acting devices for simultaneously actuating oppositely-moving brake-shoes at the respective sides of the car truck to grip the wheels of the truck in stopping the car.

807,800. Electric Railway Signaling Appliance; Henry A. Ammann and Albert D. Campbell, Spokane, Wash. App. filed April 6, 1905. A signal box mounted above the trolley wire, having two electric circuit-making and breaking mechanisms, including make-and-break wheels of different form, a lever operatively connected to each mechanism, and a pendulum in the path of the trolley wheel arranged to move the levers successively in opposite directions.

807,984. Electric Railway; Frank Adams, North Adams, Mass. App. filed Jan. 30, 1904. The wheels of the car contact with a shoe, which is effective to move a switch for energizing the third-rail section immediately ahead of the car.

808,013. Radial Truck for Tramway and Like Vehicles; Elmer E. Cook, Louthborough, England. App. filed Aug. 21, 1905. Comprises a frame, radially movable axles carrying axle-boxes having lateral extensions longitudinal to the truck by and on which the frame is supported and adapted to slide.

PERSONAL MENTION

MR. H. P. BRADFORD, who has been in Europe for several years in the employ of Mr. H. A. Butters and others as owners of the Geneva system, and later with Mr. C. T. Yerkes in London, is in the United States for a short stay.

MR. A. W. LEONARD, for some time general manager of the Houghton County Street Railway Company, of Hancock, Mich., owned by Stone & Webster, of Boston, and formerly with that firm in Boston, has been appointed general manager of the Minneapolis General Electric Company to succeed Mr. A. M. Robertson, who will retire from the company Jan. 1, to engage in private business.

MR. JOHN COWAN has resigned the managing directorship of the Stirling Boiler Company, Ltd., of Motherwell and 25 Victoria Street, Westminster. The directors have appointed Mr. E. G. Constantine, A. M. I. C. E., M. I. M. E., of Manchester, to be managing director, to enter upon his duties at Motherwell on Jan. 1. Mr. Cowan still retains his interest in the company and will continue to be chairman of the directors.

MR. CHARLES T. YERKES, of the London Underground Railway Company, who has been ill in his apartments in the Waldorf-Astoria, New York, with kidney trouble since coming to this country in November, was reported on Wednesday to be dying, and his relatives were summoned to his bedside. Mr. Yerkes contracted a severe cold in London, and on the steamship on the way to New York, exposure to bad weather caused a recurrence of the chronic trouble with which he is afflicted. He took to his bed immediately upon arriving here.

MR. M. M. GILLESPIE, until recently a prominent member of the staff of the British Westinghouse Electric & Manufacturing Company, was recently entertained at a complimentary dinner given at the Midland Hotel, Manchester, by his old friends and colleagues in the firm, as a mark of the esteem in which he was always held. The proceedings, which were of an informal nature, bore ample witness to the popularity of a gentleman who has been associated for over seventeen years with the Westinghouse Companies on both sides of the Atlantic. In future, Mr. Gillespie will be found at his offices, Amberley House, Norfolk Street, Strand, W. C., where he will represent, among other firms, Browett, Lindley & Company, for London and the South and West of England.

MR. MORTON BEALES was mostly kindly entertained, Dec. 2, at a farewell dinner given by his friends at the British Westinghouse Electric & Manufacturing Company, upon his resigning his position of district office manager with that company, in order to take up the position of manager to Bruce, Peebles & Company. Mr. Beales had been connected with the Westinghouse Company for the last three years, and previous to that he was commercial engineer to J. G. White & Company, having resigned his position with the Ferranti Company, on whose staff he had been for nearly ten years. His address will be No. 1 London Wall Buildings, in the new office of Bruce, Peebles & Company.

THE ELECTRIC STORAGE BATTERY CO.

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MANUFACTURER OF THE

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New York, 100 Broadway Boston, 60 State Street Chicago, Marquette Bldg. San Francisco, Rialto Bldg. Philadelphia, Allegheny Ave. & 19th St. St. Louis, Wainwright Bldg. Cleveland, Citizens Bldg.

HAVANA, CUBA, G. F. Greenwood, Mgr., 34 Emperado Street. CANADA, The Canadian General Electric Co., Ltd., TORONTO.

MEXICO, Chas. L. Seeger, Primera de Humboldt, No. 10, MEXICO CITY.

"Unit Accumulator"

PATENTED JAN. 11, 1905

RELIABLE

FOR STREET RAILWAY WORK

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National Battery Company

ELECTRIC STORAGE BATTERIES

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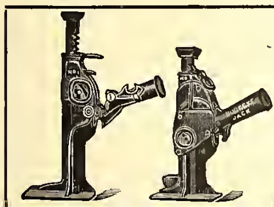

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Buckeye Jacks,

on account of their superiority are rapidly displacing other makes. Shrewd Contractors and Purchasing Agents buy them because they save money by so doing. Correspond with

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Louisville, - - Ohio.

Alabama Frog & Switch Co.

ANNISTON, ALABAMA, U. S. A.

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RAILROAD CROSSINGS, FROGS, SWITCHES, SWITCH STANDS

AND SPECIAL WORK OF EVERY DESCRIPTION FOR STEAM AND STREET RAILROADS

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This and its other appliances have the approval of **all** Insurance Interests, and are controlled and erected **exclusively** by this Company.

Where installed lowest rates obtain.

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MINNEAPOLIS: 716 Lumber Exch. NEW ORLEANS: 920 Hennen Bldg.
SAN FRANCISCO: 401 California Street

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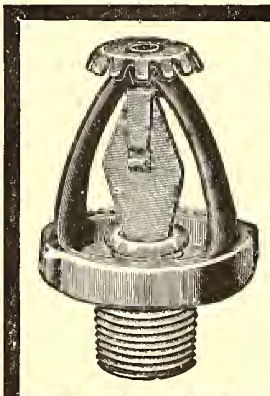
In a car barn, you can always confine the damage to a very small area if the barn is equipped with



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They can never fail, summer or winter. Reduce Insurance Rates.

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Information Furnished on Application

Executive Offices: PROVIDENCE, R. I.

Index to Advertisers.

(Continued on page 13.)

Index to Advertisers

(Continued from page 11.)

(Continued on page 15.)

VOLTAX
REGISTERED TRADE MARK

Voltax Magnet Wire

will stand 500% more overload than any other magnet wire without charring.

Will stand 10 times the voltage and 5 times the heat that ordinary magnet wire will.

Coils of this wire are practically indestructible, and will last many times as long as ordinary coils.

They cost more, but are well worth the difference.

We also make

Ordinary Cotton Covered Magnet Wire, Field and Armature Coils.

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MADE BY

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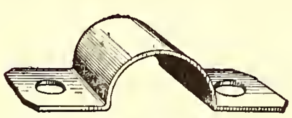
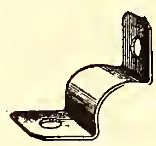
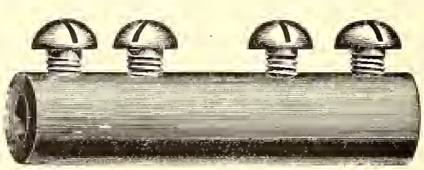
WRITE FOR PRICES



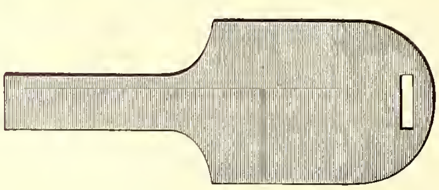
Brass Plain Cleats



Brass Corner Cleats



Two Way Connectors



Brass Cable Tags

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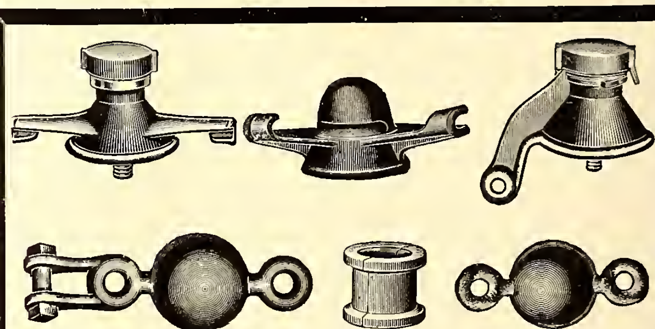
FACTORY
251 A Street, So. Boston, Mass.



ANDERSON LINE MATERIAL WITH AETNA INSULATION

There is true economy in quality, and our goods are of the highest quality. They hold a record of over fifteen years in service.

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PARIS, 20 Rue St. George
CHICAGO, 175 Dearborn Street
LONDON, 59 City Road
BRUSSELS, 20 Avenue Du Boulevard
MILAN, 12 Via Dante

Agents, PETTINGELL-ANDREWS COMPANY, Boston, Mass. 4

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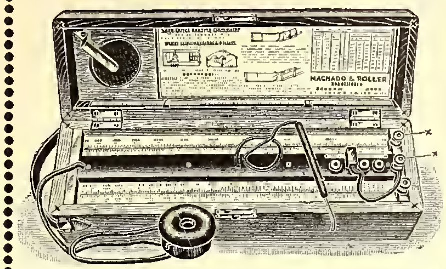
AN OHMMETER,



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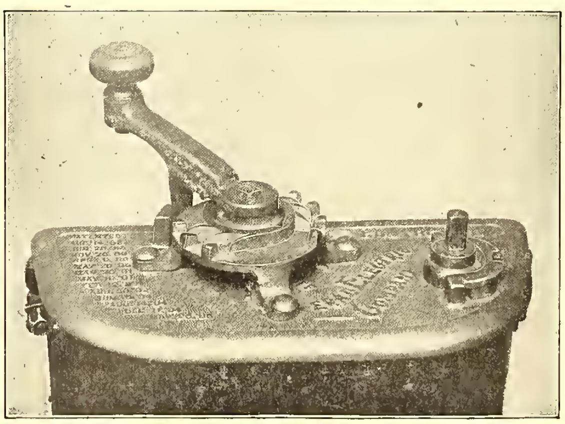
ST R'Y JOURNAL

A Watchdog on Every Car



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A dog that makes the "green" motorman start and reverse his car as the Master Mechanic would start and reverse it. Regulates the feed by means of the simplest mechanism.

The dog under the DURKIN CONTROLLER HANDLE catches for a moment at each position, then falls and permits of moving the handle to the next position.

Effects a decided saving in current, protects motors and connections; avoids jars to passengers; insures equal wear and longer life in controller contacts; spares wheels and tracks; lessens the powerhouse load.

To attach, no change is required in the controller. Simply drill three holes in the top of the dial and bolt on the DURKIN rack.

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CLASSIFIED DIRECTORY

OF

Manufacturers, Dealers, Engineers, Contractors, Etc., advertising in this issue of the Street Railway Journal

NOTE For reference to the advertisements, see alphabetical index on Pages 11-15

Advertising (Street Car)
Petry, Ambrose, Co.

Alloys and Bearing Metals
(See also Bearings for Trucks and Motors.)
Brown Harold P.
General Electric Co.
More-Jones Brass & Metal Co.
Ohio Brass Co.
Phosphor Bronze Smelting Co., Ltd., The.
Pittsburg White Metal Co.
Ridlon, Frank, Co.

Alternators
(See Generators, Alternating Current.)

Amusement Attractions
(See Park Attractions.)

Anchors (Guy)
Matthews & Bro., W. N.

Armature and Field Coils (Including Winding and Handling Methods)
Chattanooga Armature Works.
Cleveland Armature Works.
Columbia Machine Works & Malleable Iron Co.
Dittrick & Jordan Electric Co.
General Electric Co.
Magnet Wire Co.
Ridlon, Frank, Co.
Rossiter, MacGovern & Co.
Van Dorn-Elliott Electric Co.
Wire & Telephone Co. of America.

Armature Lifts
(See Cranes, Hoists and Lifts.)

Automobiles
Fairbanks, Morse & Co.

Babbitt Metals
(See Alloys and Bearing Metals.)

Babbitting Devices
Ridlon, Frank, Co.

Badges and Buttons
American Railway Supply Co.
International Register Co.
Waterbury Button Co.
Woodman, R., Mfg. & Supply Co.

Ballast Cars and Ballasting Machinery
Allis-Chalmers Co.
Browning Engineering Co.

Bankers and Brokers
Farlow, W. E., & Co.

Bases, Trolley
General Electric Co.

Batteries
Electric Storage Battery Co.
General Storage Battery Co.
Gould Storage Battery Co.
National Battery Co.

Bearings for Trucks and Motors
(See also Alloys and Bearing Metals.)
Baltimore Railway Specialty Co.
General Electric Co.
Ohio Brass Co.
Ridlon, Frank, Co.
St. Louis Car Co.

Bells and Gongs
Brill, J. G., Co.
Ohio Brass Co.
Wallace Supply Co.

Belting
Boyle, John, & Co.

Benders, Rail
Fairbanks, Morse & Co.
Kalamazoo Railway Supply Co.
Niles-Bement-Pond Co.

Bending Tools
Wallace Supply Co.

Block Systems
(See Signal Systems.)

Blowers
(See Mechanical Draft Apparatus.)

Blue Printing Machines
Buckeye Engine Co.

Boilers
Parker Boiler Co.
Stirling Consolidated Boiler Co.

Boiler Cleaning Compounds
Dearborn Drug & Chem. Works.

Boiler Coverings
(See Coverings, Pipe and Boiler.)

Bonds, Rail
Bissell, F., Co.
Brown, Harold P.
Chase-Shawmut Co.
General Electric Co.
Goldschmidt Thermit Co.
Lorain Steel Co.
Lord Electric Co.
Mayer & Englund Co.
Ohio Brass Co.
Porter & Berg.
Protected Rail Bond Co.
Roebling's, John A., Sons Co.

Bond Testers
Machado & Roller.
Whitney Elec. Instrument Co.

Bonding Tools
(See Tools, Track and Miscellaneous.)

Boosters
General Electric Co.
National Electric Co.

Borers, Wheel
(See Machine Tools.)

Boxes, Journal
(See Journal Boxes.)

Brackets and Cross Arms
Bissell, F., Co.
Creaghead Engineering Co.
General Electric Co.
Mayer & Englund Co.
Ohio Brass Co.
Porter & Berg.
Southern Exchange Co.
Traction Equipment Co.

Brakes and Brake Systems
Brill, J. G., Co.
Columbia Machine Works & Malleable Iron Co.
National Brake Co.
National Electric Co.
Philadelphia Air Brake Co.
Porter & Berg.
St. Louis Car Co.
Sterling-Meaker Co.
U. S. Metal & Mfg. Co.
Westinghouse Air Brake Co.

