

Electric Railway Journal

DAILY EDITION

Published at the Annual Conventions of the American Street & Interurban
Railway Association and Its Affiliated Associations

VOL. XXXVI

NEW YORK—OCTOBER 12, 1910.—ATLANTIC CITY

No. 15B

PUBLISHED DAILY BY

McGraw Publishing Company

James H. McGraw, President. H. M. Wilson, 1st Vice-president.
A. E. Clifford, 2d Vice-president. C. E. Whittlesey, Sec. and Treas.

HENRY W. BLAKE, Editor.
L. E. GOULD, Western Editor.

Associate Editors:
RODNEY HITT, FREDERIC NICHOLAS, WALTER JACKSON.

News Editors:
G. J. MACMURRAY, FRANK J. ARMEIT.

NEW YORK, 239 WEST THIRTY-NINTH STREET.
ATLANTIC CITY, MILLION-DOLLAR PIER.

CHICAGO: Old Colony Building.
PHILADELPHIA: Real Estate Trust Building.
CLEVELAND: Schofield Building.
LONDON: Hastings House, Norfolk St., Strand.

Cable Address, Stryjourn, New York; Stryjourn, London—Lieber's
Code.
Copyright, 1910, by McGraw Publishing Company.

TERMS OF SUBSCRIPTION

Subscription including regular weekly issues and special daily editions
published from time to time in New York City or elsewhere, postage
prepaid:

United States, Cuba and Mexico.....	\$3.00 a year
Canada	4.50 a year
To all Other Countries.....	6.00 a year
Single Copies.....	.10 each

Application made at the Post Office at New York for entry as mail
matter of the second class.

Of this issue of the ELECTRIC RAILWAY JOURNAL,
DAILY EDITION, 9500 copies are printed.

NEW YORK—OCTOBER 12, 1910.—ATLANTIC CITY

PROGRAM FOR TO-DAY

MORNING

- 9.00 a.m. Traymore Hotel, Meeting of the Claim Agents' Association.
- 9.30 a.m. Annex Court Hall, Convention Pier, Meeting of Accountants' Association.
- 9.30 a.m. Aquarium Court Hall, Convention Pier, Meeting of Engineering Association.
- 9.30 a.m. Greek Temple, Convention Pier, Meeting of Transportation & Traffic Association.

AFTERNOON

- 12.30 p.m. Capt. Young's Villa, Convention Pier, Group Photograph of Engineering Association.
- 1.45 p.m. Atlantic City Country Club—Ladies' Afternoon, Clock Golf Contest. (Special touring cars leave Marlborough-Blenheim and Chalfonte Hotels at 1.45 sharp.)
- 2.00 p.m. Greek Temple, Convention Pier, Meeting of American Association (Executive Session).
- 2.00 p.m. Aquarium Court Hall, Convention Pier, Meeting of Engineering Association.
- 5.00 p.m. Greek Temple, Convention Pier, Annual Meeting of Manufacturers' Association.
- 8.30 p.m. Apollo Theater, Amateur Vaudeville and Theatrical Performance.
- 11.00 p.m. Ball Room, Marlborough-Blenheim, Informal Dancing.

In Atlantic City Again

This is only the second time in its history that the association representing the electric railway interests of the country has met in the same city three times. The only other locality boasting of this distinction is St. Louis, which was selected for the annual conventions of 1885, 1896 and 1904. Cities which have been honored with two conventions are Boston in 1882 and in 1898, Chicago in 1883 and in 1899, New York in 1884 and in 1901, and Philadelphia in 1887 and in 1905. The attendance at the present convention, so far as it could be determined by the registration up to a late hour last night at the headquarters of the association at the pier, will break all records. This indicates that Atlantic City was a popular choice this year. It is needless here to cite the many advantages of Atlantic City for a convention of this kind, such as the many good hotels comparatively near each other, the large exhibit hall, and the equable climate on account of the location of the city on the ocean. The choice of future convention cities will be determined by future conditions as they arise and it is not worth while to discuss them here, but it is safe to say that the logical choice for the convention city this year was Atlantic City.

President Shaw's Address

The address of President Shaw yesterday was devoted principally to the affairs of the association, which he was able to report were in a most gratifying condition. The expenses of administration have been higher this year than ever before, but, as the address states, such a condition of affairs is to be expected in every progressive organization. Facts which are vastly more important than increased expenses are that the association has a good return for the money which it has spent and that the receipts have increased in a much larger ratio than the expenses.

Some of the more important outside activities of the association to which President Shaw refers are those of closer affiliation between it and the State and sectional organizations initiated at the mid-winter meeting and the establishment of better facilities for securing information in regard to accident claimants. The internal affairs of the association are also considered at length and the subject is logically divided under the work of committees, that done at headquarters, and that of the affiliated associations.

President Shaw concludes his interesting address by discussing the general situation. The conditions which he described last year of high operating expenses have become aggravated as the result of the past twelve months. While there has been a slight recession in the cost of materials, there is no doubt that the recompense which companies are obliged to pay for labor is higher on many roads than last year. As 60 per cent of the entire operating expenses of the average road are for labor, the effect on the total operating expenses is very large.

Mr. Shaw repeats the remedies for the present condition of affairs suggested in his address of last year and urges publicity as a means of applying them. He believes that if the public should become better acquainted with the real conditions and high cost of railway operation there would be less seeming

antagonism of interests between it and the companies. The term "public" is generally assumed to include all members of the community in which a railway operates except those actively interested in the ownership or management of the property. But if the make-up of "public" is analyzed, this all-embracing term will be found to include many whose business prosperity is closely allied with the prosperity of the corporation, and a still larger number whose friendship can be gained for the railway company if its cause is just. As President Shaw intimates, if those who are thus directly and indirectly allied with public service corporations would but take the trouble to correct many of the misapprehensions which are prevalent in the minds of their neighbors and friends as to public service corporations, sentiment would be awakened in their favor and but little difficulty would be experienced in obtaining fair treatment.

Express and Freight Accounting

How the expenses rightly chargeable to freight and express can fairly be determined is a problem of long standing. Coincident recommendations that the problem be attacked have been made to both the Accountants' Association and the Transportation & Traffic Association. L. T. Hixson suggests that a uniform basis for apportionment of the operating expenses be reached by conference between members of the two associations. The committee on express and freight traffic of the Transportation & Traffic Association has gone much farther by compiling and recommending for adoption a method of segregating earnings and expenses arising from these classes of business. Its proposed method, fortunately, is given in detail for the consideration of the association.

The plan provides, in brief, for a direct charge to the operating expenses of each department of such items as are plainly attributable to freight or express business and for apportionment of the other items. Where the difficulty lies, of course, is in the apportionment of those expenses which are rightly divisible in some ratio between freight or express and other branches of the service. The members of the committee were able to agree, item by item, on bases of division. In some cases a pro rata charge according to gross earnings is recommended; in others a corresponding charge according to the value of the property involved is held desirable, while in still others a charge in accordance with the car mileage is approved as the proper method of distribution.

The two papers discussing this important subject furnish evidence, first, that traffic officials feel that they need to have freight expenses segregated from other classes of operating expenditures; and, second, that the accountant of a leading interurban system in the Central West appreciates the importance of similar analysis of expenditures in order that the profitableness or unprofitableness of the freight business may be demonstrated. Whatever action may be taken by either or both these associations is of great importance to the industry. If the Accountants' Association decides to take up the matter and prepare a standard classification, it will be confronted by the well-known and deep-seated diversities of opinion existing on the subject. Nevertheless, if there is a demand among members of the association for an investigation into the intricacies of this topic, the association should by all means undertake the task. Even if the final conclusion should be reached that no fair division of all items of expense can be made, the study into the question would furnish information of value. But no matter to what degree the theory of apparent profitableness or unprofitableness of individual rates is carried, the question of the value of the service should be considered in conjunction with the cost of the service in rate-making.

Rail Joints

The progress report on rail joints submitted this year by the committee on way matters is a very interesting discussion of the good and bad features of the various types of joints now in use in electric railway tracks. The rail joint problem has been studied for many years by the ablest track engineers, but a perfect joint has yet to be developed. In paved streets rail joints are much more expensive to maintain than in open track, and because of this defective joints usually are allowed to stand without attention until the pavement, the substructure and the rails are damaged beyond repair. Few rails are actually worn out in service. They become kinked and flattened out at the ends because of defective joints until they are unfit for any purpose except to be cut up for scrap. The committee points out that as the joints represent only a small part of the first cost of track construction and as the life of the track is largely determined by the life of the joints, any additional expenditures within reason for improvements in this detail are fully justified.

It is of interest to call attention to the experiments made by the Board of Supervising Engineers, Chicago Traction, in connection with the second requisite for a perfect joint as given by the committee. The committee says in its report that "a joint should be mechanically strong and should be such that the rail at the joint will be equal in strength and stiffness to the rail itself." This is an old axiom of steam railroad track engineers, who experienced trouble with rails breaking just beyond the fishplates of joints designed to be stiffer than the rail itself. The theory that the joints should just equal the rail in stiffness is based on the phenomenon of progressive wave motion observed in steam railroad track under wheel loads of 25 tons or more. The deflectometer tests made by the Board of Supervising Engineers revealed no deflection of the rails except where the wheels were exactly over the point where readings were taken. In other words, with the heavy girder or T-rail sections used in paved streets and under comparatively light wheel loads, no measurable wave motion takes place in the rails. If the wave motion is absent or so slight as to be incapable of measurement, there could be no objection to the use of a joint having greater stiffness than the rail with corresponding freedom from loose rail ends.

The most important recommendation of the committee is that the top surfaces of the abutting rails should lie in exactly the same horizontal plane. This applies equally to bolted and welded joints. Grinding or filing of the abutting rail heads to an even surface is absolutely essential for satisfactory service, as a difference of even the one-hundredth part of an inch produces a hammer blow, which rapidly increases in violence and destructive effect.

A very interesting contribution to the subject of rail joints was the paper presented by Felix Lange, of Essen, Germany, chief engineer of the Goldschmidt Company. After a strong plea for a perfectly continuous rail, he discussed the strains to which rails are subjected through changes in temperature, and showed that where there are variations in temperature due to the seasons of 100 deg. Fahr. and more, a collar of steel welded about the base and flange of a rail, that is, around only 50 per cent of its section, is insufficient to withstand this strain. The result will be broken joints. His solution of this problem is to weld the entire rail section, except in localities like Southern California, where the range of temperature is not so great. In Europe this is being done by casting the thermit about the web and flange and allowing the slag to pass up around the heads of the rails, which are drawn together by clamps, but this is not practicable in this country owing to the higher content of carbon used in American rails. Hence for American conditions Mr. Lange recommends a weld of the entire section and later grinding off the riser around the head of the rail to give a smooth running surface.

Conventionalities

Good morning. How is your potential?

H. M. Scott, of the Griffin Wheel Company, is attending the convention for the first time. He is under the strict chaperonage of Mr. C. K. Knickerbocker.

Frederich H. Beach, receiver of the Eastern New York Railroad, Ballston Spa, N. Y., is a guest of the convention. He is accompanied by Mrs. Beach.

B. M. Lathrop, superintendent of the Colorado Springs & Interurban Railway, brought Mrs. Lathrop to the convention this year. They came by way of Chicago.

Among the visitors at the hall yesterday and attendants at the meeting of the American Association at the Greek Temple were Commissioner Edward M. Bassett and E. G. Connette, transportation expert of the New York Public Service Commission of the First District.

W. E. Wilkinson had the honor of occupying the first convention chair on the Boardwalk Monday morning. In his capacity as chairman of the roller chair committee he was out bright and early marshalling his forces at the three checking stations which have been established.

Pittsburghers, of whom there are several at the convention, feel quite at home on the Boardwalk. The clouds of black smoke which float out to sea just north of the Pier make some of the Iron City visitors to Atlantic City wonder if they really are 500 miles away from Smithfield Street.

Waldo E. Berry, of the Carnegie Steel Company, is the only salesman from the New York office of that company. Mr. Berry, as a member of the entertainment committee, is serving with Mr. Garland and Mr. Metteer on the golf committee, so the tournament will probably be run on strictly "Colonial" principles. Mr. Berry will also assist in the amateur vaudeville show.

J. A. Pearson, purchasing agent of the Public Service Corporation of New Jersey and the United Gas Improvement Company, spent Tuesday at the convention. Mr. Pearson did not wear a badge and for that reason probably was not recognized by many of the exhibitors, who would gladly have welcomed Mr. Pearson at their booths. He carefully examined, however, many of the exhibits in which he is especially interested.

E. M. Williams, of the Sherwin-Williams Company, called a meeting of himself yesterday morning. He adopted resolutions on a color scheme for convention badges for the future. Eddie is having a good deal of trouble with the red ribbon on this year's badge. He has a lot of new clothes and they are truly gorgeous (as to color), but a red ribbon seems to harmonize with nothing in his wardrobe except his night clothes. Red is peculiarly repulsive to him this year.

The hardest working young woman on the Pier yesterday was Miss C. F. Swenson, who is Secretary Donecker's capable assistant. She is in charge of registration of delegates to the American and Transportation & Traffic Associations and all railway guests and ladies. Single-handed she managed three counters at once from early morning until late in the afternoon, and by her tact and patience greatly facilitated the progress of registration.

C. S. Sergeant, vice-president of the Boston Elevated Railway and past-president of the American Association, arrived in Atlantic City Tuesday morning. The company is well represented at Atlantic City. Besides four or five representatives from the engineering department the company has sent to the convention its treasurer-auditor and its claim agent, three senior division superintendents who had not previously attended a convention, its signal man and its assistant superintendent of the elevated division.

A group picture of the Engineering Association delegates will be taken immediately after the adjournment of the morning meeting at 12.30 p. m. The delegates will assemble in the garden of Captain Young's villa on the north side of the Pier just beyond Marine Hall. Copies of this picture may be obtained from the official convention photographer, Harper Smith, 1637 Boardwalk.

The Metropolitan Street Railway, New York, has a representative delegation of officers at the convention. It includes H. H. Adams, superintendent of rolling stock and shops; L. H. Palmer, superintendent of transportation; William T. Dugan, engineer maintenance of way; F. C. Nordsick, purchasing agent; J. R. C. Armstrong, electrical engineer, and F. T. Wood, assistant to general manager.

Paul Winsor, past-president of the Engineering Association and chief engineer of motive power and rolling stock, Boston Elevated Railway, will be missed at this convention. Mr. Winsor has been most regular in his attendance at conventions in the past, and his wide experience in engineering work has made his discussion of engineering topics most instructive. He is unable to be in Atlantic City this year on account of business.

Captain Robert McCulloch, president United Railways of St. Louis, and Richard McCulloch, vice-president of the company, will not be here. This is "Aviation Week," and high records for traffic are expected by the United Railways, as well as high records of flight by the aeronauts. The United Railways has a good representation here, however, in J. E. Burgess, C. B. Hardin, M. O'Brien, James Samuel and Dr. E. P. North.

The Pittsburgh Railways Company has sent 14 officers to the convention this year. They are S. L. Tone, second vice-president; P. N. Jones, general superintendent; F. R. Phillips, superintendent of equipment; C. S. Mitchell, auditor; J. A. Laughlin, traffic agent; F. Uhlenhart, Jr., chief engineer; W. H. Boyce, superintendent Beaver division; C. G. Rice, superintendent claim department; J. M. Larned, engineer maintenance of way; G. W. Emery, assistant engineer maintenance of way; Thomas Davin, division track foreman; Michael Walsh, division track foreman; John A. Rogan, master mechanic; and H. K. Gowdy, chief engineer of power stations.

Joseph A. McGowan, the author of the paper before the American Association on Thursday on "What Interurban Railway Companies Do for the Public," is secretary and treasurer of the Terre Haute, Indianapolis & Eastern Traction Company, and a cousin of Hugh J. McGowan, president of the company and also president of the Indianapolis Traction & Terminal Company. Joseph McGowan has been associated with traction enterprises in Indianapolis for the past eight years. Prior to that time he was connected for over 15 years with the Grand Trunk Railway, Portland, Me., where his boyhood and young manhood were spent.

The Syracuse Rapid Transit Railway, the Oneida Railway and the Utica & Mohawk Valley Railway have a large number of delegates in attendance, headed by C. Loomis Allen, vice-president and general manager of the associated lines. Among those in the party are J. E. Duffy, superintendent, Syracuse Rapid Transit Railway; T. C. Cherry, superintendent, Utica & Mohawk Valley Railway; I. H. McEwen, superintendent, Oneida Railway; R. E. McDougall, claim agent, Utica; A. D. Brown, claim agent, Syracuse; P. J. Honold, purchasing agent; J. M. Joel, auditor; C. R. Gowen, general passenger agent; F. W. Watts, general freight agent; W. J. Harvie, chief engineer; J. P. Barnes, electrical engineer; E. P. Roundey, engineer maintenance of way, Syracuse Rapid Transit Railway, and M. J. French, engineer maintenance of way, Utica & Mohawk Valley Railway. They are all registered at the Traymore.

The form of Joe Cunningham, of the Allis-Chalmers Company, towers above the crowd.

Fred N. Root, manager of the Root Spring Scraper Company, Kalamazoo, Mich., is attending the convention for his company.

Have you observed that the Brill car, on the Boardwalk, is several lengths ahead in its race with the sand automobile?

The accountants are requested to take account of the fact that their meeting this morning will be held at the Hotel Chalfonte.

Jim Gardner from Chicago is here in the interests of the Allis-Chalmers Company, for which he is manager. Mrs. Gardner is with him, which accounts for his sedateness.

E. T. Pardee, one of the members of the Exhibit Committee, blew in from Boston on Tuesday morning. His rotund figure is a tribute to the Allis-Chalmers Company.

Jack Blackhall, general manager of the Chicago & Joliet Electric Railway, is completing his twentieth attendance at this convention with his genial smile, which has been never known to come off.

Walter S. Heaton, claim agent of the Los Angeles-Pacific Company, Los Angeles, Cal., is in attendance. Mr. Heaton is the only representative of the Los Angeles companies at the convention.

Frank Randall, the tar of tars in the street railway field, looked larger than ever last evening in his six-foot two, capped by a top hat. Randall never could help being in evidence by reason of his figure.

John R. McGivney, purchasing agent, New Orleans Railway & Light Company, is missing from the convention. A careful search has elicited the information that he was scheduled to be married on Wednesday, Oct. 12.

There will be a Dutch supper given at the Marlborough-Blenheim Hotel to-night at 6:30 o'clock by the Southern supply men to the Southern railway men. All Southern railway men are cordially invited to be present.

"The man who dared" held his hand in the pneumatically operated door of the "pay-within" car with an expression on his face which said plainly, "Behold a hero!" And everybody smiled when he said, "Why, it didn't hurt a bit."

It has been noted that Jack Shanahan, general manager of the Washington, Baltimore & Annapolis Electric Railway, has been joyfully renewing old acquaintances, among whom is to be known one Colby from the Pacific slope.

W. O. Wood, president of the New York & Queens County Railway, is establishing the latest novelty in men's attire in the way of chamois gloves and an English walking stick. The style will undoubtedly be copied by many of his admirers.

There were objections in some quarters in regard to the strict enforcement of the 1 o'clock closing law in Atlantic City. Mayor Stoy, who was found by an ELECTRIC RAILWAY JOURNAL reporter at Old Vienna at 2 o'clock this morning, said that as far as he could see there was no cause for complaint.

One of the latest arrivals at the convention is S. Misaki, engineer-in-chief of the Hanshin Electric Railway, Sutka, Japan. Mr. Misaki is an associate member of the A. S. & I. R. A., and this is his second visit to the United States. He attended the convention held in Chicago in 1899, and is greatly interested to learn what developments have been made in electric traction since that time. Mr. Misaki is making a trip around the world and will remain in Atlantic City for several days. The Hanshin Electric Railway now operates 20 miles of double-track in Hanshin.

A lady visitor, examining the Samson Spot Cord demonstration in the Electric Service Supplies Company exhibit, wanted to know if the "machine" pulling the cord was for the purpose of "saving the conductor the trouble of ringing up fares." The gentlemanly guide threw up his hands and fled.

W. H. Heulings, Jr., of The J. G. Brill Company, was in the Shelburne Grill last evening trying to make up his mind whether "this sort of a convention" was better than the "convention we used to have." Mrs. Heulings was strongly in favor of the new style of gathering, and Mr. Heulings finally agreed to make that decision unanimous.

To meet the objections of certain visitors the Electric Service Supplies Company has provided caps from Mellen's Food bottles for those who prefer this form of mouth piece to test the pneumatic bell ringer. The usual foil caps are still kept on hand for those to whom they seem more natural.

R. E. Adrian, president of the Railway Men's Supply Association of the Railway Master Mechanics and Car Builders' Associations, is at the convention looking over the splendid exhibits. Perhaps he has in mind plans to go this convention one better in June of next year. Mr. Conway, secretary of the Supply Men's Association, is also here.

Between the Wellman dirigible balloon at the Inlet and the convention at the Pier no one can say that the latest developments in transportation are not represented this week at Atlantic City. The general opinion seems to be that electric traction has not much to fear from aerial competition. Dirigibles and aeroplanes may be all right for high fliers, but most people on their travels will prefer to stay nearer earth. In this connection it might be said that Mr. Wellman has stated to some visitors that he hopes to be ready for his long flight toward the end of this week or the early part of next week. Some matters still remain to be attended to in connection with the machinery—otherwise the balloon is nearly ready for its long trip.

Bearing a petition signed by all the directors and many stockholders of the Union Traction and Philadelphia Rapid Transit Companies, a delegation called yesterday on E. T. Stotesbury, head of the banking house of Drexel & Company, requesting him to accept election as a director of the Philadelphia Rapid Transit Company. Ellis Ames Ballard, general counsel of the company, was the spokesman of the delegation, which included Charles O. Kruger, president of the Philadelphia Rapid Transit Company, and J. J. Sullivan, president of the Union Traction Company. Mr. Stotesbury was urged to accept a directorship as a duty that he owed the public. There are no vacancies on the Philadelphia Rapid Transit board, but a number of directors have stated their willingness to resign in order to make way for Mr. Stotesbury.

ACCOUNTANTS TO MEET AT CHALFONTE

Owing to the poor acoustic properties of the Annex Court hall, on the Pier, the Accountants' Association will hold its remaining sessions at the Hotel Chalfonte.

CLAIM AGENTS' DINNER

The annual dinner of the Claim Agents' Association at the Windsor Hotel last evening was one of the pleasing and memorable events of the convention season. The attendance was beyond expectations and there were a number of ladies in the party. The dinner was good and the speeches were as witty as they were brief. The speakers were formally limited to three minutes each. H. K. Bennett was toastmaster and the speakers on the program were Carl Sylvester, F. W. Johnson, W. F. Web, E. C. Carpenter, A. G. Rippey, S. S. Hallam, C. B. Hardin, J. S. Harrison, T. B. Donnelly and C. A. Avant.

ADDRESS OF PRESIDENT SHAW OF THE AMERICAN ASSOCIATION

At your last annual meeting, held in the city of Denver in 1909, I undertook somewhat briefly to relate the history of your association from the date of its formation in 1882. At the mid-year meeting, held in New York in January last, I was privileged to address the members on questions of public opinion and the general conditions confronting electric railway companies. It is now my purpose to bring to your attention a few facts concerning the work of the association during the past year.

MEMBERSHIP AND FINANCES

Naturally, in passing judgment on the efficiency of the work of the association, as well as its ability to continue to carry out the objects for which it was formed, the most important element of consideration must be the strength of its membership and its financial condition, and it is with a feeling of gratitude to the officers who have been associated with me, to the officials of the member companies, to the committeemen who have devoted so great an amount of valuable time and to the associate members, to whose combined efforts all credit must go, that I call attention to our total membership and the healthy condition of the association's finances. There are enrolled to-day 356 companies, a net increase of 41, and 1108 associates, a net increase of 291 during the present year. I desire to take this opportunity of expressing my appreciation of the action of the new members who have consented to assume their proper share in our work, and again cordially to thank our old members who, both from the standpoints of financial assistance and personal co-operation, have been unwavering in their support. The small number of resignations and the comparatively few delinquents shown in the treasurer's report manifest the great interest sustained throughout the past year and indicate how confidently our members look forward to increasing usefulness on the part of the association.

ASSOCIATE MEMBERSHIP

Speaking particularly to our associates, I would call especial attention to the change in your status as developed by our committee on revision of associate membership. The new plan makes those who under our by-laws are permitted to attend the executive meetings of the American Association eligible as associate members of that body. Other associate members can ally themselves with any of our affiliated associations which possesses the grade of associate membership. This plan undoubtedly places our individual membership on a much more satisfactory basis than before, both as to the identification of the individual with a specific branch of the work and as to a more uniform and equitable arrangement of the benefits conferred. I hope you have appreciated the policy of the association in supplying the associates with printed material during the past year. No better evidence than this can be shown of our recognition of the influence for good which an aroused associate membership can exert; therefore, we have been anxious to place in your hands material facts that will enable you to speak out truthfully and intelligently in behalf of the electric railway industry when the opportunity presents itself. I also wish to express the appreciation that we all feel for the open display of the emblem of your membership, now so generally worn by our associate body. At different times I have spoken of my faith in the good that can be accomplished through the exhibition of this pin and only wish to add now that personal observation of its effect has strengthened my confidence manyfold.

TREASURER'S REPORT

As will be seen from the treasurer's report, the cash balance on Sept. 30 amounted to \$14,862.73, an increase of \$4,297.62 over the balance shown at the end of the previous

fiscal year. It seems well at this time to call attention to the increase in expenses and to say that this is in large part chargeable to the greater cost of printing and distributing the annual proceedings, which, as you know, were considerably enlarged both in number of pages of printed matter per set and in the number of volumes distributed, due, of course, to increased membership, particularly in the associate class. Some other items, however, such as the general distribution of material throughout the year to the large associate membership, the inauguration of the mid-year meeting, the installation of the information service for the Claim Agents' Association, etc., played a minor part in adding to the expense of conducting association affairs. I might say, as a matter of interest, that had the work proceeded on the same basis as in 1908-1909 the expenses this year would have shown a considerable decrease, although, in this connection, I think we all should expect that expenses are not likely to decrease if our association is to progress from year to year.

MID-YEAR MEETING

Our members will recall their approval at the Denver meeting of a resolution providing that the American Association supplement its annual convention meetings by a mid-year meeting, to be held at the time of the winter session of the executive committee at the association headquarters in New York, this meeting to be open only to the presidents of other duly accredited representatives of the member companies and to be held for the purpose of considering in executive session matters of pressing interest to all the member companies. The first meeting under this plan was held at the association headquarters on Jan. 27 and 28 and was attended by about 125 executives of member companies from cities as far apart as Montreal, Canada, and Dallas, Tex. Addresses by men prominent in our business were presented and discussions of lasting value to each one of us ensued. The papers read at the mid-year meeting were subsequently printed, and thus by wide dissemination great interest was aroused in the problems which our industry now faces. As indicative of this interest, many requests for printed copies of the papers have been received from all parts of the country and applications still continue to come in.

At this meeting, also, H. G. Donecker was appointed secretary and treasurer of the association to take the place made vacant by the resignation of B. V. Swenson. In the opinion of your executive committee, Mr. Donecker's previous experience both in association work and before he became connected with our organization eminently fitted him for the office to which he was appointed, and the experience of the past eight months shows that this judgment was correct.

The wisdom of the committee which suggested the mid-year meetings, at which those who shape the policies of the member companies may meet and exchange their views, has been thoroughly demonstrated, and beyond question these meetings will greatly increase the value of membership in the association. To those who attended the first mid-year meeting I need not say "Come again," but I most earnestly urge those who did not participate this year not to fail to be on hand at the next mid-year meeting. None of us can afford to neglect such an opportunity as the mid-year meetings offer to express and hear expressed views and suggestions as to ways and means for promoting the interests of our transportation companies.

CLOSER AFFILIATION WITH SECTIONAL ASSOCIATIONS

Coöperation must be the keynote of association work, and in support of the principle your executive committee at its January meeting approved a plan by which the presidents of the State, sectional and national associations of America should become members of our committee on public relations. This action followed a joint meeting of the representatives and of the public relations committee, which had for its object the consideration of ways and

means by which the various associations representing electric railway properties could work together with the unity of purpose that the mutuality of our interests demands. Your association has endeavored to perfect the arrangement further by arranging for the interchange with the local associations of information pertaining to legislation in the various States, in order that the member companies in these States and in others immediately adjacent should be kept closely in touch with important developments along this line. While some progress has been made in developing this plan, much remains to be done to make it automatic in operation and comprehensive in scope.

INFORMATION BUREAU SERVICE

Recent statistics have shown that approximately $4\frac{1}{2}$ per cent of the gross earnings of the electric railways of this country are expended to effect settlements of accident claims to persons or property and to defray the legal expenses in connection with these claims. On the basis of the combined earnings of the electric railway properties, as shown in the report of the United States Census for 1907, this $4\frac{1}{2}$ per cent represents the enormous total of \$18,176,305, as against 3.9 per cent in 1902, representing the total payments of \$9,395,545. From this it will be seen that in five years this account has almost doubled, a fact that should impress us with the important duty we owe our companies, first of all in the lessening of the number of accidents, and secondly, in instituting methods by which these companies may be protected from fake or excessive claims. Many officials of member companies engaged in claim department practice have within the past few years made a careful study of the advantages to be derived from reporting the names of claimants to a central bureau to determine whether or not the individual has made previous or concurrent claims against street railways, steam railroads or accident indemnity companies. Their consideration convinced them that benefits were likely to follow, and a trial of the plan has brought full confirmation of this expectation.

Your Claim Agents' Association, as a body, made a careful investigation of this whole matter, with the result that it recommended to your executive committee in January last the acceptance of a proposition from the Hooper-Holmes Information Bureau by which all members of our association can at a nominal expense file information as to claimants and receive information of duplicate claims. For this service the association subscribes to a membership in the bureau at a cost of \$500 annually, whereas individual companies which enrolled were required to pay \$100 a year for the service for their own particular organization. I think that the association is to be congratulated that it was able to effect such an advantageous arrangement, and the participation in it, particularly of the larger companies, indicates its success. But its real value depends upon general utilization by each and every one of the member companies for whose benefit the contract was made. I would, therefore, ask that you give the matter a thorough trial, the cost being almost negligible and the possible benefits both to your company and the other members being many and valuable.

CHANGE OF NAME AND MEMBERSHIP OF STEAM RAILWAYS

Comment on the progress of electric traction would be incomplete without some reference to its increasing application by steam railroad companies, and it must be with a feeling of pride and lasting gratification to all who have assisted in the development of electric railroading that trains now roll in and out of the magnificent terminals of the steam railroads propelled by electric power. What is more natural, therefore, than that the men connected with steam railroads and engaged in this work of electrification should express a desire to affiliate with our association, which is the only one that has given detailed attention to

and has solved many of the problems which they now will be called upon to face? It was with this in mind that your executive committee at its January meeting gave attention to a plan by which the name of the association and its constitution and by-laws should be broad enough to cover electrical operation by the steam railroads of the country. Committees were appointed to consider these two propositions, with the result that you will have presented to you in the report of the executive committee the definite suggestions covering the changes necessary to provide for this new class of membership and a recommendation that the name of the association be changed to "American Electric Railway Association." This plan, I am convinced, will be received without a dissenting vote. That the interest of the steam railways has been aroused is shown by the fact that the Pennsylvania Railroad Company has recently joined the association and that the whole question is now under consideration by most of the other steam railroads which are affected, with what to me appear to be excellent chances of favorable results. The coöperation of the extensive personnel of the steam railroads is bound to work to our mutual great advantage. Their interest, already manifested by participation in committee work, guarantees increased strength, efficiency and influence on the part of your association.

COMMITTEE WORK

The committee reports to be presented at your convention will speak for themselves. It is almost needless for me to speak of the amount of time and energy which the preparation of these reports represents, and, being mindful of the hearty appreciation of the work performed by every one of our committees, I would refer to the reports of the committees on interstate commerce commission affairs, public relations, insurance and compensation for carrying United States mail, as matters calling for attention and perhaps action at this time.

The first of these reports, that is, the one on interstate commerce, emphasizes the need for carrying out the plan of which I have heretofore spoken, that is, of keeping member companies in touch with legislative matters in general, and I bespeak for the report your careful consideration. The report also shows the trend of public opinion toward the regulation of electric railway companies and corporations in general.

The report of the committee on public relations somewhat similarly treats of the situation as it applies to State regulations and is, therefore, equally valuable. Future plans of the committee on public relations include the publication of a digest of the laws of the different States relating to electric railway companies. The committee hopes to have this compilation completed and in the hands of member companies about the first of the coming year.

The report of the committee on insurance is a development which has been given most careful consideration by the committee members and covers a matter which has also been discussed at length by your executive committee at three of the four meetings held during the present year. Undoubtedly, there is a way of handling insurance matters in which the association can be of no real tangible value to its members, and this report should be the means of guiding us aright in the selection of a proper plan. I bespeak careful attention to the reading of the report and trust that it will bring forth discussions that will set forth the views of the members and lead to the inauguration of a method which will save to the railway companies an exceedingly large proportion of the money they now pay out in insurance premiums.

With regard to the report of the committee on compensation for carrying United States mail, I might say that the present year was not an opportune time to expect definite results; therefore, your committee has used its re-

sources by attempting to gather detailed information of conditions throughout the country. The committee has secured data that I think will demonstrate beyond question the reasonableness of our claim that our compensation for this service is not adequate. Your president has personally investigated this matter at Washington and is satisfied that your committee has followed the proper course. The committee is now ready to take some definite action, having in its hands the necessary material to justify the position taken.

Another pleasing feature of the work of the committees of all associations this year has been the more general use of the association headquarters as a meeting place, a practice which I think we should encourage in so far as it may be consistent with the geographical location of the committee membership.

CONVENTION LOCATION

Atlantic City was selected for the meeting place this year because it seemed to possess more advantages in the way of hotels, meeting places and exhibit hall than any other available city in the East, and we trust that the choice of the executive committee will meet with your approbation. We have again been favored with a most elaborate and instructive exhibit by our allied association, the Manufacturers' Association, to which we are under great obligations not only for the exhibit and for the entertainment which it has provided here, but also for many courtesies extended during the past year.

During the past year the association has been the recipient of a proposal, with the details of which I presume you are acquainted, from the Chamber of Commerce of Saratoga Springs, N. Y. Briefly, it contemplated the erection of that city of a large hall to be designed and built under the direction and supervision of the association, to which we were to receive title at the end of five years in consideration of meeting in that city for three years of these five years. The subject was very carefully considered by your executive committee and their report to be presented at this meeting will bring the matter before the convention for discussion.

RECORDS OF CONVENTION BENEFITS

I should also like to call attention to a suggestion sent to member companies by which they might increase the benefits from the attendance of their representatives at the convention, by securing from each representative, after the convention, an outline of the new ideas obtained by him during the sessions, or from talks with other delegates outside the meeting halls, or from an examination of the exhibits of electric railway appliances. At least one company has followed this plan for two years with very satisfactory results to itself. I believe that the plan should be generally followed and that a digest of the main features of these reports should be sent to the headquarters of the association. It would then be possible to compile these reports in a confidential bulletin which would be issued to the member companies and would undoubtedly contain much information of great value to them. The data would also be useful in another way as indicating the subjects in which those in attendance at the convention are most interested and would aid considerably in the preparation of the programs for the future association meetings.

WORK OF THE HEADQUARTERS

At the Denver convention I described at some length the work carried on by the association headquarters, and without going into details again this year, I desire to state that, extensive as the work was in 1909, it has been greatly increased during the year just closed, and, as is to be ex-

pected, the additional demands have resulted in a marked increase in efficiency even though the force employed is slightly reduced from that of 1909. It must be apparent to us all that the greater the number of requests which we make for useful information, the greater will be the resources of the headquarters and the more promptly will it be possible to provide the data asked by member companies. The fund of information is rapidly growing and it is now possible in many cases to respond immediately to requests which come by mail, telegraph and telephone. This availability of material is due, of course, in a great measure to the coöperation of member companies in supplying data called for from time to time. The inclination to do this even at the expense of considerable time and effort has been thoroughly evident in the past year and is an indication that the member companies are alert to the value of a central organization for the collection and dissemination of information in connection with electric railway operation. Heretofore your aid has been asked by the association in responding to requests of this nature, and I wish again to impress upon you the importance of giving it, and would also suggest that equal importance attaches to your assuming the initiative in calling for investigations of various kinds. Doubtless, good results have been obtained by our member companies in the interchange of information between themselves, but it must be obvious that far better results will be obtained if all inquiries of this kind are directed to the central office, which may have the information on file, or, if not, can quickly obtain it through communication with the members at large, and probably in many instances save these companies the trouble of responding to duplicate calls.

There is another matter which I think merits your consideration, and that is the need of permitting some latitude in the use of the information furnished. This is daily becoming more necessary, and it would serve a splendid purpose if the use of data heretofore furnished as strictly confidential information could, to some considerable extent, be left to the judgment of the officers of the association or its headquarters. My personal attention has been directed to the need of this in several instances this year, in view of which I have thought it desirable to call the matter to your attention. In the past twelve months various compilations prepared by the association have been required for use in arbitration proceedings, in hearings before public service commissions, before city councils and legislative bodies, and in many other ways, some of which require more or less publicity. In many cases the immediate receipt of the information by the member company is essential, and if the association is given a certain amount of freedom in utilizing the material in hand, I am confident that a considerable increase in valuable results would accrue.

WORK OF AFFILIATED ASSOCIATIONS

I desire to call attention to the splendid programs arranged by our affiliated associations, and, without going into details, mention some of the important work accomplished during the past year.

ACCOUNTANTS' ASSOCIATION

The arrangement to which I referred last year by which our Accountants' Association considers, in connection with the Interstate Commerce Commission, questions arising under the classification remains a most important and valuable feature of the work of our affiliated association. The results of this have been distributed to member companies in the form of Accounting Bulletin No. 5. Another splendid development of the year is the report of the committee on shop accounting, the details of which fill a want of member companies, as shown by many requests for information along this particular line. This report, as you

know, is the joint product of the Accountants' and Engineering Associations, and is a tribute to the harmonious spirit evident throughout the various branches of our business.

