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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, 327,950 copies, an average of 8198 copies per week.

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 pre-

senting 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 successful 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 chanced 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 unparalleled 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 of 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 inter-urban 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 inter-urban 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 financing 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 in-

struct 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 classifi-

cation 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 controller 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, dispatchers 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, dispatchers, 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 stationery, 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 intersection 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 städtischen 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 world-wide 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 COM- MISSIONERS, 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 start-

ing 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.

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 sell 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 up 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 ex-

pense 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 operation 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 dispatchers 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 dispatchers, 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 source. 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 ac-

counting 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. Burlington, 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 dis-

posed 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 Elevated 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 $\frac{3}{8}$ -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 $\frac{1}{2}$ -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. Woolcott, 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. Danckerley, 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 change 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 voucher's 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 it 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 col-

umns, 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, 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 sepa-

ration 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 for 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 Rypen, 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 Rypen 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 ma-

chines 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 multi-phase 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 $1\frac{3}{4}$ 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 than 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 clue 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 be 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 under-
element 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 sugges-

tions, 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 ground 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?*

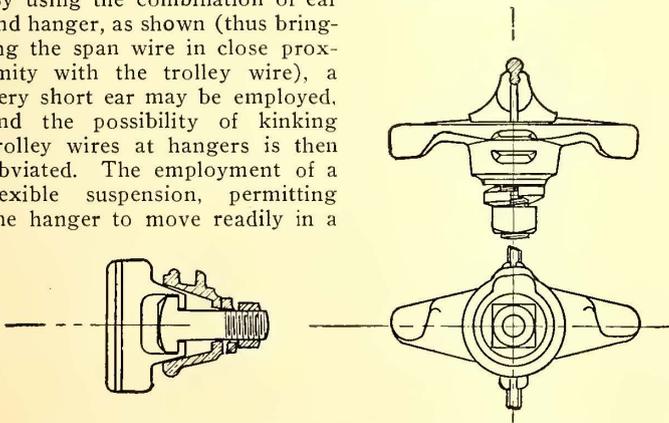
The buying of coal on specification of high B. T. U. contracts is done to protect the purchaser by keeping the coal up to the contract standard, with a penalty of a rebate for every B. T. U. below the number of units stipulated in the contract. Otherwise there would be practically no way to prevent the 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



MILWAUKEE COMBINED TROLLEY EAR AND HANGER

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.

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



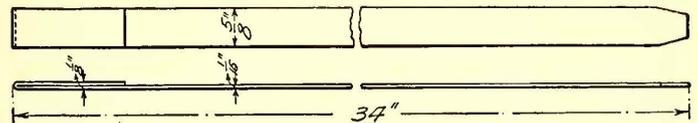
GAGE TO LOCATE LOW ARMATURE BEARINGS

brass about 1-32 in. thick with a width of 3/4 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 babbitt 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 babbitt metal for motor bearings?*

1. The following babbitt 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 to 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.)

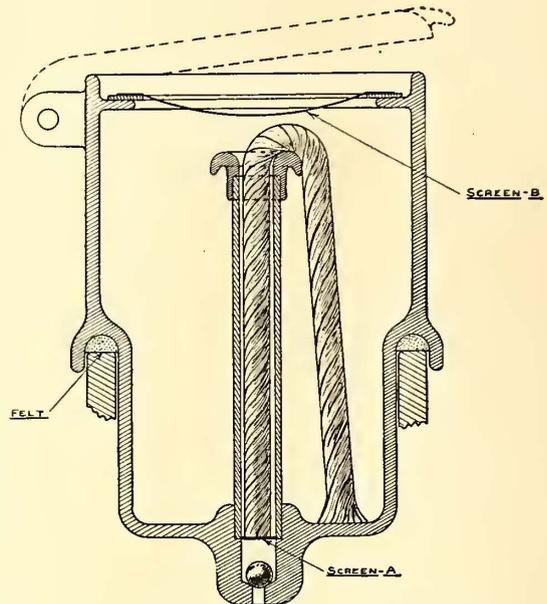
4. Eight cents per thousand car-miles for all oil and grease used. (No. 14.)

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 indifferant 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 ¼-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 1/2 in. of the top with a 3/4-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

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?

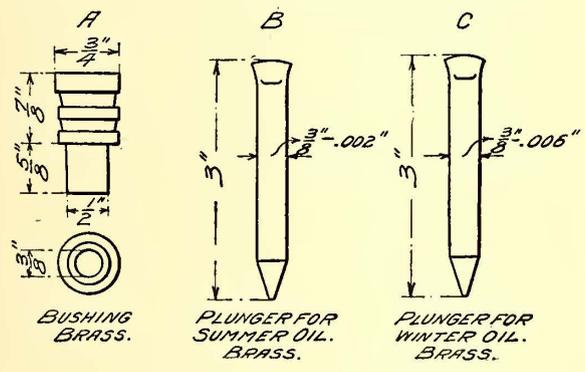
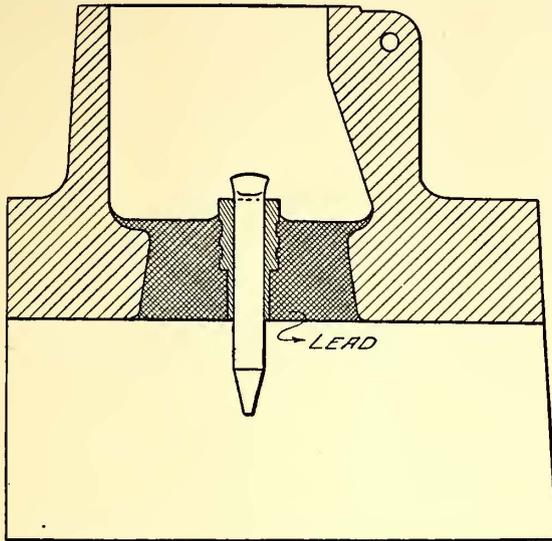
1. A bell-mouth should be used at the end of the iron conduit, so designed as to hold the leads firmly to prevent any possible chafing. A cleat should then be used at a distance of about 6 ins. from the bell-mouth, with a second one about 13 ins. from the first, allowing the connector to come between 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.)

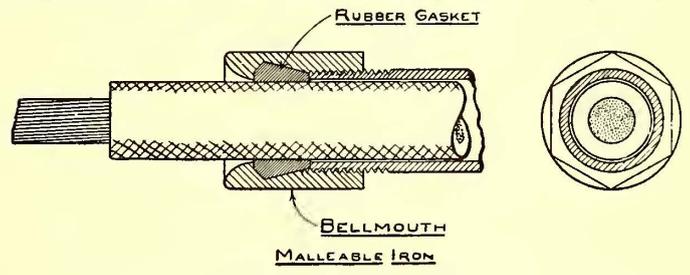
3. Where wire leaves the conduit we wind friction tape around the wire and then screw a T. & B. bushing, which is bell-mouthed, on to the end of the pipe. The bushing squeezes tight onto the tape and thus avoids chafing of the wire. We have had no trouble with work done in this manner. (No. 14.)

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

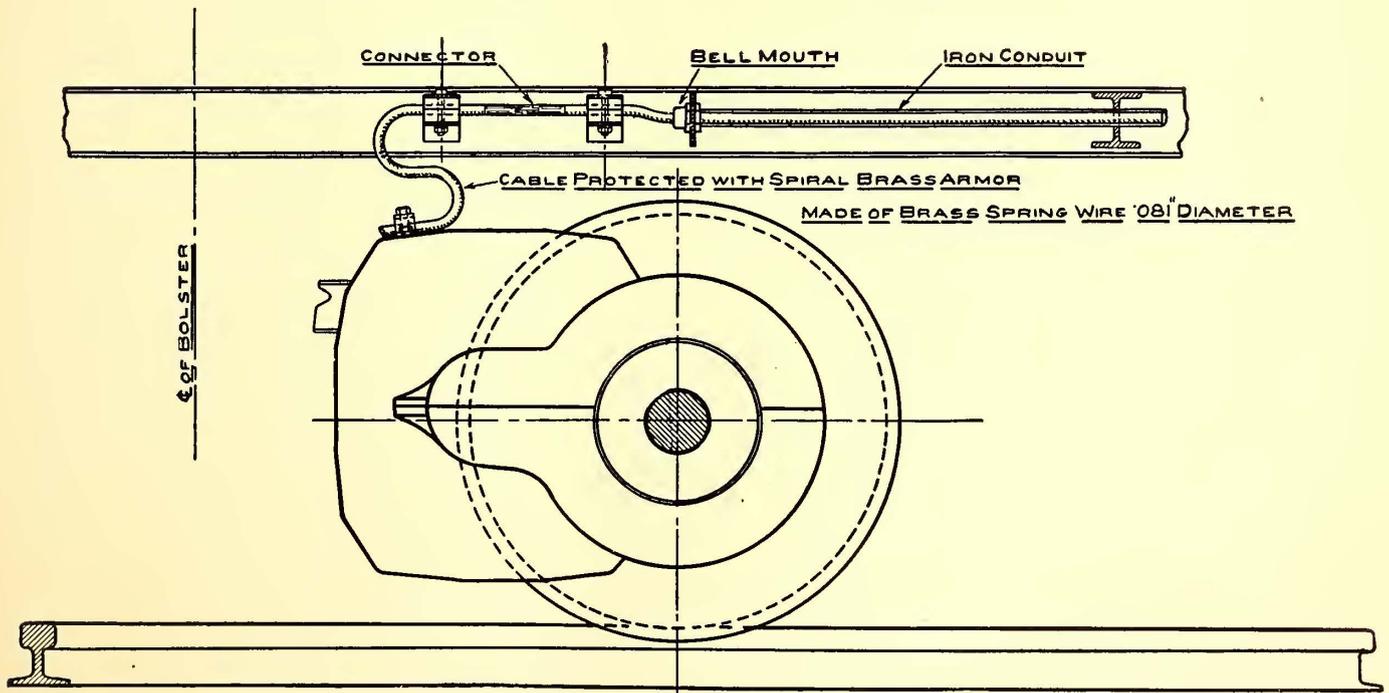
1. For the ordinary city service, circuit breakers should be sufficient if equipment is properly taken care of. For heavy suburban or interurban service one circuit breaker for all motors and independent fuses for each motor is better practice. (No. 2.)