Brake Shoes
American Brake Shoe & Foundry Co.
Bissell, F., Co.
Brill, J. G., Co.
Dorner Mfg. Co.
Porter & Berg.
St. Louis Car Co.
Standard Brake Shoe Co.

Brazing Processes
American Ferrofix Brazing Co.

Bridges and Buildings
American Bridge Co.
Trussed Concrete Steel Co.

Brushes, Carbon
Bissell, F., Co.
Copley-Senior Carbon Co.
General Electric Co.
Le Valley Vitæ Carbon Brush Co.
National Carbon Co.
Porter & Berg.
Speer Carbon Co.

Bumpers, Car
Brill, J. G., Co.

Buttons
(See Badges and Buttons.)

Cables
(See Wires and Cables.)

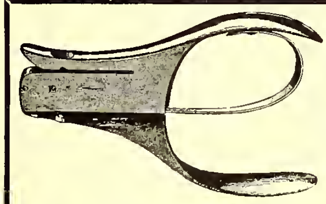
Carbon Brushes
(See Brushes, Carbon.)

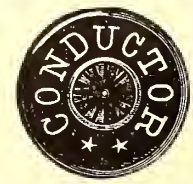
Cars—Passenger, Freight and Express
American Car Co.
Brill, J. G., Co.
Dorner Mfg. Co.
Hanna, J. A., Co.
Jewett Car Co.
Kuhlman, G. C., Car Co.
Niles Car & Mfg. Co.
St. Louis Car Co.
Stephenson, John, Co.

Cars, Pressed Steel
Pressed Steel Car Co.

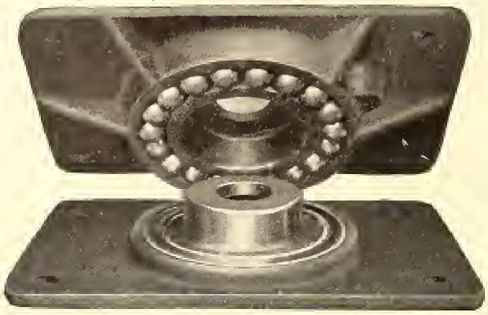
Cars, Portable Sub-Station
Brill, J. G., Co.

Cars, Construction and Repair
Fairbanks, Morse & Co.
Kalamazoo Railway Supply Co.

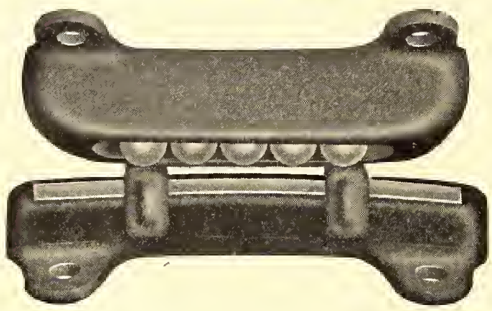




Baltimore Ball Bearings



Center and Side Bearings



Baltimore Railway Specialty Company
Baltimore, Maryland

THE T. H. SYMINGTON COMPANY
SELLING AGENTS
Calvert Bldg., BALTIMORE, MD. 315 Ry. Exchange Bldg., CHICAGO

Hot seats or warm cars?

Which do you want on your road? They aren't the same thing by any means. Most electric heaters make things mighty hot right where the heaters are placed.

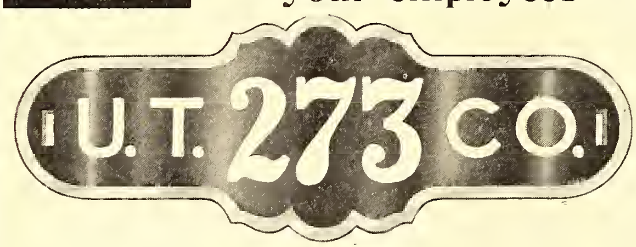
Gold Electric Car Heaters

on the contrary, do not produce excessive heat at any place, but produce an even, agreeable temperature throughout the entire car.
It's the Gold construction that does it.
30 different styles of Gold Heaters.
Over 200,000 in use.
Have you a copy of our new red book?

Gold Car Heating & Lighting Co.
Whitehall Bldg., New York.

TAG!

The Heeren Badges are "It" for labeling your employees.



All Sizes and Shapes, but ONLY ONE QUALITY!

The kind that doesn't chip or break or look shabby after a little weatherbeating.

Make it an honor to wear a badge of your company. It will be a pleasure as well if that badge is a Heeren.

The International Register Co.
124 West Jackson Boulevard, CHICAGO.

WALKOVER
TRADE MARK
CAR SEAT

Gives more room, more comfort, and more money value than any other seat made.

Notice its superior construction and substantial appearance. Specify our product for your new Electric Cars.

98-A IN RATTAN

The Hale & Kilburn Mfg. Co.
PHILADELPHIA, PA.

CLASSIFIED DIRECTORY—Continued.

Car Equipment
(For Fenders, Heaters, Registers, Wheels, etc., see those headings.)

Car Trimmings
(See also Curtain Fixtures, Registers, Fittings, etc.)
Wallace Supply Co.

Castings
American Brake Shoe & Foundry Co.
American Bridge Co.
Beaver Dam Malleable Iron Co.
Columbia Machine Works & Malleable Iron Co.
Ohio Brass Co.
Ridlon, Frank, Co.

Cast Welded Joints
(See Joints, Rail.)

Catchers and Retrievers
Ridlon, Frank, Co.

Cattle Guards
(See Stock Guards.)

Cement
Johns, H. W., Manville Co.

Chains
American Bridge Co.

Chimneys
Weber Steel Concrete Chimney Co.

Circle Swings
Boyce, Edw. C.

Circuit Breakers
Bissell, F., Co.
Cutter Co.
General Electric Co.
Ohio Brass Co.
Porter & Berg.
Westinghouse Electric & Mfg. Co.

Clamps and Connectors for Wires and Cables
Matthews, W. N., & Bro.
Ridlon, Frank, Co.

Cleaners and Scrapers, Track
Brill, J. G., Co.
Dorner Mfg. Co.
Kalamazoo Railway Supply Co.
Ohio Brass Co.
Van Dorn & Dutton Co.

Cleaners, Boiler
(See Boiler Cleaners.)

Cleaning Powders and Washes
India Alkali Works.

Clusters and Sockets
General Electric Co.

Coal Handling Machinery
(See Conveyors.)

Coils, Armature and Field
(See Armatures and Field Coils.)

Commutators and Parts
Chattanooga Armature Works.
Cleveland Armature Works.
Columbia Machine Works & Malleable Iron Co.
Cutter Co.
Dittrick & Jordan Elec. Co.
General Electric Co.
Homer Commutator Co.
Ohio Brass Co.
Porter & Berg.
Ridlon, Frank, Co.
Rossiter, MacGovern & Co.
Van Dorn-Elliott Electric Co.
Westinghouse Electric & Mfg. Co.

Commutator Compounds and Truing Devices
Jordan Automatic Electric Signal Co.
Ridlon, Frank, Co.

Compounds, Boiler Cleaning
(See Boiler Cleaning Compounds)

Compounds, Insulating
(See Insulations and Insulating Compounds.)

Compressors, Air
Allis-Chalmers Co.
Clayton Air Compressor Works.
General Electric Co.
National Electric Co.
Westinghouse Air Brake Co.

Computing Machines
Hamburger, Felix.

Concrete Steel
(See Bridges and Buildings.)

Condensers
Alberger Condenser Co.
Allis-Chalmers Co.
Blake, W. H., Steam Pump Works.
Conover Condenser.
Watson Machine Co.
Worthington, Henry R.

Conduits, Underground
Bissell, F., Co.

Control Systems
General Electric Co.
Westinghouse Electric & Mfg. Co.

Controllers and Controller Parts
General Electric Co.
Westinghouse Electric & Mfg. Co.

Controller Regulators
Durkin Controller Handle Co.

Converters, Rotary
Allis-Chalmers Co.
General Electric Co.
National Electric Co.
Westinghouse Electric & Mfg. Co.

Conveyors, Coal and Ashes (Including Auxiliary Apparatus)
Brown Hoisting Machinery Co.
Browning Engineering Co.
Robins Conveying Belt Co.

Cooling Towers
(See Towers, Cooling.)

Cord, Bell and Trolley
Bissell, F., Co.
International Register Co.
Mayer & Englund Co.
Porter & Berg.
Samson Cordage Works.
Sterling-Meaker Co.

Cotton Duck
Boyle, John, & Co.

Couplers, Car
Brill, J. G., Co.
Van Dorn, W. T., Co.
Wallace Supply Co.
Westinghouse Air Brake Co.

Coverings, Pipe and Boiler
Johns-Manville Co., H. W.

Cranes, Hoists and Lifts
Brill, J. G., Co.
Brown Hoisting Machinery Co.
Browning Engineering Co.
Case Mfg. Co.
Cleveland Armature Works.
Duff Mfg. Co.
Marine Engine & Machine Co.
Maris Bros.
Niles-Bement-Pond Co.
Van Dorn & Dutton Co.

Cross Arms
(See Brackets and Cross Arms.)

Crossings, Track
(See Track Work.)

Curtains, Curtain Fixtures and Curtain Material
(See also Sash Fixtures.)
Boyle, John, & Co.
Brill, J. G., Co.
Hartshorn, Stewart Co.
National Lock Washer Co.
Pantasote Co.

Derailing Devices
(See also Track Work.)
Lorain Steel Co.

Detective Service
Mooney & Boland Detective Agcy

Doors and Door Fixtures
Brill, J. G., Co.
Ridlon, Frank, Co.
Wallace Supply Co.

Doors, Steel Rolling
Kinnear Mfg. Co.

Draft, Mechanical
(See Mechanical Draft and Apparatus.)

Draft Rigging and Drawbars
(See Couplers, Car.)

Drills, Track
Bissell, F., Co.
Brown, Harold P.
Fairbanks, Morse & Co.
Kalamazoo Railway Supply Co.
Porter & Berg.
Ridlon, Frank, Co.
Van Dorn-Elliott Electric Co.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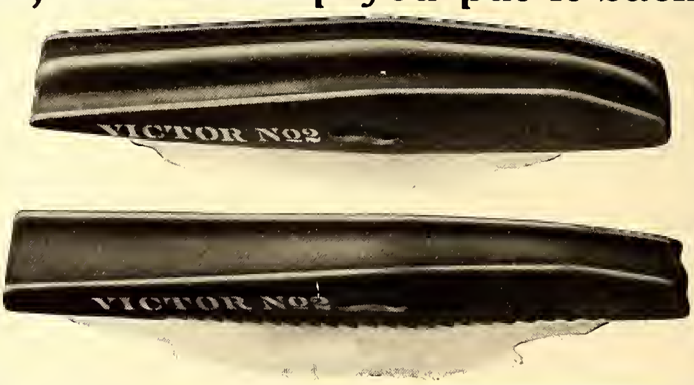
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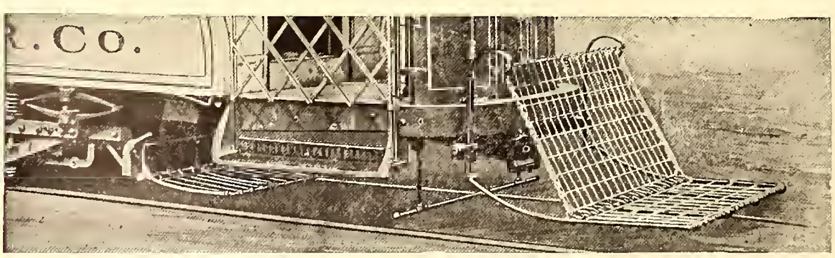

CLASSIFIED DIRECTORY—Continued.

Drying Apparatus
(See also Heating & Ventilating Apparatus.)
Sturtevant, B. F., Co.

Dust Guards
(See Lubricating Devices.)

Dynamos
(See Generators.)

Economizers, Fuel
Green Fuel Economizer Co.
Parker Boiler Co.
Sturtevant, B. F., Co.

Electrical Testing
Electrical Testing Laboratories.

Elevators
Marine Engine & Machine Co

Engines, Gas and Oil
Allis-Chalmers Co.
Buckeye Engine Co.
Power & Mining Machinery Co.
Westinghouse Machine Co.

Engines, Hoisting
Allis-Chalmers Co.

Engines, Steam
Allis-Chalmers Co.
Buckeye Engine Co.
Hooven-Owens-Rentschler Co.
Marine Engine & Machine Co.
Quincy Engine Works.
Sturtevant, B. F., Co.
Westinghouse Machine Co.

Engineers, Consulting, Contracting and Operating
Arnold Co.
Baker, W. E., & Co.
Bates, Putnam A.
Byllesby, H. M., & Co.
Cason & Barrett.
Cleveland Armature Works.
Cox, A. A.
Electrical Installation Co.
Ford, Bacon & Davis.
Herrick, Albert B.
Kohler Bros.
Myers, L. E., Co.
Pepper & Bowie.
Register, A. L., & Co.
Sanderson & Porter.
Schott, W. H.
Stearns, Chas. K.
Taylor & Ely.
Van Bibber, Chas. Edwin.
Westinghouse, Church, Kerr & Co.
White, J. G., & Co.

Extinguishers, Fire
(See Fire Extinguishers.)

Exhaust Heads
Hoppes Mfg. Co.

Fans
(See Mechanical Draft Apparatus.

Feed-Water Apparatus
(See Heaters and Purifiers, Feed-Water.)

Felts, Fireproof
Johns-Manville, H. W., Co.

Fenders and Wheel Guards
Consolidated Car Fender Co.
Mayer & Englund Co.
Parmenter Fender & Wheel Guard Co.
Star Brass Works.
Sterling-Meaker Co.

Fibre
American Vulcanized Fibre Co.
Bissell, F., Co.
Porter & Berg.

Field Coil Cushions
Massachusetts Chemical Co.

Field Coils
(See Armature and Field Coils.)

Filters, Oil
Turner, M. A.

Fire Extinguishers
General Fire Extinguisher Co.
International Sprinkler Co.
Manufacturers' Automatic Sprinkler Co.
Vogel, H. G., Co.

Fireproofing Materials
(See also Lumber, Artificial.)
John-Manville, H. W., Co.

Forges
Sturtevant, B. F., Co.

Frogs, Track
(See Track Work.)

Fuel Economizers
(See Economizers, Fuel.)