ENGINEERING ASSOCIATION

As in former years, the work of the Engineering Association has been carried on entirely by committees, the number of which has been increased by the addition of the committee on buildings and structures, a branch not heretofore given special consideration, and the committee on heavy electric traction, the personnel of which includes prominent officials of steam railroad companies. The formation of this committee is in line with the broadening of the scope of the association to include the operation of the electrified sections of steam railroads and, undoubtedly, is a field of effort from which splendid results may be expected.

Standardization, of course, remains one of the fundamental objects of our Engineering Association, the officers of which I think are to be complimented upon the careful manner in which they are taking up the question of the adoption of definite standards or recommended practices. It is unnecessary for me to speak at any length upon the valuable work performed along this line. Standardization means tangible benefits to our companies and is a matter to which every one of us should give increasing thoughtful consideration.

CLAIM AGENTS' ASSOCIATION

I have heretofore spoken of the installation of the service of the Information Bureau for the use of the members of the Claim Agents' Association. I think that this is undoubtedly the most important work accomplished by this affiliated association during the present year. The officers have, as in former years, been most active in their efforts to reduce to a minimum the losses due to the claims of accident fakers, and, in addition, have considered many subjects of general interest and value which should bring about effective remedies and results.

TRANSPORTATION AND TRAFFIC ASSOCIATION

Another program of particular excellence is that provided by our newest association. The field of investigation and the opportunity for specific lines of work are especially inviting in the operating department, a fact well exemplified in the committee reports and papers this year. One important feature should have your earnest attention; that is, the report of the newly formed committee on the construction of schedules and timetables, a line of investigation suggested by one of the prominent members of our association in January last. The continued excellent work of the other committees is noteworthy and its value must be clearly apparent.

CONDITION OF THE INDUSTRY

No one who has not been intimately acquainted with the painstaking work during the year of our association and its affiliated associations, both at the main office and through committees, can realize the importance which this organization has upon the sound development of the industry.

The increase in the gross business of the electric railway companies of this country, mentioned in my address of last year, has continued during the twelve months which have just passed. This condition, although gratifying so far as it goes, has been accompanied proportionately by a still greater general increase in the cost of materials and labor. This fact emphasizes the most serious aspect of our business, namely, the gradual but sure decline on many of our properties of the margin between the income from operation and the operating expenses per passenger carried. The recognition of this condition is no novelty to

those engaged in electric railway work, but its full import and significance do not yet seem to be realized by the public. Personally, I can see no escape from one of the three remedial measures suggested last year—viz., higher fares, or reduced transportation for the present fare, or relief from some of the present forms of taxation—if the electric railways of the country are to fulfil the due measure of service which is demanded of them by the public.

Concurrently with these conditions there has been a gradual cessation of activity in the electric railway field so far as new construction is concerned. Capital will not engage in unprofitable enterprises and the public cannot expect a change in this attitude under the present condition of affairs.

REMEDIAL MEASURES

In my address in January I spoke of the most practicable means of securing the adoption of these remedial measures, namely, to make the public acquainted with the real conditions of railway operation. The general trend in both national and State governments is toward a closer supervision of the financial operations of corporations than ever before and toward the collection and publication of the returns so secured. This is one way by which the public will be informed of the real situation of affairs. Knowledge of the conditions of electric railway operation on the part of the public should be welcomed. The more thoroughly it is acquainted with the financial facts surrounding our properties, as well as with our problems of operation, with the difficulties confronting us in taking care of rush-hour traffic and with the increase in the cost of our labor and the materials which we have to buy, the better for us and for the public. I am confident that when the public understands these real conditions opposition to the introduction of some remedial measure or measures will disappear. We have suffered in the past from public ignorance of these facts, an ignorance for which we ourselves are to blame perhaps as much as, if not more than, the public. In too many cases, perhaps, we have shown a disposition to remain silent when incorrect statements have been made concerning our own properties or concerning electric railway properties in general. It is time now not only to be ready to give the facts when asked, but to take the initiative and do our part in making them public, so that misapprehension as to the correct condition of affairs will decrease.

There are two other methods of reaching the public to which I wish to refer in this connection. One is through the newspapers and periodicals. The other is through individual effort. I have sufficient confidence in the integrity of the press to believe that the newspapers and periodicals will treat us fairly if they know the facts, and these we should be willing at all times to give. They are the molders of public opinion, and if some of them have not always treated both sides of questions relating to electric railways in the way in which we think they might have done, it may have been because they did not have at their disposal the facts which we could have given them. There remains the medium of individual effort. We have both in the holders of our securities and in our employees two large bodies of individuals whose influence should go far in assisting this missionary work, and both of them ought to be vitally interested in the prosperity of our companies. Possibly too little attention has been paid in the past to making all of those who are financially interested in our companies acquainted with the interests of the companies themselves and to securing their coöperation in promoting the general welfare. So far as our employees are concerned, we have an intelligent body of men who should be capable of understanding the seriousness of the problems which confront us in earning sufficient revenue to maintain our properties in good condition. Each com-

pany needs an esprit de corps animating its entire organization. This can be gained in many ways and the manager of each property should do his best to create it.

Still another valuable agency which can be utilized in this work is our associate membership. We now have 1,108 associate members, but this membership should be markedly increased when we consider the number of those directly and indirectly identified with electric transportation. It should include representatives of every business allied with our industry, and should provide an element of great strength in a movement which, if successful, must work to the advantage of all.

Undoubtedly, a considerable period of time will be required to obtain the results sought. There must be active and persistent application on the part of the leaders of our business and a constant study of the condition of the public mind to know along what lines false ideas have been or are developing and to take the necessary corrective measure. The greater part of this publicity work must necessarily be carried on by individual members of the association so that conditions affecting local interests may be properly set forth. But the association should take up the question in its broad or general sense and, as a foundation for its task, I recommend that committees be appointed to investigate the subjects of a scientific basis for rates and fares and of equitable methods of taxation.

CONCLUSION

Speaking somewhat personally, perhaps, this convention marks the twentieth year that I have been privileged to be connected with the work of the association. You have honored me with election as an officer of the association during six of the past seven years, and for the past two years you have chosen to elect me as your executive head. I am glad to turn over the responsibilities of the office to the gentleman who is to succeed me, with the association strong in membership and strong financially and with the assurance to him of my hearty coöperation in the future.

LADIES' PROGRESSIVE EUCHRE

While the gentlemen were rooting at the world's championship baseball game on the Convention Pier last night the ladies were enjoying a progressive euchre in the ballroom of the Marlborough-Blenheim Hotel. The affair was in charge of a committee of ladies who volunteered to relieve the entertainment committee of all responsibility, so that the members of that committee could devote their efforts to policing the bleachers in Marine Hall. The ladies' reception committee was headed by Mrs. A. L. Whipple and she was assisted by Mrs. C. Loomis Allen, Mrs. H. H. Adams, Miss May Hedley, Mrs. R. E. Danforth, Mrs. J. H. Pardee, Mrs. E. F. Fassett, Mrs. W. B. Rockwell, Mrs. T. C. Cherry, Mrs. D. A. Hegarty, Mrs. W. H. Heulings, Jr., Mrs. Joseph R. Ellicott, Mrs. H. C. Evans, Mrs. William Wampler, Mrs. W. G. Gove, Mrs. George Keegan, Mrs. E. M. Williams, Mrs. H. C. Donecker, Mrs. C. J. Pizzini, Mrs. W. S. Bartholomew and Mrs. W. K. Archbold.

About 60 tables were made up and a number of handsome prizes were awarded to the ladies who finished the evening's play with the highest score.

The Tramways Committee of Keighley, England, has recommended the construction of a trackless trolley system 23 miles long, connecting that town with Stockbridge. The cost is estimated at from \$6,000 to \$7,500 a mile. At the present time a motor bus is operating over this route, and from April 1 to Sept. 15 its earnings were at the rate of 24 cents per car mile. The operating expenses were 18 cents per car mile, and it is believed that the operating expenses with the trackless trolley can be reduced to 12 cents per car mile.

THE BASEBALL GAME AND SMOKER

When the rival indoor baseball teams trotted out on the field last night arrayed in their athletic accoutrements they were greeted with prolonged applause. The supply men had all the advantage of weight, but the superior speed of the railway men was apparent. The teams lined up as follows:

RAILWAY MEN	SUPPLY MEN
Shorty Shaw, captain	Pop Ellicott, captain
Buggs Brady	Honus Hawley
Lifty Harries	Crab Hequembourg
Griff Allen	Buster Sisson
Cy Hedley	Birdie Peirce
Oats Wood	Hook Williams
Mutt Brush	Admiral Evans
Mattie Shannahan	Olaf Conwell
Heinie Pardee	Chief Partridge
SUBSTITUTES	SUBSTITUTES
Three-finger Page	Muggsy McGraw
Topsy Todd	Prince Castle
'Peerless Donecker	Mike Heulings
	Water Boy
	Joie Cunningham

LATER

At the hour of going to press the baseball game between the A. S. & I. R. A. and the A. S. & I. R. M. A. teams has the appearance of a free fight, with the umpire in the sea lion's cage. As soon as the coroner and police force are obtainable a full account of the match will be printed. The official score was 10 to 7 in favor of the railway men's team.

Later inquiries at the Methodist Hospital elicited the information that Umpire Hank Fassett and Admiral Evans, the right fielder of the supply men's team, were expected to recover.

The world-renowned Eureka Quartet rendered a number of song-and-dance specialties, and W. T. Stanton, of the General Electric Company, gave a finished exhibition of buck-and-wing dancing. There were free smokes for everybody before, during and after the festivities.

MEETING OF ILLUMINATING ENGINEERING SOCIETY

The next annual convention of the Illuminating Engineering Society will be held in Baltimore Oct. 24 and 25, and will be followed by a course of lectures on illuminating subjects to be given at Johns Hopkins University. These lectures will be 36 in number and will be delivered by men prominent in the line of work upon which they will lecture. The lectures will be completed between the dates of Oct. 26 and Nov. 8. Arrangements have also been made for complete demonstrations at the lectures and for experimental laboratory work at the university upon the subjects treated. A fee will be charged for admission to the course of lectures and for the laboratory instruction.

This is the first convention for a number of years which A. H. Classen, president of the Oklahoma Railway, has missed. Mr. Classen has just returned from a trip abroad of two months or more, and had been absent from Oklahoma City so long that he felt that his presence there was necessary. His company, however, has several representatives in attendance at Atlantic City. In a recent interview with Mr. Classen, after his return from Europe, he said that the Oklahoma Railway had a number of important improvements under way, including a large office building, which will also include a waiting room and will be one of the largest and handsomest structures in the city. It will also be entirely fireproof. Mr. Classen believes that the association should meet in St. Louis or in some other city in or near the Southwest before long.

FIRST MEETING OF THE AMERICAN ASSOCIATION

The first meeting of the American Street & Interurban Railway Association was held yesterday afternoon at the Greek Temple. President Shaw called the meeting to order at 2:30 and read his annual address. It is published elsewhere in this issue. On motion of Gen. Harries the association voted that a committee consider the suggestions contained in the report. The president appointed D. A. Hegarty, C. C. Smith, J. H. Pardee, H. W. Fuller and F. A. Healy to act on such committee.

President Shaw next called for the report of the secretary and treasurer. It is published in abstract elsewhere in this issue.

The report of the committee on compensation for carrying United States mail was then presented by Mr. Fassett.

The report of the committee on the Brill prize was then read by the secretary. It was signed by W. H. House, of Baltimore, and said:

"The notices covering the offer of The J. G. Brill Company for a prize essay on the 'Design of an Electric Car for City Service' were forwarded by the Brill Company to the various colleges in December, 1909, but as no responses were received up to July 1, 1910, the time indicated in the notices when these were required to be submitted, the natural assumption is:

"1. That the offer did not arouse sufficient interest on the part of students.

"2. That notices were forwarded so late after the opening of the scholastic year that students were engaged in other work, or had already selected subjects for their graduation theses.

"3. That it was felt that the subject had been so fully treated by contestants in the previous years that there was practically nothing further left open for discussion.

"I am informed by the Brill Company that it proposes this year to offer the same prizes as heretofore and is now in communication with President Shaw with a view to determining subject for these for 1911 and 1912. This should afford ample time to contestants who may decide to compete to prepare their essays. The action of the Brill Company in this matter is very commendable and should receive the support of the association, as we all realize how difficult it is to obtain capable men who have been educated along technical lines, to fill positions of responsibility. I am informed that some of the railway companies have instituted apprenticeship systems, the object being to train young men for future positions with their companies. These positions are filled largely, I understand, by graduates from the different schools and colleges. The Brill Company has, however, gone a step further, as its plan has in view the interesting of students in corporation work and methods prior to their graduation. The offering of these prizes should act as a stimulus to useful thought, as well as encourage young men to make a scientific study of what is best adapted to railway requirements in the way of rolling stock."

DISCUSSION ON RATE REGULATION

Frank R. Ford then read his paper on rate regulation. This paper is printed on page 752.

William J. Clark, General Electric Company, thought that Mr. Ford's paper emphasized the importance of having a committee of the association investigate the subject of the establishment of a scientific basis for fares.

R. P. Stevens said that the most important factor in the question of fares was whether there was any competition. Assuming that there was none, he believed, from his experience, that a fare of 2 cents a mile for single tickets and 1¾ cents per mile for round-trip tickets produced the best results. He had raised fares on certain lines where the fare was lower than this.

M. C. Brush, Boston, said that the company with which

he had formerly been connected in Massachusetts had had its property appraised, and that the appraisal came within 2¼ per cent of the book value. The company then commenced the campaign of education or enlightenment through the communities served. This was continued for several months. A table of the history of the property was prepared, giving capitalization, fixed charges, number of cars, cost per mile operated, etc., by companies and also for the entire property. This history was carried back some 18 or 20 years to the horse ear period. Copies were printed, and one was sent to every taxpayer in the community. In the territories directly served it was published in the suburban papers. The company also announced that its books were open to inspection to any reputable representative of clubs or associations, or to any reputable attorney. The company did not endeavor to say what it considered a reasonable return, but did maintain that 2 to 4 per cent was not a reasonable return. This policy was continued from 4 to 5 months. At the end of this time, the company increased its unit of fare on all of its properties, except one, from 5 to 6 cents. On that property, it was felt that the position of the company was not sufficiently strong to justify changing the unit of fare; hence, 1 cent was charged for transfers. This additional 1 cent amounted to about \$8,000 a year, although the property is not a large one. At first, some inconvenience was experienced by the conductors in being obliged to supply change, but soon the passengers learned to assist the company in tendering the exact amount of fare. Under the laws of the State, the Railroad Commission had to pass upon the reasonableness of fare. The authority for the increase was granted by the Commission for one year, but since that time the fare has again been approved by the Commission.

C. Loomis Allen, Utica, asked Mr. Ford whether, during the consideration of the Coney Island fare case, any rate was named as being a fair return on the valuation.

Mr. Ford replied that his recollection was that in none of the opinions on the Brooklyn fare cases did any of the commissioners suggest a higher rate than 6 per cent on the value of the physical property after deducting depreciation. This included three opinions on the Brooklyn Rapid Transit case, as well as that on the Coney Island & Brooklyn case.

Mr. Sergeant, Boston, said he did not suppose there was any one present who had not had the experience of building a line through sparse territory where the operation for a number of years was conducted at a loss. This fact should be considered in a valuation. He did not think that a physical valuation of a road should be considered in determining the rates of fare, except where the issues of securities had been made without legal regulation. He thought that the State should concern itself only with service rendered. He did not see how it had any right to alter rates specified in the charter. He did not see why people who put their money into a public service corporation lose their rights and that the city should decide subsequently what the valuation of the property should be considered to be. The risks in electric railroading are considerable and there should be enough profit to cover the risks. Now a government risk has been piled onto the ordinary property risks, yet many claim that the company is entitled only to a bare 6 per cent or slightly more. He knew of no decision in Massachusetts that 6 per cent was all which investors in railway properties were entitled.

T. H. McCarter, Newark, thought that if properties were to be limited to earning 6 per cent to be arrived at by any method of valuation there would be no justification for railway investments. There was little inducement for a company to build extensions and develop somebody's else real estate and operate at a loss for several years or earn only 1 or 2 per cent, and then when the line earned 6 per cent to have the law automatically stop any further profit. There was no corresponding condition in mercantile business. He considered the decision in the Knoxville Water Company case as being confiscatory.

He thought that 10 per cent profit was not too much for any company to earn. If a company earned 10 per cent one year it did not mean that it would earn 10 per cent the next year.

A. W. Brady, Anderson, commended particularly the portion of Mr. Ford's paper which dealt with the methods of raising the valuation of a company. He thought that the situation was more serious in the case of the electric roads than with steam roads, because the latter carried both freight and passengers, whereas the electric roads carried principally passengers; that is, one class of traffic. It might be more plausible to make an argument in favor of lowering the rates for electric roads upon some valuation than in case of the steam roads. That at least seemed to be the tendency of the Interstate Commerce Commission and the State commissions. Mr. Ford's valuation seemed to have been worked out with a great deal of care. A recent decision by the Supreme Court in the case of the Omaha Water Company threw additional light upon the legal status of valuations, which up to that time had largely been fixed by the cases of the Consolidated Gas Company and the Knoxville Water Company. In the Omaha case the city had the right to take over the water works, and agreed to do so at an appraised valuation. The arbitrators were appointed in the regular manner and made their valuation, which was largely in excess of what the city was ready to pay for the plant. The city thereupon refused to carry out its bargain. The company brought suit to compel the city to live up to its contract, and finally won in the United States Supreme Court. One of the chief objections made by the city of Omaha to the valuation which the arbitrators had placed on the property was that the arbitrators had put a value upon the concern as a growing concern. But the Supreme Court said that this was something different from good will, and that it was properly included by the arbitrators and refused to interfere with the award made on that account. This decision, he thought, very largely modified that previously implied in the Consolidated Gas and other cases and justified the class of expense to which Mr. Sergeant referred, i. e., the development of a line in sparsely settled territory.

John I. Beggs, Milwaukee, believed that the principle of physical valuation should be considered as a contingency which every railway company should be prepared to meet. On some of the properties with which he was connected physical valuations had been made. The speaker believed that properties should be permitted to earn not only on what appeared to be their physical valuation to-day, but upon what was expended to create the condition that exists to-day. For instance, his company had been put to a great expense to contest the efforts of the city of Milwaukee to reduce a 4-cent city rate of fare to 3 cents. There had been a great deal of expense also in the development of many of the lines. Capital would not invest in railway enterprises if the rate of earnings were to be limited to 6 per cent. Companies should be permitted to earn from 8 per cent up. Physical valuations had their place as factors in determining the value of properties. The Wisconsin State Commission had conscientiously set itself to study the situation in that State carefully and intelligently, and the speaker had great faith in the result. He believed that the commission would act as a buffer or intermediary between the unreasoning public and the public utility corporations. His own company was not attempting to extend any of its lines for obvious reasons. The interurban fare question was simple compared to the city fare question. It was generally admitted that the electric road was entitled to earn as much per mile for carrying passengers as a steam road. But in the city business a company was expected to carry people in on a suburban line 5, 6 or 7 miles, then possibly through the city and out on another line for a 5 or 4-cent fare.

Mr. Brush said that the Massachusetts commission was composed of men who were not only broadminded but had had long experience. In the valuation previously referred to, the engineers had included in the appraisal the value of all property which the company could prove had ever been in existence and

had cost real money. Such an appraisal value, of course, far exceeded the present value of the property.

Mr. Ford in closing the discussion pointed out how he had built up the income account of the Coney Island-Brooklyn Railroad during all the years of its existence from 1852 to 1909. After deducting operating expenses and taxes, interest paid, funded and floating debt and dividends on capital stock represented by actual value in the property at the rate of 8 per cent from 1852 to 1884, and 6 per cent from 1884 to 1909, the result was a deficit for each year. Figuring accumulated interest on the deficit each year, the total deficit, with interest, for the period from 1862 to 1909 came to the enormous total of \$7,600,000 on a total capitalization of \$8,600,000.

The president appointed as a committee on resolutions Frank Hedley, R. E. Danforth, D. H. Lovell, R. P. Stevens and H. J. Crowley. This committee will report on Thursday afternoon.

The meeting then adjourned.

JOINT MEETING OF ENGINEERING AND ACCOUNTANTS' ASSOCIATIONS

The joint meeting of the Engineering and Accountants' Associations on shop accounting was held yesterday afternoon at Aquarium Court Hall. Acting-President Harvie, of the Engineering Association, presided. The report was presented by P. S. Young, Public Service Railway. This report is published elsewhere in this issue.

W. F. Ham, Washington, quoted the recommendation on the first page of the committee report that "The committee recognizes that it is not within its function to present classification of accounts and recommends that after the suggestions outlined here have been discussed by both associations, this part of its report be referred to the standard classification committee of the Accountants' Association." Mr. Ham said that as chairman of the committee named, and without consulting the other members of the committee, he would say that the report had better not be referred as suggested. The standard classification dealt only with primary accounts. He believed better results would be accomplished if the subdivisions of those primary accounts were acted upon by a joint committee of the Engineering and Accountants' Associations than if this work was turned over to the standard classification committee.

Secretary Corning then read a letter from James D. Andrew, superintendent of power stations, Boston Elevated Railway, in which he said that he agreed with Mr. Hewitt's recommendations in general, but thought some slight changes in the sub-accounts would be of advantage. Mr. Hewitt had suggested that account 3004 cover all auxiliaries, including coal and ash elevators. He could find no provision elsewhere for coal and ash handling machinery and recommended that this be given a sub-account number rather than be included with the auxiliaries.

H. G. Stott, New York, said that he saw nothing about an account for obsolescence. Depreciation in modern accounting seemed to be taken care of under maintenance, but this did not cover obsolescence.

Mr. Forse, Anderson, said the paper under discussion was not an attempt to get a complete story of power costs because it omitted several things, such as insurance on the plant itself. He thought the subdivisions of accounts was one largely influenced by home conditions.

Professor R. B. Rifenberck suggested that a committee be appointed to report on obsolescence.

J. H. Neal, Boston, said that what was wanted was the knowledge whether a man was running a station economically. This had nothing to do with obsolescence or the investment. The subdivision of operating expenses should be such that the engineers would know whether they were doing a job right or not. The subdivision recommended was a normal one.

H. G. Stott, New York, said there was more to the subject than simply maintaining the plant. When capital charges of

depreciation or obsolescence were ignored, one lost sight of the most important part of the expenses. Operating charges could be taken care of by supervision; capital charges could not. He suggested that against the operating expenses there should be charged every year a portion of the obsolescence. The latter really was an operating expense as ultimately it would be charged against the company. Of course, a sinking fund could be established but the most obvious way was first to establish the probable life of the apparatus, then the probable scrap value when thrown out. The difference between these two must be charged in the per annum account against the plant.

Mr. Neal said he did not intend to convey the idea that obsolescence and depreciation should not be considered. He meant that operating expenses had nothing to do with them, and that they should be considered separately. Naturally, the man at the head of the engineering department would consider the items Mr. Stott had enumerated, but it was not the function of the auditor or the engineer to take care of the depreciation in that way.

C. O. Mailloux, New York, did not want the discussion to be closed with the impression that depreciation was a matter entirely outside the engineer's province. The engineer must understand all items of expense connected with the plant. What should be considered in the operation of a plant were not only the receipts and expenses and the difference between the two, but the ratio of that difference to the total capital investment.

P. S. Young, Newark, said he had been asked to close the discussion for Mr. Hewitt. He thought the meeting had gotten a little off the question under discussion when it turned to obsolescence and depreciation. The committee understood that these questions could be considered as part of the cost in determining the cost of power, but this report was one on the expenses for operating the power plant. Certain accounts were presented simply for the best feasible sub-divisions without endeavoring to include all items that go to make up the cost of power. Referring to Mr. Andrew's point about account No. 3004, Mr. Hewitt had called his attention to the fact that coal machinery was mentioned under his table No. 1 on Page 8 where it is shown as a percentage of the total maintenance of the various sub-accounts.

Terrance Scullin, Rochester, said he did not see any account for damage cases. This was a very important point as the mechanical end of the car equipment has no control over the expense of damage cases. In order to make that clear, some separate account should be set aside for damage cases and for other cases other than ordinary upkeep.

Irwin Fullerton, Detroit, said they had just put into effect an accounting system that indicated the ratio that the injuries and damages on account of the equipment bear to the total expense. This strongly reminded the operating department what it was costing the company in that respect.

H. H. Adams, New York, said he had been using sub-divisions of accounts for equipments for about two years. They were of great value, particularly in comparing the repairs of one class of equipment with another either on a car-mile or ton mile basis. Such a method can be made as broad or as narrow as the conditions on the property demand. The committee had in mind that a large system would want to use all sub-divisions while a small system would use a portion. N. E. Stubbs, Baltimore, agreed with Mr. Adams as to the value of these sub-divisions and said they were also of great importance to the auditing department.

Mr. Fullerton said that he had started to keep an account of the different classes of motors, studying the expense of armatures fields, bearings, commutators, etc., to find out whether some of the equipments were really obsolete and fit for the scrap pile.

President Swift then asked for a discussion of the forms. In response to a question by C. H. Lehr, M. R. Boylan, Newark, said that their time tickets were made out by the em-

ployees in the shops, checked by the foreman and rechecked with the time clock.

H. H. Adams said that the time card system was flexible enough to have it made out by the time clerk, providing that the latter transfers it around to the workmen and obtains the distributions from the individual workmen. There were two time cards, one a detailed card, to be used with or without a clerk, and another a weekly time card, to be used in conjunction with the time card. He called attention to the fact that these forms were practically the same as those adopted by the joint convention of the Accountants and Engineering Associations except for some slight changes to bring them up to date.

Mr. Brown, referring to Form 4, asked whether the committee had found it practicable to have these store order slips signed by four different individuals, as the blank provides. In his experience it was fortunate if the signature of one shop clerk could be secured.

Mr. Neal, Boston, said that in the shops of his company, employing 250 to 400 men, they abstract all the time cards by shop numbers and get them back to the shop every two days, and thus they have every job they are working on in the auditor's office up to within two days.

M. J. French, Utica, thought that Forms 4 and 5 could be combined. His company had the body almost identical, the only difference being in the transfer. When the second form for selling the scrap comes up to the general manager for approval, it seemed to him it would be a great deal better to know that all the subordinates in charge of the work have approved the sale of the material. A good deal of the clerical work in the office could be saved if the two could be combined in that way.

W. F. Ham, Washington, said that in the shops and contract department of his company the scrap was valued at the time it was scrapped and the estimated value was credited directly to the proper operating account, job work or shop order affected. The credit was charged to the scrap account. When the sale was made later on, there might be a little over or little less on that account, but this method brought the credit at the proper time into the proper account at very nearly the proper amount.

W. H. McAloney, Denver, said he used credit slips for all scrap material recovered, and these credits are taken into the material and stores account at the time it is received, daily or weekly. To take care of the market variations in copper, the scrap value is charged at two cents below the market value, making the material stores account safe. All scrap, as a general rule, is cleaned up very rapidly, and when sold, if sold at an advance, a further credit slip is made out to take care of the advance.

P. J. Honold said his contract for the sale of scrap is made for one year with a local scrap iron concern. The price on which the contract is made is taken from the "Iron Age," which gives quotations of the value of scrap materials. If copper is 14 cents at the time the contract is made, the price is fixed at 13 cents.

President Harvie said he would like to hear from Mr. Boylan in closing the discussion.

M. R. Boylan, Newark, said it was the intention of the committee that Form 4 would be used by the different departments, track, line, overhead, etc., to send in reports to the manager's office, and the items would be taken from these individual reports and entered on Form 5. Bids would be received and the amounts entered.

Chairman Swift thought they had now closed what had been a very interesting discussion; it seemed to him and also to Mr. Harvie that this work should be continued, and it could no doubt be best continued by continuing a committee; and it was now in order for someone to make a motion to that effect.

H. E. Weeks, Davenport, moved that it be the sense of the meeting that a committee be continued on the ques-

tion of form of reports and that this report be accepted. The motion was carried.

President Harvie wanted to express the appreciation of the Engineering Association for the very valuable discussion they had had that afternoon on the paper which had been presented, and expressed the hope that the two associations would continue to cooperate in matters of this kind.

POWER GENERATION

H. G. Stott, New York, presented the report of the committee on power generation, which will be found elsewhere. At the conclusion of its presentation, he said that, with bituminous coal and forced draft, there was no difficulty in getting 225 per cent. rating on old furnaces. Better evaporations with forced draft have been obtained than before. The explanation seemed to be that the flame is shorter with forced draft, and the combustion takes place on the surface of the coal. The long-tongued flames do not shoot up through the tubes and get chilled. The natural draft of air infiltration through the brick setting of the boiler is a very serious item, but with forced draft a balance condition exists in the furnace.

B. F. Wood, Pennsylvania Railroad, thought the fixed charges on the boilers should be placed at 15 per cent., instead of 11 per cent. A good lesson could be drawn from steam locomotives, which burn from 100 lb. to 150 lb. of coal per square foot of grate area of 50,000 lb. per hour. Some stoker arrangement that will admit rapid firing was essential for stationary boilers.

G. H. Kelsay, Anderson, Indiana, discussed flue gas analysis. He did not want to give the impression that he recommended making the schedule of pay of the firemen on the basis of CO₂ in the flue gas. He knew of some plants that pay a bonus on CO₂ records. Great progress has been made in the last two or three years in applying flue gas analyzers, and engineers of power stations should not be discouraged because the devices now in use were not altogether satisfactory. The speaker had recently received a letter from a company manufacturing flue gas analysis apparatus, in which it was stated that a high percentage of CO₂ did not necessarily indicate high efficiency. This being the case, it would be very dangerous to establish a bonus system whereby the firemen obtained a higher rate for high percentage of CO₂.

Charles Hewitt, Philadelphia, said that he had had two flue gas analyzers in almost continuous operation for three years, and that they were still working and giving good service.

Mr. Reynolds, Newark, N. J., said that it was necessary to pay for draft in the furnace in some form or another. It might be paid for out of the products of combustion that go up the chimney, or it could be paid for by expending energy to create the draft by means of a mechanical fan. He thought the day of big chimneys was fast passing away. The proper way to supply air to a boiler was by the combination of suction and pressure. The point brought out in the committee report concerning the stirring effect of air under pressure, as it passes through the fuel bed, on increasing efficiency, is a very important one. Most boiler makers ignore the fact that the rate at which the gases come into contact with the boiler tubes, and pass out through the stack have much to do with the efficiency of the boiler. The rate of transfer of heat through the walls of the tube is not a linear function. There is an infinitesimally thin surface, less than one-thousandth of an inch thick, through which there is a fall of temperature of 1500 deg. In order to get the highest efficiency from a boiler, the gases must be moved as quickly as possible over the heating surface.

Owing to the lateness of the hour, the meeting then adjourned, and the discussion of the report was continued as the first order of business for the session of Wednesday morning.

REPORT OF THE SECRETARY-TREASURER AMERICAN ASSOCIATION.

The report of the secretary and treasurer for the fiscal year ended Sept. 30, 1910, consisted practically of the treasurer's report. It contained a list of the members and associate members of the association and a list of those with dues unpaid during the year. According to the report, there are now 1079 associate members in good standing, as compared with 817 Oct. 1, 1909. During the year 24 associate members resigned, 3 died and 62 were dropped for non-payment of dues. Three hundred and forty-seven new associate members were enrolled. The list of member companies of the association shows that there are now 350 members in good standing as compared with 315 on Oct. 1, 1909. Four member companies resigned during the year, three were lost by consolidation and six were dropped for non-payment of dues. Forty-eight new companies applied in the year for admission and have paid their dues.

The report of the treasurer shows:

Cash on hand, Oct. 1, 1909.....	\$10,565.11
Receipts during fiscal year ended Sept. 30, 1910....	40,281.34
Total cash	\$50,846.45
Expenditures during fiscal year ended Sept. 30, 1910.	35,983.72

Balance on hand, Sept. 30, 1910.....	\$14,862.73
--------------------------------------	-------------

The secretary explains that the increase in expenses over 1909 was due largely to the following increases:

Additional cost for printing and distributing annual proceedings, due to increased number of pages of printed matter and greater number of volumes required for added membership.....	\$2,666.53
Added expenses due to newly inaugurated plan of midyear meeting.....	389.02
Added expenses of American and affiliated associations due to location of 1909 convention.....	364.31
Installation of Index Bureau Service.....	500.00
Added postage, due to increased distribution of printed matter, particularly to associate members	331.46
Added expenses, due to increased number of committees, committee members, etc.....	728.87
Expenses incurred in 1908-1909, but paid in 1909-1910	594.55
Total	\$5,574.74

The Great Northern & City Railway of London has been using metallic filament incandescent lamps for train lighting during the past two years. The average life is 2,000 hours, which compares favorably with 800 hours of useful life obtained from carbon filament lamps. The lamps are connected five in a series on a 550-volt circuit, but each lamp is rated for 120 volts, and the long life obtained is believed to be due to this provision against excess voltage. The fluctuations in voltage are said not to be so noticeable with metallic filament lamps as with carbon filament lamps. In cold weather the metallic filaments in the lamps are more liable to break than at the normal temperatures.

It is seldom that an electric railway is the plaintiff in an accident case. The Liverpool Corporation Tramways, however, recently won a novel suit for damages against the owner of a traction engine. The traction engine had disputed the right of way with a tramway ear, with the result that the car was damaged to the extent of \$85, and three weeks were required to repair the damages. The corporation sued for the actual damages to the car and also for \$200 damages on account of loss of earnings from the car. The court decided in favor of the tramways company as regards the actual damage to the car, but the amount claimed on account of loss of earnings is still in dispute.

MEETING OF THE TRANSPORTATION & TRAFFIC ASSOCIATION

The second meeting of the American Street & Interurban Railway Transportation & Traffic Association was held at the Greek Temple yesterday morning. As announced at the close of the meeting Monday afternoon, a roll call was taken. At its close, Mr. MacAfee suggested that at later meetings each delegate should hand his card, with his name and the name of the company which he represented, to an attendant at the door, and this plan should be substituted for the roll call.

INTERURBAN RULES.

President Todd then called for the report of the committee on interurban rules, which was read by C. D. Emmons, Fort Wayne.

J. D. Wardle, Cedar Rapids & Iowa City Railway & Light Company, thought the association and the committee should be congratulated for the thoroughness with which this question had been considered, and hoped that the committee would be continued and make complete report and recommendations along the lines of their present report, as the interurban rules should agree, as nearly as possible, with the standard code of the American Railway Association. These rules had always been in force on his road from the very beginning. Where orders are transmitted through agents or operators, he saw no reason why orders conferring rights should not be given by Form 19. It was generally conceded that time orders are not the best form of orders to give, but under some conditions they are practical and may be used. If interurbans are not operating under a headway less than 30 minutes, superiority by direction is essential to operation where freight service is handled over the same tracks as passenger service.

J. N. Shannahan, Washington, Baltimore & Annapolis Electric Railway, took issue with the recommendations of the committee. While it was undoubtedly true that the primary object of the rule book of a railroad is to promote the safety of the traveling public and the employees, he did not believe the changes recommended by the committee would do so. It is not many years since the same code of rules was in use on both street and interurban lines. Before long the men operating the interurban lines found many situations arising which were inadequately covered by the city rules. To meet this condition the interurban code was formulated. As time went on, the operating methods of the interurban lines each year approached nearer to those of the steam roads until within the past two years it has been believed by a number of managers that the standard code of rules of the American Railway Association should be adopted by the Transportation & Traffic Association. In advocating such a step these men deliberately ignored the fact that the conditions governing the operation of an interurban line differ radically and in many respects from those governing the operation of a steam railroad. They differ fully as much as do the interurbans and the city lines. The code of the American Railway Association fully meets the demands and needs of the steam roads, but it could hardly be argued that the framers of this code had at any time had in mind any interurban operating conditions and it is folly to say that these rules will fit interurban needs in the best possible manner, simply because they fit the steam road conditions.

In no one respect is the difference between interurban and steam roads so striking as in the training and experience required before a man is given charge of a train. On a steam road he must fire an engine or brake a train from 6 to 10 years before he gets an engine or train to run. How many interurban lines require their men to post for more than four weeks? Is it reasonable to suppose that a man can be as

familiar with the theory and practice of railroad operation in one case as in the other? Is it reasonable to attempt to govern a comparatively green man with the same code of rules as the man who has had years of experience? One gentleman in discussing the code adopted at Denver said there were rules incorporated in it that were an insult to the intelligence of a trainman. Is it wiser to strike out the rules that he referred to, for fear of insulting the intelligence of some trainman, or retain them for the guidance of some man who after a few paltry weeks of posting is entrusted with the safety of human lives? Mr. Shannahan thought interurban managers have had too many recent object lessons to make such a mistake. An experienced man would hardly feel insulted by such rules when he knew that it might help a less skilled trainman to avoid an accident.

There are rules in the recommended A. R. A. code obscure in their wording and so difficult to correctly follow that many an old steam road man has gone wrong in his interpretation of them. The association when it places its stamp of approval on a code of rules should know that each and every rule is right, safe and in all ways the best for the conditions to be met.

Not only was he opposed to the suggested code in creating superiority by direction, and to many of the other changes made to have it conform to the American Railway Association, but he advocated going a step further, and requiring all meeting points to be positively fixed either by time table or train order. His own experience has impressed upon him the necessity for this step, and he has been making positive meeting points for more than two years.

The reasons given for the renumbering of the rules did not seem impressive to the speaker. That a conductor would fail to properly protect his train because the rule requiring him so to do was numbered 219 rather than 99 seemed unlikely. The renumbering will necessitate the entire reprinting of the rule book on all roads that have already used the Denver code as a basis, and at no inconsiderable cost.