OIL CUP FOR G. E. 2000 MOTORS



DESIGN OF BELL-MOUTH



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

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

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.)

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 $\frac{7}{8}$ 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 stops 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 ad-

vantage 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

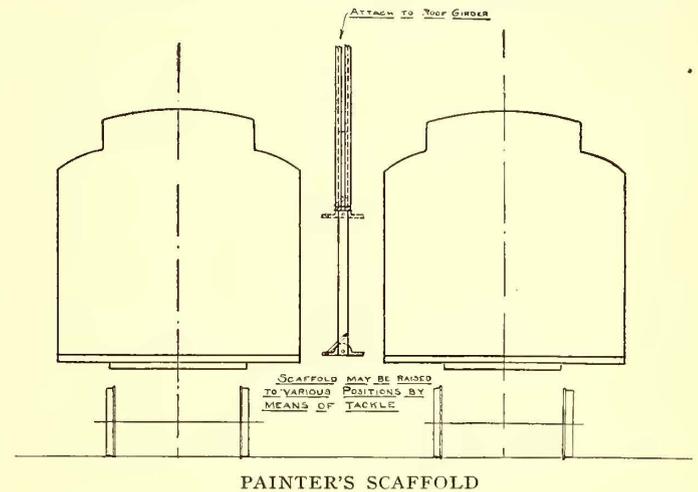
such places as it is needed. Then, again, the incandescent lamps do not require the attention of electricians so frequently, and, in case of a burnout, any car house employee can substitute a new lamp, whereas, with the arc lights, the trimming should always be done by electricians. In car houses no 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



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?

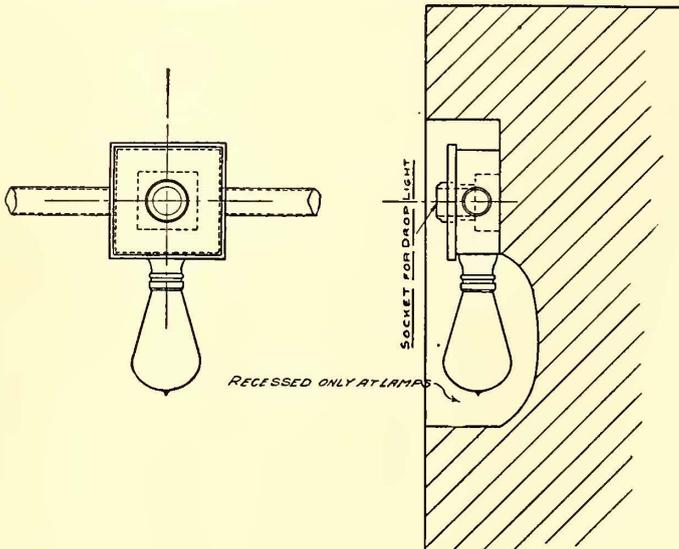
1. There should be $\frac{1}{4}$ in. difference between wheel and track gage if gage line is taken from wheel in gage line; namely, $\frac{1}{8}$ in. upon flange, although, by making the wheel gage the same as track gage and measuring from wheel where flange starts to round it gives you the same results 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 $\frac{1}{4}$ of an in. for a 4 ft. $8\frac{1}{2}$ 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 companies, 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 $\frac{5}{8}$ 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 special-

ties 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 bagges, 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 Phoenixville, Pa., works.

THE TROLLEY SUPPLY COMPANY, of Canton, Ohio, arranged an apparatus at its exhibition, 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.

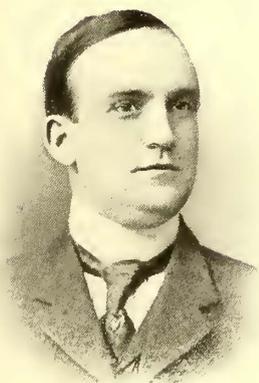
THE ELECTRO-DYNAMIC COMPANY, of Bayonne, N. J., showed the inter-pole motor for use in driving machine tools in any location where different constant speeds are required. With this motor, a speed variation of 350 r. p. m. to 1400 r. p. m. can be obtained, the speed being constant at any point of the 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

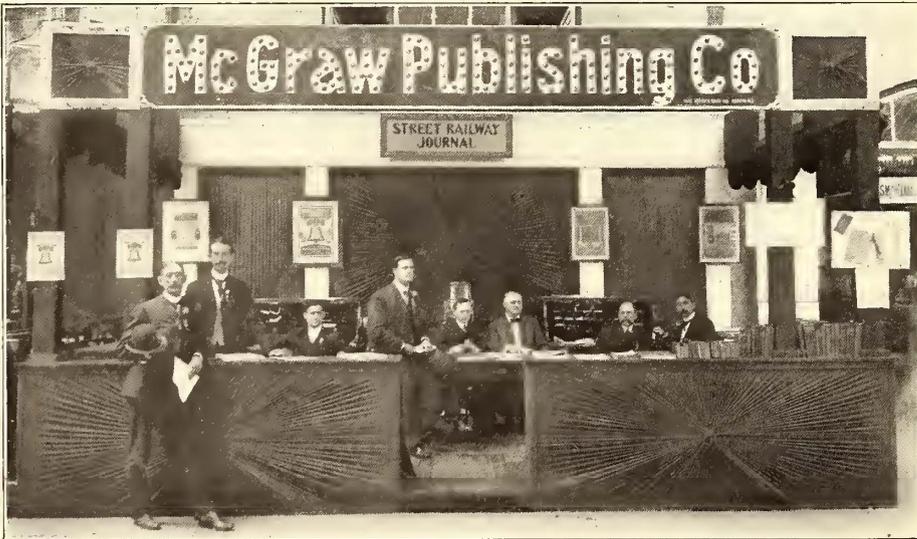


S. L. RHOADES,
Representing the American Association of Street Railway Claim Agents

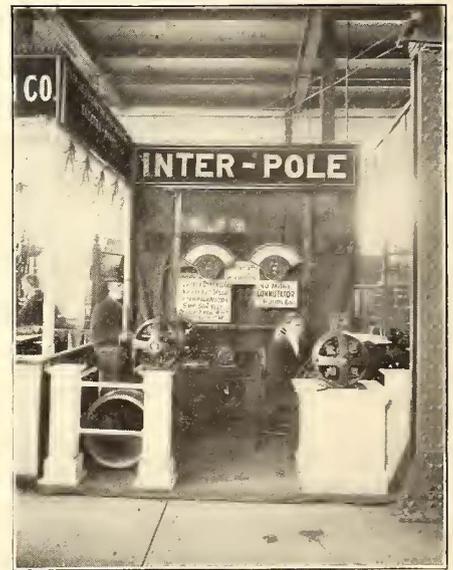
OFFICERS AND EXECUTIVE COMMITTEE OF THE AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION



GENERAL VIEW OF SOUTH EXHIBIT HALL AT THE PHILADELPHIA CONVENTION, LOOKING WEST



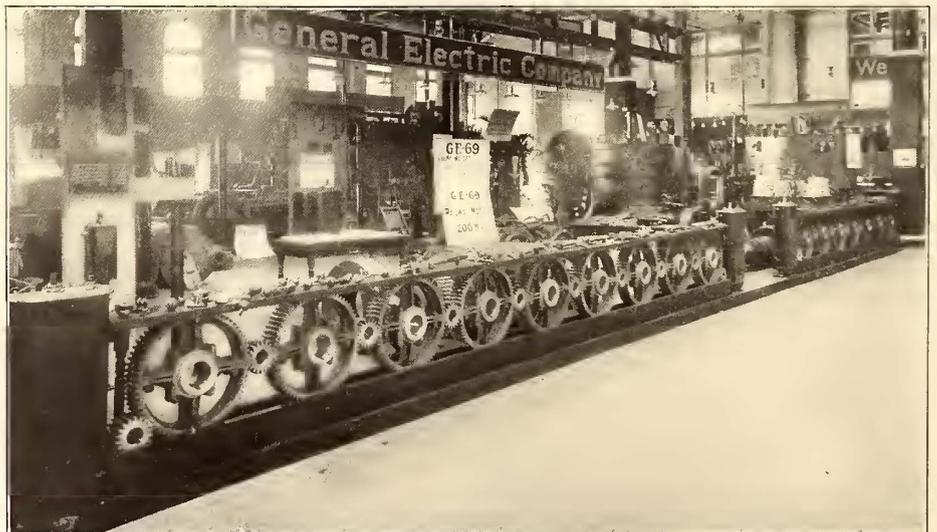
STREET RAILWAY JOURNAL



THE ELECTRO-DYNAMIC COMPANY



GILES S. ALLISON AND SECURITY REGISTER COMPANY



GENERAL ELECTRIC COMPANY



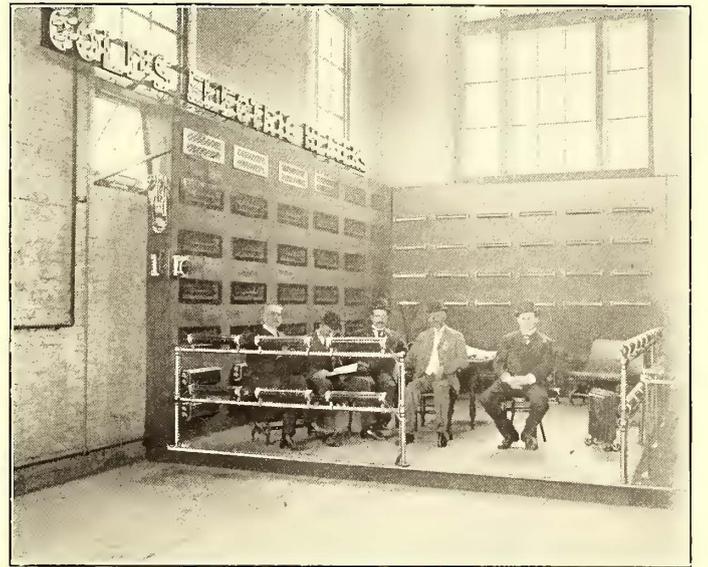
NATIONAL ELECTRIC COMPANY



ALLIS-CHALMERS COMPANY



ELECTRIC STORAGE-BATTERY COMPANY



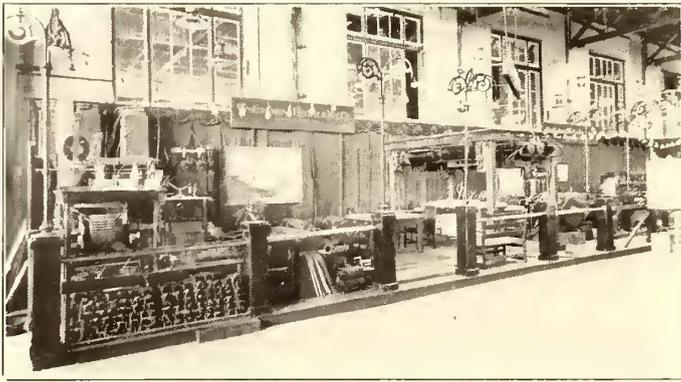
GOLD CAR HEATING & LIGHTING COMPANY



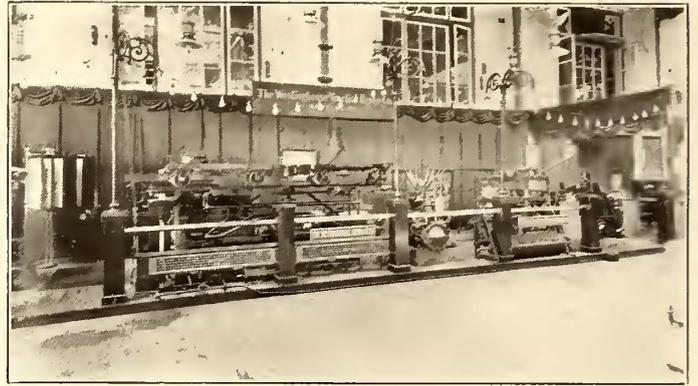
AMERICAN LOCOMOTIVE SANDER COMPANY—GOULD STORAGE BATTERY COMPANY—U. S. METALLIC PACKING COMPANY—THE T. H. SYMINGTON COMPANY



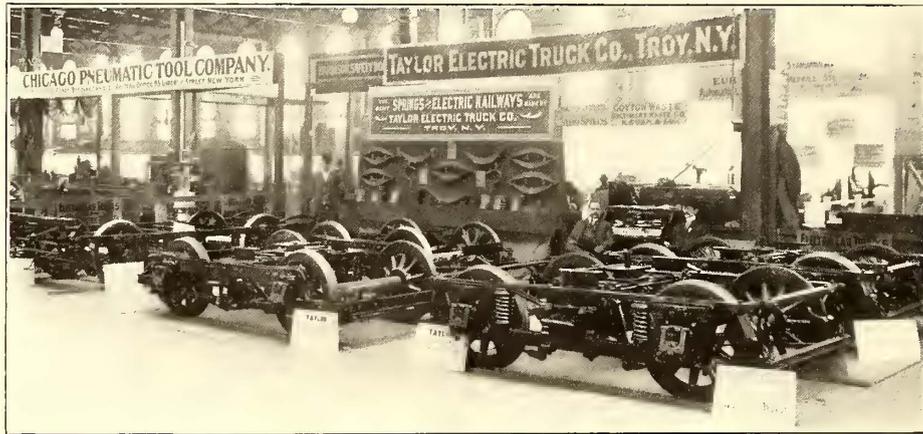
ALBERT B. HERRICK—CHAS. I. EARLL



WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY



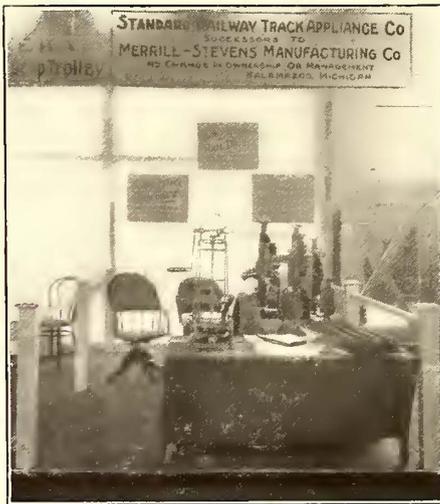
THE WESTINGHOUSE TRACTION BRAKE COMPANY



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. Rosenthal, 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 was 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. Battenfield, 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 $\frac{3}{8}$ in. The next size weighs 15 lbs., and will drill holes up to $\frac{1}{2}$ 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 $\frac{7}{8}$ -in. hole. The other has a gear ratio of 3 to 20, and drills a $1\frac{1}{4}$ -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 $2\frac{1}{4}$ ins. and another up to $1\frac{3}{4}$ 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 attendance.

THE OHIO BRASS COMPANY, Mansfield, Ohio, as usual had a large representation and a large exhibit. The Nichols-Intern 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. Cospier, 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 multivolt-

meter. 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 in Denver. 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 $4\frac{1}{2} \times 10$ 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.

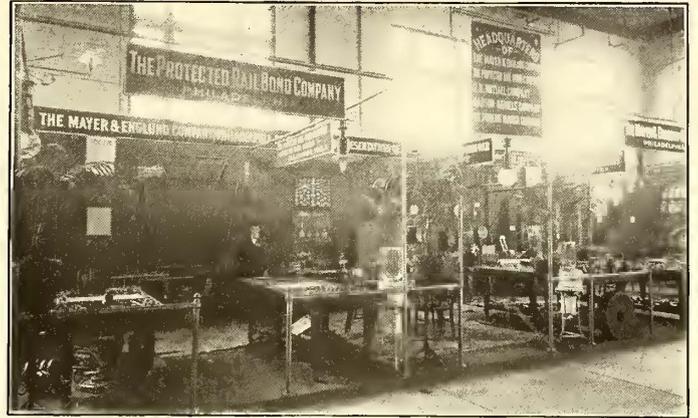
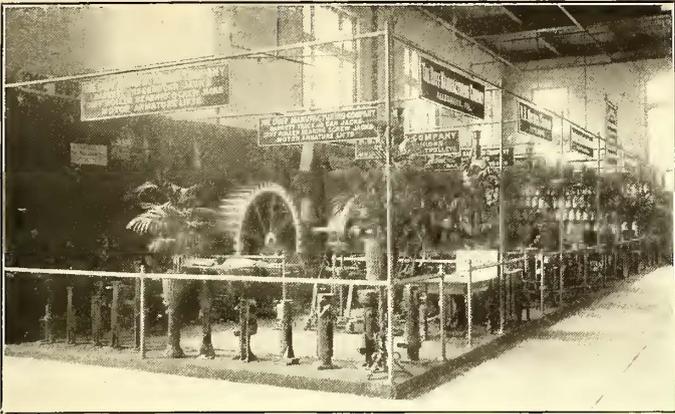
It will be understood that when the wind strikes the band, should it pass over the top edge and enter the band, it will either strike the intermediate deflector or the corrugated deflector at the bottom, and is thus directed upward, creating a partial vacuum in the tube or flue, and the wind is prevented 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)



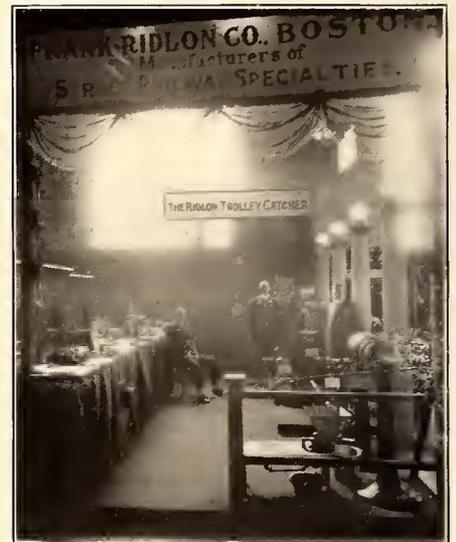
GROUP OF EXHIBITS OF J. G. BRILL COMPANY



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



J. R. McCARDELL & COMPANY



THE CURTAIN SUPPLY COMPANY



MASSACHUSETTS CHEMICAL 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-arcng 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 connector 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 orchestration 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 gcats 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 acquaintances.