Fuses
Bissell, F., Co.
Chase-Shawmut Co.
Johns-Manville Co., H. W.
General Electric Co.
Mayer & Englund Co.
Porter & Berg.
Westinghouse Electric & Mfg. Co.

Gas Producers
Power & Mining Machinery Co.
Westinghouse Machine Co.

Gates, Car
Brill, J. G., Co.

Gear Cases
Bliss, E. W., Co.
General Electric Co.

Gears and Pinions
Bliss, E. W., Co.
General Electric Co.
Mayer & Englund.
Ohio Brass Co.
Van Dorn & Dutton Co.

Generators, Alternating and Direct Current
Allis-Chalmers Co.
Crocker-Wheeler Co.
General Electric Co.
National Electric Co.
Westinghouse Electric & Mfg. Co.

Generators, Gas
(See Gas Producers).

Generating Sets
Marine Engine & Machine Co.
Sturtevant, B. F., Co.

Generators and Motors, Spare Parts of
Crocker-Wheeler Co.

Glass
Bache, Semon, & Co.

Gongs
(See Bells and Gongs.)

Graphite Paints
(See Paints and Varnishes.)

Greases
(See Lubricants.)

Grinders
Brown, Harold P.
Royal Mfg. Co.

Guards, Cattle
(See Stock Guards.)

Gutta Percha or Rubber Insulation
(See Insulation and Insulating Compounds.

Handles, Controller
(See Controller Regulators.)

Harps, Trolley
Bayonet Trolley Harp Co.
Fairbanks, Morse & Co.
Kalamazoo Railway Supply Co.
Porter & Berg.
Star Brass Works.

Headlights
Bissell, F., Co.
Fairbanks, Morse & Co.
General Electric Co.
Porter & Berg.
Ridlon, Frank, Co.
St. Louis Car Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Johns-Manville Co., H. W.

CLASSIFIED DIRECTORY—Continued

Heaters, Car, Hot Water and Stoves
Dorner Mfg. Co.,
Gold Car Heating & Lighting Co.
Smith Heater Co., Peter.

Heaters and Purifiers, Feed-water, (Iecluding Feed-water Regulators)
Alberger Condenser Co.
Harrison Safety Boiler Works.
Hoppes Mfg. Co.

Heating and Ventilating Apparatus
(See also Mechanical Draft.)
Green Fuel Economizer Co.,
Sturtevant, B. F., Co.

Hoists
(See Cranes, Hoists and Lifts.)

Hose Bridges
Ohio Brass Co.,

Hose Cotton
Boyle, John, & Co.

Hydraulic Machinery
Allis-Chalmers Co.

Ice Leveler
Gifford-Wood Co.

Impregnating Compounds
(See also Vacuum Impregnating Apparatus.)
Standard Varnish Works.

Inspection, Watch
Forsinger, J. W.

Instruments, Electrical Measuring
General Electric Co.
Machado & Roller.
Westinghouse Electric & Mfg. Co.
Whitney Elec. Instrument Co.

Instruments, Recording
General Electric Co.

Insulations and Insulating Compounds
(See also Paints and Varnishes.)
Anderson, A. & J. M., Mfg. Co.
Bissell, F., Co.
Garton, W. R., Co.
General Electric Co.
Johns-Manville Co., H. W.
Massachusetts Chemical Co.
Ohio Brass Co.
Porter & Berg.
Sherwin-Williams Co.
Standard Varnish Works.

Insulating Cement
Massachusetts Chemical Co.

Insulating Paper and Cloths
American Vulcanized Fibre Co.,
General Electric Co.
Massachusetts Chemical Co.
Sterling Varnish Co.

Insulating Tapes
General Electric Co.
Massachusetts Chemical Co.

Insulators (Including Third Rail)
(See also Line Material.)
Bissell, F., Co.
Creaghead Engineering Co
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co., The.
Porter & Berg.

Jacks
(See also Cranes, Hoists and Lifts.)
Brill, J. G., Co.
Buckeye Jack Mfg. Co.
Dorner Mfg. Co.
Duff Mfg. Co.
Fairbanks, Morse & Co.
Kalamazoo Railway Supply Co.
Ohio Brass Co.
Porter & Berg.

Joints, Expansion
(See Pipe Fittings.)

Joints, Rail
Continuous Rail Joints.
Goldschmidt Thermit Co.
Lorain Steel Co.
Rail Joint Company.
Weber Rail Joints.

Journal Boxes
Brill, J. G., Co.
Symington, T. H., Co.

Journal Lubricators
(See Lubricating Devices.)

Laboratories, Electrical
Electrical Testing Laboratories.

Lamps, Arc and Incandescent
(See also Headlights.)
Bissell, F., Co.
Creaghead Engineering Co.
Garton, W. R., Co.
General Electric Co.
Mayer & Englund Co.
Porter & Berg.
Westinghouse Electric & Mfg. Co.

Lamp Parts
(See Clusters and Sockets.)

Lifters, Car Step
Consolidated Car Fender Co.

Lifts
(See Cranes, Hoists and Lifts.)

Lightning Protection
Anderson, A. & J. M., Mfg. Co.
Bissell, F., Co.
General Electric Co.
Lord Electric Co.
Ohio Brass Co.
Porter & Berg.
Westinghouse Electric & Mfg. Co.

Line Material
(See also Brackets and Cross Arms, Insulators and Wires and Cables.)
Anderson, A. & J. M., Mfg. Co.
Creaghead Engineering Co.
Electric Railway Equipment Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Mayer & Englund Co.
Porter & Berg.

Lockers, Metal
Merritt & Co.
Meyers, Fred J., Mfg. Co.

Lock Nuts and Washers
(See Nuts and Bolts.)

Locomotives, Electric
American Locomotive Co.
Baldwin Locomotive Works.
Brill Co., J. G.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Lubricants, Oil and Grease
Champion Oil Co.
Dearborn Drug & Chemical Co.
Franklin Oil & Gas Co.
Galena Signal Oil Co.

Lubricating Devices
Axle Lubricator Co.
Jolt Lubricator Co.

Lumber, Artificial
Johns-Manville Co., H. W.

Machine Tools
Niles-Bement-Pond Co.

Machinists' Tools
Niles-Bement-Pond Co.

Mechanical Draft Apparatus
(See also Heating and Ventilating Apparatus.)
General Electric Co.
Green Fuel Economizer Co.,
Sturtevant, B. F., Co.

Mirrors for Motormen
Brown, H. P.

Motors, Electric
Allis-Chalmers Co.
Cleveland Armature Works.
Crocker-Wheeler Co.
Electro-Dynamic Co.
General Electric Co.
National Electric Co.
Sturtevant, B. F., Co.
Westinghouse Electric & Mfg. Co.

Movers, Car
(See Pushers, Car.)

Multiple Unit Control
(See Control Systems.)

Nuts and Bolts
Bliss Co., E. W.
Lorain Steel Co.
National Lock Washer Co.
U. S. Metal & Mfg. Co.

Ohmmeters
Machado & Roller.
Whitney Elec. Instrument Co.

Oils
(See Lubricants.)

Oil Eliminators
Hoppes Mfg. Co.

Oil Filters
(See Filters, Oil.)

Overhead Equipment
(See Line Material.)

Packing
Johns-Manville Co., H. W.
Porter & Berg.
Power Specialty Co.

Paints and Varnishes
(See also Insulating Compounds.)
Massachusetts Chemical Co.
Standard Varnish Works.
Sterling Varnish Co.,

Panels, Seat End
Brill Co., J. G.

Park Attractions
Boyce, Edw. C.
Federal Construction Co.

CLASSIFIED DIRECTORY—Continued

Patent Attorneys
Rosenbaum & Stockbridge.

Paving Material
American Brake Shoe & Fdy. Co.
U. S. Wood Preserving Co.

Phosphor Bronze
(See Alloys and Bearing Metals.)

Pipe Coverings
(See Coverings, Pipe and Boiler.)

Pipe Fittings
Alberger Condenser Co.
Crane Co.

Planers
(See Machine Tools and Woodworking Machinery.)

Plows, Snow
(See Snow Plows and Sweepers.)

Poles, Ties and Lumber
Abeles & Taussig.
Bissell, F., Co.
Fowler, John H., & Co.
Hearne Timber Co.
Humbird Lumber Co.
Maus & Co., H. H.
Southern Exchange Co.
Standard Tie Co.
Worcester Co., C. H.

Poles, Trolley
Columbia Machine Works & Malleable Iron Co.
General Electric Co.

Poles, Metal Street
American Bridge Co.
Bissell, F., Co.
Creaghead Engineering Co.
Electric Railway Equipment Co.
Fairbanks, Morse & Co.
Porter & Berg.

Presses, Hydraulic Wheel
(See Machine Tools.)

Pulleys, Non-Metal
Rockwood Mfg. Co

Pumps
(See also Condensers.)
Alberger Condenser Co.
Allis-Chalmers Co.
Blake Steam Pump Co., W. H.
Deming Co.
Fairbanks, Morse & Co.
General Electric Co.
Laidlaw-Dunn-Gordon Co.
Watson Machine Co.

Punches, Ticket
Fairbanks, Morse & Co.
Meyers, Fred J., Mfg. Co.
Porter & Berg.
Woodman, R., Mfg. & Supply Co.

Purifiers, Feed Water
(See Heaters anl Purifiers, Feed Water.)

Pushers, Car
Woodman, R., Mfg. & Supply Co.

Rails,
(See Track Work.)

Rail Benders
(See Benders, Rail.)

Rail Joints
(See Joints, Rail.)

Rail Welding
(See Joints, Rail.)

Rattan
Brill Co., J. G.
Hale & Kilburn Mfg. Co.
Mayer & Englund Co.
Ohio Brass Co.
Porter & Berg.

Registers and Register Fittings
International Register Co.
Sterling-Meaker Co.
Traction Equipment Co.
Westinghouse Electric & Mfg. Co.
Woodman, R., Mfg. & Supply Co.

Regulators, Controller
(See Controller Regulators.)

Repair Work
(See also Armature and Field Coils.)
Brill Co., J. G.
Chattanooga Armature Works.
Cleveland Armature Works.
Columbia Mach. Wks. & Malleable Iron Co.
Dittrick & Jordan Elec. Co.
Dustin, Chas. E., Co.
Jordan Automatic Electric Signal Co.
Rossiter, MacGovern & Co.
Van Dorn-Elliott Electric Co.

Pinions
(See Gears and Pinions.)

Replacers, Car
Kalamazoo Ry. Supply Co.
U. S. Metal & Mfg. Co.

Resistances, Wire and Tube
General Electric Co.
Traction Equipment Co.
Westinghouse Electric & Mfg. Co.

Retrievers, Trolley
(See Catchers and Retrievers, Trolley.)

Roofing
Johns-Manville Co., H. W.

Sand Boxes (Including Pneumatic Sanders)
Brill Co., J. G.
Ohio Brass Co.
Jewett Car Co.
Porter & Berg.
Ridlon, Frank, Co.
St. Louis Car Co.
Sterling-Meaker Co.
Traction Equipment Co.

Sash Balances
National Lock Washer Co.

Sash Fixtures
(See also Curtains.)
National Lock Washer Co., The.

Scrapers, Track
(See Cleaners, Track.)

Seating Materials
(See Curtains and Curtain Materials.)

Seats, Car
Brill Co., J. G.
Hale & Kilburn Mfg. Co.
St. Louis Car Co.

Separators, Oil and Steam
Harrison Safety Boiler Works.
Hoppes Mfg. Co.

Shoes, Brake
(See Brake Shoes.)

Shovels, Power
Vulcan Iron Works

Shutters, Steel Rolling
(See Doors, Steel Rolling.)

Signal Systems
Jordan Automatic Electric Signal Co.

Signs, Car and Track
Columbia Machine Works & Malleable Iron Co.
Creaghead Engineering Co.
Porter & Berg.
Traction Equipment Co.

Sleet Cutters
Garton, W. R., Co.
Porter & Berg.

Sleeving
(See Tapes and Cloths.)

Smokestacks
(See Chimneys.)

Snow Plows and Sweepers
Brill Co., J. G.
Consolidated Car Fender Co.
Dorner Mfg. Co.

Soaps
(See Cleaning Powders and Washes.)

Speed Indicators
Woodman, R., Mfg. & Supply Co.

Splicing Sleeves
(See Clamps and Connectors for Wires and Cables.)

Sprinklers, Fire
(See Fire Extinguishers.)

Sprinklers, Track and Road
Brill Co., J. G.

Springs, Car and Truck
Brill Co., J. G.
Railway Steel Spring Co.
Standard Steel Works.
Union Spring & Mfg. Co.

Steps, Car
Brill Co., J. G.

Stock Guards
American Bridge Co.
Fairbanks, Morse & Co.
Kalamazoo Railway Supply Co.

Stokers, Mechanical
Westinghouse Machine Co.

Storage Batteries
(See Batteries.)

Superheaters
Parker Boiler Co.
Power Specialty Co.

Strips, Protecting
(See Paving Materials.)

CLASSIFIED DIRECTORY—Continued

Structural Iron Work
(See Bridges and Buildings.)

Sweepers, Snow
(See Snow Plows and Sweepers.)

Switch Locks
Blanchard Railway Switch Lock Co.

Switchboard Mats
Massachusetts Chemical Co.

Switches and Switchboards
Anderson, A. & J. M., Mfg. Co.
Consolidated Car Heating Co.
Cutter Electrical Mfg. Co.
Fisk-Newhall Telephone Mfg. Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Electric & Mfg. Co.

Switches, Track
(See Track Work.)

Sub-Station, Portable
(See Cars, Portable Sub-Station.)

Substructures, Track
(See Track Work.)

Tapes and Cloths
(See also Insulating Tapes.)
Johns-Manville Co., H. W.

Telephones
Fisk-Newhall Telephone Mfg. Co.
Mayer & Englund Co.

Testing Instruments
(See Instruments, Electrical Measuring; Bond Testers.)

Third-Rail Insulators
(See Insulators, Third Rail.)

Tickets and Transfers
(Including Ticket Boxes and Cases.)
American Railway Supply Co.
MacDonald Ticket & Ticket Box Co.

Ticket Punches
(See Punches, Ticket.)

Ties
(See Poles, Ties and Lumber.)

Tie Plates and Braces
(See Track Work.)

Timber Preserving Machinery
Allis-Chalmers Co.

Toboggans
Federal Construction Co.

Tools, Machine
(See Machine Tools.)

Tools, Track and Miscellaneous
(See also Grinders.)
Bissell Co., The F.
Brown, Harold P.
Fairbanks, Morse & Co.
Ohio Brass Co.