W. B. Rockwell, Eastern Pennsylvania Railway, suggested that the association get up a complete set of rules, and then let each general manager be governed more or less by his local conditions, and adopt such rules as he thought absolutely necessary for his own protection. He described at length a marker signal to be put on each corner of a car, both front and rear, which by a very simple device makes it possible to show three colors, white, green and red. They are made with a Frensel glass or marine lens in a half circle, so that the bull's-eye shows from any angle. Even with a car turning a short radius curve in a street, the red light can be seen from the side.

The secretary read a letter from J. A. DuBois, chief dispatcher of the Cedar Rapids & Iowa City Railway & Light Company, commenting on the rules submitted by the committee. The writer thought rule No. 81 was superfluous in a time card or rule book. If a trainman has a watch that will not keep the right time, the watch inspector should know it and inform the superintendent, who should require him to get a watch that will keep time.

He could not understand why the committee was opposed to "right by direction." On large interurban roads it would often save trouble and is as safe a practice as any. In rule No. 83 the words "without a clearance" are entirely wrong and misleading; a clearance card does not tell a train crew that all opposing trains have arrived or left and gives them no right to proceed whatever until they have an order from the dispatcher saying that opposing trains past due at that place are clear. If trains are to get a clearance card at a specified station the rules should so state.

He believed the interurban rule in regard to trains proceeding under a flag, when unable to get a dispatcher, was wrong. If the time card is right, it is entirely unnecessary for trains to proceed under flag and to call the dispatcher at each office until they can reach him. This could

be avoided entirely by giving trains in one direction the right of track, and keeping them moving.

Rule 107, he thought, was entirely wrong, and rule 114 was unnecessary, if the time card prescribes right by direction, as it should. The rule regarding how to obtain orders was entirely too long, and requires too much valuable time to put an order out. When orders are given through an operator, the safe way and the quickest way is to use the A. R. A. rule.

C. Loomis Allen made the suggestion that Rules A to Z, proposed by the committee, be changed to conform more closely to the text of the Denver Code.

J. H. Pardee, J. G. White & Co., did not believe that the association should adopt the A. R. A. code verbatim. In commenting on the reasons given by the committee for proposing what is substantially the A. R. A. code, he said that there is not one single-track steam road operated under the standard code that begins to handle the traffic that 75 per cent. of the interurban electric railroads handle. The steam railroad men that have prepared the A. R. A. rules have never been confronted with the conditions that are met in the operation of the average interurban road. He did not think the re-lettering and the re-numbering was particularly important, as long as the contents of the rules are in the employee's mind. Examinations of trainmen are not conducted on the basis of their ability to tell the number of the rules in the book.

During the past six months some very bad accidents have occurred on interurban railways which are stirring up the whole country.

He thought the time was coming, very soon, when legislative action will be taken, in regard to accidents, and he urged the Association to be just a little ahead of the legislatures in recommending safe methods of operation.

Mr. Shannahan did not think that rules 20A and 21A had any place in the code.

T. C. Cherry, Utica & Mohawk Valley Railway, asked what was the object of having green flags in addition to green lights at night.

I. H. McEwen, Oneida Railway, explained that at dusk and dawn there was apt to be someone who could not distinguish the lights distinctly, and the display of flags in addition would give further assurance.

In reply to a question, C. D. Emmons, Fort Wayne & Wabash Valley Traction Company, chairman of the committee on interurban rules, said that a mistake had been made in the cuts of classification and marker signals on pages 34 and 35 of the report. The hand lamp shown in the centre of the end of the car should be indicated as a headlight.

C. E. Morgan, Indianapolis, Crawfordsville & Western, criticized the practice of mounting both the classification lamps and flags and the markers at the height of the letter board. He thought the classification lights should be mounted on brackets, placed on the corner posts below the belt rail, and that the classification lights or flags should be mounted at the height of the letter board.

D. A. Hegarty, Little Rock Railway & Light Company, said that he had changed from white flags to orange flags for the reason that it was very difficult to distinguish a white flag when it became dirty.

I. H. McEwen, Oneida Railway, thought that superiority by direction was largely a matter of local conditions, and that it should be recommended as optional. He had not found it practical on interurban roads and he preferred to give opposing trains equal rights at meeting points. The latter method required a less number of train orders to be issued in case of delays to trains.

J. P. Maloney, Albany Southern Railroad, said that he had found it to be a good practice to confine the meeting points to three or four sidings only, even at the expense of incurring slightly longer delays. If the meeting points are

always at the same place, the trainmen are not so liable to forget them.

Mr. Shannahan thought that Rule 82 should be omitted, as it conflicted with Rule 114. He also asked the reason for omitting the rules providing for the issuance of "19" and "31" train orders.

Mr. Emmons replied that, acting under instructions given at the Denver convention, the form of train order proposed by the committee was one that could be used either as a "31" order or a "19" order.

Mr. Pardee made a motion that the question of amending the Denver code be referred back to the committee on interurban rules for further consideration, and that the committee be instructed to confer with the committee on city rules, and report next year.

Mr. Allen suggested that the motion be amended so as to instruct the committee to confer with the rules committee of the American Railway Association, with a view of reconciling any differences which now exist. The motion, as amended, was unanimously carried.

EXPRESS AND FREIGHT TRAFFIC

Edgar H. Hyman, Electric Package Agency, Cleveland, read the report of the committee on express and freight traffic, which will be found elsewhere.

F. W. Watts, Utica & Mohawk Valley Railway, in recommending the adoption of the report submitted by the committee, pointed out that the classification of expenses chargeable to the express and freight department, was both just and necessary. It was just because every department of a railway should pay its share of the operating expenses, and participate correspondingly in the earnings. The classification was necessary because, in the complete analysis of the figures outlined by the committee, every weak spot in the department is revealed. If the department shows a loss in net income for any month, the head of the department who lumps all items of expense in one miscellaneous sum is totally at a loss to find the cause. The Utica & Mohawk Valley Railway has long maintained a system such as is outlined by the committee, and the result is that the monthly reports are intelligent, beneficial and invaluable records of the business.

There was no further discussion, and the meeting then adjourned.

The interests of W. N. Matthews & Bro., St. Louis, Mo., are being looked after at the convention by W. N. Matthews. While the company is making no exhibit this year, several of the devices manufactured at its plant are displayed by exhibitors who handle these products. Mr. Matthews is also president and treasurer of the Davis Expansion Boring Tool Company, which is making a display at booth 615, Building No. 2.

The Leeds (England) Corporation Tramways are planning to handle heavy freight over the tramway system. Tests have been made in handling construction material for improvements and extension of the tracks and this suggested the idea of regularly handling heavy freight for revenue. Several freight cars are to be built. An experimental contract, covering a period of six months, has been made to move about 30,000 tons of sand and gravel 4 miles for use in filter beds. The sand will be brought to the tramway depot in barges and loaded on the cars by electric cranes. The cars to be built will have two hoppers and will carry about 8 tons. They will be equipped with standard motors and brakes so that they can be operated on passenger-car schedules. This is believed to be the first serious attempt in England to utilize the street-car tracks for handling heavy freight.

THEORY OF RAIL JOINTS*

BY REGIERUNGSBAUMEISTER FELIX LANGE, OF ESSEN, GERMANY

It is generally agreed that the life of the rail is dependent upon the life of the joint. It is, therefore, natural that the engineer should look to the continuous rail for the solution of this problem. Recent developments in Europe prove that we are gradually approaching the final goal in this matter.

The chief cause of wear at the joint is a difference in height of the sections. The momentary load when the wheel strikes an inequality in the rail (see Fig. 1) is $P = \frac{MV^2}{R}$.

In this formula R = the radius of the wheel, V = practically Vt , M = the load not supported by springs.

It will be seen that P is much greater than the nominal wheel load. Lateral shifting of the rails, causing a momentary lateral sliding of the wheel flange and consequent wear on the surface of the rail, produces similar results. Even rail joints which have been ground perfectly true will show cupping in course of time. What is the cause?

First may be mentioned the inequalities in the rail sections and angle plates due to wear of the rolls. All angle plates cannot fit closely on all rails, and where there is a poor fit the bending moment is not transferred across the joint by the plates and different heights are produced in the rails when the cars pass the joint. Another cause is the direct compression of the metal of the rail by the wheel load. When a load is applied at a point (Fig. 2) the rail assumes a form shown in exaggeration in the diagram. As this pressure must be transmitted from the wheel to the foundation, the pressure per square inch in the web and therefore its relative deflection will be greater than in the head or foot of the rail. When the rail is cut in two just in front of the load as in Fig. 3 a difference in heights must result. If the cut extends only to the foot of the rail (or if the base is welded) the conditions are not materially changed, although

change of section at the joint will cause the wheel to leave the rail.

None of the numberless types of mechanical joints now in use is capable of meeting all the conditions which the foregoing remarks prove to be necessary requirements.

Among the welded rail joints only two can be considered absolutely ideal, viz., the Elihu Thomson and Dr. Goldschmidt types of pure butt welding joints, in which the entire surface of the cross sections of the rails are welded. But the difficulties encountered in the practical application of both of these types have proved so serious that neither of them can as yet be considered of practical importance. In America butt joint welding is impracticable on account of the high percentage of carbon used. In Europe butt joint welding, such

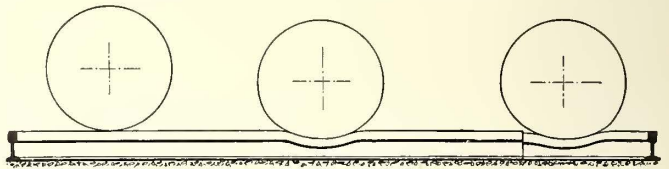


Fig. 4—Rail Joints.

as conceived by Dr. Goldschmidt, has been replaced by a combined process of cast welding and butt joint welding, as a number of causes for ultimate defects are avoided in this combined process. On the other hand, the combined process requires only from 4 to 6 kg (9 lb. to 13 lb.) of cast metal on the rail end. An experience of over 11 years has demonstrated that this mass is too small perceptibly to disturb the elastic curve of the rail during its lifetime.

The foregoing remarks prove that a welded track must meet at least two important requirements, viz., that the elastic curve must be disturbed as little as possible and that the tension in the longitudinal fibers of the rail caused by the load of the rolling stock must be transmitted from one rail section to the other.

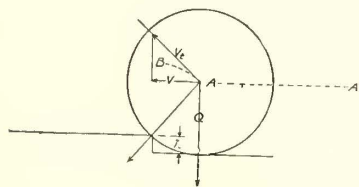


Fig. 1—Rail Joints

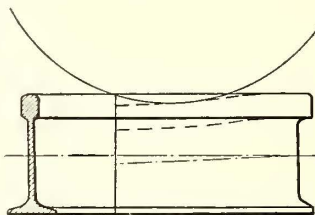


Fig. 2—Rail Joints

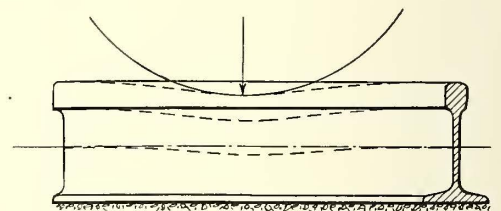


Fig. 3—Rail Joints

the difference in heights is not quite so great as in the first instance. If the cut extends only through the head, the difference in heights will usually be negligible.

Still another cause for pounding is that the deformation of the rail under load does not remain constant across the joint. On account of the elasticity of the material there is an elevation of the metal of the rail before the wheel, and this elevation advances as the wheel advances. When the wheel comes to a joint, however, there is a sudden change. (See Fig. 4.)

Cold flowing of metal is also the cause for a difference in height of rail sections at joints. It has been shown that a very fine cut made in the head of a sound rail fills up within a comparatively short time and a depression will be formed at the point.

It is also obvious that in transferring the bending moment across the joint by means of plates the vertical fibers of the web of the rail will be lengthened, as the plates act as levers to spread the head and foot of the rail apart. This will cause a difference in height.

Finally—a change in the elastic curve due to any marked

Stresses resulting from variations in temperature may be determined with greater accuracy. Extensive experiments to determine the effect of temperature on the rail were first carried out in the United States in 1892 and further experiments were made by me in Essen in 1904-1906 which are better for our purpose, as the temperature of the rail itself was directly measured instead of that of the earth surrounding the rail. Holes measuring 6 mm ($\frac{1}{4}$ in.) in diameter were drilled to different depths exactly in the center of the rail webs. In these holes thermometers were inserted. The tubes of these thermometers, which were of different lengths, were endorsed in a second glass tube, providing an air jacket between the mercury tube and the rail walls. (See Fig. 5.) The result showed that, as a rule, the maximum temperature of the rail is always not less than 9 deg. Fahr. above that of the air, and proved that the climate plays an important rôle in producing stresses in the rail, the more important of which can be calculated.

While there is no accurate mathematical method for investigating long columns under stress by pressure, it is possible to prove that no danger from lateral warping exists. The pressure which must be laterally taken up by the pavement,

*Abstract of paper read before the American Street & Interurban Railway Association, Atlantic City, N. J., Oct. 10-14, 1910.

assuming the case of an L. S. Co. 80-335 rail subjected to a temperature increase of 55 deg. Fahr., figures approximately 35 lb. per running inch. A further question arises as to whether gaps of dangerous widths can be produced by the breaking of rails during the winter season. On the basis of my personal experience I can answer this question in the negative. The widest gap I have ever seen was $1\frac{3}{4}$ in. and was in track which had been set in the pavement at the hottest time of summer. The joint broke when the temperature was 5 deg. Fahr. The track had been laid without ties but with tie rods merely on rock ballast and embedded in ordinary stone pavement. It is safe to assume that gaps measuring more than $\frac{1}{2}$ in. in width will scarcely be liable to occur in track laid in concrete on ties and with tie rods, because the resistance of such construction is considerably greater than under the conditions mentioned above, nor will it warp under these conditions.

In addition to the tension due to the changes in temperature the rails are also subject to those which result from the cooling of welded joints. These tensions can only be determined by practical tests, and as they depend upon the various systems used I shall refrain from a further discussion of them.

A further matter is the extent to which welded joints will resist wear. That the wearing qualities of the rail are not changed in systems in which the head of the rail is heated during the welding or casting operation is proven by more than ten years' experience in Europe.

Engineers will be able to apply the foregoing to the vari-

elastic limit of rail steel and far greater than any permissible strain under the conditions of alternate loading to which a rail is subjected.

Under favorable conditions, especially as to climate, such as exist in some of the cities on your Pacific coast, there can be no objection to the use of such a system, and I understand that many thousands of joints of this description have given perfect satisfaction.

BRILL COMPANY ON THE BOARDWALK

The most conspicuous exhibit this year is certainly the semi-convertible car on the Boardwalk which is richly arrayed in bright autumnal colors, orange and gold, with deep cream. The lettering on the convex panel is "Brill Semi-Convertible Car" and the letter panel bears the legend "Brill Plain Arch Roof." This latter feature is probably getting the most attention just at this time when the outlook for this style of roof is rather promising. It is astonishing how quickly one becomes accustomed to the novel appearance of the simple roof lines and realizes the excellent proportions. The long P-A-Y-E platforms do not appear to be so long as with the monitor, and, as the side windows are considerably higher than with the regular roof, an effect of lightness is produced which properly belongs to the car, for it is primarily a light-weight design. The body, less electrical equipment, weighs 15,000 lb. This with one or two exceptions is the lowest weight for its size of any car ever built. The length over the corner posts is 30 ft. 8 in.; over the platforms, 42 ft. 8 in.. platforms, 6

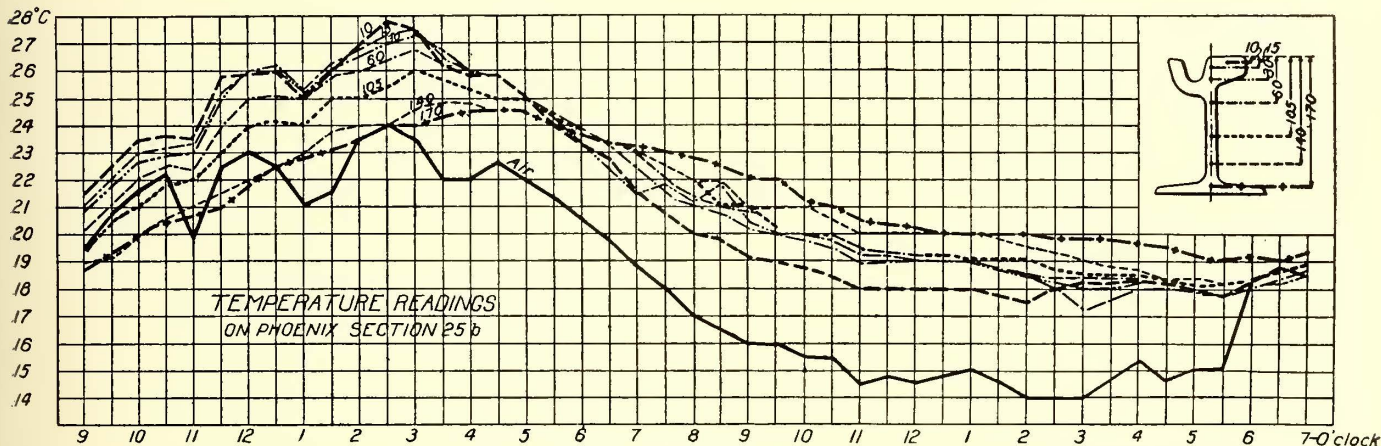


Fig. 5—Rail Joints

ous systems of rail welding now being used, and I will confine my remarks to a system which has come under my notice. This system provides for welding a collar of steel about the web and flange of the rails so that only about 50 per cent of the rail is united.

Assume the following unfavorable conditions: minimum local temperature 20 deg. Fahr. below zero, temperature at the time of welding 80 deg. Fahr., rail section L. S. Co. 80-335. Under these conditions the tension resulting from changes in temperature will be 19,500 lb. per square inch for the full section of the rail, or 39,000 lb. in the cross section welded. To this must be added the stresses from bending moments. The negative bending moment is the dangerous one, as we have to base our figures on a section modulus of about 11.5, and for the moment as figured earlier we get a stress of about 900 lb. per square inch. To this calculated stress must also be added stresses due to the bending moment produced by the change of section at the joint owing to the fact that the head is not welded and the stress due to the difference of temperature in various parts of the rail at the same time. These would add about 15,000 lb., making an aggregate of 55,000 lb. per square inch, which is greater than the average

ft; width over sills, 7 ft. 10½ in.; over posts, 8 ft. 2 in.; centers of posts, 2 ft. 8 in.; height from track over trolley boards, 11 ft. 7½ in. The seating capacity as arranged for this exhibition car is 41.

Various forms of ventilation are possible with this roof, but in this instance the Vacuum Car Ventilating Company's device is used. This consists of a motor-driven fan located under the hood against the end of the body with eight registers along the headlining. It is asserted that the air is changed completely every 3½ min.

The Brill semi-convertible window system is better adapted to the new roof than to the monitor type because of the longer curve in the roof. It has the additional advantage of larger sashes, both being of equal height with the window opening about 5 in. higher than usual. A new style of window lock is used and with continuous series of stops enables the sashes to be held with absolute safety at any height. The car is mounted on the latest type of Brill No. 39E single-motor trucks, which recently demonstrated their superior traction on the lines of the Virginia Railway & Power Company in Richmond by hauling two trailers up a 5 per cent grade, starting with ease on any part of the grade.

MEETING OF THE ACCOUNTANTS' ASSOCIATION

The first session of the convention of the American Street & Interurban Railway Accountants' Association was called to order yesterday morning at 10:30 by President H. S. Swift, who delivered the annual presidential address. This document appears elsewhere in this issue.

REPORT OF EXECUTIVE COMMITTEE

The report of the executive committee which was approved for record contained a résumé of the work of the committee for the year. Considerable attention was devoted to the report made to the executive committee at its meeting in January last by the committee on construction and operating expenses of electric railways, as submitted to the National Association of Railway Commissioners and adopted by that body. The following is from this report:

"There was prepared about a year ago a system of accounts which was adopted by the Interstate Commerce Commission, and by the two public service commissions of the State of New York, with certain modifications. The system adopted by the Wisconsin Railroad Commission is similar to a considerable degree. A number of private corporations, operating electric railways which are not under the jurisdiction of the Interstate Commerce Commission or the commissions of New York and Wisconsin, have also put into effect, voluntarily, this uniform system. There seemed to be a general feeling that as the systems adopted by the Interstate Commerce Commission and the commissions of New York and Wisconsin have been in operation less than a year, it would be unwise at this time to recommend any specific system of accounts. Your committee does not recommend at this time, therefore, the adoption or approval of any system, but does recommend that any State which is intending to adopt any system of accounts, in whole or in part, should adopt a plan which harmonizes or is in substantial agreement with the system in force under the jurisdiction of the Interstate Commerce Commission and in the States of New York and Wisconsin.

"Your committee appreciates that, even though a single system may ultimately be adopted by all of the States, it will be necessary to provide some means by which questions of interpretation may be decided similarly by the various State commissions. It is impossible, as experience has shown, to cover every point which may arise in a system of accounts, even though the instructions and definitions are carefully prepared and in great detail. In actual operation, questions are bound to arise which are susceptible of various answers, and it has even been found that the fundamental principle involved is not so clear or so important but that different persons or different commissions might, with equal propriety, answer the questions differently. As the principal object of uniform accounting is to enable such comparisons to be made, the primary purpose of uniformity will not be attained unless there is a substantial agreement as to the interpretation of the various rules, definitions, and instructions which are a part of an adequate system of uniform accounting. Although your committee has given some consideration to the method whereby this result may be brought about, we are not prepared at this time to recommend a plan. Indeed, a plan is not necessary until a uniform system has been recommended for approval.

"Apparently there was referred to this committee only a part of a uniform system of accounts, namely, construction and operating expenses. Your committee believes that better results can be obtained if the scope of the committee's work for the closing year is somewhat enlarged so as to include all accounts and statistics for electric railways. Before any intelligent action can be taken upon construction and operating expenses, one must know what the other features of the accounting system are to be and whether the system as a whole is logical and whether each part is in harmony with every other part. We recommend that the chairman of the committee upon

railroad statistics for the coming year be made a member of the committee upon accounts and statistics of electric railways. We also recommend that the committee upon this subject for the coming year be composed of a representative from the Interstate Commerce Commission, the Public Service Commission for the Second District of New York, the Wisconsin Railway Commission, the Massachusetts Railroad Commission, the American Street & Interurban Railway Accountants' Association, and such other commissions as are likely to adopt or are giving consideration to uniform accounting for electric railways."

The committee making this report was composed of M. S. R. Maltbie, chairman; Wm. F. Ham, Wm. Kilpatrick, Halford Erickson, F. C. Cockrell.

The report of the executive committee closed with the statement that at a meeting held in Atlantic City on Monday, the 10th inst., the committee unanimously approved the proposal to change the name of the association to the "Electric Railway Accountants' Association."

The report of the secretary and treasurer was submitted and approved. It showed that the total expenditures for the year had been \$1,883,91.

FREIGHT AND EXPRESS ACCOUNTING

The paper on "Freight and Express Accounting," by L. T. Hixson, auditor of the Terre Haute, Indianapolis & Eastern Traction Company, was read by the author. This paper is printed in another column of this issue.

The discussion of Mr. Hixson's paper was not protracted. Walter Shroyer, Anderson, Ind., said that he believed that the items of expense that properly could be charged directly should be so charged, and that the most of the expenses should be prorated on the basis of earnings, instead of on the basis of car mileage.

W. H. Forse, Jr., Anderson, Ind., disagreed with Mr. Hixson. He did not believe that the car mile can safely be used for apportioning the cost of all the express and freight business. Certain general expense does not depend entirely, or at all, upon the mileage made by either passenger or freight cars. He believed there are some charges, such as the maintenance of cars particularly and the wages of the car men, that should be charged direct to certain accounts. There are other items of expense, such as maintenance of track, that can be prorated upon the basis of mileage, and there are still other items that can be prorated according to the amount of revenue received. Mr. Forse referred to the fact that in the meeting of the Transportation & Traffic Association they were going to receive a report from their committee on freight and express traffic. He was surprised to see a report of that kind presented at that meeting. In other words, that is an accountants' report or a report on a system of accounting for freight and express traffic.

Secretary Weeks said that in the report before the Transportation & Traffic Association they suggest that the details of this work be worked out by a joint committee of the two associations.

C. L. S. Tingley, Philadelphia, said that Mr. Hixson's paper and the point raised as to the allocation of the expenses raised a question which is common to more things than the express and freight business, and he believed fully that for their own information at least they should make an effort to allocate the various items of expenses to the business which causes that expense. It is a common occurrence, or was a few years ago, to have electric railway managers tell them that all the money they got for handling United States mail was velvet. He never believed it was. The same thing is true of all business aside from the passenger business. There are certain expenses which are met in common with the passenger business, and which they should attempt to allocate. Many of those can be divided, and should be divided on the car-mile basis. Others should be properly divided on the car-

hour basis. Again, there are others which possibly should go on the kilowatt hour per car mile basis, but as far as possible, there should be charged directly all expenses which can be so charged. The maintenance of the bodies and trucks of freight should be charged direct. The companies, for their own information, should try to find out as nearly as possible the true cost of doing that particular branch of the business.

Irwin Fullerton, Detroit, said that there are so many items of expense that it is very hard to determine how much is caused by the passenger and how much by freight handling. To illustrate, he cited a case where a passenger car ran over a stretch 70 miles in length on a schedule of two hours. It may take from six to ten hours to get a freight car over the same line, and it is a question whether or not that difference should not be not only prorated, regarding motormen and conductors' wages, but whether that should not be carried on down through all the expenses that go to make up the handling of that railroad, and it is quite a problem to know just how to handle those things. He alluded to the problem of apportioning the fixed charges relatively, and inquired as to whether they should be divided on a car mileage basis or on a basis of earnings or on the basis of the amount of equipment of each kind.

On motion of W. B. Brockway, the president was requested to confer with the president of the Transportation & Traffic Association, and if concurrent action by that association could be obtained, to appoint a committee to act with a like committee from the Transportation & Traffic Association to consider and report upon the whole question of the accounting for freight and express business.

C. E. Thompson, Chicago, felt that it would not be fair to the freight and express department to charge to it certain items on the basis suggested by Mr. Hixson. One of these items was terminal charges. Some companies pay terminal charges in cities, and pay for their passenger business on the basis of passengers carried, while on their freight and express business they pay on the basis of car mileage. It seemed to him that it is much more fair to the freight and express departments to charge direct all such items as can be charged direct. In the handling of express business under contract with some express companies he knew of some companies that have contracts with the United States Express Company where the express company furnishes a messenger on the car who acts as conductor. This man is paid entirely by the express company, so that the transportation company pays only the motorman's wages.

The system of dividing the expense on the Chicago & Milwaukee Electric Railway has been to charge direct to the freight and express departments the train wages, the maintenance of the equipment and the terminal charges, and the cost of power has been charged on a kilowatt hour per car mile basis, which figure has been arrived at by tests made by electrical engineers. The freight business is entirely carload business, all baggage and express matter being handled by the United States Express Company.

Owing to the delay in the arrival of Mr. W. M. Stewart, his place on the program was assigned to the paper by N. E. Stubbs on "Payrolls and Invoices." This paper is printed on another page.

PAYROLLS AND INVOICES

The discussion on this subject was opened by H. L. Wilson, Boston, who said that after fifteen years they had never had the slightest trouble with the standard bill form. Mr. Wilson read a letter from Mr. Charles S. Clark, the sales agent of the Pennsylvania Steel Company for New England, who inquired if it would not be possible for the American Street & Interurban Railway Accountants' Association, at its convention next week, to take some action with a view of perfecting a form that can be standard for the electric railways, the steam railways and the manufacturers. The letter stated that Mr. G.

Smith, controller of the Pennsylvania Steel Company, expected to attend the convention, and that he is well qualified to speak for the manufacturers.

Further discussion on this feature was put over until Mr. Smith could be present.

C. N. Lahr, Akron was asked about the use of the check system on his road. He said that recently the bank raised the question of having all payroll checks made out to bearer instead of to order. They claim to have a great deal of trouble with foreigners not being able to get anybody to identify them. The bank wanted to be relieved of the responsibility of paying the money to the right party. The company agreed to relieve the bank on this score, because they deemed it a great favor on the part of the bank to handle their payroll checks. They employ 1,200 men, who are all paid by check, and they would not care to go back to the old way of handling the cash.

MISCELLANEOUS

Under the head of new business, President Swift said: "I suppose that you are all aware that the parent association proposes to change the name of the association to the American Electric Railway Association, and it was requested that the other affiliated associations change their names provided the thing would go through in the American Association, and also to make a change in the by-laws in so far as they will be affected by this change in name and by the admission to membership of these steam railroads which have a portion of their property operated by electricity. At the same time the secretary of the American Association stated that they desired to accept associate members from such companies, and I wrote him and told him that we as an association had always been opposed to associate membership, and that the question had come up a great many times, and that it had always been thought inadvisable for us to have associate members. They have remitted that part of it so far as our association is concerned; but it would be proper now for somebody to make a motion to change our by-laws and the name of our association."

C. L. S. Tingley, Philadelphia, moved that the amendment be adopted. The motion was seconded by Mr. Stubbs and carried.

The president called upon Mr. Sweeney, of the Interstate Commerce Commission, who responded briefly and expressed his pleasure at being present at the convention.

W. H. Forse, Jr., stated that the committee on interline accounting had no report to make because at the meeting last year the committee presented a report which was an outline of the plan adopted in following interstate passenger accounting. Since the report was rendered there had been no new developments in this connection. The matter is still as it was then, and for that reason the committee had not found it possible to prepare any report either of progress or new development.

The president announced the appointment of the following committees:

Nominating committee, Messrs. Tingley, Lahr, Hixson, Thompson and Thorpe.

Convention committee, Messrs. Brockway, Fullerton and Cavanaugh.

Just before the noon adjournment general dissatisfaction with the meeting room was expressed, and the officers were instructed to arrange if possible for better quarters.

O. M. Edwards Company, Syracuse, N. Y., has spaces 832-834, Building No. 3, where it is showing extension platform steel doors, window fixtures, locks and metal window sash in which the glass is held in place without the aid of screws. This company has recently begun to make metal furniture for office and filing purposes. Its exhibit includes a steel desk and some steel bond boxes finished in perfect imitation of mahogany and other woods. The exhibit is in charge of O. M. Edwards, E. F. Chaffee, C. H. Rockwell, W. C. Bradbury, T. P. O'Brian.

REPORT OF COMMITTEE ON WAY MATTERS*

BY E. O. ACKERMAN, CHAIRMAN; MARTIN SCHREIBER, M. J. FRENCH,
J. M. LARNED, C. L. CRABBS, GEORGE WESTON

Your committee in accordance with instructions herewith submits a report on each of the following articles: (1) Specification for open-hearth steel rails, (2) standardization of girder rails, (3) gage of track on curves, (4) rail joints, and (5) economical maintenance.

With reference to the subjects of (1) specifications for manganese steel rails, (2) rail corrugation, and, (3) clearance between street surface and the rolling equipment, sufficient data were not obtained to warrant a report and the committee requests that it be continued for another year.

The subjects were divided among the committee members for primary treatment; circular letters were sent out and a summary statement of the answers received is given in Appendix C, hereto attached.

The subjects here reported upon were assigned to and received treatment from committee members, as follows: 1, J. M. Larned; 2, E. O. Ackerman; 3, M. J. French; 4, George Weston, and, 5, Martin Schreiber. From the data thus secured this report has been written with but few amendments.

SPECIFICATIONS FOR OPEN-HEARTH STEEL RAILS

Owing to the rapidly increasing use of open-hearth steel for high T and girder rails it has been considered that the adoption of a uniform specification for the manufacture of such rails would be of mutual benefit to the users and the manufacturers of steel rails for electric railway service. A specification was drafted by J. M. Larned, engineer maintenance of way, Pittsburg Railways Company. From said specification and with the valued assistance of the representatives of the manufacturers and inspection bureaus, the committee formulated the following specifications, which it recommends be followed until such time as experience will warrant their adoption as standard.

SPECIFICATION FOR THE MANUFACTURE OF OPEN-HEARTH GIRDER AND HIGH T-RAILS

I. General:

The entire process of manufacture and testing shall be in accordance with the best standard practice, and special attention shall be given to the following specifications:

II. Ingots:

(a) A test ingot shall be cast, while each heat is being poured, from steel going into the middle of the heat.

(b) "Bled" ingots. No ingot shall be used from the interior of which the liquid steel has been permitted to escape.

(c) Badly teemed heats. No ingot shall be used from a heat poured without the control of the operator.

(d) Ingots shall be kept in a vertical position until ready to be rolled, or until the metal in the interior has had time to solidify.

(e) Care shall be taken to avoid the burning of the steel while in the soaking pits and in reheating of the cold ingots. The ingots or blooms shall be discarded when the effects of injurious treatment show when rolled.

III. Analyses:

(a) The maker shall furnish the railway inspector daily with the chemical analysis for each heat, covering the elements specified under Section IV hereof.

(b) Each analysis shall be made from drillings taken from the test ingot at not less than $\frac{1}{4}$ in. beneath the surface thereof.

(c) These analyses may be checked from time to time by the railway company's chemist, and the maker shall fur-

nish, on request of the inspector, a portion of the test ingot or drillings therefrom for check analysis.

IV. Chemical Composition:

The steel of which the rails are rolled shall conform to the following limits in chemical composition:

	Lower Limit	Desired Composition	Upper Limit
Carbon	0.60 per cent.	0.68 per cent.	0.75 per cent.
Manganese	0.60	0.80	0.90
Silicon (not to exceed)	0.20
Phosphorus (not to exceed)	0.04

Note: An increase of 0.035 per cent carbon above the upper limit of this specification will be permitted for a decrease of each 0.01 per cent of phosphorus below 0.04 per cent.

V. Discard:

(a) Sufficient material shall be discarded from the top of the ingot to insure sound rails.

(b) All metal from the top of the ingot, whether cut from bloom or rail, is the top discard.

VI. Rolling:

(a) The number of passes and speed of train shall be so regulated that on leaving the rolls at the final pass the temperature of the head of the rails shall not exceed the following as measured on the Fahrenheit scale:

For rails weighing 100 lb. and upwards, 1900 deg.

For rails weighing less than 100 lb., 1700 deg.

(b) The bars shall not be held for the purpose of reducing their temperatures, nor shall any artificial means of cooling them be used between the leading and finishing passes, nor after they leave the finishing pass.

VII. Branding:

The name of the maker, the letters "O. H.," the weight of the rail, the section number and the month and year of manufacture shall be rolled in raised letters and figures on the side of the web, and the heat number shall be plainly shown on each rail where it will not be covered subsequently by the splice bars.

VIII. Straightening:

(a) Rails on the hot beds shall be protected from water or snow, and shall be carefully manipulated to minimize cold straightening.

(b) The distance between the rail supports in the cold-straightening presses shall not be less than 42 in. The gag shall have rounded corners to avoid injury to the rail.

(c) Any rail injured in cold straightening, or showing gag marks therefrom, shall be rejected.

(d) "Lumpy"—that is, short kinked or wavy—rails shall be rejected.

IX. Finish:

(a) Rails must be free from mechanical defects and flaws. They shall be smooth on the head, straight in line and surface without any twists, waves or kinks, particular attention being given to having the ends without kinks or drop. They shall have the ends square laterally and vertically, but the base may be undercut $\frac{1}{32}$ in.

(b) All burrs or flow caused by drilling or sawing must be carefully removed.

X. Drilling and Punching:

Circular holes for splice bars and bonds shall be drilled and for tie rods punched, to conform accurately in every respect to the drawing and dimensions furnished by the purchaser.

XI. Section:

(a) The section shall be.....as shown in detail upon the attached plan and the cold templet of the manufacturer must accurately conform to the specified section, and must at all times be maintained perfect.

(b) The section of the rail must conform as accurately as possible with the templet and any variation therefrom shall be within the following limits:

*Abstract of report read before the American Street & Interurban Railway Engineering Association, Atlantic City, N. J., Oct. 10 to 14.

Height, $\frac{1}{64}$ in. over, $\frac{1}{32}$ in. under.

Overall width of head and tram, $\frac{1}{8}$ in. under or over, provided that said variation will not affect the gage line by more than $\frac{1}{32}$ in.

Width of base, $\frac{1}{8}$ in. under or over.

(c) No variation will be allowed in the dimensions affecting the fit of the splice bars.

(d) The base of the rail shall be rolled to a true plane, at right angles to the web, a convexity of the base of $\frac{1}{32}$ in. being permitted.

XII. Weight:

(a) The weight of the rails per yard as specified in the order shall be maintained as nearly as possible after complying with Section XI, and the aggregate of the order shall not vary more than 0.5 per cent from the specified weight.

(b) Actual weights will be paid for.

XIII. Length:

(a) The lengths of rails at a temperature of 60 deg. Fahr. shall be 60 ft. and 62 ft. for those sections in which the weight per yard will permit.

(b) Ten per cent of the entire order will be accepted in shorter lengths, varying by even feet down to 40 ft., and shall be paired as to lengths before shipment.

(c) A maximum variation of $\frac{1}{4}$ in. over or under the specified lengths will be allowed.

XIV. Drop-Testing Machine:

The drop-testing machine shall be of the type that is recommended by the American Railway Engineering & Maintenance of Way Association.

XV. Drop Tests:

(a) Three test pieces shall be selected by the inspector from each heat, and they shall be in each case taken from the rails rolled from the top of the ingot and selected at approximately equal intervals from the heat as poured. They shall not be less than 4 ft. nor more than 6 ft. in length.

(b) The test rails shall be placed head upwards on the support and shall be subjected to an impact test under a free falling weight of 2000 lb.

Height of drop for rails weighing 100 lb. per yard and upward, 14 ft.

Height of drop for rails weighing less than 100 lb. per yard, 13 ft.

(c) The temperature of the test pieces, when tested, shall not be less than 60 deg. Fahr. or greater than 120 deg. Fahr.

(d) The testing shall proceed concurrently with the operation of the mill.