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. Demonstrations 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 windows. 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 irritate 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.

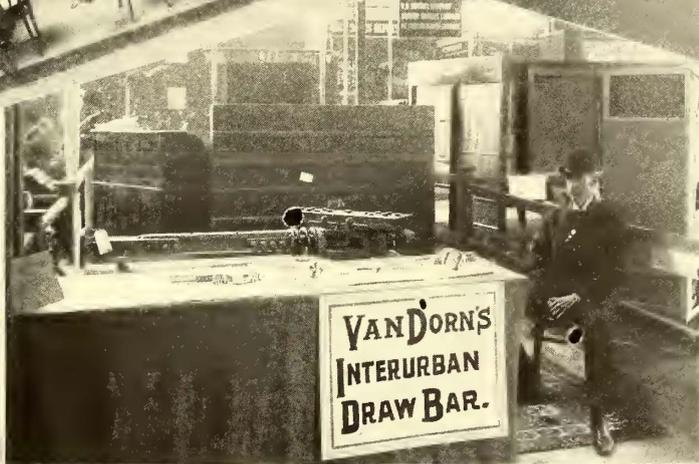
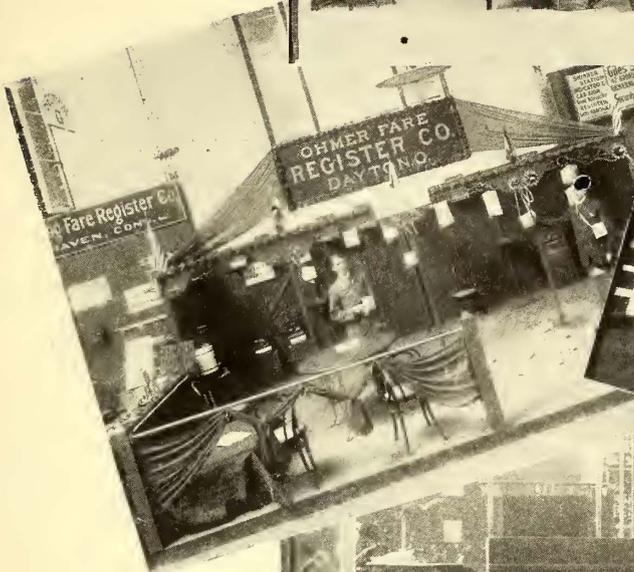
THE COLUMBIA MACHINE WORKS & MALLEABLE IRON COMPANY, of Brooklyn, N. Y., made a feature of the new Columbia brake for maximum-traction trucks. The construction and application of the brake was demonstrated outside the convention hall by an operating exhibit. As has been described in the STREET RAILWAY 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.

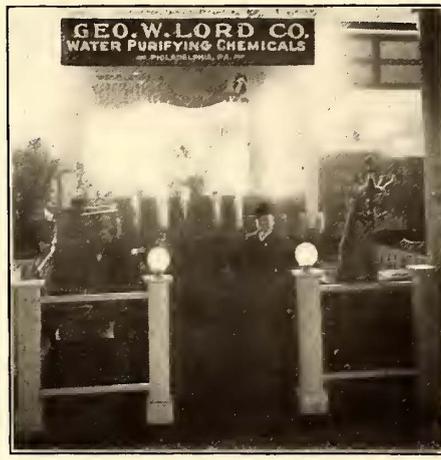
THE NATIONAL LOCK WASHER COMPANY, of Newark, N. J., had its curtain fixtures and sash balances installed in the new pressed steel car for heavy service, shown at the convention by the American Car & Foundry Company. Many of the delegates to the convention appreciated the easy working of both the curtains 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 being 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
 INTERNATIONAL REGISTER COMPANY
 W. T. VAN DORN COMPANY
 SCHOEN STEEL WHEEL COMPANY
 PENNSYLVANIA STEEL COMPANY



JOHN LUCAS & SON



GEO. W. LORD COMPANY



THE NATIONAL LOCK WASHER CO.



THE DUPLICATE TRANSFER & REBATE CO.



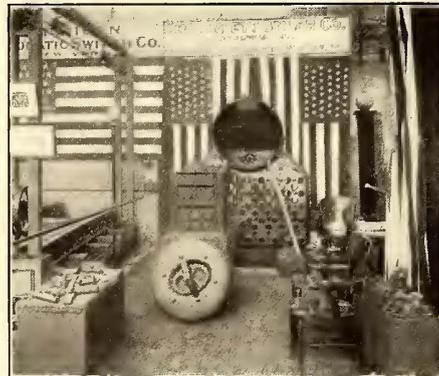
CREAGHEAD ENGINEERING CO.



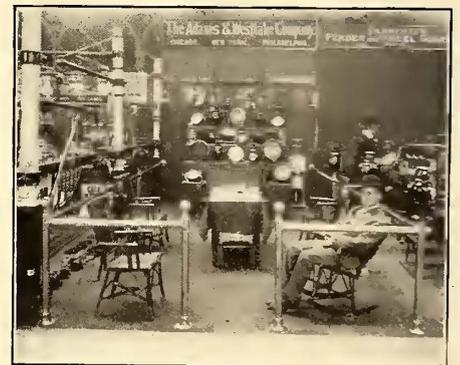
DEWITT SAND BOX CO.



D. & W. FUSE CO.
AND WESTERN ELECTRIC CO.



HEINE SAFETY BOILER CO.



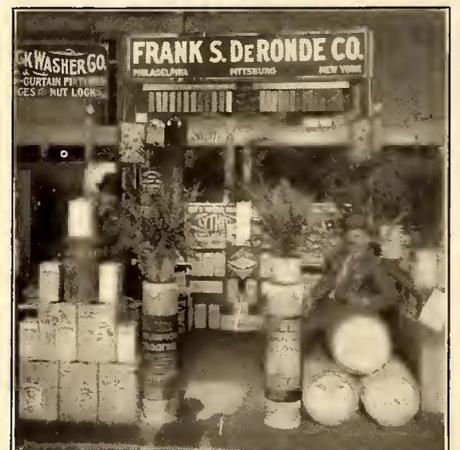
ADAMS & WESTLAKE CO.



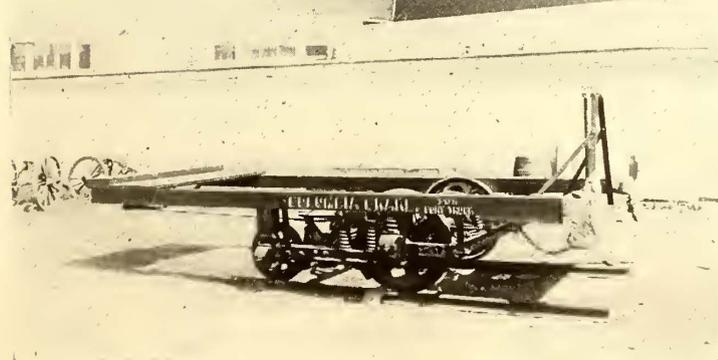
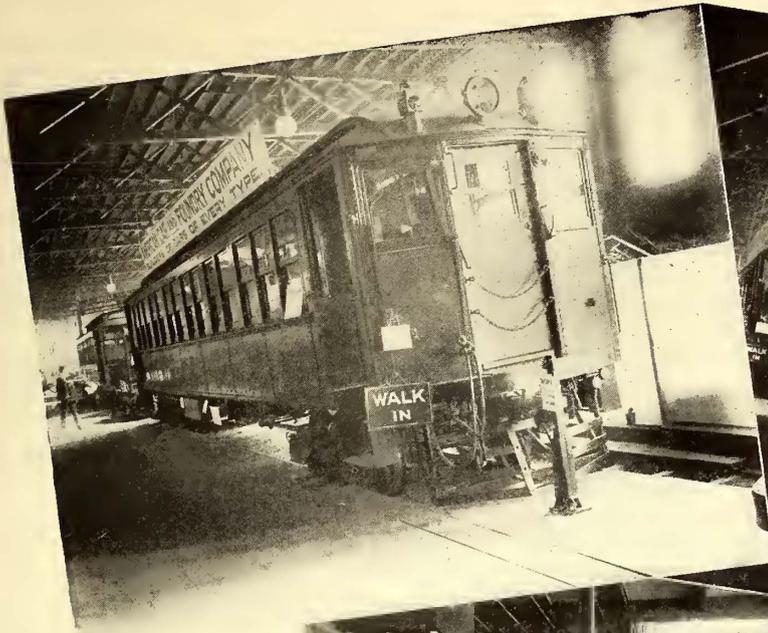
BALTIMORE WASTE CO.