Towers, Cooling
(See also Condensers.)
Alberger Condenser Co.
Fairbanks, Morse & Co.
Worthington, Henry R.

Track Work
Alabama Frog & Switch Co.
American Bridge Co.
Beaver Dam Malleable Iron Co.
Lorain Steel Co.
Wharton, Wm., Jr., & Co., Inc.

Track Work, Heaters and Light for
Macleod, Walter, & Co.

Transformers
Allis-Chalmers Co.
Bissell, F., Co.
General Electric Co.
National Electric Co.
Westinghouse Electric & Mfg. Co.

Traps, Steam
Sturtevant, B. F., Co.

Trolley Bases, Poles, Harps and Wheels
(See Bases, Poles, Harps and Wheels, Trolley.)

Trucks, Car
American Car Co.
American Locomotive Co.
Baldwin Locomotive Works.
Brill Co., J. G.
Dorner Mfg. Co.
St. Louis Car Co.
Stephenson Co., John.

Truing Devices
(See Commutator Compounds and Truing Devices.)

Trust Companies
American Loan & Trust Co.

Turbines, Hydraulic
(See Hydraulic Machinery.)

Turbines, Steam
Allis-Chalmers Co.
General Electric Co.
Hooven-Owens-Rentschler Co.
Westinghouse Machine Co.

Vacuum Impregnating Apparatus
Devine, Jos. P.

Valves and Gates
Crane Co.

Variable Speed Motors
(See Motors, Electric.)

Varnishes
(See Paints and Varnishes.)

Ventilating Apparatus
(See Heating and Ventilating Apparatus.)

Vestibules, Portable
Brill Co., J. G.

Voltmeters
(See Instruments, Electrical Measuring.)

Water Softening Apparatus
(See Boiler Cleaning Compounds.)

Water Wheels and Governors
(See Hydraulic Machinery.)

Wattmeters
(See Instruments, Electrical Measuring.)

Wheelbarrows
Fairbanks, Morse & Co.

Wheel Guards
(See Fenders and Wheel Guards.)

Wheels and Axles
Brill Co., J. G.
General Electric Co.
Railway Steel Spring Co.
Standard Steel Works.
Taylor Iron & Steel Co.
Woodworth-Engert Co.

Wheel Presses
(See Machine Tools.)

Wheels, Trolley
Johns-Manville Co., H. W.
Star Brass Works.

Winding Machines
(See Armature and Field Coils.)

Wires and Cables
Bissell, F., Co.
General Electric Co.
Magnet Wire Co.
National Conduit & Cable Co.
Porter & Berg.
Ridlon, Frank, Co.
Roebling's Sons Co., John A.
Wire & Telephone Co. of America.

Wire Connectors
(See Clamps and Connectors.)

Woodwork, Car
(See Vestibules, Doors, etc.)

Woodworking Machinery
American Wood Working Mach. Co.

NEWS OF THE WEEK

CONSTRUCTION NOTES

ENSLEY, ALA.—J. M. Dewberry and associates are asking for franchises for street railway lines in Ensley, and the matter is now in the hands of the Council committees. The Birmingham Railway Light & Power Company has two lines into Ensley from Birmingham, and is to build a third. Besides, the lines run through to Wylam.

MOBILE, ALA.—It is understood a New York company has secured control of the Lighting Company of Mobile. It is reported that J. Howard Wilson, president of the Mobile Light & Railroad Company, is one of the parties interested.

FORT SMITH, ARK.—The Fort Smith Light & Traction Company is to build a bridge across the Arkansas River, so as to extend its lines to Van Buren.

HOXIE, ARK.—The old mule line here is to be converted into a gasoline motor line.

MOUNTAIN HOME, ARK.—The Mountain Home & White River Traction Company has been incorporated to build an interurban railway from the latter place to a point where the Big Creek empties into White River. The capital stock is $25,000, of which $15,000 has been subscribed. The officers are: John J. Geghan, of Yellville, president; W. L. Marshall, of Mountain Home, vice-president.

MURPHYS, CAL.—Announcement is made of the successful financing of a large hydro-electric enterprise, to be developed by the Stanislaus Electric Power Company in the central portion of California. Actual construction has already commenced, and the work will be pushed to completion as fast as possible. The project includes the construction of a power plant on the middle fork of the Stanislaus River at Sublette Crossing, about 6 miles from the town of Murphys, Calaveras County, and the establishment of storage reservoirs at the head waters of the river; a diverting dam near Sand Bar Flat in Tuolumne County; a flume and ditch system 15½ miles long, with a capacity of 300 cu. ft. of water per second; a large equalizing reservoir above the power house site; a system of pipe lines, which will deliver the water to the power house under a head of 1500 ft.; a power station, equipped with water-wheels and electrical apparatus of a capacity of 20,000 kw, and a transmission system which will provide for the distribution of power to a market within a radius of 150 miles of the power house. A pressure-pipe system will also deliver water across the Stanislaus River canyon for distribution in Calaveras County. The proposition is backed by strong interests in Boston, Chicago, New York and San Francisco. Tucker, Anthony & Company, of Boston; Frederick L. Eldridge, first vice-president of the Knickerbocker Trust Company, and C. C. Cuyler, of Cuyler, Morgan & Company, of New York, are syndicate managers. Knickerbocker Trust Company, of New York, is the trustee for the bond issue, which is to be $10,000,000. The engineering and construction work is to be in charge of Sanderson & Porter, engineers, of New York City. The water rights, reservoir sites, timber land and other properties have been acquired by the Stanislaus Electric Power Company from Beach Thompson, of San Francisco, who will be associated with the enterprise. H. P. Vedder and James K. Moffitt, of San Francisco, and Harvey P. Goodman, of Napa, Cal., are also interested.

SAN DIEGO, CAL.—At a recent meeting of the Council an ordinance was adopted accepting the bid of G. M. Hawley for the Adams Avenue franchise. The concurrent resolution offering for sale the street railway franchise, petitioned for by P. B. Moore, which runs from Thirty-Second Street and National Avenue south to the National City boundary, thence east for some distance just north of said boundary, was adopted.

SAN FRANCISCO, CAL.—It is reported that the interests controlling the the San Jose-Los Gatos Interurban Railway will soon incorporate a new company for the purpose of building an electric road from San Jose and Los Gatos to San Mateo. The route of the proposed new road, it is understood, lies some little distance to the west of the Southern Pacific Company's tracks down the peninsula. Coming this way, the road is projected close to the lands recently acquired as a site for the new Jesuit college near Mountain View, will skirt the foothills back of Stanford University, and so on up the peninsula, with spurs or branch lines reaching to all of the important points below San Mateo. The new company will be an adjunct of the San Jose-Los Gatos Interurban Railway, with substantially the same stockholders and directors. This will be interpreted to mean, by those familiar with the ownership and affiliations of the Los Gatos Road, that Southern Pacific interests are behind, or at least friendly to, the new project. The proposed new road will compete with the San Jose & Santa Clara County Electric Railroad Company, which has been brought into existence by Lewis E. Hanchett, John Martin and their associates to take over the rights, franchises and tracks of the Santa Clara Interurban Railroad Company, recently acquired by them, and to build an electric road from Santa Clara up the peninsula through Palo Alto to San Mateo. It is assumed by some that this road will eventually be used by the Southern Pacific as a cut-off to Santa Cruz and for points south for limited trains, cutting out San Jose and Santa Clara.

SAN JOSE, CAL.—Lewis E. Hanchett, John Martin and their associates, who recently took over the properties of the San Jose & Santa Clara Street Railroad Company and the Santa Clara Interurban Railroad Company, have incorporated a new company to be known as the San Jose & Santa Clara County Railroad Company. The interests of the two older companies are to be consolidated in the new corporation, which has a capital stock of $5,000,000, and the new corporation will undertake the electric railway construction heretofore programmed by Mr. Hanchett and Mr. Martin. The incorporators of the new company are: Lewis E. Hanchett, John Martin, Henry Bostwick, Leo. H. Susman and Karl E. Kneiss. Mr. Hanchett has subscribed for $48,000 of stock, and each of the other incorporators $500 each. The new company, according to the articles, will build a road extending from the town of San Mateo through Redwood City, Menlo Park, Palo Alto, Mayfield, Mountain View, Santa Clara and San Jose to Alum Rock Park. Most of this embraces the route over which the Santa Clara Interurban Road planned to build, and for which it obtained considerable rights of way. This company already has something over 1 mile of track in Palo Alto. The present single-track, narrow-gage line to Alum Rock is to be rebuilt and converted into a double-track system.

SAN FRANCISCO, CAL.—City Engineer Woodward has made it necessary to rescind the measure calling for bids for the reconstruction of the Geary Street line by asking for the return of the plans and specifications recently presented by him to the Board of Supervisors. He states that several changes will have to be made in the wording of the specifications, as well as some alterations in the plans themselves. He says that a month will be consumed in making these alterations. Consulting Engineer Stut, who drew the plans, provided for steel in certain parts of the road where the City Engineer thinks cast-iron would be better, and he also planned to have the extension of the same gage as the old Geary Street line, which has worn a quarter of an inch wider than its original gage.

SAN FRANCISCO, CAL.—The Yosemite Short Line Railway, which is backed by the Sierra Railway Company, T. S. Bullock, president, is graded for a distance of 10 miles from its junction with the latter road near Jamestown, Cal. The heavy work has been done on the three largest bridges on the line. The piers are in place for the big bridge over the Tuolumne River at Jacksonville. There has been quite a delay in filling orders for rails in the East. An officer says that the road will be completed in time to handle the tourist travel to the Yosemite Valley next spring. Automobiles, with flanged wheels, operated by gasoline, will be used, carrying from ten to twenty-four passengers each. Steam trains can be used when necessary to carry heavy freight.

SAN FRANCISCO, CAL.—The Ocean Shore Railway Company's plans for an uptown passenger terminal at Twelfth and Mission Streets will include a tall, steel frame and brick building that will be a credit to the city. The lower floors will be occupied as a modern passenger station that will compare well with the central passenger station of the Huntington Electric Railway system in Los Angeles. A half block, 275 ft. x 550 ft., will be occupied by the building, tracks and train sheds. Owing to private right of way being used largely, rapid time can be made, and the distance from the Army Street terminal to Twelfth and Mission will be covered in nine minutes. The Southern Pacific tracks and Channel Street will be crossed by an overhead structure of steel at least 600 ft. long. Eight miles of track have been completed, extending north from Santa Cruz. Nearly 2 miles of track have been built from the Ocean View base, reaching to the second trestle. A telegraph system now connects the city offices with the construction work around the city.

SAN RAFAEL, CAL.—The Marin Terminal Railroad has asked for a franchise for an overhead trolley system through the city over Fourth Street to the western end of the city. From the station to the terminus of the line is 4½ miles, and a ten-minute service will be established if the franchise is granted.

NEW HAVEN, CONN.—The building of the longest electric railway in New England has begun by the construction of a line between Norwich and Worcester by the New York, New Haven & Hartford Railroad. The line will parallel the railroad between these points.

WILLIMANTIC, CONN.—First Vice-President Townley and General Manager Punderford, of the Consolidated Railway Company, were in Willimantic a few days ago with the end in view of looking into the advisability of extending the Willimantic Traction Company's line, owned by the Consolidated Railway Company, from this city at the cemetery to South Coventry. They made no announcement while here as to the prospect of the road being built.

BELLEVILLE, ILL.—The East St. Louis & Suburban Railway Company has notified its Belleville patrons that it will place the Walnut Street power house in East St. Louis, which was formerly used for the East St. Louis city line, into commission for the winter, in order to give better service.

HIGHWOOD, ILL.—The Chicago & Milwaukee Electric Railway Company has just made preparations for extensive additions to its equipment. This road already has in operation sixteen cars with four-motor, 65-hp equipments and Sprague-General Electric type M control, and has ordered two four-motor, 75-hp equipments, with type M control, and ten General Electric air-brake equipments. The station apparatus included in the plans for extension consist of two 3000-kw and one 1000-kw, 13,200-volt Curtis turbine generators, and four 500-kw rotary converters with transformers, switchboards and accessories. The rotaries, etc., are for installation in sub-stations located at Racine, State Line and Highwood. All the additional apparatus has been ordered from the General Electric Company.

SPRINGFIELD, ILL.—The Secretary of State has licensed the incorporation of the Peru, LaSalle & Deer Park Railroad Company, with a capital stock of $100,000. The principal office will be in Peru. The line to be constructed is from Peru to Deer Park. The incorporators and first board of directors are: Thomas F. Noon, Chales F. Neureuther and Patrick T. Keegan, of Peru, and Winfield S. Clow and E. H. Wolf, of LaSalle.

AUBURN, IND.—The Toledo & Chicago Traction Company has completed its line from Fort Wayne to this city, with the exception of the crossing over the Baltimore & Ohio Railway tracks. Here the contractor meets with a temporary restraining order, and must wait the fight in the courts. The power house is almost completed and machinery placed.

BLUFFTON, IND.—The traction line building from Fort Wayne to Bluffton by the same interests that control the Fort Wayne & Wabash Valley is practically completed into Bluffton. Rails are all laid and the overhead work almost completed. The completion of the steel bridge over the Wabash is likely to retard the putting of the road in operation until Jan. 15.

FORT WAYNE, IND.—The Fort Wayne Construction Company has secured the contract to build a large power house for the Cincinnati Northern Traction Company at Lindenwald, and has begun work.

INDIANAPOLIS, IND.—The Capital Circuit Traction Company, of this city, has incorporated to build an interurban railway between the cities of Greensburgh, Greenville, Noblesville, Lebanon, Danville, Martinsville, Franklin and Shelbyville. Each of these cities is about 25 miles out from Indianapolis, and the line will encircle the Capital City, connecting with interurban lines that run into the city. The initial capital is $25,000. Charles E. Averill, A. R. Tucker, I. W. Trotter and James M. Crabb, incorporators.

INDIANAPOLIS, IND.—Chas. N. Wilson, president of the American Engineering Company, with offices in the Traction Terminal Building, announces that on his recent trip to New York he disposed of the bonds of the Huntington, Columbus City & Northwestern Traction Company, for the building of which the American Engineering Company has the contract. While in the East, Mr. Wilson established an office for the American Company at 52 Broadway, New York, in charge of F. T. Neeley.

RUSHVILLE, IND.—The Indianapolis & Cincinnati Traction Company is building a spacious freight and express depot in this place, with side tracks on either side. The building is 30 ft. x 110 ft., and will contain a large room for the employees.