(e) Rails under drop test shall be considered as having failed when fractured or showing indications of the same.

(f) Two drop tests shall be made of the test rails from each heat. Should both rails withstand the test all the rails from the heat which they represent shall be accepted. Should one of the two test rails fail under the test the third rail selected shall be tested, and if two of three rails fail all rails from the heat which they represent shall be rejected.

(g) The report of the drop test should state the atmospheric temperature at the time the tests were made.

XVI. No. 1 Rails:

No. 1 rails shall be free from defects and flaws of all kinds.

XVII. No. 2 Rails:

(a) Rails which by reason of surface or other imperfections are not classed as No. 1 rails will be considered No. 2 rails, providing they do not in the judgment of the inspector contain imperfections in such number and of such character in any individual rail as to render such rail unfit for recognized No. 2 uses, and providing such rails comply with the requirements of Section XI of this specification.

(b) Rails shall not be accepted as No. 2 rails having flaws of more than $\frac{1}{4}$ in. in depth in the head or more than $\frac{1}{2}$ in. in depth in the base.

(c) No. 2 rails will be accepted to the extent of 10 per cent by weight of the entire order.

XVIII. Distinguishing Marks:

No. 1 rails (short length)—Both ends of all short-length No. 1 rails shall be painted green.

No. 2 rails (all lengths)—Both ends of all No. 2 rails shall be painted white and shall have two heavy center punch marks on the web of the rail at such a distance from both ends that they will not be covered by the joint plates.

XIX. Handling and Loading:

(a) All rails must be loaded in the presence of the inspector, and shall be handled in such a manner as not to bruise their flanges or cause other injuries.

(b) Rails of each class must be placed together in loading.

(c) Due notice must be given the inspectors of the time of loading so they may be present.

XX. Inspection:

(a) The inspectors, representing the purchaser, shall have free access to the works of the manufacturer at all times during the execution of any contract under this specification, and shall have all reasonable facilities afforded to satisfy themselves that the rails are being made in accordance with this specification.

(b) All tests and inspections shall be made at the place of manufacture prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the mill.

(c) The inspector shall have authority to reject rails from heats, the test pieces of which have failed, or from rails not in accordance with Section XI, or from badly poured heats, or from "bled" ingots or any other causes not in accordance with good mill practice.

Rails from insufficiently sheared blooms shall be accepted if they are not shorter than the minimum lengths, when properly cut, and otherwise conform to this specification.

Rails which show "pipes" should be cut to the shortest permissible length, and if "pipe" is not visible they shall be accepted as No. 2 rails.

All lumpy rails shall be rejected.

Rails shall be rejected if imperfectly drilled, chipped or filed, but shall be accepted if properly refinished.

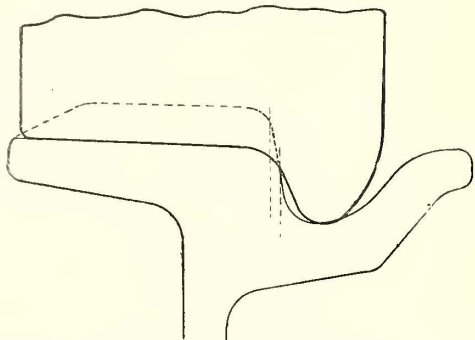
STANDARDIZATION OF GIRDER RAILS

The use of a multitude of rail sections in a street railway system unquestionably increases the expenditure and requires a large stock of material to be held for maintenance purposes. The Way Committees of 1907 and 1909 recommended rail sections of merit, and this committee desires to approve the principles upon which said sections were designed.

While this committee recognizes the superior merits of the T-rail for railway purposes, there is a demand by many of our member companies for a grooved rail to fulfill certain requirements in heavily traveled paved streets which must be met, and your committee wishes to again call attention to the 7-in. and 9-in. grooved-rail sections recommended by the Committee on Way Matters of the American Street & Interurban Railway Engineering Association of 1907, and shown in Fig. 1, page 122, and Fig. 2, page 123, of its 1907 report. In these sections a minimum amount of rail movement is secured. No criticism of any of the features of the above rail sections has been offered excepting that of heavy weight and consequent high first cost, and in order to obviate this objection your committee proposes the 7-in. section weighing 106 lb. per yd., as shown herewith, also the 9-in. section weighing 120 lb. per yd., shown herewith. The amount that safely

may be worn from the head of a rail of the proposed cross section is graphically shown. For track special work your committee proposes the 7-in. guard section weighing 122 lb. per yd., as shown herewith, and the 9-in. guard section weighing 141 lb. per yd., also shown.

The fits for both 7-in. sections and both 9-in. sections,



Way Matters—Possible Wear on Head of Proposed Standard Grooved Rails

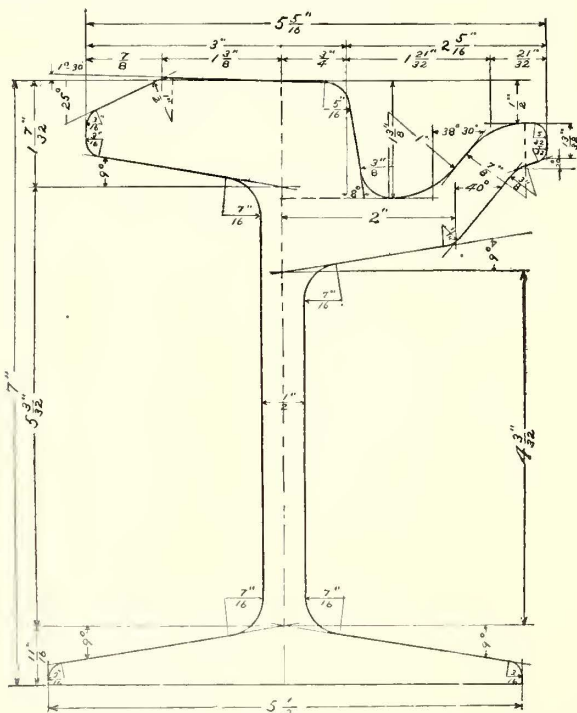
respectively, are made the same, so that compromise joints at special work may be eliminated.

RULES FOR DETERMINING GAGE AND FLANGEWAYS IN CURVES

Your committee recommends the following as standard practice:

Condition. Wheel gage is assumed to be standard, namely, 4 ft. 8 1/4 in., between fillets of flanges, 1/4 in. below treads; track gage, 4 ft. 8 1/2 in.

Rule 1: For A. S. & I. R. E. A. standard wheel flanges and one wheel base use standard track gage and determine the minimum flangeways required by graphical plating of



Way Matters—Proposed Standard 7-in., 106-lb. Grooved Rail for Use in Paved Streets Where Vehicular Traffic Is Extremely Heavy on the Railway Strip

groove, cross-section of wheel flanges, wheel base, and radius of curve, as described by Mr. C. W. L. Filkins in the report of the Way Committee on page 73 and illustrated by Fig. 1 and Fig. 2, opposite page 74, of the printed proceedings of this association for 1909, allowing 1/8 in. extra width in outer flangeway for irregularities in wheel setting and special work.

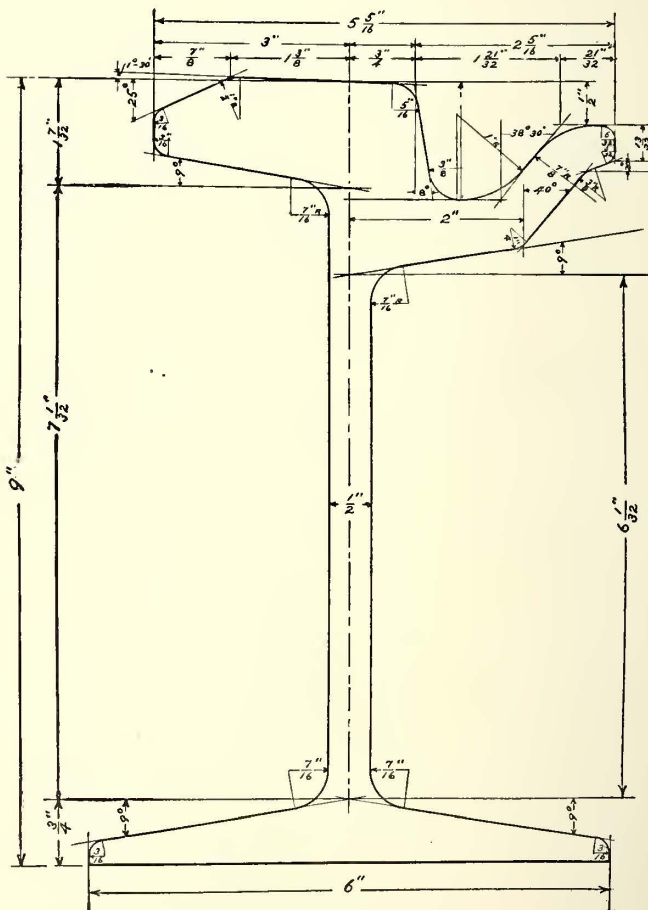
Rule 2: If various types of wheel flanges or various lengths of wheel bases are operated, determine, by graphical plating, the inner flangeways required for both the maximum and minimum conditions. Use inner flangeway to suit maximum conditions and widen gage by the difference between the maximum and minimum width of flangeways as above determined. Make outer flangeway 1/8 in. wider than minimum outer flangeway for maximum conditions plus the amount of the widening of the gage.

Rule 3: Rolled guard rails having too narrow flangeways should be planed on gage side of inner rail and on guard side of outer rail to obtain required width.

Rule 4: If inside flangeway be too wide increase the gage the difference between the width of flangeway and the narrowest groove required. Make the width of outside flangeway equal to that required by the maximum conditions of outside radius, wheel flanges and wheel bases, increased by the widening of gage and also by 1/8 in. to be allowed for any irregularities in wheel setting and in special track work.

Rule 5: In expressing specification for gages and flangeways measure gage on a plane 1/4 in. below the head of rail at fillet, except that when steam railroad wheels are to be used give distance on plane 5/8 in. below the head of rail, making special notation thereof.

Rule 6: Measure flangeways horizontally from gage line



Way Matters—Proposed Standard 9-in., 120-lb. Grooved Rail for Use in Paved Streets Where Vehicular Traffic Is Extremely Heavy on the Railway Strip

opposite head of rail. Give vertical slope of guard if rails are to be modified.

ELEMENTS OF A PERFECT RAIL JOINT

1. The joint should prevent independent motion of rail ends during the life of the rail.
2. The joint should be mechanically strong and should be

In order to obviate the loosening of joints due to the wear on the under sides of the head of the bolt and of the nut, as well as that which occurs through the stretch of the bolt, riveted joints have been tried. The design of the riveted joint, which contemplates the absolute fixing of the rail ends, was completed through a consideration of the stresses brought about by the contraction of the rails due to temperature changes, and the stresses introduced by the moving wheel loads were not considered.

Examination of these joints, after a reasonable period of service, is likely to disclose a weakness in the receiving rail head, depending upon the design of the rail on which the joint is used, and it therefore appears desirable that the riveted plate should offer some support to the rail head on these sections.

A further modification of the ordinary simple bolted joint has been brought about by the use of the machine-fitted bolts. The advantage of this joint over the riveted joint lies in the fact that standard splice bars are used which support the rail heads, instead of flat-rolled plates; while, on the other hand, it is probable that the strength of the grip of the machine bolts is not as great as that of the rivets.

CAST WELDING

In certain cities cast welding has been very successful, while on other railways the results have been unsatisfactory. Investigation, however, shows that a fair percentage of the failures may be attributed, first, to the section of the rail welded and its chemical composition; second, to an improperly designed mode and the consequent distribution of the metal; and third, to indifferent workmanship on individual joints.

ELECTRIC WELDS

The process of welding by electricity is too well known in detail to be described here. Failures of this type of welding occur through the fracturing of the rail, which takes place usually at the end of the welded bar. Several instances have been noted where the bars themselves have been fractured at the joint. This method of welding depends principally upon two items for a successful joint, first, the insertion of the "dutchmen" between the rail ends in such a manner that the pieces inserted cannot work loose, and, second, that the grinding of the finished joint, together with the removal of a slight hump that occurs in welding certain sections, be accurately done.

The thermit weld has not been in use a sufficient length of time, compared with the other methods of welding, to make a complete comparative statement, and while it has certain advantages we feel assured that it should only be applied by competent and skilled workmen.

MAINTENANCE DISADVANTAGES

The life of welded tracks is not determined by the life of the rail, but by the rate of joint failures per annum. It is desirable to be able to repair imperfect joints by additional joints of the same type. This can be done by either the cast weld or thermit weld process, but it is impracticable to do so by the electric process on account of patents, excessive cost of equipments, etc.

ELECTRICAL CONDUCTIVITY OF JOINTS

Where cars are operated by electricity and the tracks are used as a return circuit, the question of relative conductivity of the rail at the joint becomes more and more involved in the design of an economic joint.

In consideration of the track as a return circuit, joints may be divided into the following classes in accordance with their conductivity compared with that of the rail: (1) Welded joints, (2) riveted or machine-fitted bolted joints with a bond of thermit steel, (3) the simple riveted joint, (4) the various general types of bolted joints, without bonds.

The engineers on traction lines, through experience, have concluded that the spacing of rails with open joints is unnecessary in paved streets and have ascertained by practice that the damage to the rail end, due to the impact of the wheels, is in direct ratio with the width of the opening between rail ends.

Therefore, the Committee on Way Matters has recommended, in its proposed specifications, that "the rails may be undercut $\frac{1}{32}$ in."

OPPOSITE VERSUS STAGGERED JOINTS

It is a known fact that if staggered joint track construction is placed under heavy traffic conditions the failure of a joint will damage the center of the rail lying opposite to such an extent that the rail will not be fit for further service. It, therefore, appears that tracks in paved streets should be laid with opposite joints.

RECOMMENDATIONS

In conclusion the writers would call particular attention to certain points which, in their opinion, are often neglected. These points are:

(1) Because the life of the joint is practically dependent upon the initial set, we believe it is necessary to insist upon a thorough cleansing by means of wire brushes, files, etc., or, better, with a sand blast, to obtain this end.

(2) It is recommended that sledging be reduced to a minimum and that the foreman should assure himself that the bolts when fully drawn up are not overstrained.

(3) The maximum variation from the templet height of rails as permitted by nearly all girder rail specifications is $\frac{3}{64}$ in. This amount of variation is undesirable from the point of view of the purchaser, but is now required by the manufacturer. The proposed specification now recommended by the Committee on Way Matters permits the above variation but also requires that there shall be no variation in the fishing dimensions. In view of the prime importance of these two points we recommend that a rigid inspection be insisted upon by all purchasers.

We recommend that grinding, or some other means, be adopted to eliminate imperfect surfaced joints.

Joint depreciation is one of the greatest factors in producing high maintenance costs with excessive renewals, and if additional money be spent when tracks are constructed to carry out the above recommendations the resulting benefits will greatly reduce the amount of depreciation.

Inasmuch as the life of the track is largely determined by the life of the joints, and as the joints form but a small proportion of the total cost of track construction, the additional expenditures recommended for labor and inspection will be justified.

ECONOMICAL MAINTENANCE

The subject of economical maintenance is of such vital importance to street railway operation that the committee has decided to publish a paper on that subject prepared by Martin Schreiber, engineer maintenance of way of the Public Service Railway Company, Newark, N. J. The subjects of standardization of layouts for special track work and rail corrugation have been included in Mr. Schreiber's paper, which is made a part of this report.

The committee recommends:

1. (a) Standard switch for special work as shown by Mr. Schreiber;

(b) or modify the standard proposed by the special work manufacturers by simply breaking the joint at the end of the switch so that the connections could be easily and better made.

2. Standard symbols similar to those proposed by Mr. Schreiber.

3. That next year's committee include set of rules governing the way department.

4. That next year's committee make report on shop work as it particularly applies to the track department.

APPENDIX C—SUMMARY OF 40 REPLIES TO DATA SHEET

(1) Do you use standard switches or mates?

Nineteen companies use standard tongue switches and mates with radii varying from 75 ft. to 200 ft., and 10 use switches and mates of 100 ft. radius.

(2) Do you use a standard cross-over or standard steam trolley crossing?

Twenty-two companies use standard cross-overs with radii from 20 ft. to 200 ft., of which 8 companies use 100 ft. radius switches. Three-rail type steel trolley crossings are used by nearly all companies, and a few use solid manganese crossings.

(3) What advantage, if any, has spiral switch over one with a straight 100-ft. radius?

Twelve companies favor and 17 companies do not favor spiral switch pieces.

(4) Which is the most economical, solid manganese or hardened center switches, mates or frogs?

Twelve companies favor hard center special track work, three companies favor solid manganese; two companies favor solid manganese switches and mates and hard center frogs, and one company favors solid manganese switches and hard center mates and frogs.

(5) Is it your custom to place a switch with movable tongue on inside or outside of curve? Is it advantageous or not?

Twenty-six companies favor placing the switch tongue on the inside rail of curve, two companies favor placing it on the outside rail, except in some special cases.

(6) Do you think it advisable to grind all rail at joints?

Fourteen companies grind or file rail joints when made, and 15 companies do not.

(7) Minimum clearance between street surface and underside of truck and motor equipment?

Answers indicate clearances from 2 in. to 5 in.

(8) Give quantity of rail laid during the last year (with specification), open hearth, Bessemer and manganese (outside of specials)?

The 40 companies report 23,632 tons of open-hearth steel rail used last year as against 9910 tons of Bessemer steel rails and 66 tons of manganese steel rail used during the same period. About half of the open-hearth rail was high carbon, ranging in carbon from 0.70 per cent to 0.85 per cent, the mean of the limits specified in any case being either 0.75 per cent or 0.80 per cent carbon.

CONCLUSION

Your committee wishes to thank Victor Angerer, of Wm. Wharton, Jr., & Company; H. C. Stiff, of the Lorain Steel Company; F. D. Carney and C. A. Alden, of the Pennsylvania Steel Company; C. W. Gennet, Jr., of Robert W. Hunt & Company; Walter Jackson, of the ELECTRIC RAILWAY JOURNAL; R. F. Kelker, division engineer, track and roadway, Board of Supervising Engineers, Chicago Traction, and other engineers who have co-operated with the committee.

The Nachod Signal Company, Philadelphia, is showing its signal system in operation, using a track plan of a typical block and turnout with miniature cars running over it to set and clear the signals. By thus preserving the scale and the relative location of parts, hardly any explanation is required and the demonstration becomes of immediate interest. In the system shown, which is for single track, the contractors have a sense of direction, a car passing one way setting the signals and releasing them when going the other way. Separate night and day indications, which are independent, are given at all times. Represented by C. P. Nachod, general manager, F. W. Kulicke, engineer.

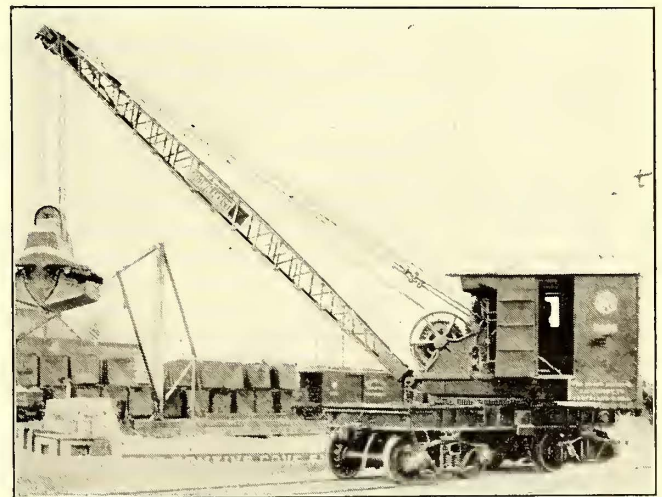
THE ECONOMICAL MAINTENANCE OF TRACKS AND ROADWAYS*

BY MARTIN SCHREIBER, ENGINEER MAINTENANCE OF WAY, PUBLIC SERVICE RAILWAY COMPANY, NEWARK, N. J.

Probably no department of the street railway industry offers more possibilities for improvement in maintenance and construction than that of the track and roadway, and the fact is now just becoming thoroughly appreciated by managements. It is well known that the resources of trackmen have been in great part in the past supplied from the odds, ends and scrap of the other departments. This results in track equipment of shocking inefficiency, and it is not surprising that it is reflected in the cost of the upkeep when extended over a term of years. The writer appreciates that this subject is too broad to be covered entirely in a single paper, but it is proposed to bring out only some of the most important features.

HEADQUARTERS

On account of the rough and heavy nature of the material used in the execution of the work for tracks and paving, adequate yard room should be provided for the way department. Suitable space is necessary for a neat and orderly storeroom, shop space for ties, rails, special work, paving material, and other accessories, so that they may be



Economical Track Maintenance—Locomotive Crane

properly stored, or racked up and spaced, in order that the material may be economically handled and intelligently checked. The way department should have quarters large enough to allow of purchasing material in quantities and storing it in advance. Such an arrangement is the only guard against delays. It insures the advantage of getting proper supplies and gives time to buy them under correct specifications and careful inspection, thereby obtaining the benefit of honest competition and of getting the best for the least outlay. The location of the yard should be convenient to the center of distribution for the system, at the same time providing a steam road siding. Extra hauling charges would soon pay the interest on an investment for a location of a proper size, to say nothing of the inconvenience and loss of time. Size and fitness may only be determined by the amount of work to be done.

YARD MACHINERY

Few street railway companies can afford to be without some power machinery for unloading heavy material from the steam cars and loading it again on the work cars. The

*Abstract of paper presented as Appendix B of Report of Committee on Way Matters, American Street & Interurban Railway Engineering Association, Atlantic City, N. J., Oct. 10 to 14, 1910.

first step in this direction is the use of a stationary derrick. A good design has a 45-ft. boom, a 50-ft. mast and handles 4-ton loads with boom fully extended. The operating engine is driven by a 40-hp, 500-volt d. c. motor, and has four main drums that provide for boom, load, revolving line and extra drum for closing line in case a clam-shell bucket is required. Such a machine is entirely under the control of one man, and costs installed complete approximately \$2,500.

The locomotive crane illustrated represents the highest type of machine for loading and unloading material. It is not only speedy and substantial for handling the supplies, but on its own power operates over the tracks and at the same time may be used to push steam or flat cars. The purchaser of such a crane for yard work should be careful to get one with a boom of such a length that the machine may operate through a radius of at least 35 ft., and the requisite number of drums should be provided for taking care of the possibilities of equipping the machine with a bucket or a clam-shell for handling coal, sand or crushed stone.

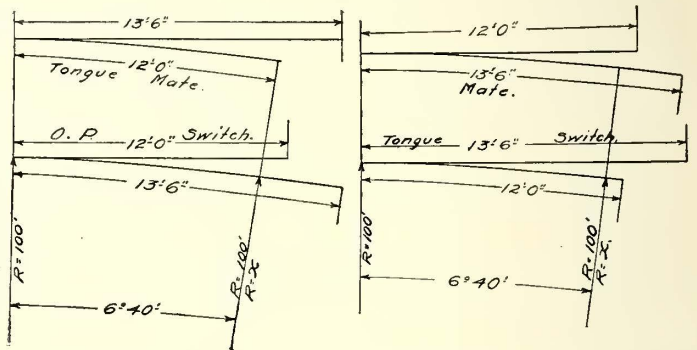
WORK-CAR EQUIPMENT

The cost of repairs to the tracks and roadway is very materially reduced by hauling all supplies by work cars or trains. Instead of a discarded passenger car, which seems to have been the standard in the past for the track engineer, the most substantial car and equipment that can be obtained are recommended. Motor work cars equipped with power cranes are exceptionally economical for gathering up scrap, rail and special work; handling bridge timbers and other heavy pieces which would otherwise require a large number of men; also they serve the purpose of the work cars, as material may be carried on them to and from the yards, as well as be conveniently and cheaply handled on and off the work. The ordinary railway would, in a comparatively

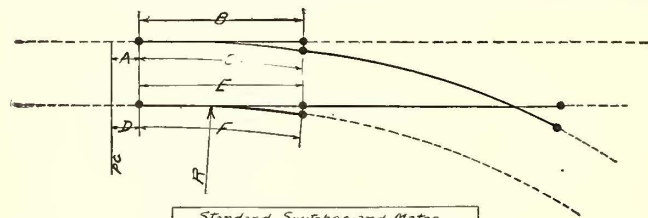
work, such as making split switches and frogs, may be taken care of by the mechanical department, an arrangement that is fairly satisfactory if there is proper co-operation. For urban properties, the large use of manganese for specials has minimized the local shop work to a large degree. Some companies bend a large proportion of their own track curves. An hydraulic railbender is a fair substitute for a powerbender.

STANDARDS

The adoption of standards to meet particular conditions is strongly recommended because of the importance not only of keeping the stores and stocks down to a minimum, but of increasing the general efficiency of the work executed. Laborers, skilled or unskilled, after handling the same type of rail, special work and accessories naturally become more proficient in making repairs, and not only is



Economical Track Maintenance—100-ft. Inside Radius Switch Pieces with Broken Joints



Standard Switches and Mates						
Stated Radius	For all Gages	Dimensions				
	R	A	B	C	D	E
50'	Lateral	47 7/8"	-6"	10'-0"	-6"	10'-0"
75'	"	72 7/8"	0"	12'-0"	0"	12'-0"
100'	"	97 7/8"	0"	12'-0"	0"	12'-0"
150'	"	147 7/8"	12"	14'-0"	12"	14'-0"
200'	"	197 7/8"	18"	15'-0"	18"	15'-0"
100'	Wye	97 7/8"	-6"	10'-0"	-6"	10'-0"
150'	"	147 7/8"	0"	12'-0"	0"	12'-0"
200'	"	197 7/8"	0"	12'-0"	0"	12'-0"
350'	"	347 7/8"	12"	15'-0"	12"	15'-0"

Note— It is recommended that the 100 foot Radius Lateral and 200 foot Radius Wye, shall be used wherever practicable. It will rarely be found necessary to use others.

Economical Track Maintenance—Table of Proposed Standard Switches of Different Radii

short time, save the investment required for a proper crane-car. For the smaller road the crane-car could do all the lifting work in the yards as well as out on the tracks. In selecting a crane-car precaution should be observed to get the hoisting apparatus from a recognized company making a specialty of this class of machinery. Some home-made cranes, mounted on a scrapped passenger car, take so many men to work the apparatus, and lose so much time doing it, that the outfit is often little in advance of the hand method.

SHOPS

Only the largest roads require special shops for the track department, except a smithing shop to take care of the tools, make temporary plates, bend rail, and the like. Other

the work done better and more quickly, and, therefore, more cheaply, but also without requiring the strict supervision and inspection that would otherwise be necessary. Moreover, there is a material saving to be effected by being able to make proper repairs promptly.

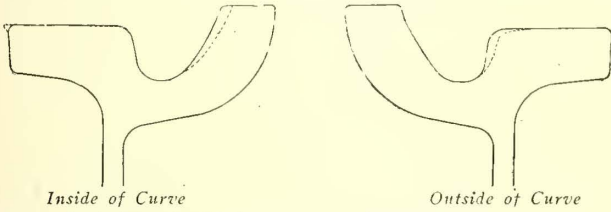
It might be well to briefly consider special work. The maintenance of track and roadway for urban roads amounts to as much as \$600 per mile per year. One hundred and fifty dollars, or 25 per cent of this, would be a fair average for special work, including the installation and paving. Hence the importance of a close study of this item. Guard rails should be standard to fish with the regular rail section, without compromise joints. Little may be accomplished in getting standard frogs, except for cross-overs or turnouts, but it is well to have standard switch pieces, standard at least as to lengths and radii. It would not be very practicable to standardize the details of design. A standard switch makes it convenient in replacement for any location. The switches may be shifted around without cutting in and out the straight rail. Also, with a few switches in stock, renewals may be made at any time, which is no small item when special work exists with switches of varying lengths and radii. It appears that a 100-ft. radius switch is satisfactory for many urban roads and its possibilities are illustrated by one lay-out, in which, under many conditions, 186 standard switches and mates were utilized.

Accompanying sketches show 100-ft. inside radius switch pieces with joints broken, and a table gives dimensions of the proposed standard switches of different radii that were recommended by the special work manufacturers, consisting of the Wharton Steel Company, Lorain Steel Company, Pennsylvania Steel Company, New York Switch & Crossing Company, Cleveland Frog & Crossing Company, Buda Company and Barbour-Stockwell Company. Another table, on the following page, gives a list of proposed standard frogs, designating the frogs by numbers, following steam road practice, which is to be commended.

One illustration shows a 100-ft. radius switch applied to make up a standard cross-over. In the cross-over for a distance between tracks of more than 4 ft. 10 in. two jump frogs may be used; otherwise one jump frog. Open-point switches, or switches on the outside curve, should be utilized where the cross-over is seldom used, as in this case the mate will last longer than the switch in the main-line track.

It was interesting to note that from the records of one of the large manufacturers it was shown that over half of all the switches ordered were of 100-ft. radius; also that very few data sheets showed that any of the street railway companies favored spiral switches.

The use of solid manganese for switches, mates, frogs and curves is steadily increasing. There is no doubt that



Economical Track Maintenance—Cross Sections of Cast Manganese Guard Rails Showing Wear

in the case of any curve of 75-ft. radius or less for permanent street work money is eventually saved by using the solid manganese rail.

Illustrations show cast manganese steel guard rails that have been in service since February, 1908. The old curve was Bessemer, and if renewed with same material it would now be ready for replacement for the second time. From the experience of the Interborough Rapid Transit Company of New York there seems little doubt that the open-hearth rail of 0.75 per cent carbon is very superior to the present market Bessemer steel.

For city traffic the solid manganese switch is gaining favor. It means an additional cost of probably one-third to one-half, yet the advantage of a one-piece casting, with

turn-outs and branch-offs rather than crossing frogs with the larger angles. For crossing frogs at intersection of two trolley roads, in case of severe traffic, solid manganese construction is preferable.

CORRUGATIONS

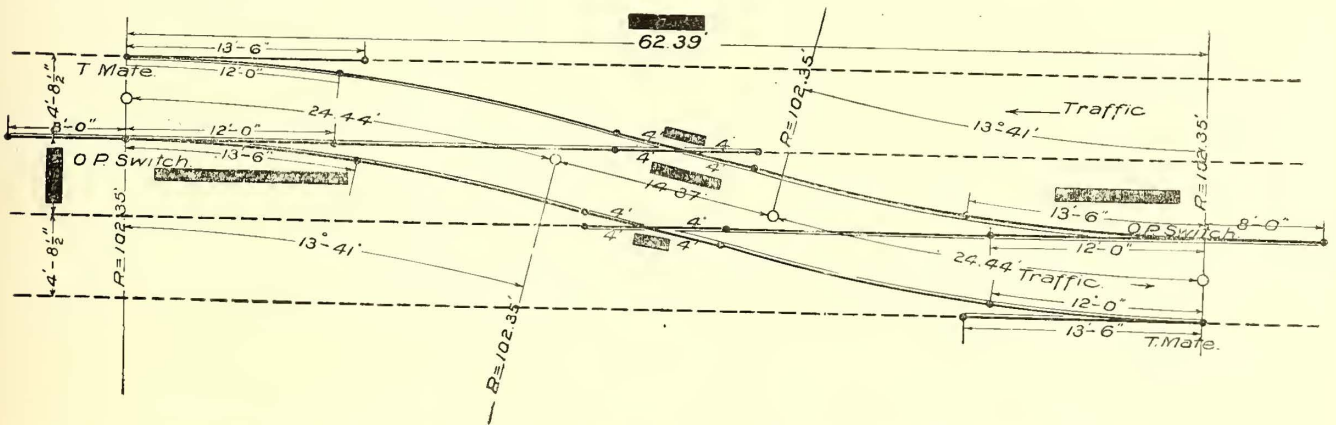
Few maintenance troubles have attracted so much attention and study as corrugations in rails. We are having more corrugations than ever before, and the problem is to get rid of what we have in the large quantity of rail that is now in service and to do it in the most efficient and inexpensive way. One of the simpler methods of removing corrugation is by means of an ordinary file or emery block set in a frame and operated by hand. The Twin City Rapid Transit Company, Minneapolis, Minn., uses a device which consists of a holder for carborundum blocks which are rubbed back and forth over the rail by a car to which the device is attached. Power-operated grinders also are used by some roads.

The Detroit United Railway Company is using a rail grinder devised by John Kerwin, superintendent of tracks. Two emery wheels are attached to a swiveling frame, projecting out from the car and over each rail. The frame is kept in adjustment by means of a screw arrangement and a flat shoe that rests and slides along the rail, so that the emery wheel cuts level. The car is also equipped with regular propelling motors. The cost of removing corrugations in rails varies from a few cents to 50 cents per foot of rail, depending on the depth of the waves. Even at the latter price it pays, as the only other remedy is to renew the rail. Luckily, once the corrugations are removed they are not likely to return, so it is important to attend to their removal as soon as the indentations appear, as at that time their elimination is easily and readily effected.



No. of Frog	Angle	Arm Length G	Arm Length H
#4	14°16'	4'-0"	4'-0"
#5	11°25'	4'-6"	4'-6"
#6	9°32'	5'-0"	5'-0"
#8	7°3'	6'-6"	5'-6"

Economical Track Maintenance—Table of Proposed Standard Frogs for Turnouts and Cross-overs



Economical Track Maintenance—Application of 100-ft. Radius Switch to Standard Crossover

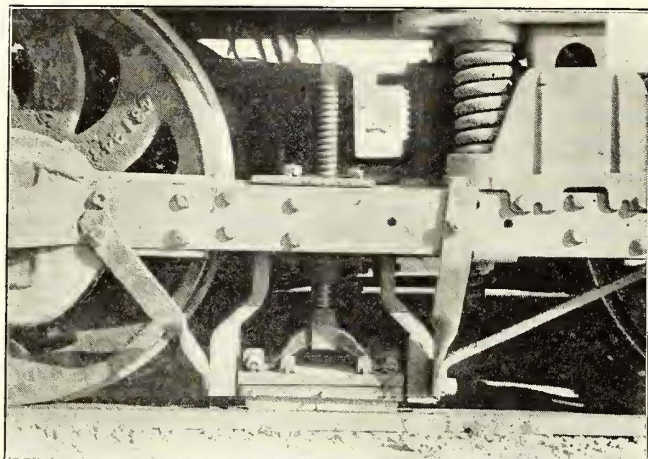
manganese arms, as well as other wearing parts, appeals to the ordinary engineer, as the switch pieces of the hardened center type often batter down and fail at the arms if the joints are not first class. Another point in favor of solid work is that those who have used the special work speak favorably of it and are still ordering. This is not true, however, for the solid manganese frogs. Undoubtedly, since the frog wears away at the point, it seems rather extravagant to scrap the whole piece of material whose first cost is 10 times as much as it is worth in scrap. Therefore, the solid frog is not recommended at this time in preference to the hardened center one. Of course, the frogs referred to above are understood to be those found in

It is now held by a large number of way engineers that all joints should be ground when first installed. There is no question that a joint should not be left if there is any variation whatsoever between the running surfaces of abutting rail ends. Once the wheels have an opportunity of pounding the rail the receiving side will rapidly cup out and the track will fail. Rail could have its life considerably extended if, as soon as the joints began to pound, the plates were pulled up and the rail so ground that the abutting rail ends were a true, level surface. Such practice should be resorted to instead of neglecting the joints to such an extent that nothing can be done except lose the rail or apply some expensive method in reclaiming it.

The practice of making home-made offset or compromise joints should be discouraged. It is not practicable for the ordinary smith to make compromise plates for rail that are fit to use.

TIES AND STRUCTURAL TIMBER

In no material has a greater waste been permitted than in structural wood for railways. Even without preservative treatment a good deal may be accomplished by purchasing under proper specifications and intelligent inspection. In crossing planks it is often the practice to purchase "merchantable" yellow pine, regardless of what is the cause of renewals, whether due to traffic wear or natural deteriora-



Economical Track Maintenance—Rail Grinding Device, Twin City Rapid Transit Company

tion. If the repairs are rendered necessary by street traffic, which is common, good red oak timber will not only stand up under vehicular traffic twice as long, but is considerably cheaper than the yellow pine. Again, if "merchantable" timber be purchased, it is the duty of the engineer to see that he gets "merchantable" and not "standard" or some inferior grade. There should be someone in the way department trained for timber inspection. The best place to inspect the timber is at the mills or point of shipment. Few dealers will object as much to having 50 per cent of the proposed order cancelled at the yards as they will to have 10 per cent rejected at delivery point.

It is now generally conceded that it pays to treat timber with some accepted preservative, especially when the cheaper woods may be used. The pressure method is no doubt the most reliable, but unfortunately it costs the most, and the work must be done outside, as few railroad companies can afford to own a treating plant. Trestles, bridges, ties and the like have their life extended by even a simple dipping treatment in a hot bath of coal tar distillate.

When a thoroughly seasoned tie is immersed for 20 minutes in a hot preservative at 220 deg. Fahr. the liquid fills all the crevices, and creates an antiseptic fungus-resisting zone around the stick; also gives a penetration of at least 3/16 in. in the solid sap wood. A deeper penetration may be obtained by placing the tie in a cold bath of creosote or a solution of zinc chloride after it is removed from the hot bath. Indeed, it is possible by this method to obtain complete penetration of the sap wood in such woods as the pines and the gums. It is well to use sound and square-edge yellow pine ties for treating, and if any commercial creosote is used, to specify coal tar creosote, after the specification of the American Railway Engineering & Maintenance of Way Association. If the dipping process is resorted to, a high distillate of coal tar should be used. Ties and all lumber should be thoroughly

seasoned before being used. A tie treated by pressure with 10 lb. of coal tar creosote per cubic foot of timber is increased in price 40 to 45 cents; treated by open tank to 8 lb. per cubic foot, about 30 cents; and treated by dipping in hot coal tar distillate, about 25 cents. If sound and square yellow pine tie were bought at 45 cents, the total cost of the tie with the above treatment would be approximately 85, 75 and 70 cents respectively.