JOLT LUBRICATOR CO.



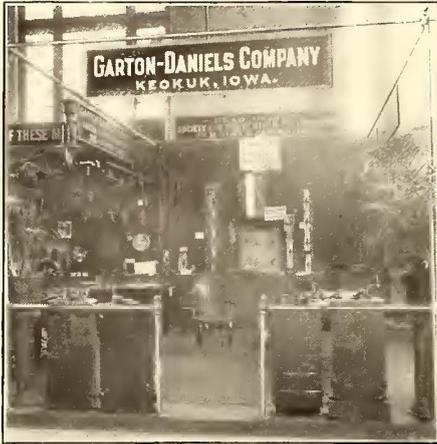
FRANK S. DeRONDE CO.



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



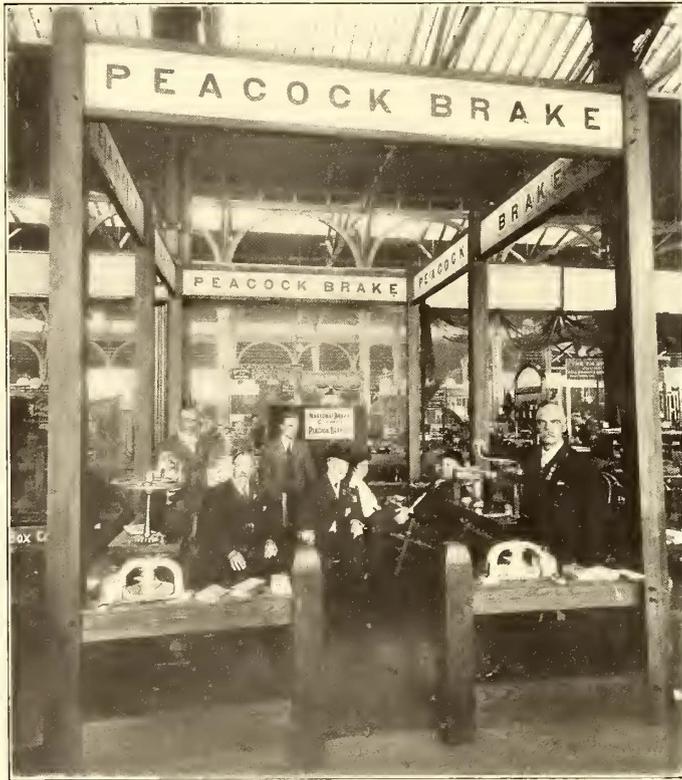
GARTON-DANIELS COMPANY



STANDARD PAINT COMPANY



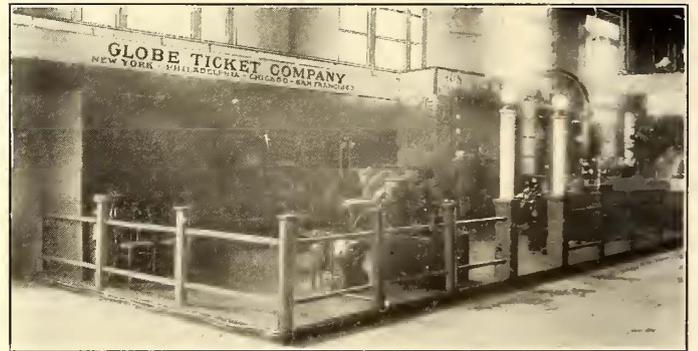
THE STERLING VARNISH COMPANY



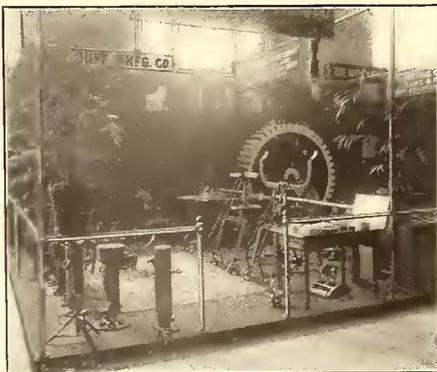
NATIONAL BRAKE COMPANY



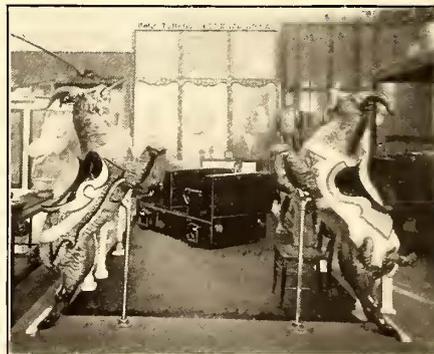
PHILADELPHIA AIR-BRAKE COMPANY AND NATIONAL CAR WHEEL COMPANY



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 ELECTRICAL 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, babbit 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 home-like 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 inter-urban 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. Bittenheim, C. A. Babbiste, 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 babbitt 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 Philadelphia 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. Rodmaning. 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 attention.

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 "boy-less" 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. Killion 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 button-hole 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.

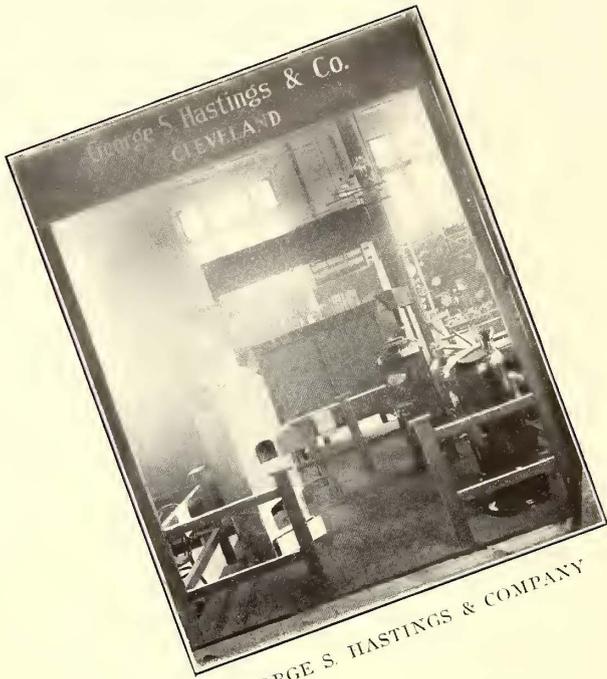
THE YALE & TOWNE MANUFACTURING COMPANY, of New York, is giving special attention to the electric railway field, particularly in the matter of supplying appliances for repair shops. The company took occasion during the convention to exhibit its triplex, duplex and differential chain hoists, overhead trolleys 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



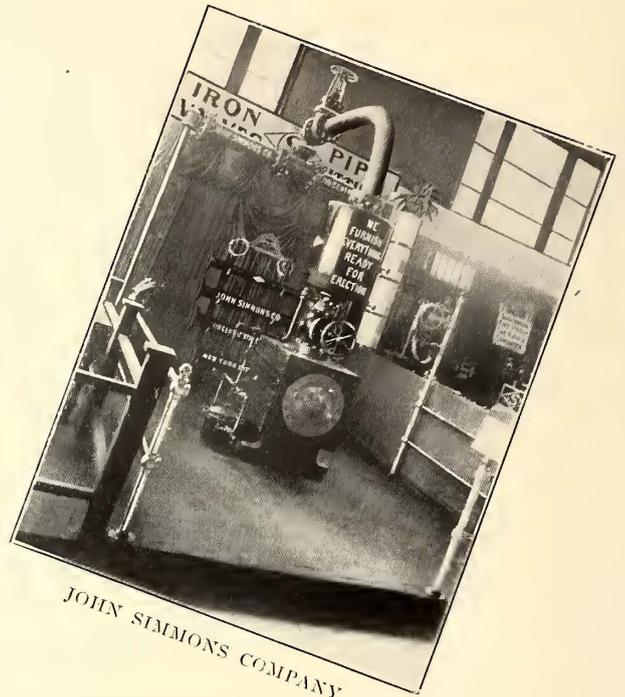
THE YALE & TOWNE MFG. CO.
 THE HALE & KILBURN MFG. CO.
 THE LAGONDA MFG. CO.
 THE STAR BRASS WORKS