SHELBYVILLE, IND.—The power house, boilers, engines and electrical equipment of the Shelbyville division of the I. & C. Traction Company are offered for sale by Mr. Henry for $25,000. The line will now be operated by power secured from the Rushville power house.

TERRE HAUTE, IND.—The Cummings Car Company, of this city, is building six cars for the Terre Haute & Sullivan Electric Railway, each 51 ft. 6 ins. long, and equipping them with four 75-hp motors.

BARTLESVILLE, KAN.—Papers giving legal existence to the Bartlesville Interurban Railroad Company have been prepared for filing with the Clerk of the proper court, and further proceedings under an act of Congress soon will be undertaken for the purpose of constructing an electric line to connect all of the towns of the oil field with this city. The officers of the company are: Wm. Higgins, president; James M. Specht, of Dewey, vice-president; G. F. Woodring, secretary and treasurer.

HUTCHINSON, KAN.—The City Council has passed an ordinance giving a franchise to Emerson Carey, K. E. Sentney, C. H. McBurney, A. W. Smith, C. M. Williams and J. S. George, their successors and assigns, representing the new local company organized to build an electric railway here. The franchise is for fifty years, and the ordinance authorizes the company to engage in the making of gas and electricity for public use. The franchise for the latter is for a term of twenty years.

IOLA, KAN.—L. F. Mitchell, treasurer of the Commonwealth Trust Company, capitalist and president of the Iola Electric Railroad Company, says that he, together with Paul Fuse, another capitalist and stockholder in the Iola Electric Railroad Company, is ready to supply the money needed to build the Kansas Southern Electric Railroad from Iola to Humboldt as soon as local people show their faith and their good will by subscribing to $25,000 of the stock of the Kansas Southern.

IOLA, KAN.—By the action of the directors of the Iola Electric Railroad, at a meeting held at their offices in the Northrop Building, the executive work of the railroad hereafter will be transacted at St. Louis, under President Mitchell's supervision. The office in Iola will be abolished altogether the first of the year. The superintendent's office will be at the power house. L. Messingale, it is practically settled, will be the local superintendent in charge. The formal transfer of the road from the receiver, O. J. Peterson, has already occurred.

SABETHA, KAN.—A company has been organized, charter taken out and survey made to build a railway from Falls City, Neb., by way of Sycamore Mineral Springs, Brown County, Kan., to Sabetha, Nemaha County, Kan., a distance of about 18 miles. It is to be a standard-gage road, and the purpose of the company is to use steam, electricity or gasoline for power. The present plan is to build from Falls City to Sabetha, by way of Sycamore Mineral Springs, but the charter calls for an extension north from Falls City, and southeast from Sabetha to Topeka, Kan., and west and south from Sycamore Mineral Springs to the east line of Colorado. E. V. Kauffman, Sabetha, Kan., first vice-president.

HOPKINSVILLE, KY.—Surveys are being made here for street railways for which a company headed by John Bell has a franchise.

ALGIERS, LA.—The Algiers Railway & Lighting Company has let a contract to build a line from Gretna to Algiers, 4 miles, to the New Orleans Engineering Company, of New Orleans.

BALTIMORE, MD.—Three electric railway companies, to operate on the eastern shore of Maryland, have been incorporated, with aggregate capital of $300,000. The companies are: Easton & Cambridge, Peninsula Traction Company, and the Bay Hundred Traction Company.

FREDERICK, MD.—James E. Ingram, Jr., of Baltimore, president of the Baltimore & Frederick Electric Railway Company, and also president of the Frederick & Middletown Electric Railroad Company, together with J. Roger McSherry, of Frederick, also an official of the two companies, held a conference here a few days ago with William W. Churchill, one of the vice-presidents of the Westinghouse, Church, Kerr & Company, of New York. After the conference, which related to the building of the proposed electric railway between Frederick and Baltimore, it was stated that while no definite time had been fixed for commencing the construction of the road, it was expected that work would begin early next year. Since the Baltimore-Frederick Railway project was started it has been enlarged so as to include the extension of the line to Hagerstown. The Westinghouse Company, it is stated, has charge of the engineering of the project and the surveying corps, under the direction of S. L. Dodge, which has been at work in Frederick County since early last summer, is in its employ. This corps made several surveys between Frederick and Hagerstown, the details of which are now being worked out at the corps' headquarters in Frederick. The survey between Frederick and Baltimore was made a couple of years ago, and the promoters of the project, by the purchase of the railway between Frederick and Middletown, are already in possession of an 8-mile link of the proposed road.

ANN ARBOR, MICH.—On account of the lack of available funds, the work on the electric line between this city and Toledo has ceased. It is said that already between $400,000 and $500,000 have been spent on the new line and that the roadbed has been practically made between Ann Arbor and Toledo, with perhaps the exception of about 5 miles.

DETROIT, MICH.—The Detroit-Bay City Traction Company reports that it has the grading practically completed upon that portion of its line from Saginaw to Quinacassee City, a distance of about 10 miles, and that all the necessary material for the completion of that part of the line has been purchased, and that it will be completed within a short time.

DETROIT, MICH.—An application has been made for the appointment of a receiver for the Detroit, Saginaw & Flint Railway Company, which was organized a number of years ago for the purpose of building a line from Saginaw to Detroit via Flint, and has built and is operating a portion of its line from Saginaw to Frankenmuth, a distance of about 14 miles.

DETROIT, MICH.—At a special meeting of the Detroit, Ypsilanti, Ann Arbor & Jackson Railway Company, held Dec. 11, W. A. Comstock, of Alpena, and Henry A. Haigh, of Detroit, were elected members of the board of directors. Both of these gentlemen are members of the Haigh-Comstock-Walker Company, which built the Syracuse & Eastern, sold later to an Eastern company, generally understood to be in the interest of the New York Central. Mr. Haigh was also interested with S. F. Angus in the building of the Fremont & Norwalk line which was sold to the Lake Shore Electric.

GRAND RAPIDS, MICH.—A company has been organized in this city under the name of the Lamont, Titusville & Grand Rapids Construction Company for the purpose of doing the preliminary work toward securing an electric line between Lamont, Mich., and Titusville, a town on the Muskegon Interurban. The stockholders of the company are all residents of Lamont, and own practically all the right of way between Lamont and Titusville. The company, it is said, does not intend to operate the road, or even lay rails, but will simply put the road-bed in condition for construction work. The company is capitalized at $10,000, and the following are the officers: Colon C. Lilly, president; Willard F. Walling, vice-president; B. Rice, secretary; Wilber Stoddard, treasurer; John Burdick, William S. Nichols, Edward Sherwood, John Scanlon and Herman Olker, directors.

KALAMAZOO, MICH.—Ties and rails have arrived for the city tracks of the electric line to South Haven. The company, failing to secure a new franchise for other streets, without paying a heavy franchise fee, will come in under the franchise originally granted.

KALAMAZOO, MICH.—The Kalamazoo, Lake Shore & Chicago Traction Company reports that it has purchased a large engine and two cars, and will commence the running of cars between Kalamazoo and Paw Paw early in the month of January. The road is not completed, but the steel and ties are all received and distributed along the line, and, as the track is being laid at the rate of a mile a day, it is believed that it can be done. The distance is about 22 miles.

LANSING, MICH.—The new belt line around the northern part of the city has been officially opened by the Lansing & Suburban Traction Company.

NILES, MICH.—The new power house of the South Bend & Southern Michigan Electric Railway is in operation. The plant, which was erected at a cost of about $30,000, including the building and machinery, is practically completed now. It is located at Scotdale, about 20 miles north of Niles. Power will be transmitted into this city, connected with the power from South Bend, and will be sufficient to carry the large cars which will be operated on the line north of Niles.

LONG BEACH, MISS.—The Town Council, at its regular monthly meeting, granted the franchise of all the streets of the town of Long Beach to the Gulfport & Mississippi Coast Traction Company for twenty-five years.

JOPLIN, MO.—A franchise has been granted to W. H. Mitchell, of New York, and Wm. S. Brawner, of St. Louis, to build a street railway through the city. The proposed line is to be 100 miles in length, and will have its beginning in Joplin, and, after making a circuitous route through the country southeast of Joplin, will terminate at this place. The cost of building the road is estimated at $2,000,000. The line will be operated with gasoline motor cars.

KANSAS CITY, MO.—The turbine installed in the Grand Avenue plant of the Metropolitan Street Railway Company has been placed in operation.

ST. LOUIS, MO.—The United Railways of St. Louis is making extensive additions to its system, including five 1000-kw and three 500-kw rotary converters and a bank of six-phase air-blast transformers for each group of converters. The transformers are 1100-kw and 550-kw in size, and are to have 6600-volt primary, with 430-volt secondary, windings. The entire equipment is ordered from the General Electric Company.

CAMDEN, N. J.—The New York-Philadelphia Company has sent out specifications to contractors for the construction of 9 miles of electric railway from Milltown westward to a point south of Metuchen. The contract will be awarded within a few weeks. The company is the holding corporation of the Consolidated Street Railway lines between Camden and Jersey City, and it is its purpose to build an "air-line" electric road from Elizabeth to Camden by way of Trenton. The first 3 miles of the new road westward from Elizabeth are nearing completion, and the section between Metuchen and New Brunswick will be placed under contract as soon as the second section is under way. The company declines to discuss its plans for a better service between Camden and Trenton, but it is understood an entirely new line will be constructed through a private right of way already obtained. The present line will be used for local service.

PHILLIPSBURG, N. J.—The Easton Transit Company has refused to accept the franchise granted by the Phillipsburg Common Council, giving the Phillipsburg Horse Car Railroad Company the right to extend its tracks to the new Ingersoll-Sergeant Drill Works, northeast of Phillipsburg. The ordinance is said to have been the lengthiest ever passed in the State, and it bristled with obscure features, the traction company's counsel said. It is not known whether the company will endeavor to secure a more favorable franchise or let the matter drop for the present.

SERGEANTSVILLE, N. J.—So anxious are the farmers of this district for an electric railway between Lambertville or Stockton and Flemington via Sandy Ridge, Sergeantsville and Sand Brook that they propose to secure rights of way and later assign them to railroad people who are interested in the movement. If the road is built it will connect with the Jersey Central, Lehigh Valley and Pennsylvania Railroads at Flemington; the Pennsylvania, at Stockton; the Trenton, Newhope & Lambertville Street Railway and the Pennsylvania Railroad at Lambertville, as well as convenient connections with the Philadelphia & Reading Railway at Newhope, Pa. The road would carry freight, and would afford service to a section of country now largely without railroad facilities. Sergeantsville, while 3 miles from the nearest railroad station (Stockton), is a busy little commercial center, and, with the advent of a railroad, will be the center for the trade of Delaware Township, drawing from Sandy Ridge, Sand Brook, Locktown, Idell, Kingwood, Rosemont and intermediate points. The route would partially follow the old Delaware & Flemington Railroad route (this was surveyed in 1868 and 1871, but never built), and there would be no noteworthy engineering features between Stockton and Flemington. Aside from one 70-ft. span, the bridges would be but little more than culverts, and the cutting and filling would be light. Private right of way would be used. The grades could easily be kept within 1.25 per cent by developing the line slightly where it rises out of the Wichcheoke Valley to Sergeantsville.

TRENTON, N. J.—The Trenton, Lakewood & Atlantic Railroad Company has filed an increase of capital stock from $1,000,000 to $12,500,000, but no reasons are given for such increase. It is understood, however, that there is a probability of this company taking over the Atlantic Coast Line Electric Railway and making the latter a feeder to the new road which it has been proposed to build from this city to Asbury Park or Point Pleasant. The Trenton, Lakewood & Atlantic Railroad Company has a steam railroad charter, secured more than two years ago, and a little work was done in the way of grading between Lakewood and Point Pleasnt, but nothing was done on this end of the line. George C. Vanderbilt, a lawyer of this city, is president of the company, and the directorate is made up largely of Trentonians. A separate scheme has also been on foot to build an electric railway from some point on the Camden & Trenton Railway, between this city and Bordentown, to Asbury Park, but no charter has been taken as yet.

FAIRPORT, N. Y.—The State Canal Board, on Dec. 19, granted the application of the Rochester, Syracuse & Eastern Railway Company (Thos. H. Mather, chief engineer, Syracuse) to construct and operate a double-track railway across Erie Canal in Fairport

GLENS FALLS, N. Y.—The Hudson River Power Company has ordered additional apparatus for installation in connection with the three Curtis steam turbo-generators already contracted for. In the generating station will be installed three 670-kw and one 350-kw, water-cooled transformers with 60,000-volt primary and 23,000-volt secondary, with switchboard, for same, in addition to a 100-kw motor-driven exciter and a 100-kw marine type exciter set. Sub-station apparatus consisting of three 600-kw, 40-cycle rotary converters with three water-cooled step-down transformers and switchboard will be installed in the generating station. There will also be three sub-stations each containing two 300-kw, 40-cycle rotary converters, with 60,000-volt, oil-cooled step-down transformers and switchboard. This installation is to be furnished by the General Electric Company, and will supply necessary power for the operation of the Utica & Mohawk Valley Railroad, an interurban line about 26 miles in length.

NEW YORK, N. Y.—At a meeting of the board of directors of the New York, Westchester & Boston, Frederick Hall Bull, of the firm of Edward Sweet & Company, was elected a director and vice-president of the company. A report was made showing the rapid progress in the construction of the work. A very large percentage of the grading within the city limits has been completed and the stone abuttments for the bridge are well under way. The report was made to the board that a satisfactory franchise has been granted by the city of Mount Vernon and a right of way secured through that city, and that the other cities along the line of the road have notified the company that satisfactory franchises will be given them upon application.

NIAGARA FALLS, N. Y.—The International Railway Company has commenced the operation of cars over crosstown tracks laid through Eighteenth and Nineteenth Streets, between Ontario Avenue and Niagara Street, and it has extended the line of the old Whirlpool & Northern Company past the Devil's Hole to the cut of the New York Central Railroad, an extension to Riverdale Cemetery, further north in the town of Lewiston, being contemplated in the spring.

WINSTON-SALEM, N. C.—The Fries Manufacturing & Power Company has secured a permit from City Engineer R. P. Henry for the building of a street car line from the corner of Main and Fourth Streets to Grace M. E. Church, East Winston. Capt. Henry has been engaged to make a survey of the new line, which will run on Fourth Street, as soon as the weather is favorable for this work. It is understood that it is the intention of the Fries Company to begin work on the new extension next spring, or before if the weather will permit.