CRUSHED STONE

On account of the extensive use of crushed stone or gravel in some form as ballast, paving foundation and paving, any of the large companies could show a saving in maintenance by acquiring a gravel-producing plant or a stone quarry.

One company has a stone crusher mounted on a work car. This may be moved about the road crushing up old paving block and the like on the street, and will show a saving in its proper field. About 50 yd. of 1 1/2-in. stone may be made for a day's work out of old paving blocks at a cost of approximately 40 cents per cubic yard. A jaw crusher is mounted on an old car and driven with a G.E. 1200 railway motor, rewound as a shunt motor.

PAVING

Paving comprises one-third of all the maintenance costs of track and roadway. As the work requires skilled labor it offers the best field for piece work. Some companies contract the paving, it being a very good plan to anticipate the important repairs at the beginning of the season, and then to take figures for the various paving from different contractors on a unit or yardage basis. When asphalt is required, creosote wood block should be substituted, if possible, or at least a block header or binder course should be used just adjacent to the rail. It should be kept in mind that a cheap pavement, such as macadam, when under heavy traffic, is a great deal more expensive to maintain than a permanent block pavement.

In removing old granite or stone block pavement it may be reclipped and when used again makes a first-class pave-

Department	Job No.	Account No.	Auth. No.	1910
Maintenance of Way	14	101A	July 29	
ESTIMATE for Repairing and paving on				
Cross St. Elizabeth from Arch to West Jersey St.				
8	60 ft	116-434 Rails	66	316.50
240	6x8x8	Concrete Jies	84	201.60
240	7	Rail Brues	25	60.00
3	egs	7/16x5 spikes	360	10.80
8	bricks	Continued Joint Plates	400	32.00
16	36"	4/8 Crown Boards	75	17.00
50	4x8	1/2 Stone	100	50.00
50	ft	Cement	135	67.50
25	4ds	Sand	50	12.50
Labor, Hauling etc				200.00
Paving				500.00
This Job Order to be closed into Permanent Job Order No. 117				6144.50
Approved				Total Estimate
Genl. Manager				Chief of Dep't

Economical Track Maintenance—Form of Estimate of Cost of Track Repairs

ment at a considerably smaller cost than if new block were used.

Of all the block pavements the granite is to be preferred, on account of having best wearing qualities. It is of interest to note that in New York it was found that the cost of repairs with large blocks on streets under heavy traffic was much less than with the smaller block paving; also that the costs of the various pavements per square yard per year were as follows: Sheet asphalt, 55 cents; wood block, 45 cents, and granite, 27 cents. Grouted joints with brick or stone block make the paving less susceptible to economical repairs. For this reason many prefer the sand or gravel and tar joints.

Minimum maintenance may only be effected by careful study through an efficient and systematic method of accounting. Records should be intelligently and conveniently kept and in sufficient detail to allow a most thorough analysis. Probably the job order system represents the most advanced practice. With this arrangement, whenever the roadmaster, or whoever has responsible charge of the particular piece of trackage, thinks it is necessary to make repairs, he makes out an estimate, as shown, and it is forwarded to the engineer, or the head of the department. If the engineer approves the expenditure, the job order is sent to the general manager or next responsible officer,

rate records should be kept of each special piece for comparison and for study in making renewals. On large roads it is certainly desirable to have a proper index system, so that the drawings and all records may be speedily produced. Standard survey notes should be easy, readable and systematic. One illustration shows a suggested list of symbols that are applicable to an electric railway.

CONCLUSIONS

I. Proper organization and ample headquarters for the way department, including proper facilities for shipping material, storing supplies, a shop and offices, are necessary.

II. Suitable unloading and loading machinery is desirable; a stationary derrick or locomotive crane may often be economically utilized.

III. Eliminate teaming and trucking as far as possible and use work cars.

IV. (a) Provide proper equipment. The motor work cars to be built preferably with steel body framing, especially heavy trucks, motors and independent air brakes.

(b) A motor car with an electrically operated crane is recommended where the scope of the work will permit, crane car to be used either in yards or on the street. It may also include clam-shell bucket to handle sand or crushed stone.

V. (a) Standardize where possible and consistent with conditions; use standard switch pieces in special work.

VI. (a) Grind the rail at all joints where there is not a true running surface of abutting rail ends.

(b) Compromise joints should always be avoided where possible. Home-made compromise joints should not be used.

(c) Grind out corrugations as soon as the indentations appear.

VII. (a) Purchase supplies, including lumber, under a proper specification and inspection.

(b) Treat ties and structural timber for permanent work with an accepted method and preservative.

VIII. Consider owning a gravel or crushed stone producing plant.

IX. (a) Consider doing own paving or any other work where practicable by the piece-work system.

(b) Also consider contracting paving on a unit basis.

STANDARD SYMBOLS.			
Rubble Uncoursed.	Property lines.	Public Crossing	Trolley Pole.
Rubble in mortar.	Property line foreign	Private Crossing	Trolley Pole foreign
Brick	County lines.	Private and 2ndry road.	Telegraph Pole.
Ashlar Masonry.	Township lines.	Streams	Telephone Pole.
Dressed Masonry.	City lines.	Canals.	Electric light pole
Concrete & Steel.	Street or block lines.	Roads	Combination pole
Concrete.	Cattle guard.	Contour lines.	Catch basin
Solid rock.	Original center line.	Hitching post.	Arc. lamp.
Seamy rock.	Survey lines and points	Dimension lines.	Incand. lamp.
Earth.	U.S. Harbor lines.	Block Signal.	Gas lamp
Sand	Turnstile.	Signal line.	oil lamp
Gravel.	Railroad under construction	Present track.	Hydrant.
Marsh.	Railroads	Proposed track.	Manhole.
Mud.	Street railroad	Foreign track.	Metur.
Stone ballast.	Surface & Grade line.	Abutments Walls etc.	Riscr.
Cinder ballast	North point	Bottom of Medium slope.	Valve.
Timber.	B'ldgs and Villages	Tap of Slope.	Fine Scale.
Water.	Cities and Towns	Cribbing.	Power house.
Glass	Bench mark.	Road Crossing.	Gas holder
Tree.	Triangulation Station.	Track Scales.	Gas generator
Water pipe.	Manument.	Interlocking tower.	Sub. Station
Conduit	Transit point.	Compressed air box	Carbarn
Steam pipe.	Telegraph line	Track drain	Draw bridge
Compressed air pipe.	Mail Box	Watering Trough.	culvert
Compressed air Station.	Embankment	Derail	Truss
Sewer pipe.	Cut	Derail lever	Trestle
		Switch Stand.	

LOCATION		SPECIAL WORK. No 191			
ST. BANK ST.		Division	ESSEX		
		Description	BROAD & BANK ST. NEWARK, N.J.		
		Notations			
		ORIGINAL	1-13	12-13	3-5
		Renewals			
		Price Nos			
		Date	4/10/10	7/20/10	10/10/10
		Cost of Special work	1700	278	150
		Cost of other Material	400	25	15
		Cost of Labor-Paving	300	100	30
		Total Cost	3000	400	215
		Manufacturer	Wagner	150	150
		Drawing No.	67981	6024	7214
		Rail Section	104	359	352
		Our Drawing No.	4211 C	4207	7215
		Revision No.	17430	812	3022
		Remarks			

Economical Track Maintenance—Standard Symbols Suggested for Use of Way Department

Economical Track Maintenance—Index Card for Engineering Department Files

and if the work is thought to be desirable it is authorized. A copy of this job order is sent to the storekeeper, the chief timekeeper and the auditor. At the end of the year it is possible to add all the job orders and account for the entire expenditure on definite sections of trackage, and so by analysis be able to tell whether or not the expenditure is justifiable.

The stores account requires intelligent supervision, the special work, rails, ties, paving stones, being as carefully accounted for as all the smaller supplies. Until this is done accurately, no accounting system will be effective. The engineering office records should be complete. Accu-

X. Adopt a proper accounting system for convenience and thorough auditing and analysis to obtain a minimum maintenance cost—use the job order system or its equivalent.

XI. (a) Compile accurate, convenient and complete engineering records, including a physical survey of the tracks and roadway.

(b) Make standard drawings, properly indexed and filed.

(c) Surveys and reports should be made intelligent and complete and systematized with standard signs and symbols.

ADDRESS OF PRESIDENT SWIFT TO THE ACCOUNTANTS' ASSOCIATION

The primary reason for an address from the president is, I presume, to afford him an opportunity to outline a policy for the future, and it is usual for him to make some general remarks about greater efficiency, high standards, scientific accounting, and lifting our work to a higher plane. These ideals, have, however, been frequently voiced in well chosen words, and I shall not attempt to add to them, for we can see that auditors are advancing the efficiency of their departments to keep pace with the improved methods of conducting this great business of transportation, which have given to our passengers increased speed with greater safety and comfort. And I believe they are striving to make each year's work better and more valuable to their companies and to their profession.

The history of the association for the past year has not recorded any startling events. We were apprehensive that the requirements of the corporation tax law would conflict with present accounting methods, but the interpretation of the act was so liberal as to require no material change. It is possible that the organized action of the accountants throughout the country, in pointing out the hardship which would follow an attempt to insist upon a literal interpretation of its provisions by the federal government, had great influence in bringing about this satisfactory result.

The first undertaking of the association, that of perfecting a uniform system of accounts, has been accomplished, and we will now turn our attention in a large measure toward more advanced problems. But while doing this, we must not forget that there are many details in reference to our work which are always interesting to our members, and, notwithstanding past discussions, these subjects from time to time will again be presented for our consideration.

Some years ago the association made a collection of blanks which were a source of great interest and an education for its members. This year the collection has been revised and books containing many new forms are now available for those who desire to examine them. I believe that such an educational work should be continued by the collection of data showing the practice of member companies in reference to certain important office methods.

There are many problems arising from the interchange of traffic between interurban lines which are of great interest to their representatives. In some sections local associations have taken up these questions, and because of their more frequent meetings and their immediate interest in these discussions they have, no doubt, obtained as satisfactory results as would have been possible had they waited to have such questions discussed in our association. We recognize the good work these local associations are doing, but the American Street & Interurban Railway Accountants' Association offers many benefits and advantages which local associations cannot give; and I believe that the majority of their members appreciate this. When we analyze our membership we find that many subjects must necessarily come before the association which cannot be of equal interest to all. But the comprehensive vision of an outsider is sometimes of great value. Therefore, we should be willing to give our views, although we may think we are not qualified by actual experience to offer useful suggestions.

It has been a source of gratification to all of us that in past discussions new ideas have frequently been suggested by members who would appear to have less interest in the subject than other members who have taken no part in the discussions.

In the numerous purchases and consolidations which have taken place throughout the country there is an increasing number of our members who are operating electric light plants. The accounting between these properties presents some difficult problems, and a discussion of the most logical method under such conditions would be of interest.

I believe that in a large measure the success of our associa-

tion is due directly to the unselfishness of our members in giving the result of their experience, their time, and their talent for the benefit of the members of the association. The same spirit must govern us in the future if the interest of the entire membership is to be maintained.

The gradual growth of sentiment in favor of government control of public service corporations, and of the belief that their profits should be restricted to a fair return upon capital actually invested, brings into more prominence such questions as overhead charges and depreciation, which are of especial interest to those companies which must negotiate with the authorities for rates adequate to maintain their properties and pay reasonable returns, or have reached the maturity of their grants and are asked for the physical valuation of their property.

In the past our association, in considering depreciation, has traveled in a circle around the subject; but while as an association we may not have accomplished much, we are conscious that this great question stands before us, and many of us, having advanced somewhat nearer and having studied this subject, have, no doubt, formed some opinions, and shall be prepared to state them when the time comes. Meanwhile, proper data for determining the life of way and structures and of equipment are necessary, and the discussion of suitable records will prove interesting.

In some locations there is considerable agitation in favor of municipal ownership, but so far in this country there have been few attempts at municipal operation of street railways. Many of us have had some insight into the methods of accounting which are usual with municipal ownership of other enterprises, and it would seem that, with the assistance of the parent association, an investigation of the results of municipal operations, based upon proper methods of accounting, would be valuable.

Another important line of work, that of shop accounting, was commenced last year. The necessity for this work has long been recognized, and to obtain the best result it seemed advisable that a joint committee from the Engineering Association and our own be appointed to work out the details. In spite of unavoidable delays, much has been accomplished, and at this session we have an instructive report from that committee.

Comment has been made in the past upon the decreasing number of topics which can be discussed with general interest, but the constant changes and improvements will continue to bring new problems, and I believe that the future work of our association will be more instructive and more beneficial than that of the past.

The program for our meeting is of such excellence that we should all feel thankful to the executive committee which arranged it. And on behalf of the association I wish to thank the members who have willingly given so much of their time and thought in preparing these papers for our benefit. I wish also to extend my thanks to the officers of our association for their interest and support and to express to Mr. Donecker, secretary of the American Street & Interurban Railway Association, my appreciation of the interest he has shown in our work and the attention he has given to every request for information or assistance.

E. C. Faber, general manager of the Aurora, Elgin & Chicago Railway, is attending the convention. He is accompanied by Mrs. Faber.

The funeral of C. W. Reinoehl will be held this afternoon in Harrisburg, Pa., and the exhibit of the Pennsylvania Steel Company will be closed all day.

The San Antonio (Texas) Traction Company is ably represented at the convention by W. L. Hibbard, engineer, and Henry Fink, Jr. Mr. Hibbard and Mr. Fink will spend several days in New York and other Eastern cities before returning to Texas.

ADDRESS OF ACTING PRESIDENT HARVIE TO THE ENGINEERING ASSOCIATION

The American Street & Interurban Railway Association is convened again on the shores of the Atlantic, and the Engineering Association, for the eighth time in its history, assembles to discuss some of the varied problems presenting themselves daily to each and every one of its members. We, as engineers, welcome this opportunity to renew old acquaintances and make new ones at this time under such favorable conditions. We have with us associate members and guests, to both of whom we are indebted for much of the profit to be obtained from these gatherings and to whom we extend the most hearty welcome. To the allied associations, also, we owe much in the way of profit and enjoyment and to those we likewise extend a warm greeting.

Your executive committee this year has endeavored to follow to completion several matters and methods which have been before this association for some time, and I trust that we have, in part at least, accomplished the purpose. For my own part, I have endeavored to assist in carrying forward the work as originally planned, and I trust I have served you to that end.

You have noted from a perusal of the advance papers which have been in your hands for some time that our association has this year performed through its committees a very creditable amount of work and is steadily improving, increasing from year to year its value to its members.

We have felt the good effect of the work done by the committee on standards. Its field has been steadily gaining since 1907 and its value we can hardly overestimate. This committee presents to you for adoption this year three different matters and suggests for adoption as recommended practice two others. These matters have been up before, have passed their respective departmental committees and have been thoroughly considered by your committee on standards. If you adopt the report of this committee the matters will be put before the main association for final ratification, which we hope will put these standards effectively before the executive officers of our various member companies.

The American Street & Interurban Railway Association has made during the past year a very marked improvement in the matter of associate membership and has on its committee some very active members. We are proud to say that the chairmanship of this committee is held by a member of the Engineering Association, whose efforts in this direction have been untiring. This committee, composed of 36 members scattered over the entire country, has been rewarded for its efforts this year by the addition of 350 associate members, or an average of nearly 10 associate members per committee member. I am informed that the Engineering Association has done its full share in this, and I feel sure that the coming year will find our members equally active in this line.

Our standing committees have been increased since our last meeting by the appointment of the committee on buildings and structures and the committee on heavy electric traction. Both of these are new fields, the former committee taking up matters relating to terminal and car house or yard work, which has been somewhat slighted in the past, and the latter committee covering the field of fast and heavy electric interurban work, including the electrified divisions of steam roads.

You will note that our policy of broadening out so as to include the entire electric railway field has been very practically demonstrated by adding the Pennsylvania Railroad to our active membership. This is only the beginning of this advance. We extend a most hearty invitation to all of our steam railroad friends who are engaging in

the electric railway industry to join our ranks, assuring them that we, as co-workers in the field, will prize their good fellowship and enjoy an exchange of ideas, and, I may say, hope to be of service to them.

One very gratifying result of our work this year has been the requests of some of our member companies for the investigation of certain specific problems. These requests involve the thorough discussion of a very general problem, but one which is of considerable importance at this time to a certain section or sections of the country. In such matters our association can be of great benefit, and if we are careful to investigate fully and study the conditions presented, our deductions will carry great weight. We should encourage to the fullest extent inquiries from member companies for investigation along specific lines. It will be productive of good results to ourselves, to our association as a whole, and to the companies by which we are employed. Requests of this kind should be in not later than January 1 of the year in which the report is desired in order to receive the proper attention.

We have this year one joint meeting—that with the Accountants' Association—on a subject which is of special interest to us all and which should develop a very profitable discussion. The report of this committee is the result of two viewpoints which are often at variance and which should more frequently be equitably reconciled.

In the matter of exhibits the Manufacturers' Association has even exceeded its usual excellence and completeness, and to it we are indebted for assisting to keep us up to date and for magnificent cooperation with our various committees. I regret that we cannot allot more than one full day to the inspection of its exhibits.

One of our former presidents has said that in order to obtain results "the interest of the individual must be aroused." This is the keynote of success in any line of work where several persons are engaged jointly and it is particularly true of the work of this association; and had our individual members not been interested in our work this association would not stand where it does to-day. I believe that our committee members under the new scheme adopted and put in force in 1908 and 1909 appreciate more fully than ever before the value of this interest in our work, both to themselves and to the association at large.

In order entirely to consummate the success of this convention and obtain from it the greatest good, let us ask you to bear in mind the following:

First—Let us all be prompt in attendance.

Second—Let us consider carefully and discuss thoroughly the questions before us, confining our remarks to the subject in hand. Let us be progressive and conservative.

Third—Let us close our discussions as promptly as possible.

Our headquarters hotel, unfortunately, is at a greater distance than usual from the convention hall, and this in itself will make it necessary for us to be particularly watchful of our time. Please assist us in this matter as much as possible.

In closing, I wish to express publicly at this time my thanks to the various members who have been called upon to do work during the past year. Some of them, unfortunately, have been called upon suddenly, but let me say that they have responded willingly to the call. I wish particularly to express my thanks to our worthy secretary, whose work this year has been especially exacting and whose actual labors for this association few of us fully realize, and also to our executive committee for its assistance to me during the time I have been called upon to serve you as acting president.

REPORT OF THE COMMITTEE ON INTERURBAN RULES*

BY C. D. EMMONS, CHAIRMAN; H. A. NICHOLL, J. W. BROWN, F. A. BOUTELLE, J. E. DUFFY, W. R. W. GRIFFIN, C. F. HANDSHY.

The committee on interurban rules has devoted much time and given very careful consideration to the subject. Several meetings have been held, but it has been impossible to carry out fully the instructions of the Denver convention, so that at this time the following is submitted as a progress report.

The report of the committee on interurban rules to the Denver convention in 1909 provoked a great deal of discussion, particularly on the part of officials of electric railways who were operating under steam railroad rules. The report as submitted, however, was finally adopted by a resolution which was carried by a vote of 41 in favor of the rules and 3 opposed to the rules. Following the adoption of the resolution approving the rules, however, a motion was unanimously carried, instructing the committee on interurban rules to confer with the committee on rules of the American Railway Association, with the idea of adjusting differences in the rules.

The committee held its first meeting in Chicago on April 25, having previously sent out a letter directed to the railway commissioners of all States as follows:

"The interurban rules committee of the American Street and Interurban Railway Association for 1910 is very anxious to keep in close touch with electric railway operation throughout the United States and to study accidents in connection therewith, to the end that we may determine whether or not the rules are specifically clear as to how to avoid such accidents, and if not, that this rules committee may make such recommendations to the 1910 convention of the American Street & Interurban Railway Association as will tend to improve the rules to the point of greatest safety.

"As chairman of this committee I would respectfully ask if we may make arrangements with you for obtaining such information concerning accidents due to the operation of electric street and interurban railways in your State as will provide us with the details of the full causes of such accidents. It is not necessary that we should know the road upon which the accidents occur.

"If you have printed bulletins to cover these points, I will be very pleased if you will place me on your mailing list.

"We believe you will fully appreciate the good which this committee may accomplish by keeping in close touch with this subject, with your assistance in the manner suggested."

To this letter replies were received from 34 States, 18 of which have no railway commissioners, or other bodies exercising jurisdiction over railroads. Sixteen have railroad commissioners, who replied signifying their willingness to aid the committee in any way they could, most of them sending copies of their reports and giving lists of accidents and investigations concerning these accidents.

The committee sent out a data sheet which elicited answers from a total number of 65 roads, representing 6,396 miles of track. But 19 roads had adopted the interurban rules as presented at the 1909 convention, although 29 of the 65 stated that they were satisfactory. Upon the question as to whether or not the interurban rules should be changed to conform to the American Railway Association rules, only 42 roads out of 65 voted, 19 signifying a desire to conform to the American Railway Association rules, and 23 signifying that they did not desire to change the rules as submitted. Your committee, however, believes the interurban rules should be revised in such manner as will make them agree as nearly as possible with the standard code of the American Railway Association. There are many reasons for this, among them being:

1. The fact that the rules committee of the American Rail-

way Association, all men prominent in the operation of large properties, have for many years worked over these rules, revised them and reduced them to their present concise state.

2. For many years the steam roads have been operating under these rules as a basis, although we find most roads add somewhat to the rules, and you will note that your committee has likewise added different rules, although keeping the lettering and numbering identical with the lettering and numbering of the American Railway Association rules.

3. From time to time those managers who operate interurban properties hire men who have previously worked on steam roads, or men leave electric railway service to work on steam roads. A difference in rules is likely to confuse these men.

4. Some properties are operated in conjunction with steam roads, and necessarily have to use the steam road rules while doing so. It would evidently be very confusing, therefore, to use the steam road rules while operating on steam road tracks, and suddenly to change to the interurban rules after leaving the steam road tracks.

5. Every day brings us nearer to closer interchange operation with steam railroads, and as this time approaches the interurban rules should be made more nearly to conform.

A second meeting of the committee was held at Fort Wayne, Ind., and a third meeting at Cleveland, Ohio, these meetings resulting in the tentative code of rules presented herewith. [Not reprinted.—Eds.]

STEAM ROAD RULES

Correspondence was entered into with F. C. Rice, chairman of the committee on transportation of the American Railway Association, this committee being now the rules committee, in an endeavor to arrange for a meeting of the committee on interurban rules with the committee on transportation of the American Railway Association. The result was that Mr. Rice felt it would be almost impossible for the committee on transportation to give sufficient time to the interurban rules committee to go over this question properly, and suggested that a railroad commissioner, a member of the interurban rules committee and a representative of a steam railroad (who might be a competent dispatcher) meet, and with sufficient time at command, go over the subject of rules thoroughly and with care.

In view of the result of the vote developed by the data sheet and the failure of the committee to obtain harmonious action in its meetings, it was not deemed advisable to proceed with a conference in connection with the American Railway Association until after submitting this report of progress to the American Street & Interurban Railway Transportation & Traffic Association.

The committee, while of the opinion that it is highly advisable to harmonize the interurban rules with those of the American Railway Association, feels at the same time that it is of greater importance that the interurban rules should harmonize in so far as possible with the city rules, for the reason that perhaps over 90 per cent of interurban roads are operating over city divisions requiring them at that time to follow the city rules. Under such circumstances, it is evident that much confusion is likely to result if differences in the rules exist, and equally true that such differences should be avoided if this is at all possible. During the coming year the committee on interurban rules, in addition to endeavoring to harmonize its rules with the American Railway Association rules, should meet with the committee on city rules and make a great effort to have the rules of the city and interurban divisions harmonize in so far as possible.

The committee will be pleased to have a full and free discussion of the rules as submitted, and to have this discussion conclude with a vote of instructions as to the desire of the association on the subject of the continuance of its efforts to conform these rules to the American Railway Association rules.

*Abstract of report read before the American Street & Interurban Railway Transportation & Traffic Association, Atlantic City, N. J., Oct. 10 to 14.

REPORT OF COMMITTEE ON EXPRESS AND FREIGHT TRAFFIC*

BY P. P. CRAFTS, CHAIRMAN; C. V. WOOD, E. H. HYMAN, FRANK WALSH, W. F. TOWNE, CHAS. FLOYD

Replies to the committee's data sheet were received from 62 member companies, of which only 26 contained information of value in connection with this report. With very few exceptions there seems to be no well-defined plan for segregating the operating expenses of the express and freight departments either for the purpose of analysis to ascertain whether or not these departments are profitable or for the purpose of comparison with previously stated periods or for comparison with other companies. Of the 26 companies which made reports which proved of service to your committee, 10 do not separate the expenses of the express and freight departments from those of the passenger department.

The reporting official of one company states that he makes careful calculations of the expenses at intervals and toward the end of each fiscal year. Probably, however, there are nearly as many methods of estimating such expenditures as there are companies, and, although in the case of the particular company referred to the estimates might be strictly fair and accurate, in other cases errors would creep in, perhaps from over-zealousness, and the official in charge of express and freight traffic would suddenly awaken to the fact that not only was he losing money for his company at that time, but that he had been losing it to a greater or less extent for several years. Such a situation is extremely embarrassing, but although, for reasons of economy, a company might wish to withdraw from that part of its business, as a matter of policy it could not afford to do so.

A comparison of the reports of 16 companies which maintain a separate system of accounts for their express and freight departments indicates that nearly every separately organized company has its individual classification and method of constructing the same. To illustrate a few of these differences, some of the following comparisons are made:

In answer to data sheet question No. 7, reading: "In arriving at the proportion which express and freight car mileage bears to total mileage operated, do you charge the mileage of each individual car, whether loaded or empty, and whether operated singly or in train?" of 26 companies reporting, 11 companies charge to express and freight car mileage the mileage made by each car whether loaded or empty, operated singly or in train; 2 companies do not include trailer car mileage, and 13 companies make no charge to the freight department for use of track, etc., by freight equipment.

From replies to other data sheet questions, we find that: "Maintenance of Freight Cars and Locomotives" is generally charged directly from shop records.

"Superintendence and Solicitation of Traffic," "Advertising," and "Miscellaneous Charges to Traffic" are handled in various ways, some companies charging to these accounts on the basis of earnings, some on the basis of mileage, some making arbitrary charges, etc.

"Power" is generally charged on basis of car mileage or by meter, when charged to the freight department at all.

"Wages of Trainmen, Messengers, etc.," are charged directly from pay-rolls.

The items of "Miscellaneous Car Service Expenses," "Station Employes," "Station Expenses," "Car House Employes," "Car House Expenses," "Operation of Telephone and Telegraph Systems," "Salaries and Expenses of General Office Clerks," "General Office Supplies and Expenses," "Law Expenses," "Miscellaneous General Expenses," "Stationery and Printing" are charged also in various ways some prorated on basis of car mileage or prorated on basis of gross earnings,

some charged directly, presumably because of a separation of departments, and some estimated or charged arbitrarily.

"Insurance" is handled by hardly any two companies in the same manner. Some companies place specific amounts on freight in transit and in depots, but the rule seems to be 25 per cent to 50 per cent of the estimated value so handled.

"Taxes" are seldom charged against the express and freight department covering the value of the equipment depots, etc. "Losses and Damages" are not handled by any particular method. Some companies charge off only the actual amounts paid out, neglecting to set aside a reserve in case of wreck or fire. "Interest and Depreciation" receive the least consideration of any of the expense accounts in connection with the express and freight business, only two companies indicating that any particular charges were made.

Although the Interstate Commerce Commission does not demand a separation of expenses of the passenger and freight departments, that is no reason why we should not do so for the correct information of our stockholders and operating officials.

As a preliminary step in that direction, your committee submits for your consideration the following method of developing and segregating earnings and expenses from express and freight, and, if approved, recommends that the details be worked out by a joint committee of this and the Accountants' Association.

EARNINGS

Credit to gross earnings the full revenue from express and freight traffic without deductions for terminal charges, track-age rights, etc., the gross earnings from all merchandise carried to be included in this account, excepting mail only.

EXPENSES

<i>Account.</i>	<i>Basis.</i>
Maintenance of Track and Roadway.	Prorate according to car mileage made by express and freight equipment.
Maintenance of Cars and Locomotives.	Charge directly from shop records.
Superintendence and Solicitation.	Prorate according to gross earnings if charge cannot be made directly.
Advertising.	Prorate according to earnings.
Miscellaneous Traffic Expenses.	Prorate according to car mileage.
Superintendence of Transportation.	Prorate according to car mileage.
Power.	By meter or prorate according to car mileage. No deductions to be made.
Freight and Express Conductors, Motormen and Trainmen, and any special train employes.	Charge directly from pay-rolls.
Miscellaneous Car Service.	Charge directly or prorate according to car mileage.
Station Employes.	Charge directly or prorate according to gross earnings.
Car House Employes.	Charge directly or prorate according to car mileage.
Car House Expense.	Charge directly or prorate according to car mileage.

*Abstract of report read before the American Street & Interurban Railway Transportation & Traffic Association at Atlantic City, N. J., Oct. 10 to 14.

EXPENSES (continued)

<i>Account.</i>	<i>Basis.</i>
Operation of Telephone and Telegraph Systems.	Prorate according to car mileage.
Salaries and Expenses of General Office Clerks.	Prorate according to car mileage.
General Office Supplies and Expenses.	Prorate according to car mileage.
Law Expenses.	Charge directly or prorate according to car mileage.
Miscellaneous General Expenses.	Prorate according to car mileage.
Stationery and Printing.	Charge directly.
Insurance on Equipment, Depots, etc.	Charge directly or prorate according to value of same.
Insurance on Freight in Transit and in Depots.	An amount to be carried representing from 25 to 50 per cent of the value of merchandise in the hands of a company, as determined by careful estimates.
Taxes.	Charge directly or prorate according to value of equipment, depots, etc.
Losses and Damages.	To properly cover this item a percentage of the gross earnings should be set aside which will be sufficient to cover actual expenditures and to provide a reserve fund in case of a wreck or unusual catastrophe resulting in heavy claims. This percentage must be determined by each individual company from past experience.
Rent of Tracks and Terminals.	All charges for use of tracks of other companies, payments made to municipalities, etc., should come under this head and be considered as an operating expense.
Interest on Fixed Charges.	On equipment, depots, and other property used specifically in the express and freight business should be charged directly. On track and roadway, shops, barns, power house, etc., used jointly by freight and passenger equipment, interest or fixed charges should be charged according to car mileage, provided full use is demanded by the passenger traffic and much additional wear and tear is imposed by freight traffic or additional facilities are required by the same.

The question whether car mileage or ton mileage should be

adopted as the unit of earnings and expenses received very careful consideration, because steam railways universally use the latter unit. Inasmuch as interurban railways, with very few exceptions, have only begun to handle express and freight in a comparatively small way and the freight car mileage is only a small percentage of the total car mileage, it seems advisable to continue that unit until the earnings from freight traffic become a larger percentage of the total and permit of the office expense necessary to maintain such records and the value of the ton mile unit seems more apparent than at the present time.

It is the thought of your committee that, should its recommendations be adopted, only a comparatively short period will elapse before comprehensive analyses and comparisons can be made and the promotion of express and freight traffic on interurban railways become much more rapid and on a much more substantial basis than in the past.

ACCOUNTANTS' "GET-TOGETHER" LUNCHEON

The "get-together" luncheon of the Accountants' Association was held on Tuesday at 1 p. m. in the Chevy Chase room of the Marlborough-Blenheim. There were present a substantial number of new men in addition to many of the veterans. The diners were seated at individual tables and as usual at gatherings of this organization the members had many interesting matters to discuss with one another. A feature of the dinner was a series of extemporaneous talks by President Swift, Past-presidents Brockway, Ham, Wilson and Tingley; Messrs. Sweeney and Morrow of the Interstate Commerce Commission, and Mr. Wishart, statistician of the New York State Public Service Commission, District No. 2. P. S. Young, comptroller of the Public Service Corporation of New Jersey, was also one of the speakers. These short talks made quite a hit, so this feature is likely to be repeated at future dinners.

MEETINGS OF THE CLAIM AGENTS' ASSOCIATION

Two meetings of the Claim Agents' Association were held yesterday at the Traymore Hotel, the headquarters of the association. The morning's proceedings were opened by the presentation of the paper by James R. Pratt, assistant general manager, United Railways & Electric Company, Baltimore, postponed from Monday. The discussion on his paper was opened by L. S. Hoffman, general solicitor, Public Service Railway, Newark. Following Mr. Pratt's paper, those by John J. Reynolds, claim agent, Boston Elevated Railway; H. V. Drown, general claim agent, Public Service Railway Company, Newark, N. J., and Henry C. Page, general manager, Worcester Consolidated Street Railway, Worcester, Mass., were presented and considered.

During the afternoon session, the papers scheduled on the program by R. E. McDougall, claim agent, Utica & Mohawk Valley Railway, and W. F. Weh, claim agent, Cleveland Railway, were read. Vice-president Harrison, acting president during the absence of Mr. Carpenter, then announced that the group picture of the Claim Agents' Association had been postponed from Tuesday and would be taken at 11 o'clock this morning by the side of the Traymore Hotel. He also stated that Mr. Hooper, of the Hooper-Holmes Information Bureau, had arranged to address the association this morning, following the paper by Mr. Schneider.

Mr. Harrison then announced the following committee on nominations for officers for the ensuing year: James R. Pratt, Baltimore; John J. Reynolds, Boston; William Tichenor, Terre Haute; W. F. Weh, Cleveland, and R. E. McDougall, Utica.

After Mr. Harrison had urged all not to forget the banquet in the evening, the association adjourned.

MEETING OF THE ENGINEERING ASSOCIATION

The first meeting of the American Street & Interurban Railway Engineering Association was held yesterday morning at Aquarium Court. The acting president, W. J. Harvie, called the meeting to order at 10:30 a. m. He said that the program usually began with the address of the presiding officer, but he would suspend the program long enough to honor the memory of those members of the association who had been removed by Divine Providence—Frederick H. Lincoln and James Heywood. The committee appointed in connection with Mr. Lincoln's death consisted of H. H. Adams, Paul Winsor and J. S. Doyle, and the president asked Mr. Adams to report.

H. H. Adams, Metropolitan Street Railway, said that the committee was appointed on July 12 to draw up resolutions and to take such action as it deemed necessary in connection with the death of Mr. Lincoln, and read the resolutions adopted. These resolutions were published on page 225 of the *ELECTRIC RAILWAY JOURNAL* of August 6, 1910.

On motion of Mr. Ackerman, the report of the committee was accepted.

President Harvie then stated that the committee appointed to act in connection with the death of Mr. Heywood was composed of Charles Hewitt, H. A. Hovey and J. W. Corning.

Mr. Hovey presented the report. It gave a biographical sketch and concluded with the following tribute to Mr. Heywood's character:

"He was an earnest and active member of this association, and at the time of his death was chairman of the committee on power distribution. He took a very active interest in all that pertains to electric railroading, and devoted a great deal of time to the very comprehensive report of his committee which was presented to this association at Denver in 1909. His genial manner endeared him to all his friends and associates, and this association desires to express its sense of loss in the death of Mr. Heywood and to convey its sympathy to his bereaved wife and family."

Upon motion of G. W. Palmer, Jr., the report was adopted.

Mr. Harvie then presented his address as acting president of the association. This address is published elsewhere in this issue.

Secretary Corning then read reports of executive committee meetings held December 6, 1909, January 10, 1910, and October 10, 1910. Accounts of the proceedings of the first two meetings were published in the *ELECTRIC RAILWAY JOURNAL* at the time of their occurrence. The meeting held on October 10 first discussed appointing a committee on education of engineering apprentices. Acting President Harvie explained that this committee had not been appointed, because the time did not seem to be opportune. As to coöperation with the American Society for Testing Materials on standard specifications, it was moved and carried that the executive committee communicate with the secretary of the American Society for Testing Materials, stating its desire to coöperate in the adoption of specifications of service to the Engineering Association; further, that in considering future specifications the Association would be pleased to have members appointed on committees of the Testing Society that are handling subjects under consideration by the Engineering Association, if consistent with the by-laws of the society. A letter was received from E. B. Katte, suggesting that the report of the committee on heavy electric traction be presented at the Friday morning session instead of the Wednesday morning session, as he found it impossible to attend before the later date. It was decided to postpone the report accordingly. A letter from A. L. Neereamer, secretary of the

Central Electric Railway Association, enclosed a copy of that body's standardization committee's report as adopted September 22 and was accompanied by a request that these standards be considered for adoption by the Engineering Association's committee on standards. This matter was referred to the incoming executive committee. A request from several Massachusetts street railways to investigate the use of car heaters other than electric, with the view of influencing the insurance companies and the State railroad commissioners to allow their use, was referred to the American Association for instructions. A resolution was also adopted that the executive committee of the main association have compiled by its secretary yearly and furnish to member companies and associate members a classified list under one cover of the subjects, reports, etc., under the various association headings.

Acting President Harvie gave a résumé of the meeting held at New York on October 8 by the committee on methods of adopting standards. After some discussion the following procedure was authorized to be proposed to the executive committee of the main association: "That the main association ratify and vote upon the standards adopted by the Engineering Association by means of letter ballot of member companies; this ballot to be taken through the secretary of the main association and be cast by the executive officer of the member companies." The standards to be ratified are to be sent direct to the secretary of the main association and upon receipt by him to be submitted by letter ballot.

The annual report of the secretary and treasurer for the year ended September 30, 1910, showed expenses of \$4,722. Of this amount, the cost of publishing and distributing the 1909 proceedings was \$2,768 and the balance, \$1,954, was for miscellaneous expenses.