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



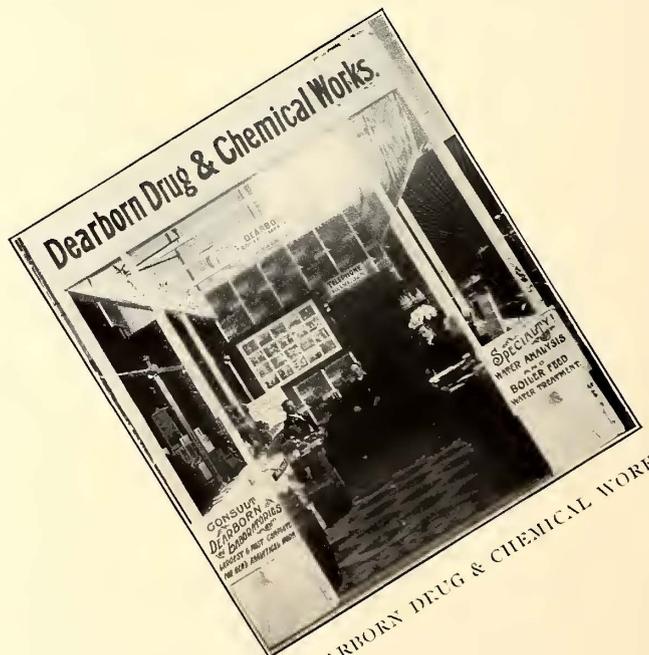
JOHN SIMIONS COMPANY



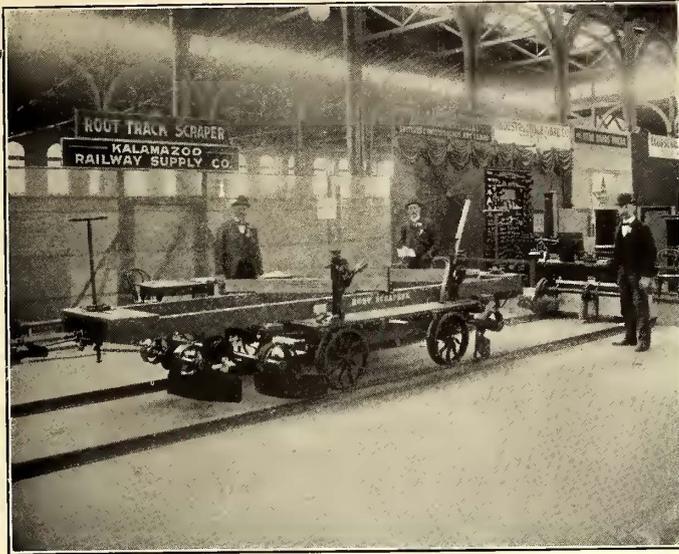
AMERICAN BRAKE-SHOE & FOUNDRY COMPANY



DOSSERT & COMPANY



DEARBORN DRUG & CHEMICAL WORKS



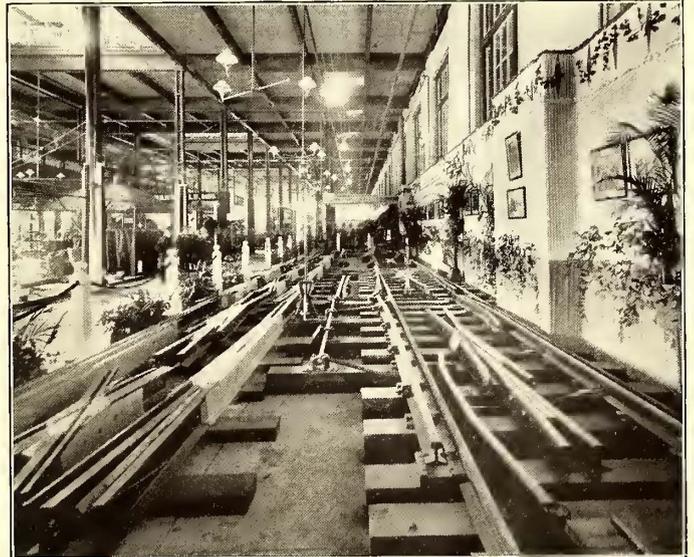
KALAMAZOO RAILWAY SUPPLY COMPANY



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



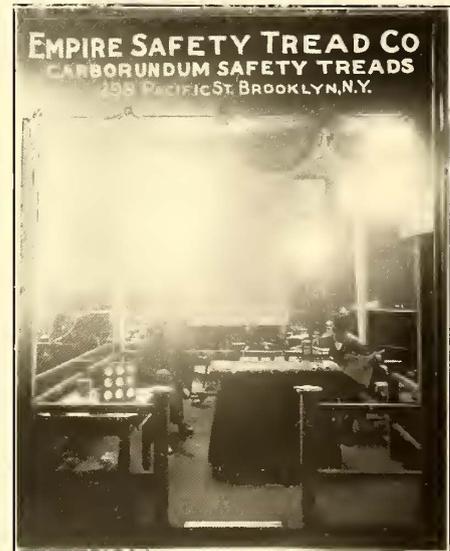
LORD ELECTRIC COMPANY



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. V. 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 center 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 payroll systems, together with its despatching system. With the Egrý 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 Egrý 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. Hinchler 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. Dornier.

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 DRESSSEL 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, manufacturers 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 lighting 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 coincidentally 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 Commission 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 recent 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 of 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 conscientious 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.

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,



D. M. BRADY

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

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,

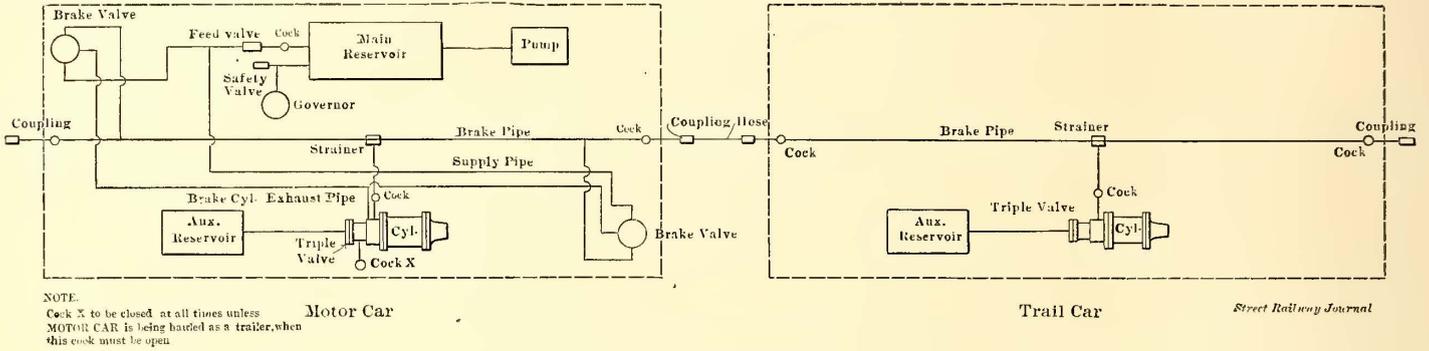


FIG. 1.—SHOWING GENERAL ARRANGEMENT OF BRAKE FIXTURES AND PIPING ON ONE MOTOR AND ONE TRAIL CAR

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

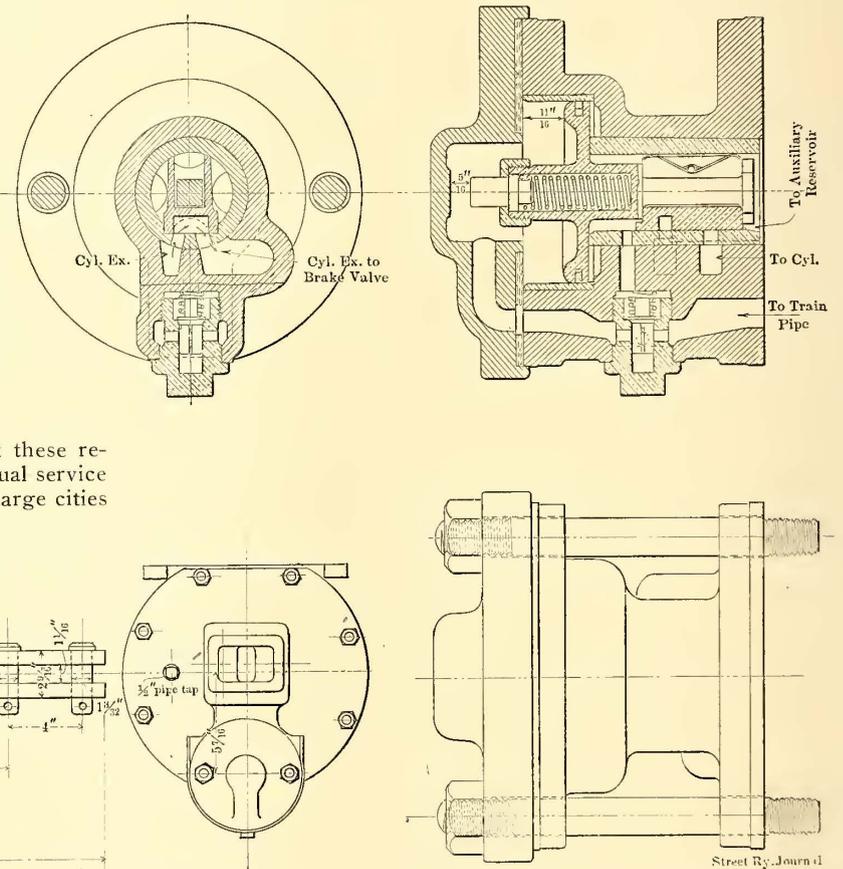


FIG. 2.—SECTIONS AND OTHER DETAILS OF SURFACE TRACTION TRIPLE VALVE

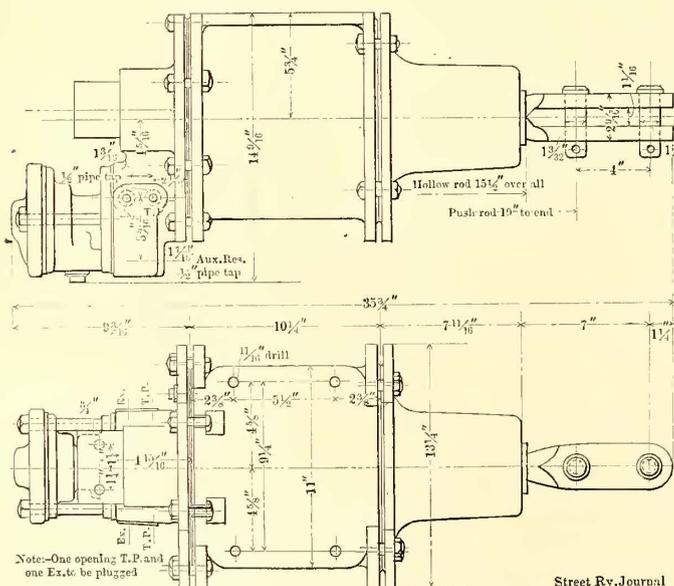


FIG. 3.—BRAKE CYLINDER FOR SURFACE TRACTION, INDICATING PIPE CONNECTIONS IN THE PRESSURE HEAD

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.