DELAWARE, OHIO.—Prominent business men recently acted as an intermedium between the City Council and the Columbus, Delaware & Marion Railway, and settled up a number of long-standing differences between the two parties. The company withdrew its suit against the city and the city revoked an ordinance passed a short time ago rescinding the company's franchise. The company will be permitted to lay a desired spur and to string high-tension wire through the town.

LORAIN, OHIO.—The Lorain Street Railway Company is installing two 400-kw Westinghouse rotary converters in its South Lorain power station. These will be supplied with current from the Beach Park power station of the Lake Shore Electric Railway, and will operate the Lorain-Elyria line, as well as the new Avon Beach & Southern line, the new branch of the Lake Shore Electric extending from Avon Beach to South Lorain. This will he opened next week, and cars will be operated through on hourly headway from Cleveland to South Lorain and Elyria.

HOOD RIVER, ORE.—H. G. Peets, of Pasadena, is president of a company capitalized at $50,000, which will put in an electric railway from White Salmon to Trout Lake. Power will be developed on the White Salmon River.

PORTLAND, ORE.—W. T. Muir, secretary of the Oregon Water Power & Railway Company, has filed a resolution with County Clerk Fields, adapted by the company at a meeting held a few days ago, when the company's officers decided to build a branch line connecting with the main line at Cedarville and extending in a general northerly and easterly direction by way of the towns of Fairview and Troutdale, to a point on the Columbia River and opposite the town of Troutdale.

ALLENTOWN, PA.—The contract placed recently by the Lehigh Valley Traction Company with the General Electric Company is for additional station apparatus, which indicates extensive increase in capacity. It includes two 2000-kw, 13,200-volt, 25-cycle; one 1000-kw and one 500-kw, 2300-volt, 60-cycle Curtis turbine generators for generating equipment, and a transforming outfit consisting of twenty-seven 110-kw and two 330-kw, 13,200-volt, air-blast transformers, and eleven 300-kw, three-phase, 25-cycle rotary converters.

AVONDALE, PA.—The Oxford, West Grove & Avondale Electric Railway has won a victory over the Pomeroy & Newark Railroad, insomuch as the Pennsylvania Railroad Company, lessees of the Pomeroy & Newark Railroad, have agreed to the construction of a bridge over its tracks at Baker station, near this borough. This will do away with the only serious obstacle to the completion of the line between Avondale and Oxford. The construction work is being pushed steadily.

PHILADELPHIA, PA.—The new plans for the Philadelphia Rapid Transit Subway loop around City Hall have been approved by Mayor Weaver and Chief Webster, of the Survey Bureau.

POTTSVILLE, PA.—A syndicate of Schuylkill County capitalists is being formed to build an electric railway between Pottsville, Minersville, Lytle, Forestville, Branchdale and intervening points, to connect with the traction lines north of the Broad Mountain and on into Scranton. The road will furnish through electric railway connections between Philadelphia and Mauch Chunk.

YORK, PA.—Plans for a complete electric railway from this city to Harrisburg were completed with the filing of specifications of extensions by the Lewisberry & Strinestown Trolley Company. The above company's recent extension provides for the building of a line from Lewisberry, this county, through Fairview Township to New Cumberland, Cumberland County, along the river, above Goldsboro, from which place the company's lines begin which will run into the capital city. The plans for the extension filed a few days ago are a continuation of the extension filed in the Recorder's office some time ago, in which it is proposed to build from this city via North Duke Street over the Old Board Road to Strinestown and thence to Lewisberry. The company, which has laid plans to complete the trolley facilities from this city to Harrisburg, is headed by David Pepper, Jr., and has offices in Philadelphia. The route as laid out by the above company would make the distance about 32 miles from York to Harrisburg. The Northern Central Railroad's measurement is 28 miles. The plans for the extension from Lewisberry to New Cumberland were agreed on Dec. 9.

WILKESBARRE, PA.—The Wilkesbarre & Hazleton Railroad contemplates extending its tracks from Ashley to Wilkesbarre, a distance of about 3 miles, and building a terminal in that city.

KNOXVILLE, TENN.—The officials and directors of the proposed electric railway which is to join Knoxville and Maryville compose some of the foremost business and professional men of the two cities. President Walter S. Nash is a physician and surgeon. Robert Vestal, the first vice-president, is treasurer of the Vestal Lumber & Manufacturing Company. J. Cal Sterchi, the second vice-president, is at the head of the Cumberland Furniture Company and very prominently identified with the Board of Trade, being its president. Jos. Gaut, treasurer, is president of the Holsten National Bank. W. T. Parkham is president of Riverside Woolen Mills. John Burger is president of the Bank of Maryville and closely allied with all the interests of a public nature of that growing city. Other gentlemen connected with the company reside in Cincinnati and Louisville. It is the purpose of the promoters of the new road to break dirt within ninety days after franchise rights are secured.

MEMPHIS, TENN.—The Memphis Street Railway Extension Company has recently ordered additional equipment from the General Electric Company in the shape of thirty-five four-motor, 50-hp equipments, with K 14 controllers, and a 60-kw motor-generator set for operating on 500-volt circuit and supplying 125 volts.

MEMPHIS, TENN.—The Memphis Street Railway Company has filed an amendment to its charter permitting it to embrace in old charter the control of a new extension, now operated under a separate franchise. The company will increase its capital stock from $500,000 to $5,000,000. The new charter will permit the company to build the new extensions and routes under the provisions of the charter granted to the Memphis Street Railroad Extension Company, a corporation owned and controlled by the Memphis Street Railway Company, but operating under a separate franchise. The application for a charter was signed by several Memphis stockholders and directors and by the visiting members of the syndicate. The incorporators are: W. R. Mallory, W. B. Rogers, Henry P. Dart, T. H. Tutwiler, W. B. Brockway, T. M. Meiklehan, John H. Watkins, E. E. Vreeland, W. B. Yereance, J. R. Pepper and J H. Thompson.

KNOXVILLE, TENN.—The announcement has been made by President Charles H. Harvey that the Knoxville Railway & Light Company will at once begin the construction of the electric line to Fountain City.

LA PORTE, TEX.—Prospects are good for La Porte getting the proposed interurban road to be built by Houston capitalists. A. N. McKay and A. O. Blackwell, of Chicago, have been here to confer with certain parties interested in La Porte.

BURLINGTON, VT.—Capitalists interested in electric railways will petition the next session of the Vermont Legislature for a charter for the Champlain Valley Electric Road Company. The route of the proposed line is through Burlington, Shelburne, Charlotte, Ferrisburg, Vergennes, Panton, Addison, Bridgeport, Shoreham and Orwell, with an ultimate outlet at Rutland. This road will be in competition with the Rutland Railroad, and will do a freight as well as a passenger business. Plans are under way to construct an electric railroad from Brattleboro, Vt., to Northfield, Mass., via Hinsdale, N. H. Capitalists have secured an option on a large amount of the stock of the Brattleboro Street Railroad and the Brattleboro Gas Company, and they propose to construct the line the coming season. The road will run from Brattleboro to Hinsdale, thence to Greenfield, and from there to Northfield. The option on the stock of the gas company has been secured because this company controls rights which would furnish abundant power for the proposed line. The Brattleboro line has not been a paynig project. but it is thought that the extension would make it a paying investment.

EVERETT, WASH.—The Seattle-Issaquah Traction & Coal Company has been incorporated by W. H. Goldson, P. J. Farley, John McQuade, E. S. Gill and others. Its stated purpose is to build and operate an electric railway from Renton northward in the general direction of Everett. The company is incorporated for $3,500,000. The line as planned runs to Issaquah from Renton, then northward into Snohomish County, and is designed, besides carrying passenger and other traffic, to carry the output of the Issaquah mines, which the company has purchased, to Everett.

NEWS NOTES

LOS ANGELES, CAL.—The Los Angeles Railway Company has announced an increase in wages as follows, to date from Dec. 6: First six months, 22 cents an hour, which is the present rate; second six months, 22½ cents an hour, which is the present rate; one year to two years, inclusive, 23 cents an hour, an increase of ½ cent per hour over the present rate; three years to five years, inclusive, 24 cents per hour, an increase of 1½ cents an hour, which is the increase on the following: Six years to eight years, inclusive, 25 cents an hour; nine years to eleven years, inclusive, 26 cents an hour; twelve years to fourteen years, inclusive, 27 cents an hour; fifteen years and after, 29 cents an hour. In addition to the increased pay, an addenda to the bulletin says: "All men who were advanced two years in time of service on May 1, 1903, will be allowed said two years' advance on the new schedule in computing time of employment." Practically the new schedule decreases the time required for a substantial advance from five years' to about three years' service.

SAN FRANCISCO, CAL.—In regard to a directors' meeting of the United Railroads on December 13, Patrick Calhoun is quoted as follows: "We talked about various contemplated improvements, but the election of a successor to President Holland was postponed until the end of the year. The fact of the matter is that I have not decided upon Mr. Holland's successor. I thought I would be able to announce the name of the new president of the company before starting home, but I find it will be impossible. I intend to leave for the East at once. Regarding improvements, I can only say that we intend greatly to improve the service on the Sutter Street and Market Street cable systems. The Sutter Street line will be relaid with new rails, the horse-car line on lower Market Street will be converted into a cable line, so as to permit of the operation of Sutter Street cars to the ferry, and the line will be operated with new and modern cars. The service on the Market Street lines will also be greatly improved. As to the details of these improvements, however, I am not prepared to speak at the present time."

NEW HAVEN, CONN.—The Consolidated Express Company, organized by interests identified with the New York, New Haven & Hartford Railroad and the Consolidated Railway Company to operate a trolley express service, is understood to have made overtures for the purchase of the Cole Electric Express Company, now controlling privileges on several of the Consolidated Railway Company's lines.

WARSAW, IND.—Farmers are opposing the placing of the subsidy tax on the tax duplicate which has been voted in this county in aid of interurban railroads. The movement is based upon the recent decision of Judge Artman, of Boone County, in which he held that such a tax was unconstitutional, and that the subsidy law applied only to steam lines, and that the County Commissioners had no right to call an election to vote subsidy tax to an electric interurban road. The Boone County case has never been appealed by the interurban company, and the opposition takes it as grounds upon which they can knock out the tax voted to interurban roads in this county. The plan is to enjoin the Auditor from placing the tax on the duplicate for collection.

MINNEAPOLIS, IND.—The Twin City Rapid Transit Company gave its employees a Christmas surprise by announcing a raise of pay for its motormen and conductors. About 1000 men are interested. The present schedule pays 18 cents per hour during the probationary service of six months, and 20 cents an hour thereafter. The new schedule is 20 cents for the probationary service and 22 cents thereafter.

NEW YORK, N. Y.—The new platform on the north side of the Manhattan end of the Brooklyn Bridge was opened a few mornings ago, with the immediate result that the crowds discharged from the bridge trains during rush hours were divided in two, and their exit was accomplished in almost half the time formerly required. There remains still to be completed the new platform on the south side. When this is opened, the facilities for loading the trains will be increased in just the proportion that the facilities for discharge have been increased.

CLEVELAND, OHIO.—The directors of the Cleveland Electric Railway have raised the wages of more than 2000 motormen and conductors 1 cent an hour. The gross earnings of the company will be $5,300,000 for the present year, a gain of $550,000.

TOLEDO, OHIO.—The Toledo Traction Company's street car houses were made the scene of a typical Western hold-up Dec. 24, when seven heavily armed and masked desperadoes entered the office of the company and, after subduing four watchmen, made futile efforts to dislodge a strong box in a safe where more than $10,000 in gold, silver and paper money was on deposit. They succeeded, however, in getting away with almost $1,000, which was taken from the cash drawer. W. J. Minke, a watchman, who did not comply promptly with the request to throw up his hands, was felled to the floor with a club in the hands of one of the robbers. While making his escape to summon assistance, Richard Powers, a watchman, was shot at several times, but was not hit. Answering Power's call for help, about twenty policemen were driven to the scene, but several minutes previous to their arrival the desperadoes gave up the job and left. Before leaving the premises, however, the bandits engaged in a pistol duel with the watchman, which terminated without injury to any one. Several days ago a fruitless attempt was made upon the safe in the West Toledo Postoffice, and as a result the building was wrecked. The police are of the belief that the same gang that operated at the car houses is responsible for the attempt on the safe in the postoffice.

PHILADELPHIA, PA.—The Trades League of Philadelphia, through its passenger transportation committee, has forwarded a communication to Mayor Johnson, of Cleveland, asking him to set a date, some time after the first of the year, when two members of the committee will discuss the project of building a 3-cent fare line here.

FINANCIAL NOTES

NEW ORLEANS, LA.—The directors of the New Orleans Railway & Light Company have declared a quarterly dividend of 1¼ per cent on the preferred stock, payable Jan. 15. Books close Dec. 30 and reopen Jan. 16. This is the first dividend since the reorganization was effected some time ago.

BOSTON, MASS.—The Lowell & Fitchburg Street Railroad Company has petitioned the Railroad Commissioners to issue $249,000 original capital stock to pay for the construction of its road and equipment.

BOSTON, MASS.—The Railroad Commissioners have authorized the Waltham Street Railway Company to issue $100,000 5 per cent twenty-year bonds to take up the floating debt incurred by construction.

WORCESTER, MASS.—Operations of the Worcester Consolidated Street Railway for the year ended Sept. 30 make this comparative showing:

Year, Sept. 30	1904-05	1903-04
Earnings	$1,379,015	$1,366,441
Expenses	821,679	813,115
Net	$557,335	$523,285
Charges	361,321	344,814
Balance	$196,023	$178,472
Dividends	195,250	177,500
Surplus	$773	$971
Total surplus	324,689	337,015

DETROIT, MICH.—Directors of the Detroit United Railway Company have declared the regular quarterly dividend of 1¼ per cent on the capital stock, payable Feb. 1. Books close Jan. 11 and reopen Feb. 7, covering the annual meeting on Feb. 6.

CLEVELAND, OHIO.—Henry A. Everett, president of the Toledo Railways & Light Company, denies that there is any truth in the report published in Toledo that the so-called Widener-Elkins syndicate is negotiating for the property. Mr. Everett says the property is not for sale.

AMONG THE MANUFACTURERS

WILLIAM HENRY EDGAR, president and founder of the Dearborn Drug & Chemical Works, is dead.

THE ALLIS-CHALMERS COMPANY announces bulletin No. 1022 describing the construction and uses of its Reliance friction clutch pulley.

WM. D. GHERKY, manufacturer of the Voynow sleeve for metal poles, has removed to the Heed Building, 1211-1215 Filbert Street, Philadelphia, Pa.