SPECIFICATIONS FOR STEEL RAILS

E. O. Ackerman, Columbus, Ohio, then presented the report of the committee on way matters. He said that it was divided into five subjects and suggested that the association first take up the specifications for steel for high T and girder rails. Mr. Ackerman read a letter from George L. Wilson, engineer maintenance of way, Twin City Rapid Transit Company, in which he said that he preferred the chemical composition of rails as first proposed and given on page 27, report No. 303. For three years rails that come near these conditions have given excellent service on his company's tracks. The change from Bessemer steel to hard open-hearth steel of high-carbon content has been amply justified by results. One report of some tests of open-hearth and Bessemer rails made by one of the trans-continental roads under very heavy traffic showed that 90-lb. Bessemer rail from three leading rail mills lost by wear an average of 14.15 per cent of the head of the rail in 13 months. During the same time and in the same track open-hearth steel rails of the same section from four mills lost an average of but 7.96 per cent. He considered comment unnecessary and thought the use of hard open-hearth steel for street railways a matter of economy. Further changes in specifications to insure rails that will fit accurately at the joints would be especially welcome.

Mr. Ackerman then said that, as explained in the report, the committee had not time in the preparation of the report to formulate recommendations. Since then, however, it had met and wished to recommend as follows:

"Specifications for open-hearth steel rails: Your committee recommends that the specification as given in this report be adopted by the association as standard for high T and girder rails."

G. C. Young thought these specifications should be adopted as a beginning and that the subject should not be dismissed from further consideration. Valuable data could

be gained and the specifications improved by continuing the committee. Possibly the first section under "General," reading, "The entire process of manufacture and testing shall be in accordance with the best standard practice," could be made more specific. The chemical composition was perhaps too expensive now but this particular specification would serve as a good starting point. He called attention, however, to the desirability, in inspection of rails, of holding the chemical composition uniform in each order. It would be unfortunate to have a wide variation, as suggested, in any one order of rails to go in any one section of track. He asked whether the committee considered it possible to specify the number of passes that might be adopted. He understood that the increased number of passes through the rolls added materially to the durability of the rails. Mr. Young also asked whether it was not desirable to indicate also specifications for standard T-rails in 33-ft. lengths. He did not see that any specific requirement was shown as to what the rail should withstand in drop tests. This was brought out more in detail in some English specifications, and possibly in the specifications of the American Railway Engineering & Maintenance of Ways Association. Under No. 2 Rails, Section (b), he noted that a flaw of $\frac{1}{4}$ inch in depth in the head was allowed. This seemed too great a variation. The No. 2 rail should require a more rigid inspection for the head of the rail, but defects in the base and other parts of the rail were not so important.

E. P. Roundey, of Syracuse, asked if rails of the chemical composition specified had ever been laid.

C. W. Gennet, Jr., of R. W. Hunt & Company, was glad to see that this specification described intelligently and carefully what constituted acceptable rails. There were, however, one or two points that would bear consideration. First of all, Section No. 6, which limited the temperature of rolling. In considering this rolling, he thought one should bear in mind the very balanced section which is being rolled as a section with a large mass of metal constituting the head, and an apparently thin and wide mass of metal constituting the base. At the same time, the committee had taken the position of nominating rails of a chemical composition which was a little bit higher than the practice of the last few years had given, except in special cases. The rolling temperature to some extent was dependent on the chemical composition. After taking into consideration the unbalanced section, it seemed desirable to him to eliminate for the present any requirement which will reduce the possible unsatisfactory result. The mills would certainly give all that was necessary in the way of a cold rolled rail. They would not spend money for unnecessary heating, and so he thought it wise to reconsider Paragraph No. 6. Section B of Paragraph 11 had a typographical error in it. The height of rails should be limited to $\frac{1}{64}$ in. under and $\frac{1}{32}$ in. over. Section 15, on drop tests, might be made a trifle more explicit, and give more comparable results if the words "front end" were inserted in the first sentence, making it read, "Three test pieces should be selected by the inspector from each heat, and they shall be, in each case, taken from the front end of the rails rolled from the top of the ingot." It might also be well to suggest that the supports of the drop testing machine be fixed at three feet, centre to centre.

E. O. Ackerman, Columbus, said a number of specifications sent in by various companies were higher in carbon than the committee's specifications. He knew the New York and Boston companies were specifying higher carbon; also the Twin City Rapid Transit Company. The specifications called for 75 per cent, with provision to increase; and it also gives the mill man the privilege to supply a low carbon rail down to 60 per cent.

Mr. Weston, Chicago, said that Mr. Ackerman, in referring to the chemical composition, as presented in the

report, failed to mention the note immediately following the table of analyses. This note really was added to this paragraph as a substitute for composition "A," as originally presented. It reads: "An increase of 0.035 per cent. carbon above the upper limit of this specification will be permitted for a decrease of each 0.01 per cent of phosphorus below 0.04 per cent." Hence, if a purchaser desired a higher percentage of carbon than .085 it would mean that the corresponding amount of phosphorus should be 0.01. It was expected that this note, in addition to the table of analyses contained in the report, would cover the requirements for a high-carbon steel.

M. J. French, Utica, said that if the phosphorus could be reduced to 0.02 per cent, that would allow an upper limit of 0.80 per cent carbon. As he remembered, that was just the rail that the Utica & Mohawk Valley Railway has had in successful use for two years on a short stretch of track. If it were not for the note, he would be in favor of a little higher carbon than was given in the specification. He had analyzed a piece of grooved girder guard rail that showed 0.84 per cent carbon. Something decidedly better than the old Bessemer rail was wanted, but it was undesirable to go to extremes. The percentages recommended by the committee were such that they should be tried out thoroughly before going further.

Mr. Angerer, William Wharton, Jr., & Company, said that in regard to guard rails, even the upper limit now given was going to cause trouble not only to the manufacturers but also to the railways on account of the extra strains set up after the manufacturer succeeded in bending them. Furthermore, sawing high carbon rails was extremely difficult. The guard-rail specification might have to be modified, especially as to the hardness, but the straight rails seemed to be on the right track.

J. M. Larned, Pittsburg, said the specifications were not intended to be extreme in any particular, especially in the matter of very high carbon. Rails had been rolled of the chemical composition specified, so there was nothing novel about it. The manufacturers took some exception to the committee specifying the heat at which rails should be rolled; but it was thought better to cover that point in the first instance, and later, after there was secured a standard rail for which accurate specifications could be made, these specifications would always be before the association for changes.

George Weston, Chicago, agreed with Mr. Larned that in case of an objection to the temperature clause that clause could be waived. He moved that this specification be accepted and referred to the standardization committee for action. The motion was seconded and carried.

RAIL SECTIONS

Mr. Ackerman then read the recommendations of the committee in regard to T-rails. They were the same as last year. The committee was not prepared this year to make any new recommendation for standard grooved and guard girder rails; but had included in its report 7-in. and 9-in. grooved and guard rails for the consideration of the association.

Charles H. Clark, Cleveland, said that he was on the committee in 1907 that recommended the 7-in. rail referred to. Last year a rail very similar was rolled for Cleveland. It was the Lorain 103-lb. No. 426 section. Being a 7-in. rail, there was less tendency for the rail to tip over with the heavy cars than with a higher rail. The unfavorable point about it was that paving designed for a 9-in. rail would not fit it. In the devil strip he had lowered the concrete and used the old stone. He had not used any of the 9-in. section because the old 141-lb. rail was very close to the recommended standard. Mr. Clark then referred to a difficulty which had been experienced in Cleveland with a piece of special work which caught

the shoes of horses. He attributed that to the fact that the skin of the rail was soft, and the first wear on it caused a little tang to form on the gauge side of the rail. After the cars had run over the rails for a year or two this wore off, but on new special work it would often form immediately. He had suggested to the manufacturers that they plane down the gauge line of the rail for $\frac{1}{4}$ in. across the corner, so that there would be no projection to pull the shoes off horses. The Cleveland Railway at present is engaged in grinding off this projection. Otherwise, he saw no objection to this form of guard rail.

M. J. French, Utica, asked Mr. Clark why he reduced the width of the base from 6 in. to $5\frac{1}{2}$ in. The 7-in. rail had a 6-in. base. Mr. Clark said that he wanted to keep as near 100-lb. per yard as possible and while he decreased the base he increased the web from $7\frac{1}{16}$ in. to $\frac{1}{2}$ in. The rails he had been using, though higher, had only a $5\frac{1}{2}$ in. base.

C. B. Voynow, Philadelphia, thought the height of the rail should also be considered in connection with its effect on the strength of the joints. While a 7-in. rail might be all right with a permanent joint, such as an electric weld, cast weld, or riveted fish-plate joint, he thought a 7-in. section was not so good for exceptionally heavy travel; the section should be deep. In the section proposed the flange of the rail was too near the gage line. He had found that after the head had worn down somewhat the flange began to go very rapidly and his company had some 141-lb. Trilby rail where the flange was cut entirely through. He also thought that the groove should be made wider. This could be done without adding any weight. As to the width of the head of the rail, if this rail was intended for 3-in. tread it would have a flare in the back; but if the track was installed where a narrow-tread wheel would run over it for some time there was danger of a false head forming. In the T-rail section $2\frac{1}{2}$ in. to $2\frac{1}{16}$ in. was allowed. This was primarily for fishing purposes. If the head was too narrow the fishing surface would not be sufficient. The Trilby rail had plenty of fishing surface and he thought the narrow head should be recommended for tracks when narrow wheels would be run for a considerable length of time.

A. B. Campbell, Seattle, Wash., said that he had had some experience with horses pulling off shoes in grooved rails. The trouble was remedied by planing of the lip which was formed by the head of the rail crushing over. He thought that for special work in city streets the head of the rail should be sloped more gradually into the groove. He had had as much trouble from this cause on an abandoned curve as on a curve over which the cars ran regularly.

E. C. Shaler thought that a difference in height of $\frac{1}{2}$ in. between the lip and the head of a grooved rail invited vehicle traffic to follow the track. In putting down new grooved rails in Brooklyn, the lip was brought up to within $\frac{1}{8}$ in. of the head. Such a section would be more desirable than that proposed by the committee. A rail with a wider base would be desirable. The rails which his company now used had a base 6 in. wide and gave a stable track construction.

J. M. Larned, Pittsburgh, had been experimenting with special work designed to keep the wheels of vehicles on the rails. He thought that this would save a good deal of the damage to the paving adjoining the rail. He had also experienced trouble with horses' shoes pulling off. At right angle crossings he had been using a Trilby section where no guard rail was required and the calks on the horses' shoes did not catch. Where a guard rail was used, it was planed at the intersection so that it sloped to a tangent with the calks on the horses' shoes. He had designed a steam-track crossing of this type which had proved successful in preventing horses' shoes from catching in the grooves.

C. B. Voynow, Philadelphia, did not think that from the standpoint of safety it was necessary to raise the guard as much as $\frac{1}{2}$ in. above the head of the rail.

E. O. Ackerman, Columbus, Ohio, then closed the discussion. He explained that the committee recognized it to be essential that the weight on the head of the rail should be as nearly over the center of the foundation as possible. For that reason, the web was moved under the center of the head as far as the practice of the rolling mills would permit. Most of the high T and girder rails now in use had the web placed too close to the gauge line. This resulted in a twisting motion under the passage of each car which disintegrated and loosened the paving. The proposed rail sections allowed for $\frac{5}{8}$ in. wear on the top of the rail head. The lip of the grooved rail was brought down $\frac{1}{2}$ in. below the surface of the ball of the rail in order to insure a clean groove at all times. The principal objection to the Brooklyn rail section was that it did not provide for wheels with 3-in. treads.

C. H. Clark, Cleveland, replied to Mr. Ackerman by saying that he did not believe that the depth of the head of the rail was important. This year he had taken up 15 miles of track laid in 1890 with a rail that had a head only 1 in. deep. It had been worn down only $\frac{1}{8}$ in. under a traffic which had averaged a 4-minute headway during the day and night for 20 years.

M. J. French, Utica, moved that the recommendations of the committee on way matters relating to proposed standard T-rail be referred to the committee on standards for action. The motion was seconded and carried.

GAUGE ON CURVES.

C. M. Kimball, Washington, D. C., said that where narrow-tread wheels are used the wide throat of the improved guard-rail sections does not permit setting the rails to a proper gauge for the necessary wheel bearing. If the guard rail performs its proper function there is not sufficient wheel bearing, and, on the other hand, if the gauge is widened, the outside wheel flanges are drawn over and the special work does not wear evenly. In Washington, where the underground conduit system is used and rails are carried on cast-iron yokes, not much variation in the gauge can be made.

M. J. French, Utica, explained that the rules for widening gauge on curves were submitted to the manufacturers of special work and that the rules as adopted would govern nearly all cases.

John Kerwin, Detroit, said that he believed the gauge should be widened on curves of large radius almost as much as on curves of small radius. Very often a new piece of special work will derail cars for a short time after it is first installed, but as it becomes worn, after three or four days, the trouble ceases. In making up curves and special work in his own shop he used a template designed to show that when one wheel on the truck is touching the guard the other wheel is touching the gauge line on the rail.

On motion by Mr. Schreiber the rules proposed by the committee were recommended for adoption as the standard of the Association.

R. B. Rifenberick, consulting engineer, Cleveland, then read a paper on "Rail Joints," which will be found elsewhere.

Following the reading of this paper, Felix Lange read a paper on "Theory of Rail Joints," which will also be found elsewhere.

Mr. Voynow disagreed with several points in the paper. One of them was in regard to the design of fish-plates. He said that the original fish-plate was efficient only when it was properly tightened up. But this was possible only in a laboratory. The next design was a fish-plate with a projection at the center of the well. This was designed for two reasons. The tightening of the upper and lower bolts was supposed to bend the plate inwardly and give a fishing section. Unfortunately that design was sometimes too strong for the bolts, and it would not bend, and so there was a line in a laboratory. The next design was a fish-plate with form a bridge between the under-head and foot of the rail.

In another place the report said that probably the strength of the grip of the machine bolts is not so great as that of rivets. The speaker thought they were equally strong. Whether the bolt would give or not was a different consideration, but if the nut was locked it would give as good or a better joint than can be had with a rivet.

Mr. Clark, Cleveland, said that last year he made a 1 in. joint plate, which when tightened up would come within 1/16 in. of the web of the rail. He found that his riveting machine, which produced a pressure of 100 tons on a rivet, was buckling the plate slightly, so he increased the plate thickness to 1 1/8 in. For the same reason, also, he had to change the rails so that the inside edges of the plate were 1/64 in. shy of the distance between the upper and the lower flanges of the rail. He thought members lost sight of the fact that in the riveted joint they are supposing the joint acts as a stress member in a bridge. If that was the case it would be necessary to place the rivets in a joint above and below the neutral axis of the rail, otherwise the rivets would not act at all. But he had disregarded that theory and simply placed the rivets in the center line of the web of the rail to act only for temporary stresses, and afterwards to produce strength for the deflection of the rail. Finally he placed a thernit shoe on the base of the rail to prevent shear and to prevent any movement of the rail, which might create a tendency for the joint plates to work loose. He thought that he could convert anyone who would go to Cleveland in five minutes to the Clark joint.

The following communication was then read from George L. Wilson, engineer, maintenance of way, Minneapolis: "The writer wishes to add his testimony to what is said in Report 303 on the importance of having a true surface of the abutting rails at joints. The larger portion of joint failures and low joints in any system of welding the joints, as well as in the use of splices, is due approximately to the fact that the abutting rails are not perfectly surfaced. Especial importance should be paid by engineers to this point during construction and careful watch maintained afterwards to preserve the surface of the rails by grinding the rail surface with some satisfactory device. It is well said that the life of the rail and track depends on the life of the joints. If the joints are kept in condition the balance will nearly take care of itself."

The president then asked Mr. Weston, Chicago, to close the discussion. Mr. Weston said: "This paper is presented as a progress report with the expectation that we would receive a full discussion of the various points that have been mentioned in the paper, and if the time that can be allotted to its discussion is limited it is to be regretted, but I know the committee will be gratified with the discussion that has been given here today. I hardly think it is necessary to go much into discussion in answer to the criticisms that have been offered, but I expect that the suggestions contained in the discussions will be written up for the use and benefit of the committee during the coming year."

"I wish to refer to several remarks made by Mr. Voynow, of Philadelphia. He referred to the recommendations concerning the cast-welded joint. Now, this report makes no recommendations as to cast-welded joints, but simply refers to them as a type of joint. As regards the question of the percentage of broken joints, in referring to welded joints it was not intended to imply that a job of welded joints could be done without any breaks. It was stated a percentage of breaks must be expected. However, if there is time I wish to add a few remarks regarding a type of joint that was not referred to in the paper, namely, the wedge type of joint, and I can submit that as an addendum in writing, if the president prefers."

"No reference has been made to the wedge type of joint in the paper as originally presented. Specific information has been brought to my attention regarding three joints of this type since writing the paper. Two of these have been placed upon the market and in the case of the third patents have been issued, but no joints have been manufactured to my knowledge."

"The first of these joints that I will refer to is a foreign joint manufactured by Scheinig & Hoffmann in Linz, Austria. Many of these, particularly in Europe, have met with more or less success, so I am informed. It is composed of wedged clamps that grip the base and are tied to the rail by a power press. Outside of this is an overall clamp applied hot and a small wedge driven in place to complete the joint. The shrinkage of the overall clamp in cooling is used to perfect the grip of the joint with the rail base. One fault that can be pointed out in this joint, as shown in the model, particularly when used on high 'T' or girder rail, is the absence of any support to the top of the rail. I am informed, however, that splice bars are to be added to the joint to overcome this objection. I have spoken at some length about this joint for the reason that none are used in this country and it exemplifies one form of the wedge joint."

"My attention has also been called by Mr. Whitman, of Seattle, Wash., to a wedge type of joint for which patents have been applied for and possibly have been issued, which is designed to take care of the inequality in the top surface of the rails at the joint by means of two wedges, one each side of the joint, which wedges are susceptible to independent movement by which it is proposed to bring the top surfaces of each rail to a uniform height. None of these joints have been placed in service to my knowledge. This joint has been referred to because it is the only bolted joint to my knowledge that is used specifically with a variation in the height of rails."

"A third joint of the wedge type of bolted joints has recently been put upon the market, named the '20th Century joint.' This joint is of the 3-point contact type, and instead of depending upon the accuracy of the rolled plates to make the 3-point contact, wedges are placed on the under side of the base of the rail that are susceptible to adjustment in order to perfect the third point of contact."

Upon motion of Mr. Ackerman, the subject of rail joints was continued to next year.

OTHER STANDARDS

Mr. Ackerman then asked that the committee's recommendations on standard layouts for track switches, mates and frogs and standard symbols shown be adopted by the association as recommended practice, and that the subject of economical maintenance as applied to track and roadway be continued by the 1911 committee, with instructions to draft a set of rules for the government of the Way Department and report on shop work as it particularly applied to the track department.

E. P. Roundey, Syracuse, asked whether any of the engineers present using concrete ballast put the concrete in dry or wet, and what precautions were taken, if any, to know that every tie was properly tamped.

R. F. Kelker, Chicago, said that the practice in Chicago was to use wet concrete. The only means of knowing that the ties are properly tamped was by careful supervision of the work. He did not know of any other way by which the fact could be determined. Speaking then of the conclusions under discussion, he said that the standard switch pieces appealed to him particularly from the Chicago point of view. At the outset of the Chicago work they designed two switches, one 80-ft. center radius, and another 160-ft. center radius. The former was used on the outside curves, and the latter on the inside curves. The difference in the two radii was made necessary to give proper clearances, and by the use of these two switches a clearance can be had at every intersection in the city of Chicago, between the cars passing on either the curves or on straight track. To be able to make rapid replacement, without cutting the rail or switch pieces, the specifications for special work contained a limitation for the variation from the length as shown in the board's drawings, and its inspectors who were employed at the various special work manufacturers' headquarters checked these measurements accurately, so that the engineers can put one switch piece in where they have taken out another. In addition to that, one type of pin-fastening

is used for all switches, so that there is a practical interchangeability of pin fasteners, of tongues and of switch pieces, made by any manufacturer who furnishes work for use in Chicago. After a year's work, the Board extended its standardization to the frogs in the cross-overs and on broken main line frogs and to the frogs of the inside curves, and the limitation for length was also made identical, so they can be interchanged at any time.

In the car-house work in Chicago it was found necessary to adopt 50-foot switches, which then became a third member of the standard, and as that switch is 7 in. high, it was impossible to use the street standard of 9 in. Hence the section of the switch at the pin was deepened to 9 in. to give opportunity to use the Board's standard pin fasteners, which were, therefore, interchangeable with the other switches. Last year they added a fourth and probably the last member of the standard switch piece. They put in a 200-ft. radius switch, which they found economical in order to obtain satisfactory car clearances, at elevated columns and other obstructions, which it would be extremely expensive to remove. As the result of their experience in three years, they suggested to all engineers to carefully consider what could be done in regard to getting standard switch pieces, and also to carefully consider the design of standard curves. Car-house work in Chicago had also been designed on the system of standards. It is possible to interchange any bay with a like bay in the same house, either front or back hand, as the case may be, provided the "hand" is the same, and this he thought would save considerable expense, in maintenance and subsequent renewals. Finally, he said, they had issued over 1000 surveys for special work alone, and had used the loose-leaf system of data book, so that the men could have a field book into which they could insert leaves for their notes. These leaves may be returned to the draughting room, and by that method they never had the occasion arise when work could not be done because the book was out. These loose leaves were filed and indexed by proper number and location, and gave an immediate and current check on any surveys which have been made during the progress of the work.

John Kerwin, Detroit, said that in 1905 and 1906 about 120 miles of track were built in Detroit on the Citizens lines and on the Detroit Railway. The Detroit Railway laid a bed of concrete on the sub-grade, 6 in. thick. The ties were then laid on the concrete and the concrete was allowed to set for about eight or 10 days. They then spiked the rail to the ties, and tamped up on 1-in. of sand. Finally they put in the remainder of the concrete to go to the bottom of the paving. The Citizens Company blocked up the track and put the concrete in one bed. The experience with the Detroit Railway construction was much better than the Citizens construction. It had been continued as the standard, putting 8 in. of concrete on the sub-grade, allowing that to set for eight or 10 days, laying the ties on it, spiking the rail, raising it, and lining it with 1-in. of sand and then putting on the rest of the concrete.

C. H. Clark, Cleveland, said that in 1903 the Cleveland City Railway followed that form of construction, when it laid some track on Lorain Street. This had proved to be some of the worst track in the city. Mr. Kirwin said that the construction was put in by another man.

C. H. Clark, said this year he put in 7 in. of broken stone under the ties, and tamped the ties for ordinary broken stone construction. After tamping and lining the surface, he grouted the whole work. He found this made as good concrete as possible. Then the concrete was put in between the ties and under the rail.

C. B. Voynow, Philadelphia, speaking about labor, quoted the following sentence from page 25 of the report under the head of Economical Maintenance: "Let the railway companies consider their own paving or any other work where practicable, by the piece work system." Day labor was not satisfactory with the class of men the railroads had to employ. The time of the year when the work was

generally done, the summer months, was not conducive to getting a fair day's work out of the men. If the general foreman or way engineer was a fair-minded man, piece work was a good thing for both sides. Unfortunately, the matter of cost came in all the time and in the long run the piece work system was made very hard for the men. There was a possibility of maintaining the day work method with the addition of the task system as a stimulant. Basing an estimate on experience of what a foreman with a gang was able to do, with different classes of work, it might be possible to apportion a certain amount of work for such a gang, and when the men had completed their work, they could stop for the day.

Mr. Kirwin, Detroit, said he had done much track construction by piece work in this way. The concrete gang received a certain amount per yard of concrete laid. Each one of the gang has a certain daily wage rate, for instance, the foreman of the gang may receive \$3.00 a day. The rest of the men vary in the daily rate. Each man, then, has a certain equity in each yard of concrete laid; it might be one cent, 2 cents or some other figure. When the day's work is done, each man knows how much money he has made that day. If there are any shirkers, the men will see that they are dismissed. This scheme had worked out well. Much grading and the tearing up of track was done on the piece work system.

George Weston, Chicago, moved the acceptance of this portion of the report as recommended by the committee. The motion was carried. Upon Mr. Weston's additional motion, the report was accepted as a whole and the committee continued. The meeting was then adjourned until 2:30 P. M.

TADPOLE SWITCHES

Lorain Steel Company, Johnstown, Pa., is finding that delegates are taking a great interest in the Lorain "Tadpole" tongue switch for street railway service. This switch contains the greatest area for support against the direct blow or load at exactly the point where it receives the blow. This, of course, is at the heel, where trouble from loose tongues begins and rapidly grows worse. While in the tongue of an ordinary switch the bearing back of the pin center is rarely over 3 sq. in., that of the "Tadpole" switch is 30 sq. in. Old-style switches depend on a pin for centering their radial movement, whereas the "Tadpole" centers itself from the outside of the heel, which is 9½ in. in diameter. It has, therefore, nearly four times the bearing of the ordinary tongue pin, so that the shock from a moving car is absorbed with much less wear. The point of the tongue is reinforced against bending. Set screws to jam against the tongue pin for taking up wear have been replaced by a lever with screw adjustment, capable of exerting a force of 1 lb. to 2 tons, in order to give the tongue heel the exact pressure desired on the tongue bed. A lug is provided on the underside of the tongue for the attachment of any throwing mechanism. The first "Tadpole" switches were put out about six years ago and over 2,000 have been installed since.

A continuous demonstration of its hot air forced ventilation heater is being made by the Peter Smith Heater Company at spaces No. 672-673, Building No. 2. Since this heater was first shown at Denver last year upward of 800 heaters have been sold for use on cars throughout the United States. The heater is manufactured in three sizes and is recommended for use on both city and interurban cars. The exhibit is under the supervision of Daniel W. Smith, president, Elmer J. Smith, secretary-treasurer, H. S. Williams, chief engineer, W. E. Hinman, Western sales manager, and Reginald M. Campbell, Western sales representative.

COLLECTION OF DATA CONCERNING PAY-ROLLS AND INVOICES*

BY N. E. STUBBS, AUDITOR, UNITED RAILWAYS & ELECTRIC COMPANY OF BALTIMORE.

At the midwinter meeting of your executive committee, held in New York on Jan. 27, 1910, it was thought that inasmuch as the fundamental principles of our system of accounting had been brought to such a high and generally accepted standard, a study of some of the most vital of our routine operating methods would be found profitable as well, in order that their importance might be kept before us, and our desire for a standard of excellence be improved upon, wherever possible, without in any way placing restrictions upon individual ideas or attempting to influence change in methods made necessary by certain local conditions. With this thought in mind the methods of handling pay-rolls and invoices appealed to us as being the most desirable subject for study. With the approval of President Swift, a letter and questions were sent by the writer to 24 member companies, located in every section of this country and Canada, ranging from the smaller companies to the largest in size, which I knew from personal knowledge were greatly interested in the work of this association.

The analysis and classification of these answers show the following results:

SUBJECT NO. 1.—PAY-ROLLS.

Question No. 1. How frequently are employees paid?

In nearly every instance officers, heads of departments and clerical forces are paid monthly. Two companies pay motormen and conductors daily. Five companies pay entire roll weekly, and five, part weekly, especially labor gangs. Two companies are compelled by State law to pay weekly. Eleven companies pay entire roll twice a month, and five, part twice a month. One company pays entire roll each 10 days, and two, part of roll each 10 days. The 11 companies paying their rolls twice a month have about 23,500 employees, or 38 per cent of the total number of employees mentioned by the 24 companies replying to this question, while the five companies paying their rolls weekly have about 19,750 employees, or 32 per cent of the total.

Question No. 2. Number of employees on roll?

The number of employees on rolls of companies answering this question varies from 400 to 8500, making a total for the 24 companies of 62,000.

Question No. 3. Paid by check or cash?

Three companies pay by both cash and check, six by check only, and 15 entirely by cash, except officials and clerical forces. Of the 15 companies paying entirely by cash, the employees number 47,165, or 76 per cent of the total of 62,000. Were we to add to this number the employees of the three companies which pay partly by cash the percentage would be greatly increased owing to the fact that all of these companies pay cash to trainmen, who represent by far the majority of employees.

Question No. 4. If by cash, is envelope system used?

Of the 15 roads that pay entire roll by cash, 10 use the envelope system, and five do not, but this does not mean that the majority of employees are paid by envelope system, as the following percentages based on estimates of the 62,000 employees represented by the 24 companies replying to these questions will show: Paid by check, 11 per cent; paid by cash in envelopes, 42 per cent; paid by cash not in envelopes, 47 per cent.

Question No. 5. Do employees receipt for money by signing pay-roll book, pay-roll sheets or time tickets?

The methods of obtaining evidence of payment are various, but the plan of having employees sign pay-roll book or pay-roll sheets seems the most popular, as 11 companies report that plan. Four companies use signed time tickets. Four accept indorsements on pay checks. Many companies identify their labor gangs by brass checks.

Question No. 6. If no signatures are taken, are second claims ever made?

Only two companies reported that no signatures were taken, and further stated that no trouble had been experienced regarding second claims.

Question No. 7. If mechanical devices are used in connection with the pay-roll work, state what kind, and your opinion of them.

Thirteen companies use mechanical devices of some kind; six use the Addressograph; four the Burroughs Adding Machine; one the Comptometer; several mention wage tables, scales and charts. The general opinion is that where they can be used these devices give good results.

Question No. 8. Should a member company be interested in your system, would you object to the name of your company being given it for further inquiry and collection of data?

Not one objection was made in answer to this question; most of the replies were to the effect that it would be a pleasure to give any assistance or information to a member company wherever possible.

Question No. 9. Are employees other than platform men paid in company's time or their own?

In nearly every instance employees are paid in the company's time, the main exception being labor gangs, which are in some instances paid after work hours. The question of time in paying off is worthy of serious consideration, in order that the result may be the least possible loss of employees' time belonging to the company, and the least amount of inconvenience to the employee.

SUBJECT NO. 2.—INVOICES.

Question No. 1. Do you use a standard bill form or accept billhead of firm from which goods are purchased?

Only three companies use a standard bill form; the other 21 accept bill of firm from which goods are purchased.

Question No. 2. If standard bill form is used, do you find it altogether satisfactory?

Of the three companies which use a standard bill form, the Boston Elevated Railway states: "We use our own standard bill form, and, so far as we are aware, we were the first railway company to adopt this. We have been using it for something like 15 years. The fact that we have used it so long is an affirmative answer to this question." The Washington Railway & Electric Company, replies: "Standard bill form is entirely satisfactory." The United Railways & Electric Company of Baltimore answered: "Standard bill form has been given a test for more than a year, and has been found most satisfactory. Regret it was not adopted earlier."

Question No. 3. Is the purchasing agent or storekeeper responsible for the correctness of invoices, and does he approve as to prices, quantity and quality?

In nearly every instance the purchasing agent is responsible for and approves bills as to prices, the storekeeper as to quantity and quality, and the accounting department as to extensions and general correctness.

Question No. 4. How often are invoices paid—monthly?

There seem to be but one or two exceptions to the usual monthly method of paying bills, except in cases where discounts figure.

Question No. 5. Do you use voucher check in payment or voucher and check separate?

Thirteen companies use the voucher check, and 11 voucher and check separate.

Question No. 6. Should a member company be interested

*Abstract of paper read before the American Street & Interurban Railway Accountants' Association, Atlantic City, N. J., Oct. 10, 11, 12, 13 and 14, 1910.

in your system, would you object to the name of your company being given it for further inquiry and collection of data?

Not one objection was stated.

Question No. 7. Give history of invoice or voucher from time of coming into office (or originating) to its final filing.

The general system of handling invoices and vouchers is as follows:

Consecutively numbered orders are drawn frequently in duplicate, triplicate or more if desired, the original being sent to firm from whom goods are purchased, and copies to the various departments interested. Invoices are received by the purchasing agent, who approves as to prices, and where the storekeeper is a separate official he passes as to quantity and quality. The accounting department checks extensions, and is finally responsible for the necessary signatures of approval, extensions and correctness in detail. Just previous to the usual time for making the monthly payments of invoices, they are properly arranged and attached to voucher, entered in voucher record, and passed to the treasurer for payment, to be paid either by voucher check or check and voucher separate. The vouchers or voucher forms are usually numbered consecutively, and filed with all the evidence of their payment, which in some cases is the receipted voucher, voucher check properly receipted and endorsed and returned by the bank, or the endorsed separate check.

The plan of sending a copy of every order for material purchased to the accounting department is worthy of special mention, as it keeps that department in close touch with the purchasing agent and storekeeper, and if he compares each invoice with the copy sent him, any difference is quickly noted, explained, corrected, or adjusted as the case may be. It also makes duplicating of invoices practically impossible, and is of further assistance in conferences between the purchasing and accounting departments regarding "unchecked orders" as to reasons why certain bills have not been passed, etc.

The plan of insisting on a monthly statement from firms from which goods are ordered is also a good one, as it assists very materially in locating differences and errors and keeping in correct balance with firms.

RAIL JOINTS*

BY R. B. RIFFENBERICK, CONSULTING ENGINEER, CLEVELAND, OHIO

The perfect rail joint is at present purely theoretical, and it will continue to be so, as long as wheel meets joint in the fight for supremacy. A perfect rail joint is a joint of few parts, in which none of the parts could ever be worked loose or worn under the loads applied on the joint. Such a joint should be easily and simply connected to the rail, and as easily disconnected when the rail has worn out. It should be capable of being applied to the second and succeeding new rails, and have such strength that it will hold the rail ends as rigid as the balance of the rail. This joint in elastic track construction must be rigid enough vertically to prevent any deflection of the joint beyond the limit of elasticity of the metal, and in a rigid or non-elastic track construction it must be rigid enough vertically to prevent any deflection, either temporary or permanent. In other words, this rail fastening must hold the rail ends so that there will be no bending upward or downward at the joint. It should require no special form of rail, requiring no increase in the cost of the rail itself. Present practice, based on past experience, is a long way from the perfect joint.

*Abstract of paper read before the American Street & Interurban Railway Engineering Association, Atlantic City, N. J. October 10-14, 1910.

An ideal practical joint is a joint embodying such of the elements of the previously described perfect joint as are at present practical, to the extent that this joint will equal the life of the rail, and, it might be added, materially prolong the life of the rail without any further attention to the joint itself. The joint should require no maintenance during the life of the rails which it connects and supplements. With such a joint applied to the rail ends there would be no tearing up of paving or paving concrete during the life of the rail, for the purpose of making any repairs to or replacing the joint.

The third element necessary to attain a perfect joint, which is cited in the report of the committee, puts a burden on the joints that properly belongs to the rail itself. No two strips of rails rolled will, when cut up into rail lengths, and the rail cut from one strip butted to the rail cut from the other, have exactly the same cross section and be of exactly the same depth. It is this difference in the plane of the heads of the two abutting rails that causes the cupping of the receiving rail, and it is to prevent this condition arising and to remedy this defect, having once arisen, that resort has been made to grinding the heads of the rail. On a new track, every joint, no matter of what form, should be ground to a perfectly plane surface before the track is given over for the operation of cars, or if this is not possible at the time, it should be done before cars have operated over the joint long enough to start the cup in the receiving rail. No bolted splice plate in use to-day will comply with this specification for an ideal practical rail joint, for as yet there has been no means of absolutely preventing the bolts from working loose under traffic. The development of the splice plate has been toward a combination of the splice plate and rail base support. The three most prominent joints of this character are mentioned in the report of the committee. Experience with these combination fastenings has shown that while they are a great improvement over the simple splice plate, they require more or less maintenance, and to make them more efficient they should be capable of being stepped, so that whenever a cup appears at the joint the fastenings can be stepped and replaced and the cup ground out of the joint. Of the joints now in service the forms that come nearest to this ideal practical joint are the cast welded, electric welded and the Clark joint. Mr. Clark has had great success with his joint, as has Mr. Kerwin with his cast-weld joint, for the welding of which he has designed and uses a water jacket to prevent the heating of the heads of the rail. In the tracks of the Detroit United Railway, some 32 kinds of joints are used on 27 different sections of rail, ranging from the 18-in. 4-hole 4-lb. strap plate to the 108-lb. 30-in. 8-hole continuous rail joint and the cast-welded joint. Most of these joints were inherited by the company from the several independent companies acquired by purchase or lease. Mr. Kerwin has been experimenting in an endeavor to attain an ideal practical joint, to maintain and add to the life of these joints and the rails to which they are connected. In conclusion, attention is called to a very exhaustive report by F. C. Schmitz to the Pennsylvania Railroad. This report appeared in a serial article in the Railroad Gazette of 1900 under the title "Some Notes on Rail Joint Fastenings." It treats at length of the same problems which are being encountered to-day.

The display of overhead line material made by the Electric Railway Equipment Company in space 462, Aquarium Court, is complete. One of the new equipments shown is the universal hanger which is manufactured for single and double curve and straight line service. This is a one-piece hanger and can be used with any length ear as the stud is free to revolve; its construction is such as to insure the ear being locked securely in position against the shoulder. Where this hanger is to be used the line ear can be soldered or clinched to the trolley wire before it is connected to the hanger. Among the other supplies shown are two iron lamp posts of the boulevard type.

REPORT OF THE JOINT COMMITTEE ON SHOP ACCOUNTING*

BY P. S. YOUNG, CO-CHAIRMAN; A. D. MCWHORTER, CO-CHAIRMAN;
N. E. STUBBS, CHARLES HEWITT, F. B. LASHER AND JOHN LINDALL

The appointment of this committee was an expression on the part of your associations of the desirability of a closer working relation between them. The two associations frequently have matters of technical interest before them, but it has been shown that whenever a subject affecting both associations has been brought up it arouses greater interest than does a subject that affects but one association.

This committee in its work this year has had the benefit of the preliminary work performed in 1909 under the direction of W. G. Gove, chairman. No report having been made to the 1909 convention because of the illness of Mr. Gove, the committee has not felt that any limitation has been put upon the scope of its inquiry, but, in order to accomplish some definite result, it was found necessary to restrict its labors.

The committee, in response to the desire expressed by members of the Engineering Association, has endeavored to determine what information is desirable in relation to the cost of operation of the way and structures department, equipment department and power plant department of an electric railway and presents to the associations, for their consideration, tentative lists of sub-accounts which, it believes, will prove suggestive.

The committee recognizes that it is not within its function to present classifications of accounts and recommends that, after the suggestions outlined have been discussed by both associations, this part of its report be referred to the standard classification committee of the Accountants' Association.