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

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

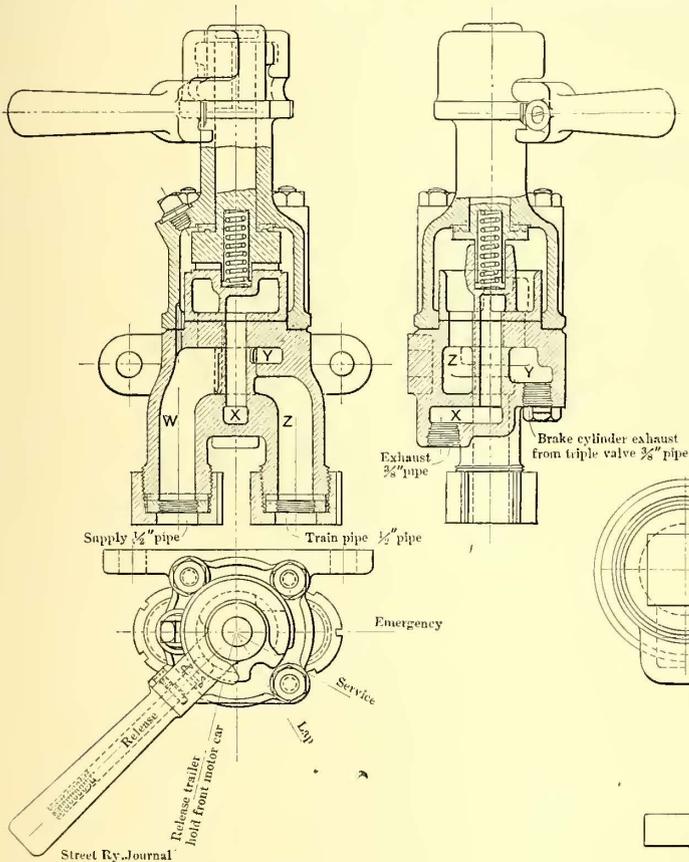


FIG. 4.—DETAILS OF CONTROLLING OR BRAKE VALVE

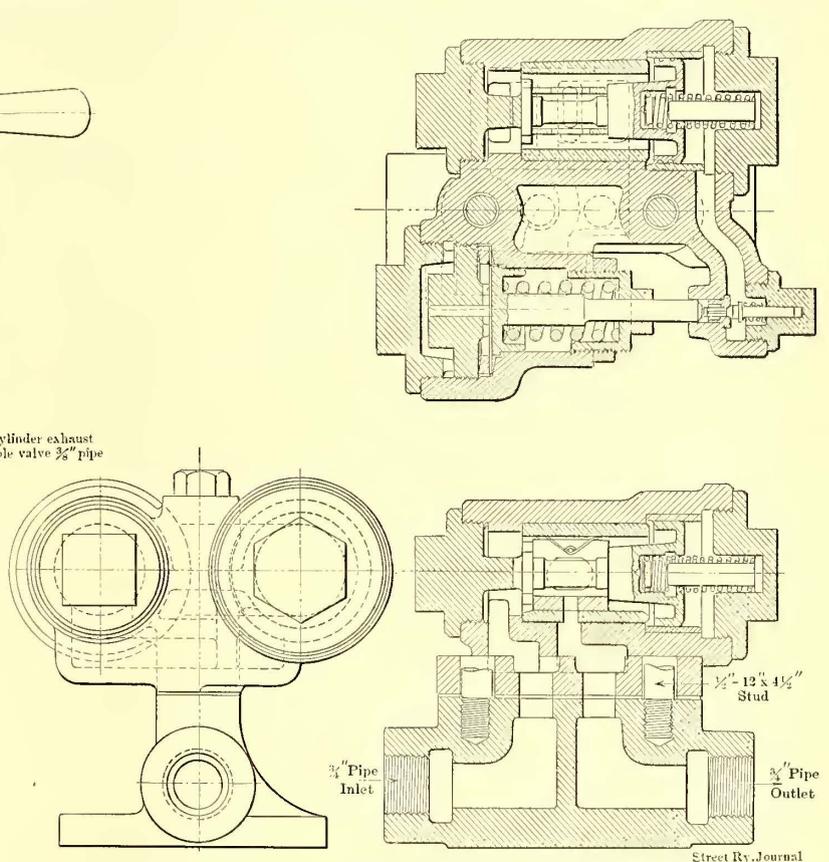


FIG. 5.—DETAILS OF REDUCING VALVE FOR SURFACE TRACTION AIR BRAKE SYSTEM

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,

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.

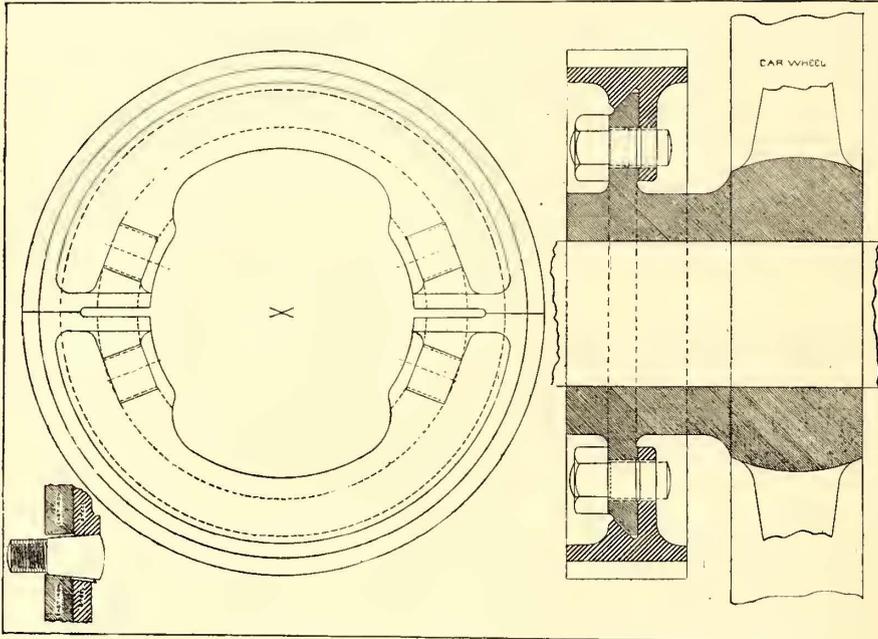
The controlling or brake valve illustrated in Fig. 4 is one of the simplest devices of the kind that has ever been used in automatic service. It is of the rotary-valve type, with a suitable handle that can be removed when the valve is "on lap" only, and this feature, in conjunction with the construction 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

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 $1\frac{3}{8}$ -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 steady 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 Brigh-