ALBERT & J. M. ANDERSON MANUFACTURING COMPANY, of Boston, has appointed J. H. Ashby as selling agent for its line material at New Orleans.

THE KUHLMAN CAR COMPANY, of Cleveland, is building 150 cars for the International Railway Company, of Buffalo. They will be 32 ft. long, have cross seats, and will be mounted on Brill short wheel-base trucks.

THE POWER & MINING MACHINERY COMPANY announces that Robert T. Lozier has been appointed district sales manager of its gas machinery department, handling American-Crossley engines, American-Crossley producers and Loomis-Pettibone gas generators, with headquarters at 52 William Street, New York.

THE VALUE OF THE INTER-POLE MOTOR for general machine-tool work is graphically demonstrated in the new bulletin, No. 18, on motor drive, sent out by the Electro-Dynamic Company, of Bayonne, N. J. Applications are shown of inter-pole motors to milling machines, lathes, centrifugal pumps, electroplating equipments, etc.

THE ALLIS-CHALMERS COMPANY has just published bulletin No. 1046, on Bullock multipolar motors and generators, types "H" and "HI." In addition to brief illustrated descriptions of the features of construction, the bulletin also contains tables of the sizes, ratings, weights, standard pulleys, etc., of these motors and generators.

"ALL ABOUT BABBITT METALS" is the title of a booklet just published by the New Era Manufacturing Company, of Kalamazoo, Mich., which it is mailing free to interested parties. The subject is handled in a comprehensive manner, and the booklet contains much information of practical value and interest to users of babbitt metals.

N. W. HARRIS & COMPANY are offering to investors $400,000 Newark Passenger Railway Company first mortgage 5 per cent bonds, due July 1, 1930. In addition to being secured by a first mortgage on all the property and perpetual franchises of the company the bonds are guaranteed, both principal and interest, by the Consolidated Traction Company.

F. M. FARMER, of the Electrical Testing Laboratories, is now at the Westinghouse Works at East Pittsburg, Pa., conducting acceptance tests on a large order of electrical apparatus, including two 1500-kw generators, nine 1000-kw transformers, rotary converters, smaller transformers, etc., for the Grand Rapids-Muskegon Water Power Electric Company, of Grand Rapids, Mich.

AFTER JAN. 1, 1906, Semon, Bache & Co., the well-known car window glass and mirror makers, will be located in their new eleven-story fireproof building on West, Hubert and Washington Streets, New York. The company will have a clear space of 28,000 ft. on each floor, and a first-class electrical equipment will be installed in connection with the companuy's other machinery.

THE PAST FEW MONTHS have been exceptionally busy ones for the shops of the American Blower Company, at Detroit, Mich. The company reports that its books show outfits for heating and ventilating some fifty schools and other public buildings, between thirty and forty manufacturing buildings, and a large number of dryers for brick, lumber and other materials. It is also doing a large business in the installation of mechanical-draft plants.

THE INTERNATIONAL RAILWAY COMPANY, of Buffalo, N. Y., has ordered 100 cars of the Stephenson semi-convertible type from the J. G. Brill Company. These cars are to measure 32 ft. 5 ins. over the body, and 45 ft. 9 ins. over all. They are to be nearly identical to the recent type furnished to the Chicago City Railway Company by the J. G. Brill Company and the American Car Company. The former company built 125 of these cars, and the latter 75 for the Chicago City Railway Company, and an order for an additional 100 cars was mentioned recently in these columns.

THE ABNER DOBLE COMPANY, of San Francisco, has just printed bulletin No. 7 on the hydraulic specialties made by this company. Among these are tangential water wheels, needle regulating nozzles, ellipsoidal buckets, high-speed, ring-oiling bearings and auxiliary contrivances. The operating principles and construction of all of these devices are explained in detail, and descriptions are given of several large water-power plants installed by this company. A particularly valuable feature to the hydraulic engineer is the large amount of data included relating to this branch of engineering.

CHAS. F. JOHNSON, of Buffalo, N. Y., who recently sold to the Cleveland & Southwestern Traction Company five 51-ft. interurban cars made on his own order by the Niles Car & Manufacturing Company, of Niles, Mich., is now offering for sale thirty interurban cars, painted to buyer's order. He is conducting a very large business along these lines, purchasing old equipments from electric railway companies and selling new rolling stock on favorable terms.

THE NEW SINGLE-PHASE BULLETIN, No. 1127, issued by the Westinghouse Electric & Manufacturing Company, is sure to attract a great deal of interest among railway men, especially on account of the prominent work done by this company in developing the single-phase railway system to its present commercial efficiency. In this publication, attention is called to the apparent superiority of single-phase current under certain conditions, and a concise description is given of some of the single-phase control and trolley apparatus which has been devised to meet the radical change in the operating current

THE AMERICAN ENGINEERING COMPANY, of Indianapolis, has just issued a pamphlet descriptive of the different departments of its business, which includes financing, engineering and contracting. In the latter, the company has attracted considerable attention on account of its policy of taking contracts on the basis of cost plus a fixed sum for superintendence. This plan the company believes is the one which is most satisfactory to both owner and contractor. The pamphlet also contains views of the different offices of the company, some of the work undertaken by it and an outline map of Indiana, showing the interurban electric railways in the State.

THE CROCKER-WHEELER COMPANY, of Ampere, N. J., in reviewing its work during last year, says that 1905 marked its successful entrance into the field of alternating-current manufacture. After seventeen years' experience in the direct-current field (in which the company holds an enviable position), it entered the market with a complete line of alternating-current generators, motors, transformers, etc. In a short time, still holding its place in the direct-current field, the Crocker-Wheeler Company has established itself in the front rank of alternating-current manufacturers. An example of its work in this line is shown on a small card calendar for January, February and March, which the company is sending out with the compliments of the season.

THE NEWTON MACHINE TOOL WORKS, of Philadelphia, Pa., have prepared a new bulletin on their plain milling machines. These are made of one general design in varying sizes from 30 ins. to 72 ins., inclusive, and are built with one wide and one narrow upright, the wide upright taking the strain of the drive. The cross rail is counterweighted, and has hand and power movement in both directions. The publication also shows a combined horizontal and vertical spindle milling machine, on which the spindles may be operated either independently or simultaneously, together with the smaller sizes of plain milling machines, and some machines adapted to special requirements. In addition to the type of machines shown, the works build a large line of vertical and duplex milling machines and vertical slabbing machines.

THE ROBERTS & ABBOTT COMPANY, consulting engineers, of Cleveland, Ohio, and Baltimore, Md., who have been engaged as consulting and supervising engineers on the Cleveland, Ashland & Mansfield Railway, are making a great effort to finish up the civil engineering work on this railway before the winter closes in. They have at the present time four complete surveying corps in the field and a large drafting office located on the work, so that the plotting of the results of the corps can be kept even with the work in the field, and any necessary changes which the calculations necessitate can be made immediately. Borings are being made in all the hills to determine the location of rock, in order that very exact estimates may be made of the cost of construction. Electric power for operation will be purchased from an existing power house.

THE GENERAL ELECTRIC COMPANY announces the following list of new bulletins: No. 4423, 1150-volt and 2300-volt alternating-current switchboard panels designed for medium and small capacity central stations, and having the instruments connected directly to the high-tension circuit; No. 4424, on Edison incandescent lamps for stereopticons, magic lanterns, projectors, headlights, etc.; No. 4425, on 4500-volt oil break switches, type F, form K3; No. 4426, on CL-B slow and moderate-speed belt-driven direct-current generators built in capacities from 16 kw to 150 kw, and No. 4427, on the type MC governor for electrically driven air compressors, which was described in the STREET RAILWAY JOURNAL of Oct. 21, on page 783. In addition to the foregoing, the company has also issued supply catalogue No. 7592, on parts of MR circuit breakers, and price list No. 5142, on Thomson recording wattmeters.

THE STANDARD UNDERGROUND CABLE COMPANY has leased the exclusive use of an all-copper line to connect its general office and factories at Pittsburg, branch offices at New York and Philadelphia and its Eastern factories at Perth Amboy. This private line will be available for either telegraph or telephone service. There could be no better evidence of the large aggregate volume of business and the growing condition of this important manufacturing company, for so far as known this will be the longest exclusive wire owned or operated by any company confining itself to the manufacture of copper wire and cables. The service will be in effect Jan. 1, 1906, and while, without doubt, of great convenience and value to the company in facilitating communication between its offices and factories and the important market centers of New York, Philadelphia and Pittsburg, it is installed primarily to enable it to place itself in closer touch with its customers and to give these customers the same quick service that would be possible if its general offices were located in each of these cities instead of in one.

A CONTRACT recently closed by the Electric Storage Battery Company with the Spokane & Inland Railway Company, Spokane, Wash., forcibly illustrates the flexibility of the storage battery and its adaptability to meet special conditions. In this instance the battery is installed to regulate the fluctuation of a single-phase railway load. Power is purchased as three-phase, 60-cycle current from the Washington Water Power Company on the maximum-demand basis, and delivered through motor generator sets to the single-phase line. Each motor generator set will be provided with a d. c. machine mounted on the same shaft and connected to the terminals of the battery circuit. The battery charge and discharge will be affected by two boosters in the battery circuit operating in parallel with each other, each having a capacity equal to one-half the maximum output of the battery. These boosters will be controlled by the Electric Storage Battery Company's carbon regulator, which in this case will be made responsive to fluctuations of the a. c. supply, thus causing the battery to keep those fluctuations within narrow limits.

FIRST MORTGAGE 5 per cent 25-year gold bonds of the Pittsburg Railway & Light Company, of Pittsburg, Kan., dated April 1, 1905, due April 1, 1930, interest payable Oct. 1 and April 1, in New York, trustee, Lincoln Trust Company, New York, are offered for subscription; total authorized issue, $600,000. The Pittsburg Railway & Light Company was organized with a capital stock of $600,000 for the purpose of acquiring by purchase the property, rights and franchises of the Pittsburg Railroad Company, a company which owned and had for some years been operating an electric railway in the city of Pittsburg, Kan., and to the suburban coal mining towns of Frantenac and Chicopee, and the Pittsburg Light & Power Company, a company engaged in the manufacture and sale of electric light and power in the city of Pittsburg. The properties of these two companies were acquired by the Pittsburg Railway & Light Company on July 1, 1905. This property consisted of 12½ miles of electric railway, extending from the city of Frontenac, population 3000, which lies 3 miles north of the city of Pittsburg, south through the city of Pittsburg to the town of Chicopee, population 1500, which lies 4 miles southwest of Pittsburg. Adjacent to Chicopee, however, are the large coal mining settlements of Cambria, Klondike, Fleming, Little Italy and Camp No. 15, which have a population aggregating 5000. In addition to this in the region northeast from Frontenac to the north end of the interurban line are the coal mining towns of Midway, Cornell, Yale and other mining camps, having a population of over 5000.

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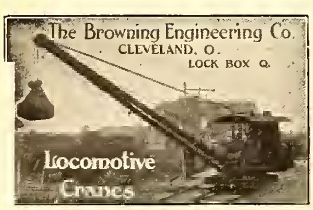

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Do not depend on railroads for carrying your coal at this time.
We have Hopper and Flat Bottom Gondola Cars, 50,000 to 60,000 pounds.
We can sell in lots to suit at moderate prices.
Have you anything to dispose of ?

34 and 36 Wall Street New York — THE MALES CO. — 713 Traction Bldg. Cincinnati, O.

POSITIONS VACANT

For advertisements under this heading the rate is $1.00 per insertion for 50 words or less, payable in advance; additional words 2 cents each.

WANTED—First-class wood-working machine shop foreman, thoroughly familiar with car building, and entirely capable of handling men; state age and experience, wages wanted, and give references. Address No. "538," care STREET RAILWAY JOURNAL.

SALES AGENCIES WANTED

for track devices for steam and electric lines by an established house in Chicago. Address "No. 529," care STREET RAILWAY JOURNAL.

Hyde Brothers & Company

904 Empire Building, Pittsburgh, Pa.

WILL BUY OR SELL

RAILS

RELAYING AND NEW

ALL SECTIONS—LIGHT AND HEAVY

Immediate Shipment. No Delays

Write, Telegraph or 'Phone Us for Prices

RAILS FOR SALE

Quick Shipment from Stock

30, 35, 40, 52, 56 and 60 lbs.

RELAYING RAILS

12, 16, 20, 25, 30, 35, 40, 65, 80, 90 and 100 lbs.

NEW STEEL RAILS

All these rails are ready for shipment as soon as cars can be placed, and we can quote low prices.
Please write, or wire us for quotations.
We also buy new and relaying rails of all sizes.

Iron City Steel Co.
Bessemer Building PITTSBURGH, PA.

Any Engineering Book on Any Engineering Subject for sale by

McGraw Publishing Co.
114 Liberty St., New York

CATALOGUE ON REQUEST

POSITIONS WANTED

For advertisements under this heading the rate is $1.00 per insertion for 50 words or less, payable in advance; additional words 2 cents each

WANTED—Position as Manager or Superintendent of Electric Rail Road. Experience of fifteen years as Superintendent of Steam road, and six years as Superintendent of Electric road. Thoroughly familiar with details of all departments. Highest references as to character and my ability to conduct a thorough and economical management. Address "No. 491," care STREET RAILWAY JOURNAL

WANTED—An up-to-date general passenger and freight agent now in charge of the passenger and freight departments of a very successful interurban road, desires a change. Best of references as to character and ability. Ten years' practical experience with very successful roads. Able to establish and handle traffic systems successfully. Address "No. 534," care STREET RAILWAY JOURNAL.

WANTED—Position by master painter in electric or steam railway shops; 15 years' of experience in coach and car painting; all around a first-class man; best of references furnished; age, 35 years; reason for change is the climate. Address "No. 536," care STREET RAILWAY JOURNAL

POSITION WANTED—Manager familiar with the successful construction, operation and management of city and interurban railways, gas and electric properties, desires to make change; age, forty; 20 years' active experience; reference Address No. "537," care STREET RAILWAY JOURNAL

MANAGERS—What have you to offer a young man with five years' experience in railway construction as foreman and superintendent of line work, pile driver foreman, and one year as car barn foreman ? Wish to be connected with some company where strict attention to work will bring promotion. Ambitious, a hustler, a fair education, and proven ability to handle men. Make me an offer. Address "No. 542," care STREET RAILWAY JOURNAL.

CHEMIST—For large street railway system open for engagement; many years experience in responsible position. Address "No. 540," care STREET RAILWAY JOURNAL.