REPORT ON SUBDIVISION OF OPERATING EXPENSE ACCOUNTS FOR ELECTRIC RAILWAY CAR MAINTENANCE SHOPS

BY JOHN LINDALL, SUPERINTENDENT OF ROLLING STOCK AND SHOPS,
BOSTON ELEVATED RAILWAY

ACCOUNT NO. 32, PASSENGER AND COMBINATION CARS

Elevated, Subway and Interurban Cars Weighing Over 28 Tons (Without Load).

- 3201 Bodies: Painting, decorating and varnishing.
- 3202 Body fittings: Including registers, sand boxes, sash, doors, glass, interior trimmings and upholstery.
- 3203 Bodies: Wood, iron and steel work, including foundation brake rigging, drawbars, etc.
- 3204 Truck repairs: Including brake rigging.
- 3205 Truck bearings.
- 3206 Brake shoes.
- 3207 Air brake equipment.

Prepayment and Semi-Convertible Cars.

- 3210 Bodies: Painting, decorating and varnishing.
- 3211 Body fittings: Including registers, sand boxes, sash, doors, glass, interior trimmings and upholstery.
- 3212 Bodies: Wood, iron and steel work, including foundation brake rigging, drawbars, etc.
- 3213 Truck repairs: Including brake rigging.
- 3214 Truck bearings.
- 3215 Brake shoes.
- 3216 Air brake equipment.

Closed Cars (Double Truck) Other than Those Classified Above.

- 3220 Bodies: Painting, decorating and varnishing.

- 3221 Body fittings: Including registers, sand boxes, sash, doors, glass, interior trimmings and upholstery.
- 3222 Bodies: Wood, iron and steel work, including foundation brake rigging, drawbars, etc.
- 3223 Truck repairs: Including brake rigging.
- 3224 Truck bearings.
- 3225 Brake shoes.
- 3226 Air brake equipment.

Closed Cars (Single Truck).

- 3230 Bodies: Painting, decorating and varnishing.
- 3231 Body fittings: Including registers, sand boxes, sash, doors, glass, interior trimmings and upholstery.
- 3232 Bodies: Wood, iron and steel work, including foundation brake rigging, drawbars, etc.
- 3233 Truck repairs.
- 3234 Truck bearings.
- 3235 Brake shoes.

Open Cars (Double Truck).

- 3240 Bodies: Painting, decorating and varnishing.
- 3241 Body fittings: Including registers, sand boxes, sash, doors, glass, interior trimmings and upholstery.
- 3242 Bodies: Wood, iron and steel work, including foundation brake rigging, drawbars, etc.
- 3243 Truck repairs.
- 3244 Truck bearings.
- 3245 Brake shoes.
- 3246 Air brake equipment.

Open Cars (Single Truck).

- 3250 Bodies: Painting, decorating and varnishing.
- 3251 Body fittings: Including registers, sand boxes, sash, doors, glass, interior trimmings and upholstery.
- 3252 Bodies: Wood, iron and steel work, including foundation brake rigging, drawbars, etc.
- 3253 Truck repairs.
- 3254 Truck bearings.
- 3255 Brake shoes.

Miscellaneous.

- 3260 Fenders: All types of passenger and combination cars.
- 3261 Signs: All types of passenger and combination cars.
- 3262 Transfer of trucks for purposes other than repairs, all types of passenger and combination cars.
- 3265 Wheels and axles: Elevated, subway and interurban cars weighing over 28 tons.
- 3266 Wheels and axles: Prepayment and semi-convertible cars.
- 3267 Wheels and axles: Other cars.

ACCOUNT NO. 33, FREIGHT, EXPRESS AND MAIL CARS

- 3301 Bodies, trucks and brakes, including painting.
- 3302 Shifting trucks for purposes other than repairs.

ACCOUNT NO. 34, LOCOMOTIVES

- 3401 Electric locomotive bodies, trucks and brakes, including painting.
- 3402 Steam locomotives.
- 3403 Shifting trucks for purposes other than repairs.

ACCOUNT NO. 35, SERVICE CARS

- 3501 Service car bodies, trucks and brakes, including painting.
- 3502 Shifting trucks for purposes other than repairs.

ACCOUNT NO. 36, ELECTRICAL EQUIPMENT OF CARS

- 3601 Elevated, subway and interurban cars weighing over 28 tons: Control and electrical equipment, exclusive of motors.
- 3602 Prepayment and semi-convertible cars: Control and electrical equipment, exclusive of motors.
- 3603 Closed cars and open cars (double truck): Control and electrical equipment, exclusive of motors.
- 3604 Box cars and open cars (single truck): Control and electrical equipment, exclusive of motors.

*Abstract of report read before the American Street & Interurban Railway Accountants' and Engineering Associations, Atlantic City, N. J., Oct. 10-14.

- 3605 Freight, express and mail cars: Control and electrical equipment, exclusive of motors.
- 3606 Service cars: Control and electrical equipment, exclusive of motors.
- 3607 Shifting electric equipment for purposes other than repairs.
- 3610 Motors (subdivided by types).

ACCOUNT NO. 37, ELECTRICAL EQUIPMENT OF LOCOMOTIVES

- 3701 Control and electrical equipment: Exclusive of motors.
- 3702 Motors (subdivided by types).
- 3703 Shifting electric equipment for purposes other than repairs.

ACCOUNT NO. 38, SHOP MACHINERY AND TOOLS

- 3801 Power drive: Including steam equipment, motors, shafting, belting, etc
- 3802 Machines: Including lathes, drill presses, planers, wheel presses, grinders.
- 3803 Miscellaneous equipment: Including fire protection, cranes, telfhers, etc.

ACCOUNT NO. 39, SHOP EXPENSES

- 3901 Heating expense.
- 3902 Lighting expense.
- 3903 Miscellaneous supplies and expenses: Including small hand tools.

ACCOUNT NO. 40, HORSES AND VEHICLES

- 4001 Horse vehicles: Repairs and painting.
- 4002 Automobiles: Repairs and painting.
- 4003 Automobile supplies.

ACCOUNT NO. 63, MISCELLANEOUS CAR SERVICE SUPPLIES

- 6301 Lamps, waste and miscellaneous car supplies.
- 6302 Lubricants.
- 6303 Carbon brushes for motors.
- 6304 Miscellaneous supplies and expenses.

ACCOUNT NO. 66, CAR HOUSE EMPLOYEES

- 6601 Elevated, subway and interurban cars weighing over 28 tons: Car cleaning.
- 6602 Elevated, subway and interurban cars weighing over 28 tons: Inspection and oiling.
- 6603 Prepayment and semi-convertible cars: Car cleaning.
- 6604 Prepayment and semi-convertible cars: Inspection and oiling.
- 6605 Closed cars, other than classified above: Car cleaning.
- 6606 Closed cars, other than classified above: Inspection and oiling.
- 6607 Open cars: Car cleaning.
- 6608 Open cars: Inspection and oiling.
- 6609 Miscellaneous car house expense (not included in above).

ACCOUNT NO. 67, CAR HOUSE EXPENSES

- 6701 Heating.
- 6702 Lighting.
- 6703 Miscellaneous expense, including water, fuel, etc.

REPORT ON SUBDIVISION OF OPERATING EXPENSE ACCOUNTS FOR ELECTRIC RAILWAY POWER PLANTS

BY CHARLES HEWITT, SUPERINTENDENT OF MOTIVE POWER, PHILADELPHIA RAPID TRANSIT COMPANY

In considering the subdivision of the power house accounts I have carefully gone over the annual reports of the Accountants' Association for the years 1905, 1906, 1907 and 1908, also the full discussions, and I am satisfied it would not be advisable for the committee to recommend any change in the primary accounts, although these accounts as recommended seem somewhat illogical.

I find that the accounts referring to the cost of power are included under three different heads, viz.: Account No. 25, under maintenance of way and structure; accounts Nos. 30 and 31, under maintenance of equipment, and accounts Nos. 49 to 59, inclusive, under transportation expenses. It is regrettable that the schedules do not provide for a more compact statement of the cost of power.

In account No. 25 I have recommended subdivisions Nos. 2501 to 2508, in accordance with the general plan of numbering subdivided accounts, as suggested at our committee meeting.

Account No. 30 I have subdivided into accounts Nos. 3001 to 3006, inclusive, as from my own experience these subdivisions have proved to be sufficient to give me all the information necessary, and I believe that they will cover the needs of the great majority of plants, although possibly some of the larger companies will subdivide these accounts somewhat more in detail. In justification of this subdivision I submit table No. 1, showing the ratio of cost of each of these subdivisions and the total cost of maintenance of power plants, as shown by the accounts of the Philadelphia Rapid Transit Company. As these accounts comprise the cost of maintaining 14 generating stations of widely varying capacities and designs, I believe the indication is a good one.

TABLE NO. 1

Sub Accounts.	P. C. of Total Maint.
3001—Maintenance of engines, turbines and pumps...	21.0
3002— " " boilers, including furnaces, stokers and boiler setting.....	20.8
3003— " " pipe system, including steam, exhaust, oil, air and gas pipes	12.4
3004— " " auxiliaries, including economizers, condensers, heaters, ash and coal machinery, cooling towers, etc.	8.1
3005— " " electric plants	21.1
3006— " " miscellaneous, including steam gages, steam meters, water meters, feed water controllers, damper regulators and similar devices	16.6
	100.0

Account No. 31—Maintenance of substation equipment: I recommend that this be subdivided into accounts Nos. 3101 and 3102; No. 3101 covers the cost of maintaining the electric plant in the substation and No. 3102 has been added because in our substations, and I presume in most substations, there are installed such devices as cranes, air compressors, fan blowers, vacuum cleaners and other non-electrical devices.

The sequence and arrangement of accounts Nos. 49, 50, 51, 52 and 53 seem to me illogical, first, because naturally the items of the most importance should come first, and second, because some of the items are too small to be accorded a primary account, and I submit the following in the hope that the standard classification committee of the Accountants' Association will give the matter consideration.

In all steam-operated stations (and most of the stations operated by the member companies are steam-driven) the cost of coal is pre-eminently the largest item. For the year 1909 this item for the Philadelphia Rapid Transit Company was 59.3 per cent of the entire cost of power. In a station which I recently visited, where soft coal is used costing \$3.20 per ton, the cost of fuel is 80 per cent of the entire cost of power. In some localities where coal is cheap it is possible the cost may fall as low as 50 per cent, but I doubt if it is much below that in any steam-operated station. Therefore, it would seem to me that fuel should be the first item in the cost of operating.

The next item of greatest operating expense is labor. On the Philadelphia Rapid Transit Company in 1909 the cost of operating labor was 20.4 per cent of the total cost of power.

The cost of lubricants was only 0.9 per cent of the entire cost of power, and for this reason it seems to me that this item is too small to be given a primary account, but should rather be a subdivision of account No. 54.

To make this clear I submit table No. 2, showing the percentage of these various items of the total operating cost and also the percentage of the total cost of power.

TABLE NO. 2

	Per Cent of Operating Cost	Per Cent of Total Cost
	P.R.T.Co.	P.R.T.Co.
Fuel	71.3	59.3
Employes	24.5	20.4
Water	1.5	1.2
Lubricants for power houses.....	1.1	0.9
Miscellaneous power house supplies and expenses	1.6	1.2
	100.0	83.0

I have recommended that account No. 49 be subdivided into accounts Nos. 4901 to 4904, inclusive. Electrical labor has been omitted intentionally. While some companies maintain a sharp distinction between the electric labor and other labor in the power stations, a great majority, including ourselves, do not. In most stations there is no distinctive electric labor, in others the switchboard men and generator men act as oilers. In any case the electric labor may well be included under engine-room labor and I believe this item is sufficiently comprehensive.

Account No. 51 is subdivided into three accounts, Nos. 5101 to 5103, while the other accounts need no subdivision.

STANDARD CLASSIFICATION	SUB-ACCOUNTS RECOMMENDED
Account 25—Buildings and Structures.	Account 2501—Power plants. 2502—Substations. 2503—Car houses. 2504—Shops. 2505—General offices. 2506—Stations, waiting rooms and platforms. 2507—Docks and wharfs. 2508—Miscellaneous buildings and structures.
Account 30—Maintenance of power plant equipment.	3001—Maintenance of engines, turbines and pumps. 3002—Maintenance of boilers, including furnaces, stokers and setting. 3003—Maintenance of pipe system, including steam, exhaust, oil, air and gas pipes, all fittings, valves and coverings.

Account 30—(continued)

	3004—Maintenance of auxiliaries, including economizers, condensers, cooling towers, ash and coal elevators, other elevators, etc.
	3005—Maintenance of electric plant.
	3006—Miscellaneous, including such items as steam gages, steam and water meters, feed water controllers, damper regulators.
Account 31—Maintenance of substation equipment.	3101—Maintenance of electric plant. 3102—Miscellaneous maintenance.
Account 49—Power plant employes.	4901—Power plant superintendence and care. 4902—Engine-room labor. 4903—Boiler-room labor. 4904—Producer room labor.
Account 50—Substation employes.	No sub-account.
Account 51—Fuel.	5101—Coal. 5102—Natural gas. 5103—Fuel oil.
Account 52—Water for power.	No sub-account.
Account 53—Lubricants for power.	No sub-account.
Account 54—Miscellaneous power plant supplies and expenses.	No sub-account.
Account 55—Substation supplies and expenses.	No sub-account.
Account 56—Power purchased.	No sub-account.
Account 57—Power exchanged, balance.	No sub-account.
Account 58—Other operations, Dr.	No sub-account.
Account 59—Other operations, Cr.	No sub-account.

SUBDIVISION OF EXPENSE ACCOUNTS FOR WAY AND STRUCTURES

In regard to the subdivision of expense accounts of the standard classification for way and structures the committee has no suggestions to make.

The manufactured material, when work upon it is complete, is delivered to the general storekeeper, together with a delivery slip; a report (in duplicate) showing the cost is prepared, "report of manufactured material put in stock." The storekeeper makes a charge for this material on his records, and an entry is made on the general books crediting the "material in process of manufacture" account and charging "material and supplies" account.

The function of the shop order in the system outlined is supplemental only. In electrical railway shop accounting it is not desirable that it be made the controlling factor in the shop's operation, as would be the case in factory operation. Its advantages are especially apparent when used by a large company. It enables the manager to analyze his costs, and, by giving each job a permanent

.....COMPANY

Date19.....

Car No.

FromCar House

SENT IN FOR

Field

Motors

Armature

Wiring

Wheel

Collision

Painting or }

Varnishing }

Trucks

Brakes

Signed

Car House Foreman.

(Reverse Side)

O. K.Truck & Motor Foreman

O. K.Wiring Foreman

O. K.Pipe Foreman

O. K.Carpenter Foreman

O. K.Paint Foreman

O. K.Inspector

REMARKS

NOTE HERE ANY CHANGE IN EQUIPMENT

Sent to.....Car House

Date.....19.....

Car Tag—Size of Original, 4 by 8 in.

individuality, presents an excellent basis for comparison. It locates responsibility for the cost of each particular job and furnishes a basis for estimate of work yet to be done. The system outlined can be easily carried out and will bring the organization of the work under the immediate control of the man in charge.

REPORT ON SYSTEM FOR HANDLING SCRAP MATERIAL

TRACK, ROADWAY AND OVERHEAD DEPARTMENTS

Roadmasters should be required to collect all material which is to be scrapped and place in their respective yards. On the last day of each month, in case they have any material for sale, a manifest should be made out in triplicate, stating actual or estimated weight of each kind of scrap material on hand for sale; one copy to be sent to the head of department, one to the storekeeper and the other to be kept on file.

Line foremen should be required to collect all material which is to be scrapped and place in their respective depots. On the last day of each month, in case they have any material for sale, a manifest should be made out in triplicate, stating actual or estimated weight of each kind of material on hand for sale; one copy to be sent to the head of department, one to the storekeeper and the other kept for file.

ROLLING EQUIPMENT DEPARTMENT

Where there are a number of car houses operated by a company all scrap material at local car house shops should be collected daily and placed in receptacles provided for that purpose and forwarded to general storekeeper by supply cars as frequently as may be directed by superintendent of shops or general foreman. A manifest, executed in triplicate, should be made out by the shop foreman for each shipment of scrap, and should contain a description and actual or estimated weight of each kind of material; one copy should be kept by the shop foreman and the original and another copy should be sent with each shipment. The general storekeeper should be required to keep separate each kind of material and report actual weight of material received. The foreman in charge of the respective shops should sign the duplicate manifests accompanying each shipment of scrap from the different car houses—one copy should be returned to the car house foreman and the other forwarded to the office of superintendent of rolling equipment.

The department heads, viz., superintendent of rolling equipment, superintendent maintenance of way and the superintendent of overhead line, should, on the last day of each month, fill out proper blanks in quadruplicate stating the total weight of the different kinds of scrap material on hand at the several storage places; one blank should be forwarded to the manager, one to the auditor, one to the purchasing agent and the other kept for file. The manager should request the purchasing agent to advertise for bids for the purchase of this material, which should be forwarded to the executive committee, sealed, within a week after the bids have been requested. After the manager has been notified of the acceptance of a bid or bids he will accordingly notify the auditor, the purchasing agent and the respective superintendents. The auditor will credit the proper accounts with the value of scrap material for the operation of the month previous; the purchasing agent will notify the party or parties of the acceptance of bid or bids, and the respective superintendents will permit the party or parties whose bid or bids have been accepted to remove the material from the premises. All material before being removed must be weighed on the premises, if scales are available, otherwise at a standard scale, and a report should be made out in quadruplicate, signed by the superintendent, purchaser, and, if on a foreign scale, by the authorized representative of same. One copy to be forwarded to manager, one to auditor, one to purchasing agent and the other for file.

All other department heads will be governed in like manner in case they have any scrap material for sale.

When bids have been accepted (and scrap recommendation has been duly approved) scrap order in quadruplicate is prepared. The original is forwarded to the party or parties whose bid or bids have been accepted, the duplicate to the superintendent; the triplicate is held by the weighmaster and the quadruplicate is filed at the office of the auditor. If any changes are made on order which has been forwarded, a "change in order" form is issued.

ASCERTAINING MILEAGE FOR PURCHASE OF SUPPLIES ON A MILEAGE BASIS

The individual car mileage itself, or the car number, or the number of trips made by car, should be furnished by the transportation department to the interested department, preferably the mechanical department. This mileage should include both

revenue and non-revenue mileage, the latter item embracing all kinds of runs, such as getting the car in and out of service, shopping the car for repairs, etc. The mileage of the car should be entered in some permanent form, as the ledger or loose-leaf book. The method giving the greatest advantage is one wherein a single sheet or page allotted to each car is ruled for each month and each day, the arrangement of the monthly columns being vertical so as to give a ready means of obtaining totals.

The purchase of wheels, brake shoes, trolley wheels, lubricant, etc., on a mileage basis then becomes a simple proposition on the summation of the total number of car miles for which the material in question has been used. This, at the contract price, gives readily the cost of the item.

The mechanical department often desires and needs other information concerning the performance of material besides the mileage. Different locations differ in these respects, and for their separate purposes forms meeting these special demands have been developed.

FREIGHT AND EXPRESS ACCOUNTING*

BY L. T. HIXSON, AUDITOR, TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY, INDIANAPOLIS, IND.

In order that a company may be prepared at any time to prove its right to charge certain rates for express and freight, if called upon to do so, and in order that it may be able to choose the most profitable business, and stop leaks in operating, it is very essential that the officials of the company should have complete knowledge of the business.

In the consideration of this subject I have been governed by conditions on the lines of the company with which I am connected. The practice is to transport freight principally in motor cars, trail cars being used only occasionally. Express shipments are handled exclusively on passenger cars, these express shipments being delivered to the forwarding station by the shipper and called for at destination by consignee.

While it is absolutely necessary that such a system of accounting should be used as will enable the company to get everything which is due, the system should be so arranged that the management may also have correct information as to the amount and kind of business done at various locations and other details of the business. The head of the traffic department should have full information as to the volume of business between the different stations and the revenue derived therefrom in order that the efforts of his department in the way of soliciting, etc., may be expended in the right direction. If some stations are forwarding all the freight or express that the company's equipment can handle, while the inbound shipments are very light, the traffic department should have this information to enable it to concentrate its efforts upon soliciting business for the return trip of the company's cars. If the volume of business is as great as the equipment can handle, the traffic representatives can then devote their time to securing shipments of a compact nature or taking the higher freight rates, and pass by the especially bulky or low-class freight. When the proper information of this nature is furnished, the transportation and traffic departments will be able to arrange the train schedules in such a manner as will best take care of the business with the equipment available, and at a minimum of expense for train crews, etc.

It would not be practical, even if it were possible, to keep separate account of passenger, freight or express expenses. To get the best results in the way of making comparisons, a uniform plan should be adopted by the various companies. Very few companies are operating under the same conditions; therefore, it becomes necessary to accept some plan which all lines may use as a basis.

I find that some roads are attempting to segregate, in detail, the expenses for freight, express and passenger business. There are only a few items of expense that can be directly charged to either branch of operating expense, it being necessary to use some estimated basis for the greater portion of the expense items. Therefore, the better plan would be to show the cost of operating for the entire business and apportion the expense to freight account on some agreed basis.

It appears that the most practical plan would be the car-mile basis, but in order to get the correct comparative figures, the mileage of all cars of approximately the same empty weight should be computed in one group and the total mileage of the various classes reduced to a uniform basis. The total mileage should be used. The car houses of one line may be at a considerable distance from the point at which the trains are scheduled to start, while the dead mileage of another line may be a very small percentage of the total. This would show the comparative operating costs on the same basis; the line having the greater percentage of dead mileage, however, would show less revenue per car mile on account of such dead mileage. This non-revenue mileage is one of the adverse conditions under which the road is operating and must be taken account of in the same manner as any other deficiency.

All companies could use this basis, and if a 40-ton car were accepted as the standard, the company operating 30-ton cars, with a total car mileage of 600,000 for the month, would reduce this mileage to 450,000, thus being enabled to make intelligent comparison with the road using 40-ton cars. While the freight business might be charged too much for some accounts, it would be charged less than the actual expense in other instances, and the net result obtained would be practically correct.

After the total cost of handling freight business is ascertained, the ton-mile cost may be arrived at if a record of the tonnage between stations is kept. The revenue per ton mile between stations, as well as the ton-mile revenue for the entire road, can also be worked up, provided the gross revenue is shown between stations. However, the preparation of statistics of this nature requires a great deal of labor.

The express revenue is practically clear, inasmuch as this business is handled in the baggage compartments of the regular passenger cars. Because the actual expense for taking care of the express business is small it does not follow that the tariff should be reduced to a very low figure, but the company should be entitled to a rate that would allow a fair profit if the entire business consisted of express, plus an extra allowance for special service.

Freight and express accounting also has its place in the preparation of tariffs. In making either freight or express tariffs, the mere fact that some other traction line or a steam road charges certain rates should not govern the rate to be charged, if such rate will not give sufficient returns to pay expenses, unless there are some other good reasons.

In arriving at a basis for the tariff rates, the average cost per 100-pound mile should be used. If the haul is 70 miles, the operating and fixed charges being \$0.0025 per 100 pounds per mile, the rate between these points must necessarily be in excess of 17½ cents to allow any profit. This rate would be the average, and the various classes would be more or less, based on whether the class were high or low. Express rates should be about double the maximum tariff rates, on account of extra service.

In order to get the best results for the company, the officials in charge of tariff and transportation and the auditor should work together in ascertaining just what information is most necessary. To this end, I would recommend that conferences be held between representatives of the Accountants' Association and members of the Transportation & Traffic Association, and that a uniform basis for use in apportioning the operating expenses of freight and express be agreed upon, thereby making possible the intelligent comparison of the accounts of one road with those of other companies.

*Abstract of paper read before the American Street & Interurban Railway Accountants' Association, Atlantic City, N. J., Oct. 10, 11, 12, 13 and 14.

MIDVALE WHEELS AND AXLES

Midvale Steel Company, Philadelphia, Pa., has a reception booth in the lobby, spaces 400-402, ornamented with solid rolled-steel wheels and with built-up wheels. A notable feature is a high-carbon steel, heat-treated inter-urban axle, entirely finished and polished, and then bent cold double on itself under a 10,000-ton pressure. This hard treatment is possible only with properly heat-treated materials, which in this case exhibit the following properties: Tensile strength, 92,000 lb.; elastic limit, 56,500 lb.; extension, 26 per cent; contraction, 58.9 per cent. Represented by W. B. Barba, Ernest Harrah, Charles F. Tietze, T. W. Illingworth, Thomas Price, James Thompson, W. S. Edger. The company has a stenographer at the service of the delegates.

THE NEW THERMIT WELD.

The discussion on rail joints at the meeting of the Engineering Association has led to considerable interest in the character of the new method of rail welding developed by the Goldschmidt Thermit Company. Previous methods of welding used in the United States by this company have comprised a weld of only the base and the web of the rail. This plan has been found successful in climates where the temperature changes are not extreme, as on the Pacific Coast, but in the cities farther east the company considers that an absolutely solid rail, that is, one in which the head also is welded, is desirable. The new method has been tried on a section of track in Harrisburg. Briefly the system is as follows:

The track is first prepared by providing a space $\frac{3}{4}$ in. between the ends of the rail at the joint. The rails are then accurately lined up, thoroughly cleaned and surrounded by a mold which allows space for a collar of Thermit steel to be poured around the rail ends. Provision is also made for a pouring gate and heating gate, and also for a riser directly over the top of the rail. In practice the rail ends are preheated to a good red heat by means of a gasoline compressed air torch directed into the preheating hole at the bottom of the mold. As soon as they have been brought to a sufficient temperature the torch is withdrawn. The preheating opening is then closed by means of a dry sand core and the Thermit charge is ignited in the crucible. At the conclusion of the reaction the Thermit steel is tapped into the mold, where it flows around the rail ends and amalgamates with them to form a single homogeneous mass when cool. An excess of Thermit steel is always provided in the welding portion, so that not only is the entire rail surrounded by steel, but enough is forced into the riser over the top of the rail to insure a thorough weld of the head and good metal on the running surface.

At the conclusion of the operation it is necessary, of course, to remove all superfluous metal from the head of the rail and to grind it to proper shape. This is accomplished by means of a grinder designed by G. E. Pellisier, superintendent of the Goldschmidt company. The body of the grinder is a channel-iron frame mounted on two pairs of 20-in. car wheels and carrying a cross rail fitted with two grinder brackets, one for each rail. Each bracket supports an emery wheel belted direct to a 5-hp d.c. motor, which has flexible connections to a resistance box and a line switch. The bracket is mounted on a saddle which slides upon the cross rail and an up-and-down feed is obtained by means of a screw. The motor is also fixed upon the grinder bracket in such a manner that by turning a screw the belt may be tightened as desired. The backward and forward motion of the emery wheel on the rail is obtained by moving the entire truck by a worm and worm gear operated by hand. This worm gear also acts as a brake and gives a positive motion to the truck. The grinder is equipped with alundum wheels 14 in. in diameter and $2\frac{1}{2}$ in. face for grinding the

surface of the rail and with special alundum wheels for grinding the groove. This machine is adapted not only to grinding joints but also to grinding out corrugations.

AROUND THE WORLD WITH THE ACKLEY BRAKE

G. S. Ackley, proprietor of the Ackley Brake Company of New York, exporter of the Ackley adjustable brake, and the British Ackley Brake Company of London, who is in attendance at the convention, has just returned from a trip around the world. He started on March 2 of this year and traveled eastward via London and Paris to Switzerland, where the Ackley brake has been adopted as standard on the lines of Geneva, Basle and other cities. He then visited his agency at Brussels, where he made arrangements for an extensive exhibit at the International Exposition in that city. During his visit in Berlin he appointed Eugen Eichel as consulting engineer of the brake company. They then visited Budapest and Vienna, where the Ackley brakes have been specified on 150 new cars.

Mr. Ackley then crossed into Russia, where his brakes are in extensive use, and traveled by rail to Vladivostok. Then he crossed to Yokohama, Japan, where the Ackley brakes have been adopted as standard and are now in use on all of the cars of that city. While in Japan he visited Sale & Frazer, of Yokohama and Tokio, as agents for his company in Japan, Korea and Manchuria. He then visited all of the important cities in that country. He appointed Shanghai, where he is represented by the China General Engineering Company.

From Shanghai he went to Hong Kong, then to Manila, where Frank S. Strong was appointed agent and where an order was received for brakes from the Manila Electric Railroad & Light Company. Australia was next on the tour, and among the cities visited were Brisbane, Sydney, Melbourne and Adelaide. All of the principal Australian roads are testing or have adopted the Ackley brake, which is represented in Australia and New Zealand by R. W. Cameron & Company. Accompanied by the Wellington representative of this firm, Mr. Ackley visited the principal cities in New Zealand, where the brake is now in service on several lines. On Aug. 3 he sailed from Auckland, New Zealand, to Vancouver, B. C., via Honolulu, arriving in Vancouver on Aug. 24. The trip covered six months, in which Mr. Ackley traveled over 36,000 miles. He experienced two winters and two summers and saw two Tuesdays in one week.

Mr. Ackley enjoyed this trip immensely from a business and pleasure standpoint, and is firmly convinced that if American manufacturers would get in touch with the electric railway situation outside of the United States they would discover great possibilities for the extension of their trade. Incidentally, Mr. Ackley stated that he found the *ELECTRIC RAILWAY JOURNAL* in the offices of all of the principal tramway companies during his trip.

One of the attractive exhibits on the pier is that of the Dearborn Drug & Chemical Works, which is located near the main entrance on the east side of the reception hall. The booth is arranged as a reception room. The floors are covered with oriental rugs, and artistic Japanese furniture. Potted plants and ferns are arranged attractively about the exhibit. The representatives in attendance who are looking after the company's interests are George R. Carr, Grant A. Spear and H. G. McConnaughy.

The display made by the Star Brass Works in space 820, Building No. 2, consists of standard trolley wheels and harps. O. P. Johnson, representative, is showing a new harp designed for mine locomotives.

WESTINGHOUSE BRAKE EXHIBIT

The principal exhibit of the Westinghouse Traction Brake Company is an exhibition rack representing the complete equipment of a 10-car subway or elevated train of motor and trailer cars, furnished with the latest electro-pneumatic brake system and Westinghouse governor synchronizing system for distributing the labor of supplying the compressed air equally among all compressors in the train. The electric control of the brakes is so superimposed upon the pneumatic apparatus that, while the brakes are being operated electrically, the pneumatic brake proper remains fully charged and ready for immediate application should power go off the line or other accident cause the electric control to become inoperative. This feature has been characteristic of all electro-pneumatic brake systems to a greater or less degree, but in the electro-pneumatic equipment now on exhibition the electric control has also been extended to the emergency features of the brake, so that an emergency application originating at the brake valve or at any other point in the train is transmitted electrically, therefore the brakes on each car apply instantly and to full pressure. At the same time, the pneumatic emergency features are kept equal in efficiency to the most advanced type of purely pneumatic emergency brake. The demonstration rack is accompanied by two illuminated charts showing curves of stops as actually made with the old-style pneumatic brake of 10 years ago and the stops now made with the new electro-pneumatic brake. Another demonstration equipment represents the complete equipment of a five-car train fitted with the company's type "AMM" automatic brake equipment for interurban service operating either in single cars or trains.

There is also an exhibit including a panel of six electric pump governors for services ranging from ordinary city car service to high-voltage heavy-duty installations like the New York, New Haven & Hartford and the St. Clair tunnel electric locomotives. Other exhibits include the Westinghouse automatic car and air coupler and the American automatic brake slack adjuster made by the American Brake Company, St. Louis, Mo.

THE HALE & KILBURN EXHIBIT

The unique exhibit of the Hale & Kilburn Manufacturing Company in Building No 3 is a departure from those presented in former conventions. The company's new line of pressed-steel car equipment is shown for the first time at a street railway convention. All-steel car doors, steel sash frames, steel interior finish and paneling, together with all-steel car seats, form a large portion of the present exhibit. A full-size 7-ft. section of the interior of a Harriman all-steel passenger coach is presented with its steel-framed Empire windows, handsome panelings and other accessories. A line of steel panels is shown with the highest type of finished effects in various colors and blends, presenting wonderful possibilities in the surface finish of steel to rival the finest productions in wood. "Walkover" car seats in numerous coverings are also in evidence, among which is the new Southern Pacific interurban steel seat, now being installed in 125 all-steel cars. The new pressed-steel "Walkover seat" for the United Railways & Electric Company of Baltimore, and for the Capitol Traction Company of Washington, D. C., is shown with the very latest improvements, together with the seat for the new lot of 100 cars of the Los Angeles Railway. The Hale & Kilburn design is saving 25 lb. or more per seat over the ordinary metal frames, which lessens the weight of an average car to a very appreciable extent. The permanence of a steel seat is self-evident compared with the breakages incident to cast metal.

W. Frank Carr, of the Falk Company, Milwaukee, Wis., is attending the convention in the interests of his company.

WONHAM, SANGER & BATES EXHIBIT

Through error, the exhibit of Wonham, Sanger & Bates, New York, was stated to be in Building No. 3. The exhibit is in Building No. 1, space 405, adjoining the headquarters of the ELECTRIC RAILWAY JOURNAL. This company is showing the H. B. life guard, American automatic switch, Tripartite steel pole, White foundry equipment and Hayes run fire brick. The Third Avenue Railroad's storage battery car on the Boardwalk, near the Pier, is also equipped with H. B. life guards. R. Sanger, F. Wonham, H. A. Goode and R. V. Collins are representing the interests of the company.

ALLIS-CHALMERS COMPANY'S LARGE EXHIBIT

The exhibit of the Allis-Chalmers Company is located in the main building. It comprises about 3,500 sq. ft. and has been attractively decorated and furnished. The display comprises operating exhibits of quick-action automatic motor and trail car air brake equipments, with high pressure pipeless triple valves, and straight air emergency motor and trail car air brake equipments with semi-automatic features; types 301 and 302 40 hp. and 55 hp. railway motors; type S4 railway controller; air brake parts; portable air compressors of varying capacities; type "C" 200 amp. 35,000 volt electrically operated oil switch with remote control; type "A" 200 amp. 3,300 volt non-automatic, and type "A" 200 amp. 3,300 volt automatic oil switches with switchboard mounting; alternating and direct current motors and static transformers.

In addition to the foregoing, the company is showing a sectional model of its steam turbine. This is one of the finest and most interesting exhibits on the Pier, and clearly indicates the details of construction of this prime mover. While it would seem that the exhibit of material should be of first importance, the Allis-Chalmers Company seems to have given the comfort of visitors greater consideration, as a large space on the main aisle has been given up to a reception and rest room and spacious aisles have been provided about every piece of apparatus shown. The company is also using a novel scheme for attracting attention to its exhibit in the form of twenty colored pennants bearing the initials of the company. These flags are blown by air from a 35 cu. ft. type "C-5" compressor. These flags are first blown alternately, and after a short rest all are blown together, creating a very pleasing and attractive decoration.

The McConway & Torley Company, Pittsburgh, Pa., is distributing a booklet describing and illustrating the McConway wheel, which is steel tired of the built-up type; the wheel center is a steel casting, the hub is cast iron and the tire is of the usual rolled steel type. There is no machine work on the tire except such "rough turning" as may be necessary to bring it to a round; and only a small amount of grinding and "rough turning" is required for the wheel centers. There are no bolts, and as the tire is neither fused nor shrunk on, it cannot come off from expansion and will not turn on the center. Separation of the two members for the renewal of the tire is effected by cutting the tire in two places, whereupon the structure falls apart, leaving the center ready for the new tire. The new tire can be applied by unskilled labor and without special machinery; a foundry cupola and lifting appliances adequate to handle units of the full weight of a car wheel are the only appliances required, so that any ordinarily equipped foundry affords the required facilities for the work.

Railway Materials Company, of Chicago, has no exhibit this year, but its representatives, George F. Allen, E. C. Folsom and H. T. Mercur, are here calling attention to the special features of the steel back brake shoes and the Rymco automatic trolley switch for interurban service which are manufactured by the company.

THE THEORY OF STREET RAILWAY RATE REGULATION AS DEVELOPED IN THE CONEY ISLAND FARE CASE*

BY FRANK R. FORD, FORD, BACON & DAVIS, NEW YORK

The Coney Island fare case is of interest on account of the number of points brought out that were of importance to the general subject of rate regulation of public utility corporations. It is also more simple and easily understood than many of these rate cases, especially as regards the Coney Island & Brooklyn Railroad Company's case as distinguished from that of the Brooklyn Rapid Transit Company.

THE PROBLEM

Here was a company of moderate size (\$1,491,000 of gross earnings from 53 miles of track) which began business in 1861 and has continued since then under its original charter, its only corporate consolidation being in 1898 with the Brooklyn City & Newtown Railroad Company, which also began operation in 1861. As this consolidation was by lease, the records of both companies have been kept largely intact since the beginning. These, together with the annual reports made to the State Engineers from 1862 to 1882, and subsequently to the State Board of Railroad Commissioners until 1906, and then to the Public Service Commission, represent for 50 years a statistical history of the street railway business which is probably unique.

The Coney Island & Brooklyn Railroad Company operates three principal lines, two of which, the Smith Street and Franklin Avenue lines, run from Manhattan Borough across the Brooklyn and Williamsburgh Bridges over the East River, and thence through Brooklyn Borough direct to Coney Island in the summer, distances of 11.28 and 12.38 miles respectively. The third line, the DeKalb Avenue Line, which runs from Manhattan Borough across the Brooklyn Bridge and through Brooklyn to Ridgewood, transfers to the direct Coney Island lines, and on days of large summer traffic operates some of its cars over the other lines direct to Coney Island.

The Coney Island fare problem reduces itself to the proposition: Is 10 cents a reasonable rate for the 12-mile ride from Manhattan Borough to Coney Island with the business largely from terminal to terminal, where over 85 per cent of the traffic is carried during the five months from June to September and most of this on Saturdays, Sundays and holidays in the months of July and August? During the remainder of the year, with fixed charges continuing to accrue, a service has to be operated for the few winter residents which barely pays the platform expenses. It is one of the most accentuated peak load traffics known to the street railway industry, both as to requirements for equipment and car operatives.