ton. 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 $4\frac{3}{4}$ miles of roadway, the total length of track, worked out on the equivalent of single line, being $8\frac{1}{2}$ 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 Middlesbrough, 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 passenger 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 Miskolcz and Diósgyőr, 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 routing 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 routing 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 thereof 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 assume 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 Avail-able for Dividends	COMPANY	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Avail-able for Dividends
AKRON, O. Northern Ohio Tr. & Light Co	1 m., Aug. '05	102,718	50,210	52,508	23,267	29,241	MILWAUKEE, WIS. Milwaukee El. Ry. & Lt. Co.	1 m., Aug. '05	277,813	124,960	152,853	79,677	73,176
	1 " " '04	95,962	46,696	49,267	22,467	26,800		1 " " '04	272,844	129,258	143,586	77,580	66,006
	8 " " '05	628,245	336,152	292,094	184,136	107,959		8 " " '05	2,106,708	1,094,355	1,072,353	609,003	463,350
	8 " " '04	588,929	322,330	266,599	180,995	85,615	8 " " '04	2,094,579	1,064,618	1,029,961	598,791	431,170	
AURORA, ILL. Elgin, Aurora & South- ern Tr. Co	1 m., July '05	47,505	22,550	24,955	9,172	15,782	Milwaukee Lt., Ht. & Tr. Co	1 m., Aug. '05	69,724	24,265	45,459	23,636	21,823
	1 " " '04	46,480	21,472	25,007	9,172	15,885		1 " " '04	50,336	19,511	30,826	18,517	12,919
	12 " June '05	454,308	258,573	195,735	111,224	84,511		8 " " '05	397,207	170,746	226,461	165,409	61,052
	12 " " '04	456,100	274,797	181,308	110,676	70,627	8 " " '04	300,120	147,318	152,803	181,693	21,109	
BINGHAMTON, N. Y. Binghamton Ry. Co.	1 m., Aug. '05	30,767	12,877	17,891	7,085	10,856	MINNEAPOLIS, MINN. Twin City R. T. Co.	1 m., July '05	435,105	187,053	248,052	103,208	144,844
	1 " " '04	27,379	12,097	15,283	6,967	8,316		1 " " '04	385,769	179,680	206,090	92,425	113,665
	2 " " '05	62,379	26,479	35,900	14,317	21,583		7 " " '05	2,606,575	1,226,580	1,379,995	690,592	689,403
	2 " " '04	56,499	24,592	31,907	13,975	17,933	7 " " '04	2,445,031	1,165,553	1,279,477	632,866	646,611	
BUFFALO, N. Y. International Tr. Co.	1 m., Aug. '05	479,891	224,925	254,965	140,953	114,012	MONTREAL, QUE. Montreal St. Ry. Co.	1 m., Aug. '05	262,009	136,199	125,810	35,469	90,341
	1 " " '04	434,035	192,405	241,631	140,230	101,401		1 " " '04	236,245	122,991	113,254	30,255	82,969
	8 " " '05	2,986,798	1,578,368	1,408,430	1,098,655	309,775		11 " " '05	2,443,829	1,581,038	912,790	267,389	645,401
	8 " " '04	2,739,836	1,643,419	1,096,418	1,053,211	43,207	11 " " '04	2,224,858	1,404,204	820,654	231,263	589,391	
CHICAGO, ILL. Aurora, Elgin & Chi- cago Ry. Co.	1 m., Aug. '05	71,373	33,117	38,256	-----	-----	OAKLAND, CAL. Oakland Traction Con- solidated	1 m., Aug. '05	125,761	62,225	63,536	33,360	30,176
	1 " " '04	53,553	26,129	27,424	-----	-----		1 " " '04	106,653	56,035	50,618	26,525	24,092
	2 " " '05	146,204	66,046	80,158	-----	-----		8 " " '05	929,921	490,916	449,005	255,345	198,606
	2 " " '04	112,071	53,260	58,811	-----	-----	8 " " '04	814,358	423,490	390,868	212,443	178,424	
Chicago & Milwaukee Elec. R. R. Co.	1 m., Aug. '05	67,838	25,181	42,657	-----	-----	PEEKSKILL, N. Y. Peekskill Lighting & R R. Co.	1 m., July '05	12,334	*5,883	6,451	-----	-----
	1 " " '04	55,087	17,253	37,834	-----	-----		1 " " '04	*5,736	*5,736	5,071	-----	-----
	8 " " '05	347,074	150,069	197,005	-----	-----		12 " June '05	119,165	*68,568	50,598	-----	-----
	8 " " '04	270,565	108,348	162,217	-----	-----	12 " " '04	110,740	*66,311	44,429	-----	-----	
CLEVELAND, O. Cleveland & South- western Traction Co.	1 m., Aug. '05	55,540	29,282	26,258	-----	-----	PHILADELPHIA, PA. American Rys. Co.	1 m., Aug. '05	159,775	-----	-----	-----	-----
	1 " " '04	51,488	27,093	24,395	-----	-----		1 " " '04	140,257	-----	-----	-----	-----
	8 " " '05	847,738	206,478	141,261	-----	-----		2 " " '05	322,219	-----	-----	-----	-----
	8 " " '04	306,783	198,231	108,552	-----	-----	2 " " '04	287,277	-----	-----	-----	-----	
Lake Shore Elec. Ry. Co.	1 m., July '05	87,649	*40,786	46,863	20,404	26,459	ROCHESTER, N. Y. Rochester Ry. Co.	1 m., Aug. '05	169,815	85,700	83,615	28,529	55,086
	1 " " '04	74,089	*38,497	35,592	20,404	15,188		1 " " '04	137,775	70,128	67,647	27,921	39,726
	7 " " '05	414,278	*238,918	175,860	142,829	32,531		8 " " '05	1,168,721	619,174	544,548	220,651	323,897
	7 " " '04	345,091	*257,187	87,904	142,795	†54,891	8 " " '04	987,325	513,604	444,241	212,850	231,370	
DETROIT, MICH. Detroit United Ry.	1 m., Aug. '05	511,942	*281,865	230,077	92,395	137,682	SAN FRANCISCO, CAL. United Railroads of San Francisco.	1 m., July '05	576,863	-----	-----	-----	-----
	1 " " '04	451,381	*247,651	203,750	90,005	113,725		1 " " '04	535,186	-----	-----	-----	-----
	8 " " '05	3,365,011	*2,001,572	1,363,439	736,211	627,228		7 " " '05	3,963,358	-----	-----	-----	-----
	8 " " '04	2,992,972	*1,840,119	1,152,853	713,267	430,586	7 " " '04	3,742,118	-----	-----	-----	-----	
DULUTH, MINN. Duluth St. Ry. Co.	1 m., Aug. '05	63,497	28,791	34,706	17,468	17,238	SAVANNAH, GA. Savannah Electric Co.	1 m., July '05	56,411	30,097	26,374	10,554	15,820
	1 " " '04	57,413	27,228	30,185	16,538	13,647		1 " " '04	51,464	25,741	25,722	10,691	15,032
	8 " " '05	432,700	226,238	206,407	135,408	70,999		12 " " '05	570,911	330,687	240,224	126,934	113,491
	8 " " '04	410,985	222,822	188,113	131,961	56,152	12 " " '04	535,167	303,631	231,535	124,809	106,727	
FINDLAY, O. Toledo, Bowling Green & Southern Tr. Co.	1 m., Aug. '05	28,693	14,518	14,175	5,879	8,296	SEATTLE, WASH. Seattle Electric Co.	1 m., July '05	225,218	132,711	92,507	24,801	67,706
	1 " " '04	57,413	27,228	30,185	16,538	13,647		1 " " '04	197,392	127,019	70,373	25,291	45,082
	2 " " '05	55,785	28,720	27,065	11,758	15,307		12 " " '05	2,423,152	1,613,746	779,406	301,190	478,216
	2 " " '04	55,785	28,720	27,065	11,758	15,307	12 " " '04	2,242,341	1,560,853	681,489	275,938	405,550	
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1 m., July '05	93,855	59,322	34,533	-----	-----	SYRACUSE, N. Y. Syracuse Rapid Transit Ry. Co.	1 m., Aug. '05	79,932	44,683	35,248	20,351	14,897
	1 " " '04	88,804	53,654	35,150	-----	-----		1 " " '04	71,328	40,192	31,136	20,131	11,005
	7 " " '05	520,014	326,825	193,189	-----	-----		2 " " '05	162,481	88,728	73,753	40,772	32,981
	7 " " '04	459,781	304,594	155,187	-----	-----	2 " " '04	146,625	81,075	65,550	40,453	25,097	
FORT WORTH, TEX. Northern Texas Traction Co.	1 m., Aug. '05	59,244	35,724	23,520	11,188	12,332	TERRE HAUTE, IND. Terre Haute Tr. & Lt. Co.	1 m., July '05	55,991	*6,051	20,941	10,747	10,194
	1 " " '04	48,626	26,128	22,498	10,100	12,398		1 " " '04	54,213	30,958	23,255	9,624	13,631
	8 " " '05	421,698	239,012	182,686	88,023	94,663		12 " " '05	598,224	391,125	207,099	115,811	91,288
	8 " " '04	359,840	201,652	158,188	80,855	77,333	12 " " '04	538,462	358,240	180,222	108,422	71,799	
HANCOCK, MICH. Houghton County St. Ry. Co.	1 m., July '05	21,391	13,083	8,308	3,732	4,576	TOLEDO, O. Toledo Rys. & Lt. Co.	1 m., Aug. '05	176,350	*87,958	88,392	42,635	45,757
	1 " " '04	20,600	10,415	10,186	3,432	6,754		1 " " '04	155,367	*77,958	77,409	41,899	35,510
	12 " " '05	166,349	164,196	2,153	41,985	†39,833		8 " " '05	1,244,139	*636,568	607,571	339,557	268,014
	12 " " '04	192,166	131,837	60,329	37,313	22,517	8 " " '04	1,139,603	*612,743	526,860	333,435	193,425	
HOUSTON, TEX. Houston Electric Co.	1 m., July '05	47,903	26,823	21,080	8,789	12,297	YOUNGSTOWN, O. Youngstown-Sharon Ry. & Lt. Co.	1 m., July '05	47,353	*23,786	23,567	-----	-----
	1 " " '04	18,344	43,281	†24,936	8,185	†33,121		1 " " '04	40,020	*32,905	17,115	-----	-----
	12 " " '05	459,130	286,495	172,636	102,055	70,580		7 " " '05	304,779	*166,846	137,933	-----	-----
	12 " " '04	355,330	322,199	33,131	93,015	†59,884	7 " " '04	264,288	*159,663	104,625	-----	-----	