WANTED IMMEDIATELY—Position with electric railway or construction company by young man who for the past four years has been paymaster and assistant to the general passenger agent of 130 mile electric road. Can give A1 references as to character and ability. Address "No. 544," care STREET RAILWAY JOURNAL.

WANTED—A position as M. M. or repair shop foreman by a competent man with wide experience and splendid references. Familiar with city and high speed cars and equipments and standard system of accounting. Thorough electrician and mechanic; can operate shops, handle men and repairs economically and sucessfully. Address "No. 543," care STREET RAILWAY JOURNAL.

WHEN WRITING to advertisers please mention the "Street Railway Journal."

FOR SALE, BARGAINS

RAILWAY MOTORS

6 STANDARD G. E. 57 RAILWAY MOTORS, in strictly first-class operative condition, repaired to the operating standard of a first-class interurban company. One extra two-turn armature for the above.

8 QUADRUPLE MOTOR EQUIPMENTS, Westinghouse 12 A. 30 H. P., complete with controllers, cables, trolleys and resistances.

6 QUADRUPLE MOTOR EQUIPMENTS, Westinghouse 49 motors, complete with controllers, cables, trolleys. resistances and lighting material.

25 G. E. 800 RAILWAY MOTORS.

25 G. E. 52 RAILWAY MOTORS.

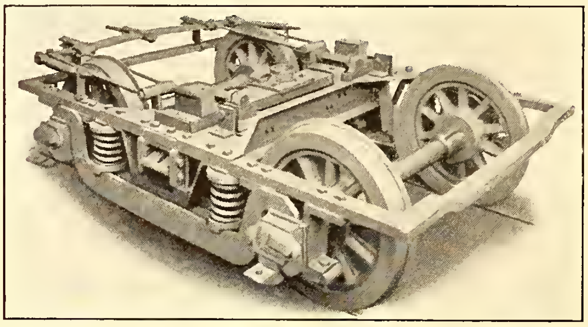
GENERATORS 2 500 K.W. General Electric, 4 pole, 375 R. P. M.

CARS 12 20-ft. closed car bodies, St. Louis type.
12 Manhattan Elevated Railway trailers, rebuilt, 40-ft. bodies.

Also Steel Underframes, Car Trimmings in bronze and malleable iron, Gear Cases, Fixtures, Armatures and Commutators

THOMPSON-BONNEY CO.
45-47 York St., Brooklyn, N.Y., U.S.A.

Baldwin Locomotive Works



Motor Truck for South Side Elevated Railway. One of an order for 300.

Builders of

Locomotives of every description

and of

Electric Trucks

Double Trucks for Street Railway, Interurban, and Long Distance Service. Workmanship in conformity with best Locomotive practice.
Trucks built to meet individual requirements.
Purchasers' designs followed if desired.

Burnham, Williams & Co.,
Philadelphia, Pa., U. S. A.

PRESSED STEEL CAR COMPANY

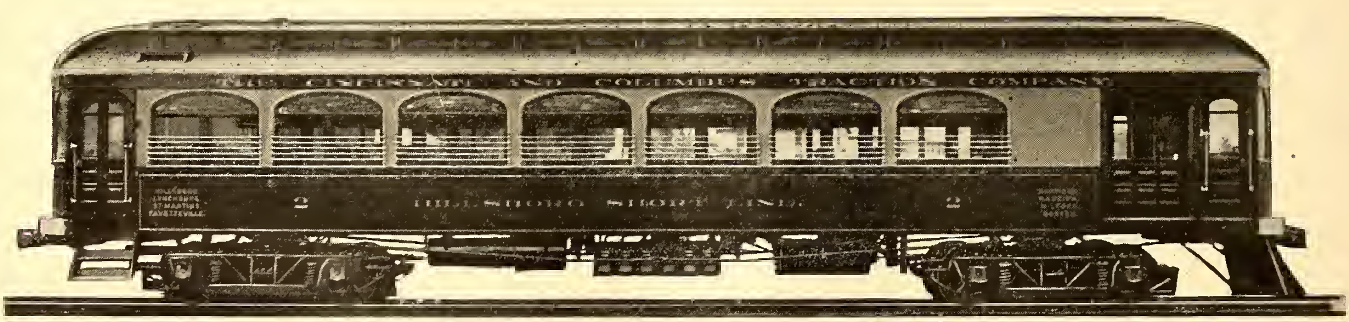
DESIGNERS AND BUILDERS OF

ALL-STEEL PASSENGER AND STREET CARS

ALSO STEEL FREIGHT CARS OF EVERY DESCRIPTION

Wooden Cars with Steel Underframes, Mine Cars, Steel Underframes Complete for Tank Cars, Street Cars and Automobiles, as well as Pressed Steel Specialties.

OFFICES:
PITTSBURG, NEW YORK, CHICAGO, ATLANTA, LONDON, MEXICO CITY, SYDNEY, N. S. W.



ALL INQUIRIES SHOULD BE ADDRESSED DIRECT TO NEWARK, OHIO, AS WE ARE

INDEPENDENT OF ALL OTHER CAR BUILDERS

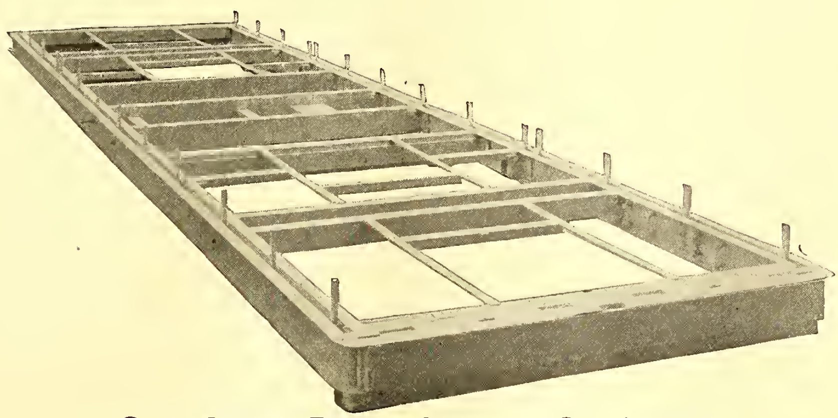
THE JEWETT CAR COMPANY

NEWARK, OHIO

Our Trade Mark: SUPERIORITY

CLAIMS

of all kinds can be made by a manufacturer for his product, but whether the thing itself makes good these claims—that is an entirely different proposition. We speak of cars. It has always been our claim that the St. Louis Car Company Steel Channel Bottom Semi-Convertible Car was strong and durable. We claim so to-day. It is. Some half dozen bad accidents during the past year have furnished splendid proof in support of this assertion.



Steel Channel Bottom, St. Louis Car Company

Cars of this type have come back into our shops for repairs with vestibules smashed to splinters; bumpers twisted beyond recognition; trucks and brake rigging badly damaged—BOTTOM INTACT. The damages saved in these accidents, owing to the extraordinary strength of the bottoms, more than make up the difference in the price. Every road that bought this type of car has favored us with duplicate orders, and in many cases there were three and four additional contracts.

BUY STEEL CHANNEL BOTTOM CARS. Photos, drawings and specifications furnished upon request.

ST. LOUIS CAR COMPANY, Builders
ELECTRIC AND STEAM RAILWAY COACHES AND TRUCKS
ST. LOUIS, MISSOURI

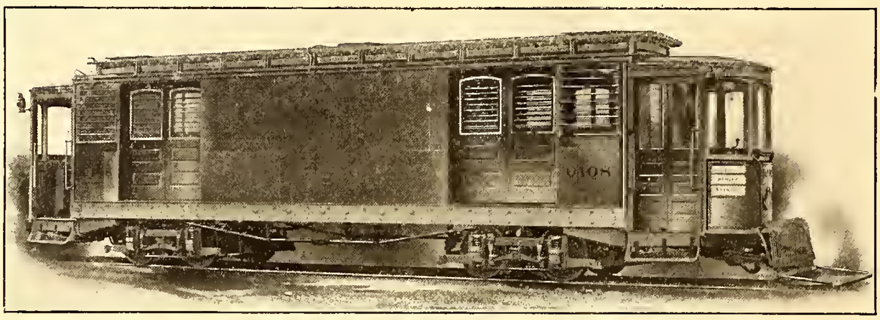
PHILADELPHIA

CABLEGRAMS.
"BRILL, PHILADELPHIA"

E. P. RAWLE, Los Angeles Bldg.
Los Angeles, Cal.
Selling Agt. for Pacific Coast.

J·G·BRILL COMPANY
AMERICAN CAR COMPANY

ST. LOUIS

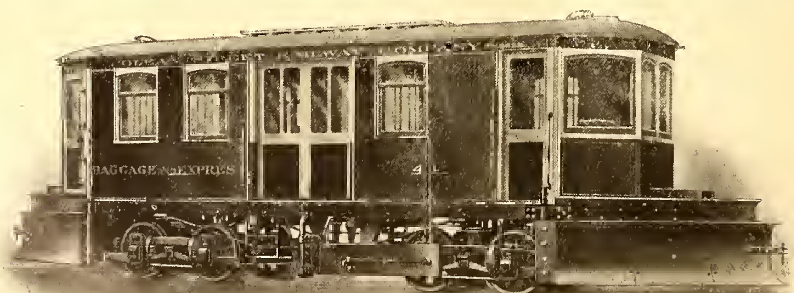


Express car for city and suburban service. Length over body, 32-ft. Length over vestibules, 42-ft. 8-ins. Mounted on Brill No. 27-GE-1 Trucks.

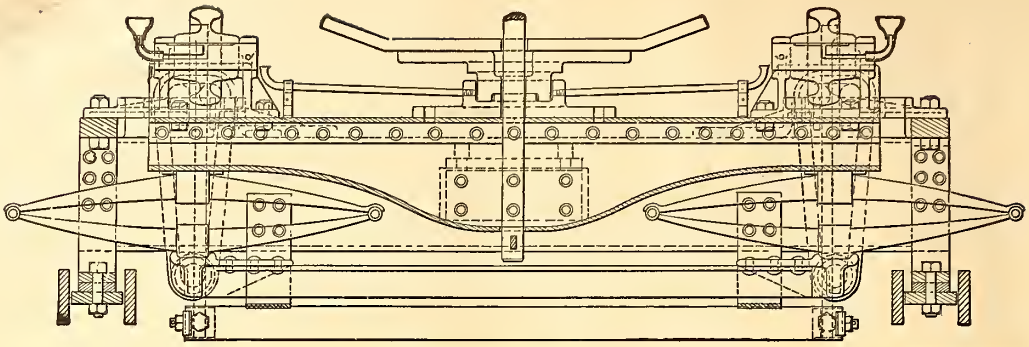
BESIDES furnishing cars for every kind of baggage and express traffic, we build mail cars with the United States standard fittings, either for freight service or combined with express; also construction cars for every requirement, tower cars of the various forms, electric locomotives from the smallest industrial types used on narrow gauge roads to machines capable of hauling heavy trains, and, in short, in addition to the types shown, we design and construct every form of rolling stock for regular and special conditions which are included in these classes of equipment. ¶The first type of express car shown is intended for city and suburban service as the character of platforms and trucks indicates. The car is equipped with powerful wrought steel cranes, one at each of the side doors, enabling heavy articles to be conveniently and rapidly handled. Four steel rollers are suspended without strain to the roof on steel frames and are used for holding long pieces of material which are brought through the vestibule windows at either end. A steel roller is bracketed to the dash outside the vestibule window to prevent injury to the sash as well as to facilitate handling material. Two large steel hooks also intended for suspending material, are on each side of the side doors and may be swung against the wall or removed. ¶The large car is the heaviest type used in fast interurban service and is also used as an electric locomotive.

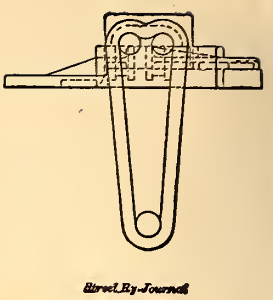
Heaviest type used in interurban service. Length over body, 56-ft. Mounted on Brill No. 27-E-3 Trucks.

Cars of this type usually have doors at diagonally opposite corners to admit long pieces of material and to enable the motorman to enter or leave the car when it is filled with freight, and also to permit him to throw switches without getting down upon the track. ¶It is usually advisable to have baggage and express cars of the largest carrying capacity that conditions permit, as the difference in cost of handling is comparatively small and the earnings are increased proportionately to the tonnage carried. ¶The combination type of express car, electric locomotive and snow plow is an economical car for interurban roads. The plows and levelers can be easily removed and therefore the car need never be idle.

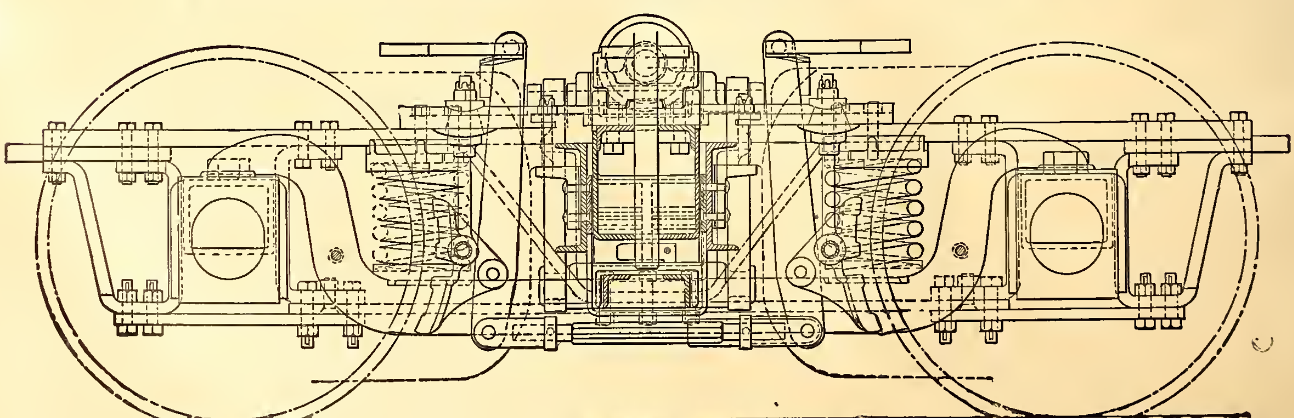


A useful combination express car and snow plow. Length over body, 30-ft. Length over all, 40-ft. 5½-ins. Mounted on Brill No. 27-G Trucks.





Transverse Section



Longitudinal Section

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