THE UNPROFITABLE NATURE OF THE CONEY ISLAND BUSINESS PER SE

In presenting the technical case for the company, we introduced a proof of the unprofitable nature of this business based on its reduction to the passenger mile unit. This showed that the 10-cent fare for the 11.28 miles from Manhattan Borough to Coney Island represented gross earnings of 0.89 cent per passenger mile. We proved that the average ride per passenger on the entire system was between 3 and 4 miles. Knowing the number of passengers and the operating expenses, interest and taxes for the year of 10-cent fares to Aug. 1, 1909, we obtained the cost of carrying the business as 0.90 cent per passenger mile if the average ride was 4 miles and 1.20 cents per passenger mile if the average ride was 3 miles. This showed for this traffic a deficit for capital stock and reserves of between 0.01 cent and 0.31 cent per passenger mile. Corresponding figures for this business at a 5-cent fare from Manhattan to Coney Island showed a much larger deficit as the gross earnings were reduced to 0.44 cent per passenger mile.

Therefore the Manhattan Borough to Coney Island business showed a small loss at a 10-cent fare and a large loss at 5

cents. In other words, even at the present 10-cent fare this business is not so profitable as the remaining business of the company, and would probably not pay the company to undertake if it had not already made the investment.

THE COMPANY'S BUSINESS AS A WHOLE NOT UNREASONABLY PROFITABLE

With regard to the company's business as a whole, it would not seem that the remainder of its traffic is of such a highly profitable nature as to justify a losing rate to Coney Island. While in the early period of its electric operation it had begun the payment of dividends on its capital stock, which increased gradually from 4 per cent in 1895 to 16 per cent for the three years 1902, 1903 and 1904, it was found that with the eventual wearing out of the physical property and the increased competition of other street railway and elevated lines the company was unable to maintain this dividend on its \$2,000,000 of stock. In February, 1907, it was compelled to discontinue dividends entirely, and at the same time ask its stockholders to subscribe for \$1,000,000 of additional stock at par, which money was required for the rehabilitation of its power system and other improvements. Since that time no dividends have been paid on the \$3,000,000 of stock, practically all of the surplus earnings being required for renewals.

From 1861 to 1890, under horse power operation the company's stock had paid an average dividend of 1.2 per cent. From 1891 to 1894, during the transition from horse to electric traction, the average dividend was 3.7 per cent, and from 1895 to 1909, during electric operation, the average dividend has been 8.6 per cent. For the entire 49 years the average dividend was 5.9 per cent, this being not only less than the usual rates of interest, but much lower than the current rates of return upon other kinds of business during the 49-year period.

It should be borne in mind in connection with the above statements that this company's bonded indebtedness and stock capitalization was testified to as representing cash or its equivalent invested in the property, these issues having been passed upon and approved by the State Boards of Railroad Commissioners and their successors, the Public Service Commission, under definite powers of approval from the State. In other words, this company's capitalization has never passed through the same process of stock "watering" as many other street railway companies in this vicinity.

As an evidence of this it should be noted that the total amount of par value outstanding of stock and bonds of this company is \$8,641,962, which is equivalent to 5.8 times the gross earnings, while the usual amount of total stock and bond capitalization of street railway companies is from seven to ten times the gross earnings.

THE HISTORY OF THE CASE

The history of the Coney Island rate case is practically co-extensive with the existence of the Public Service Commission. The force of public opinion which created the demand for the Public Service Commissions law was brought largely through the desire to secure a 5-cent rate to Coney Island.

The Public Service Commission came into office July 1, 1907. Upon complaint of certain newspaper reporters made in February, 1908, actions were begun before the Public Service Commission to reduce the fare on the Brooklyn Rapid Transit system from 10 cents to 5 cents, and to reduce the fare on the Coney Island & Brooklyn Railroad from 10 cents to 5 cents on Saturdays, Sundays and holidays, this company having a 5-cent fare in force on other weekdays.

After numerous hearings, a decision in the Brooklyn Rapid Transit case was rendered March 8, 1910 dismissing the complaint. On July 2 1909, the complaint against the Coney Island & Brooklyn Railroad Company had also been dismissed. In the meantime, however, the company had, in the preparation of its case, proved to itself that it was losing money in carrying the New York to Coney Island passengers for 5 cents on days other than Saturdays, Sundays and holidays, and on Aug.

*Paper presented at meeting of American Street & Railway Association, Oct. 10-14, 1910.

31, 1908, raised the rate to 10 cents. The commissioner in rendering his decision intimated that he would consider a complaint against this raised fare on weekdays. This was taken advantage of promptly by the complainant and a new case started on Sept. 15, 1909. Numerous hearings were given, considerable evidence introduced and the hearings closed on April 13, 1910. Since then the decision of the commission has been reserved.

Some of the interesting points which were developed in this case are as follows:

NO ALLOWANCE FOR FRANCHISE VALUE

This is believed to be the first noted case in the street railway industry in which no attempt was made by the public authority to value the franchises of the company. This is due possibly to the provision of the Public Service Commissions Law which, referring to the approval of the issue of securities, states that the commission shall have no power to authorize capitalization of any franchise.

Heretofore, in such cases as the Detroit, Chicago and Cleveland street railway valuations, the city authorities added to the value of the physical property the value of the unexpired terms of the franchises, based on their earning power. In this case it was suggested by the commission's experts that as the franchises are perpetual they are for all practical purposes simply permits for the use of the streets and hence have no special value.

COMPREHENSIVE STUDY OF VALUATION

As experts for the company we valued this property not only by the principal methods which had been previously used in the valuation of railroads and other quasi-public enterprises, but we also developed a new plan of valuation especially applicable to this class of property.

Noted writers upon the rate regulation of railroads, the fairest European treatment of the problem, even the semi-political statements of men such as Presidents Roosevelt and Taft agree that subjects such as capitalization tested by the laws in existence at the time of issue, market prices of securities, earning power, original cost, location, character of management, value of the commodity, should, in addition to a physical valuation, be considered in the regulation of rates, yet apparently in none of the preceding street railway valuations have these items been carefully valued or in most cases even considered, and in this one they were presented only by the company's experts.

The five methods of valuation and corresponding values as estimated by us, are as follows:

Commercial Valuations.

	Estimated Value.
1. Earning Power	\$8,584,245
2. Market Value of Securities	7,868,162

Valuations Based on Investment.

3. Approved Capitalization Issued	8,641,962
4. Cash Investment	8,941,227
5. Cost of Reproduction New	9,299,898

VALUATION OF EARNING POWER

The value of the earning power is one of the methods of commercial valuation or valuation from a business standpoint. The net earning power through a series of years is in the final analysis the factor which determines in the business world the value of any industry. In this case, in order to cover the period of prosperous years as well as the lean years, the average of the net earnings for 10 years was taken. From this was deducted interest on the present fixed debt of the company at actual rates, the remaining net earnings being applicable to the stock equity. The value of this equity was then capitalized on a 6 per cent basis and this capitalization added to the fixed debt, gives the total value of the earning power. Various

modifications of this method have been adopted generally in the Swiss, French and other European laws of appropriation of railroad property for national ownership.

This is also practically the method used by Prof. H. C. Adams in his railroad appraisals for the Michigan Board of Tax Commissioners. It was also in its result the method used by the City of Chicago in the valuation of the Chicago street railway systems by B. J. Arnold in 1906. In the Chicago cases, franchise value was estimated as the present discounted principal value of the estimated net earnings for the remaining life of the franchises, capitalized at 5 per cent, less the present value of the physical property. To this franchise value was then added the present value of the physical property to obtain the total present value of the property. In other words, we have the formulas.

$$\text{Total Present Value} = \text{Present Value of Franchises} + \text{Present Value of Physical Property.}$$

but if

$$\text{Present Value of Franchises} = \text{Present Value of Earning Power} - \text{Present Value of Physical Property,}$$

then

$$\text{Total Present Value} = \text{Present Value of Earning Power.}$$

In other words, the Chicago method of valuation when applied to a property operating under long term or perpetual franchises results simply in a capitalized value of the earning power.

MARKET VALUE OF SECURITIES

The market value of securities is the method which was used by Professor Adams in his commercial valuation of railway operating property in 1904.

In this case this value was taken as the average market price of the stock and bonds issued for the previous six months. Due to the fact that the company had entirely discontinued dividends the year before and had called upon its stockholders for practically a 50 per cent assessment, the market prices of its securities were considerably impaired, and it would therefore seem that this method is not such a fair one for the company as some of the others offered. It will be seen that the value of this basis is less than any of the other values.

APPROVED CAPITALIZATION ISSUED

Coming to valuations based on investment, which basis apparently has the most weight with our governmental regulating bodies, the first method is that of approved capitalization issued. By this is meant the amount of bonds and stock the issue of which the State has, through its agent, expressly approved. In the case of the Coney Island & Brooklyn Railroad Company, it was brought out in the evidence that the State of New York, through the Board of Railroad Commissioners (and latterly through the Public Service Commission for minor issues), has, after formal investigation, approved all of its bond and stock issues. It has been said that the approval of our public utility commissions upon the issue of securities practically gives them the guarantee of the government, and in this respect should make them of greater value to investors. The Public Service Commission, however, in the opinion already rendered in this case does not appear to have given any weight to the approval of its predecessor, the State Board of Railroad Commissioners.

The suggestion of the Commission's experts in this case that the depreciation of the physical property be deducted from the value on which a return is allowed also in effect would discredit a large portion of the securities outstanding of probably every public utility corporation in the State, even if such securities, when issued, had been approved by State authority, through the Public Service Commission or its predecessor.

In fixing reasonable rates for a monopoly, the actual cash investment must also be considered. This cash investment

represents, as does the approved capitalization issued, the cost of production of the property through its period of development, including the cost of promotion, the organization of the corporation, the acquirement of public rights often under conditions of competition, the cost of development of the company's business and physical property, the cost of financing the company's overhead charges upon construction, the contractor's overhead charges and profit, the cost of real estate, the cost of construction and equipment, the working capital, reserve funds, investments, etc.

The cash investment will be evidenced by the cost of property on the books, if they have been properly kept. From the records of the company and its State reports we were able to go back to its first construction and to check largely the book entries during the early period from the amount of property on hand, and later through the actual construction entries, and in this manner to prove the cash investment to represent reasonably the book cost of the property over a period of 49 years. While these figures include the cost, to an extent, of the superseded horse system and, to a less extent, the supersession of some of the early electric equipment, all of which was so charged with the approval of the State Board of Railroad Commissioners, it is submitted that this cash investment should receive the same measure of protection from the present governmental authorities as should be accorded on the other hand to the rights of the traveling public.

It is a nice question whether a company such as the Coney Island & Brooklyn Railroad, which sustains severe competition from the surface, elevated and subway lines of its powerful neighbors, should be properly subject to regulation of rates at all, provided they are not greater than the maximum rates allowed by law. In this case it is in evidence that the rates charged are less than the maximum legal rates.

In dealing with the cash investment in the property it was brought out in this case that the General Railroad Act of 1850, which was claimed to be still in force, promised a 10 per cent maximum return to all companies organized under its provisions. The Legislature reserved the right to reduce fares, and I quote from the law: "but the same [fares] shall not, without the consent of the corporation, be so reduced as to produce with said profits less than 10 per cent per annum on the *capital actually expended*." The theory of rate regulation in the State of New York for the past 60 years has therefore been based on cash investment.

VALUATION BASED ON COST OF REPRODUCTION NEW

The usual method of determining the cost of reproduction has been to make a careful inventory of the physical property, to which was applied market prices of machinery, materials and labor. Percentages were then added for engineering and superintendence, interest during construction, incidentals, &c. The total was called the cost of reproduction of the physical property. This was then generally depreciated to secure its present value, and to this was added the estimated value of the franchises.

While this might be proper for some purposes, it does not seem to be a logical method for ascertaining the cost of reproduction for use in a rate case. It would appear that for this purpose there should be determined the cost of founding and developing a new enterprise co-extensive with the present one. In other words, let us assume that the streets are clear of tracks, and then ascertain the cost of reproduction from the inception of the line in the mind of the promoter, through the period of securing rights and of financing to the completion of the construction, our plans and specifications being the actual design of the present line. Let the present cost include not only the market price of real estate, rails, machinery and labor, but also the current fee for services of promoters, lawyers, financiers, engineers and administrators. This is the basis upon which a competitive enterprise must enter the field and its rates be fixed.

Nor should the cost of reproduction now be reduced by the depreciation of physical property in order to arrive at the rate fixing value. The value of the commodity, which is the service rendered, does not depend on the age of power house, car barns, feed wire, or even of tracks, or cars if they are in reliable operating condition and in good repair.

The value of electricity conducted through a wire, or of water through a pipe, will be just as much if the wire or the pipe be 5 years old or 15 years old.

A proper reliability of service and condition of maintenance can be compelled by the commission, but the replacement of the article, due to age will not occur until it is obsolete. In other words, every property is partly worn out from the day it begins operation, and it would be an economic waste to provide a larger fund than is necessary for the renewals as they take place, except and to such an extent as such a fund should provide for unforeseen contingencies. Securities of the company are not retired as property depreciates, because the larger part of the depreciation fund accumulated from income is by current practice, with the approval of the commission, expended at once for accruing renewals.

The more the property depreciates from the condition of newness the greater the necessity for the maintenance of the original rate, so that the company can provide for its upkeep. This principle has been recognized in decisions of the Railroad Commission of Wisconsin. The Public Service Commission's expert in this Coney Island case agreed that the depreciation should not be deducted from the valuation if the company had accumulated a depreciation fund to provide for current renewals, or if the security holders were liable for the replacement of the property, which is the case at present of the stockholders of this company.

In estimating the cost of development of the Coney Island & Brooklyn Railroad an inventory was prepared covering the work and expense items for the reproduction of the rights of the present company to construct and operate its railroad. This inventory, stated briefly, comprises the cost of time and expenses of all departments of the organization of the promoter and of the company, first during the promotion period, which is the time of obtaining rights and capital, and then during the construction period, covering the time of expenditure of capital to the completion of construction. There is separately estimated this cost for the promoter's organization, the legal department and the technical department, through the preliminary development of the idea, the formation of the promoter's syndicate, the securing of the corporation's charter and the obtaining of its franchise from the municipal body and of its certificates from the Public Service Commission, together with the property owners' consents and those required from the minor city departments and other corporations. The time spent in connection with financing the enterprise is largely co-extensive with that of obtaining rights and comprises the various steps of underwriting and negotiating the sale of securities. After the franchises and capital are obtained the construction period begins by the organization of the permanent working force of the company, and continues through the general administration of the construction work by this executive organization.

In order to determine the time spent on each part of this work and the contemporaneous nature of a large part of it, there was prepared a chart of estimated time of reproduction sub-divided as between these departments. The estimated time taken for each part of the work was based upon the actual time which has recently been required to secure similar rights in New York City under the present legal restrictions. It was estimated that 3½ years would be required from the inception of the project to the time that capital and rights would be obtained. The construction period was estimated from instances of recent construction work, to require 2 years and 10 months additional, making a total of 6 years and 4 months, although the beginning of partial operation was assumed to take place one year before the end of construction.

The number of men in each department and their rate of pay were then assumed, giving, when allowance had been made for general expense items, the total expenditure in each department and for each part of the work. All of this was, as far as possible, based upon actual work and expenditure in other corporations and was accompanied by a considerable amount of supporting detail.

The total cost of promoter's organization, legal department and technical department during the promotion period was thus estimated at \$421,200, the property owners' consents at \$278,500 and the time and expenses of the permanent organization during the construction period at \$195,640, making a total of \$895,340 as the cost of development and administration of the enterprise until it was placed in operation.

Coming to the appraisal of the physical property, the company accepted the estimate of the experts of the Public Service Commission. This estimate was on the basis of sub-contracts and amounted to a total of \$4,615,838, to which we added \$276,460 for incidentals based on detailed estimates, \$108,864 for inventoried stock, tools and fixtures, 10 per cent for general contractors' overhead charges and profit, 5 per cent for engineering, and \$561,345 for interest and taxes during the construction, the last two items being the result of detailed estimates. The resulting cost of construction and equipment was \$6,320,813.

The real estate of the company was appraised by experts and to this appraisal was added 10 per cent for the cost of acquiring land, such as brokerage, legal services, title insurance, value of buildings removed, etc. To the assessed value of the private right of way owned by the company on Coney Island Avenue was added 150 per cent for additional sales value and cost of acquiring, this being the value of the "contiguity factor" adopted by the experts of the Railroad Commission of Minnesota from a careful study of the value of right of way real estate. The total cost of thus reproducing the real estate was \$1,224,500. To these figures was added \$250,000 as the estimated amount of working capital required by this corporation, and \$609,245 as the estimated cost of additions and betterments necessary to produce an adequate modern system. The resulting total cost of reproduction new at August 31, 1909, was \$9,299,898. This we stated as our estimate of the least cost of reproduction of this property, as under any but the most favorable conditions it would reach a considerably larger amount.

ITEMS NOT INCLUDED IN ESTIMATE

This estimate did not include any allowance for the profits of promotion, for discounts and commissions on sale of securities, for the value of features of the present franchises that cannot be reproduced to the present legal restrictions, for the cost of development of the business or the deficiency below a reasonable return in the early operation of this property, and for the cost of development of technical standards comprising obsolescence of the horse system and of the early electric system. It was our contention that, strictly speaking, many of these items were not items of value and that ordinarily they should be allowed for in the rate of return applied to the valuation of the property. If, however, the rate of return is fixed at the legal rate of interest, a capital valuation should be given to them.

It will be noted that the total value of the property upon the basis of cost of reproduction new, is the highest of the five valuations which we made, and would, therefore, in a sense seem to warrant the other four valuations.

Applying only a 6 per cent rate of return to this valuation we have the equivalent allowable net income of \$557,994. Inasmuch as the actual net income of the company amounted only to \$364,975 for the year ending Aug. 31, 1909, during which 10-cent Coney Island fares were charged, it would appear that even with the Coney Island 10-cent fare in force this company was earning much less than a reasonable return on this basis of valuation, and the same result is apparent if any of the other four estimated values are taken.

EXHIBIT NOTES

Rufus L. McDuffie, vice-president of the Pay-as-you-Enter Car Corporation, has just arrived at the convention to swell the forces of the officials of this well known company.

* * *

Dr. J. M. Griffin is in attendance at the booth of the Wheel Truing Brakeshoe Company. The company's exhibit consists of several types of electric railway brake shoes.

* * *

Alexander Milburn Company, Baltimore, Md., is showing in space 634, Building No. 2, its various sizes and types of Millburn emergency acetylene gas lights. Represented by C. R. Pollard and I. E. Stanbury.

* * *

Eureka Tempered Copper Works, North East, Pa., has space 670, Building No. 2, where it is exhibiting line material, commutators, trolley wheels and bearings. The representatives in attendance are C. Schimmelteng, Fred. Rundell, T. E. Lynn, John Risbridger.

* * *

Walter J. Cummings and William H. Stevenson, of the McGuire-Cummings Manufacturing Company, are holding a continuous reception at booths No. 664-665. Incidentally they are distributing literature descriptive of the company's cars, trucks, snow sweepers, plows and sprinkling cars.

* * *

Cooper Heater Company, Carlisle, Pa., is located at space 657, Building No. 2, where it is exhibiting the well-known pressed steel hot water car heaters. This heater is very low in construction and occupies about one-third less floor space and weighs two-thirds less. All the tubing and parts are welded with the oxygen acetylene process to make an absolutely seamless product. Represented by W. L. Blackwell, general manager, and W. R. Crawford, Western sales manager.

* * *

If you want information as to train schedules, or desire to have Pullman reservation made, go to the Travelers' Railway Guide, Booth No. 404. This accommodation is for members and guests of all associations in attendance at this meeting. The booth is in charge of Geo. E. Armstrong, business manager of the American Railway Guide Company, publishers of the Travelers' Railway Guide, 315 Dearborn Street, Chicago. This guide is one of the best mediums for interurban railway timetables.

* * *

Johnson Fare Box Company, New York, is showing in spaces 659-661, Building No. 2, several models of registering fare boxes. Among them is a box designed for operation without having a register inside of the car. This box has a gong, totalizer and trip register for registering passengers, in addition to a totalizer registering the coins deposited. Another box, counting coins only, is designed for operation in conjunction with a register inside of car; and still another is adapted to lines having three-cent fares. All boxes count either in dollars and cents or in fares. These fare boxes are inventions of J. M. Johnson, inventor of the Johnson coin counters, and are as substantial in construction as those successful machines. Practically all parts are of steel made from dies and with parts interchangeable throughout. They are remarkable for the way they handle mutilated coins and their safeguards for insuring an accurate count. The results of a long practical test on the One Hundred and Twenty-fifth Street crosstown line of the Third Avenue Railroad, New York, were presented in the ELECTRIC RAILWAY JOURNAL of Oct. 1. This test was so satisfactory that the company placed an order for 300 boxes to be operated without any register inside of the car. These boxes are to be delivered by Nov. 1. Represented by C. H. Birdsall, W. P. Butler, S. F. Champion, Jr.

Among the Exhibits

F. X. Cleary, advertising manager of the Western Electric Company, is present at the convention in the interest of his department in that company.

* * *

Atlas Railway Supply Company, Chicago, Ill., is using space 814, Building No. 3, for a rail joint, tie plate and rail brace exhibit. Represented by D. E. Thomson, Eastern representative.

* * *

Speer Carbon Company, St. Mary's, Pa., has on view in spaces 618-620, Building No. 2, many high-grade motor and generator brushes. Represented by John S. Speer, president; George P. Freyling, secretary; Alfred Mullhaupt, Jr.

* * *

Electric Railway Improvement Company, Cleveland, Ohio, is giving demonstrations with one of its welding and brazing cars of the brazing of copper bands to steel rails in space 864, Building No. 3. Represented by George Long, Mark Stanton, Albert Blakely.

* * *

The National Car Advertising Company of America, Chicago, Ill., has spaces 842-844, Building No. 3, where the Auto-Scope advertising device for electric cars is being shown in working order. This device is now being used by five railway companies in the United States, and contracts have been made with others.

* * *

Cleveland Frog & Crossing Company, Cleveland, Ohio, has an extensive exhibit in space 575-576, Machinery Hall, of sample hard-service manganese special work, C. C. locking devices for tongue switches, mates, frogs, crossings, rail braces, metal foot guards, spring switches, Porter derailing switches and section of crossing switch with flangeway planed out to prevent horses from catching their hoofs. The exhibit is located across the south end of Machinery Hall and is in charge of George Stanton, L. G. Parker, George Arnold, Jr., George A. Peabody, Jr., William Schmidt.

* * *

An object lesson in the economy of using properly treated cast manganese steel rails for curves subject to extremely severe traffic is forcibly demonstrated in the exhibit of Wm. Wharton, Jr., & Company, Inc., Philadelphia, spaces 208-216-304. Here is shown a rail taken from the first curve ever made of manganese steel rails cast to a 9-in. girder section. This rail has been in use almost seven years in a curve where Bessemer rails formerly were entirely worn out in about two years under much less traffic. The manganese rail is not worn out and was only removed on account of a change in routing which necessitated the abandonment of the curve.

* * *

Railway Roller Bearing Company, Syracuse, N. Y., is showing in spaces 528-530, a Brill 39-E maximum traction truck equipped with roller-bearing journal boxes. This truck was detached from car No. 1967 operated by the Philadelphia Rapid Transit Company on its Seventeenth and Nineteenth Street line from March, 1909, to October, 1910—approximately 19 months. During this time the car traveled 72,000 miles. Another journal box on exhibition was also operated in Philadelphia on car No. 2130 equipped with Brill 27-G trucks. As an extreme test these bearings were in use for several months without any lubrication whatever. The company is also exhibiting six of its latest types of journal boxes which have oil-reservoir capacity for one year's lubrication. Represented by James N. Vandegrift, Raymond H. Carhart.

Dossert & Company, New York, have space 813, Building No. 3. Among the new devices is a third-rail jumper connector of compact and simple design. Service can be quickly and efficiently restored in accidents or in any case where a jump is desirable by clamping one of these connectors on each side of any break in the third-rail circuit and connecting them with a cable. These connectors are used by the New York Central lines. Other new Dossert types are three styles of cable anchors for splicing, anchoring and taking branches off cables, and a new insulated cover for Dossert cable tap joints. The last device is used in place of the tapped joint commonly employed. The covers will accommodate taps on cables ranging from No. 6 to 300,000 cir. mil, and are especially desirable for switchboard work. Represented by H. B. Logan, S. A. Jenkins.

* * *

The Pennsylvania Steel Company's exhibit, in the lobby, contains a number of new track devices, including a pinless switch, solid Manard steel frog and involved solid Manard steel crossings. The "Never-turn" split bolt and the "Never-slip" switch plate, with adjustable rail brace, are also shown. Various types of switch stands, especially adapted for inter-urban railways, are mounted in one end of the booth. The Q. & C.-Bonzano compromise rail joint and 64 live rail sections, both T and girder, rolled by the company in its mills at Steelton, are attracting attention. On a table in the centre of the booth are some interesting samples of Y steel, a new product made from Mayari ore. This steel is being used for automobile work and other purposes where high tensile strength is required. The largest piece of special work in the exhibit is a diamond of a solid Manard steel double-gage crossing for the Vera Cruz (Mex.) Terminal Company.

* * *

Harold P. Brown, New York, has spaces 570-572 in Machinery Hall. Mr. Brown is exhibiting the well-known electrical contact alloys used in the plastic rail bond. A complete testing outfit has been installed to show that current passing through a rail joint bonded with the plastic alloy has no more resistance than when passing through the rail itself. Samples are also presented of joints that have been in the ground six years with no evidence of deterioration. An interesting part of the exhibit is a lead-surfaced motor pinion. The steel of the pinion is treated with an alloy which makes it self-lubricating, noiseless and tough. An electric-pneumatic bond chisel, for use in the application of the plastic bond, is also exhibited, as well as the "Stay-there" track bolt, "O. K." nut lock and the Brown motor-car mirror. Other interesting exhibits are economical substitutes for linseed oil and for turpentine. Represented by Harold P. Brown, J. Maxwell, Coote W. Temple, Albert Temple.

* * *

Yale & Towne Manufacturing Company, New York, occupies space 544 in Machinery Hall to show electric hoists overhead carrying trolleys and triplex chain hoists ranging from ½ ton to 20 tons capacity. A feature of special interest consists of test pieces of its new electric-welded steel pitch chain and the old-fashioned welded chain, showing comparisons in accuracy of pitch, elastic limit and breaking limits. This new chain is being used on all the company's products, increasing the safety factor 30 per cent and the working life of the chain nearly 40 per cent over hand-welded chains. The hoists shown in operation illustrate the high mechanical efficiency resulting from the balanced gear train and low gear-tooth pressure, combined with accuracy of fit in the steel sheave pockets. A large model of the "Yale" lock is also shown operating automatically, to illustrate the action of the paracentric key in effecting the release of the interior mechanism so that the door bolt may be shot. The company is represented by R. T. Hodgkins, H. C. Spaulding, C. W. Beaver.

Parsil Metal Company, Lansdale, Pa., is exhibiting in space 630, Building No. 2, its new Flower brush holder, pivot journal bearings, grease guns, oil guns and air pumps. Represented by David B. Flower, Charles W. Wade, F. W. Roth.

* * *

The Adams Bagnall Electric Company, Cleveland, has a well-planned exhibit of regenerative flaming arc lamps in spaces 554-556, Machinery Hall. These lamps, from the standpoint of economy of current and efficiency, are particularly well adapted for lighting streets, car houses, shops, yards, power houses, stations and parks. A new lamp for making blue points is also being shown. The exhibit is in charge of G. A. Thomson, R. C. Campbell and A. J. Mitchell.

* * *

Standard Steel Works Company, Philadelphia, Pa., is exhibiting in spaces 565-571, Machinery Hall, wheels for the heavy trucks built for the Alameda electrification of the Southern Pacific Railroad Company. These wheels are of the No. 1 type, 36½ in. in diameter with steel tires 5½ in. wide by 2¾ in. thick. It also shows the wheels for the light trucks built for the Shore Line Electric Company. These are of the solid rolled steel type No. 108, 34 in. in diameter, with rim 3 11/16 in. wide by 2½ in. thick; Standard solid forged steel gear blanks in the exhibit of R. D. Nuttall & Company; also iron and steel axles, coil and elliptic springs for steam and electric service, iron and steel castings and forgings. Represented by H. DeH. Bright, C. F. Dodson, C. H. Peterson, J. Green, H. W. Sheldon, F. W. Wiston, George F. Jones, C. S. Lewis.

* * *

Carnegie Steel Company, Pittsburgh, Pa., has a prominent location in spaces 860-871. The exhibit consists of 30-foot sections of track laid with steel ties in concrete; Duquesne splice bars; nine steel wheels for various types of service; two pairs of steel wheels, mounted on axles, showing wear; steel sheet piling and steel hoops for nailing spike kegs. In addition, there are specimens of vanadium steel showing tests and bends, 24 cases showing representative sections rolled in its mills, and special tests in soft welding steel. Represented by Samuel A. Benner, W. P. Siebert, John C. Neale, C. L. Wood, John W. Dix, Lee Bowman, W. A. Bostwick, C. G. Bacon, Jr.; N. D. Trist, N. M. Hench, J. C. C. Holding, J. P. Noonan, W. H. Scanlon, all of the general office at Pittsburgh; W. E. Berry and V. S. Varnell, New York; Robert Coe, Philadelphia; F. C. Bruncke, Buffalo; K. V. Porter, Cincinnati; F. E. Spencer, Pittsburgh district office, and L. P. Lincoln, of the Homestead Works.

* * *

Pyrene Manufacturing Company, New York, shows its fire extinguishers in space 817, Building No. 3. The exhibit consists of a squirt gun 14 in. long and 3 in. in diameter which contains "Pyrene," a deadly enemy to fire. The squirt gun holds about a quart of liquid which, when squirted from the gun, generates in contact with the air about 3750 cu. ft. gas. This gas at a temperature of 200 deg. or over is converted into a heavy gas blanket which envelopes an incipient fire and completely suffocates the flame. The gas is a non-conductor of electricity, its dielectric strength being 300,000 volts per in. With the squirt gun "Pyrene" can be directed to put out an incipient flame between commutator and brushes, the armatures and fields of a moving rotary, etc. It is asserted that "Pyrene" will break and completely extinguish any arc. It will not freeze at a temperature of 100 deg. below zero and needs no attention from the time it is put into the squirt gun until used. Demonstrations of its efficacy are given at the booth. Among users are the Interborough Rapid Transit Company, New York; United States Government, Chicago City Railway and the Western Union and Postal Telegraph Companies. Represented by Edward M. Davidson, George H. Peterson, Thomas Areson.

Stromberg-Carlson Telephone Manufacturing Company has spaces 843-845, Building No. 3. It is showing a complete railway dispatcher's system in operation and exhibiting acid, dust and waterproof telephones for mine, police and fire systems; hand-ringing waterproof extension bells for railway and mine use; linemen's test sets; connecting poles; jack boxes; flush and non-flush wall and desk type automatic intercommunicating telephones for factory, office and residence systems, and a new compact type private branch exchange switchboard. Represented by H. C. Slemin, sales and advertising manager; C. P. Button, railway representative; H. W. Lucia, assistant chief engineer; J. O. Oliver, territorial representative; E. P. Ellis, assistant advertising manager.

* * *

Electric Storage Battery Company, Philadelphia, Pa., occupies spaces 666 and 668, where it is exhibiting a new oil insulator, for supporting battery tanks. This insulator consists of a glass body, provided with a circular trough, which is partially filled with oil and covered by a cap of lead alloy. This insulator maintains an exceedingly high degree of insulation for a long time without attention. It has now been in service for several years under extremely severe conditions, without a single case of electrolytic action. The company also exhibits a railway panel for battery service; battery plates of the "chloride accumulator" type, and the latest type of battery tank. Represented by Charles Blizard, second vice president; E. T. Reynolds, G. H. Atkin, Mr. Say, C. H. Bristol.

* * *

Automatic Ventilator Company, New York, has a unique exhibit in space 621 of Building No. 2, of interest to all concerned with problems of ventilation. The booth contains a full-sized model, representing a section of the clerestory of a car, with two sets of automatic ventilators in the deck sash. An electric fan at one end of the model throws air along the side of the car to simulate conditions in a moving car, and shows the intake and exhaust principle of this automatic ventilator. Tests and demonstrations with an anemometer, lighted tapers, pieces of paper, silk, etc., also are made inside of the model, to illustrate the cooperating principles. Several miniature models prove the ability of the ventilator to keep the air in a smoking car clear and pure. It is worth mention that this company's automatic ventilator is installed in the "Round Top" Beach-Edison battery car to be operated at the convention. Represented by George H. Ford, Leonard J. Hibbard, William J. Fleming, Jr.

* * *

Lorain Steel Company, Johnstown, Pa., in spaces 850-859, Building No. 3, calls attention to the value of its manganese steel track work. Manganese steel may have 2 per cent of manganese, or it may have 20 per cent, but only great experience in manufacture and use makes it possible so to proportion the mixture that there will be secured the desired triple combination of hardness, ductility and elastic strength. The Lorain Steel Company has recognized the fact that it would be dangerous to have a manganese steel which will suddenly tear apart under tension, or break under shock without the warning that comes from a ductile metal under stress. The company's aim is to produce a railway structure which has the minimum number of parts and the maximum endurance. The solid manganese steam railroad crossing exhibited is offered as an example. This design is intended to minimize the abrasion or pounding down of the metal at the intersecting points of the track. So long as this end is accomplished, no concern need be felt about the quality of the metal between the intersections, as it is known that the latter is all right for frictional contact and will outlast the intersections which are subject to the direct blows of fast moving wheels carrying heavy loads.

Union Electric Company, Pittsburgh, Pa., has no exhibition this year, but has its representatives, George W. Provost, R. M. Kerschner and T. M. Cluley, looking after its interests.

* * *

National Tube Company, Pittsburgh, Pa., is exhibiting in space 653, Building No. 2, Shelby seamless cold-drawn trolley poles and welded tubular trolley poles. Represented by J. G. Bateman, W. S. Bitting.

* * *

Home Rubber Company, Trenton, N. J., in booth 683, is showing N.B.O. sheet packing; automobile tires; steam and air-brake hose, and a complete line of mechanical rubber goods. Represented by A. R. Foley.

* * *

Elliott Company, Pittsburgh, Pa., has recently purchased the entire business of the Pittsburgh Feed Water Heater Company. It can furnish heaters from 100-hp. to 30,000-hp. The company has recently enlarged its Pittsburgh plant.

* * *

Standard Coupler Company, New York, has taken space 828, Building No. 3, for a working exhibit of the shim slack adjuster with model brake rigging and shoes. Represented by Col. George A. Post, E. H. Walker, W. H. Sauvage, C. D. Jenks.

* * *

Sterling Varnish Company, Pittsburgh, Pa., is exhibiting in spaces 810-812, Building No. 3, a water-sealed dipping tank for painting car fenders. The company has a special paint for use with this device. Represented by Henry C. Todd, Alvin S. King, W. F. Hebard, W. V. Whitfield.

* * *

John A. Roebling's Sons Company, Trenton, N. J., in spaces 614-616, Building No. 2, shows a full line of wire rope and fittings; insulated wire and cables; also car cables. Represented by W. P. Bowman, U. G. Tingley, G. M. Swan, W. L. Doyle, Mr. Clarkson, A. V. Erickson, M. R. Cockey.

* * *

The representatives of the Standard Paint Company, New York and Chicago, are quite busy, as usual, discussing the subject of the P & B goods, as well as the newer lines of varnishes. Messrs. Lavelle and Inwood, who represent the company in the street railway field, are welcoming many old friends.

* * *

Jones & Laughlin Steel Company, Pittsburgh, Pa., is exhibiting in spaces 564-566, Machinery Hall, specimens of cold-rolled steel axles, chains, spikes, cold-rolled steel, cold-twisted bars for reinforced concrete, structural sections, steel sheet piling, pulleys, hangers and couplers; also two tested axles. Represented by E. D. Batchelor, Frank S. Slocum, George H. Mitchell, C. G. Fogwell.

* * *

H. B. Underwood & Company, Philadelphia, are showing in space 521, Machinery Hall, their portable crank-pin turning machine and portable cylinder boring-bar. The crank-pin machine is mounted on a dummy crank and illustrates how the machine is used when turning off a crank pin on a side-crank engine. The portable boring-bar is set up in a small cylinder to show its practical application. Represented by D. W. Pedrick, second.

* * *

Best Manufacturing Company, Pittsburgh, Pa., in booth 632, Building No. 2, exhibits brass and iron valves of different types; cast-steel adjustable disk-gate valves for high pressures and superheat; brass cast-iron and steel-flanged fittings; Myers' blow-off valves; exhaust relief valves; expansion joints; pipe bends; cocks; unions; flexible joints, etc. The articles are arranged and sectioned to show the mechanical construction and distribution of the metal. Represented by J. D. Hiles, C. K. Thomas.

The Eclipse Railway Supply Company, Cleveland, Ohio, is exhibiting its well-known "Eclipse" life guard in space 669. The new "Eclipse" destination sign, recently placed on the market, is also shown. This sign is of the illuminated type, and is legible at a considerable distance. Its simple construction, without springs or cogs, is a feature. Both the sign and the life guard are shown in working position on a full-size car front. Represented by Ross Forward.

* * *

Nelson Valve Company, Philadelphia, Pa., has space 550, Machinery Hall. The special features of the exhibit comprise a 12-in. electrically driven valve in full operation, steel and model superheated steam valves; seatless blow-off valves, all specially demonstrated and opened and sectioned in full sizes; globe and gate types in bronze, steel and iron for all services, pressures and temperatures. Represented by Carlisle Mason, W. J. Spencer, R. E. Thomas, LeRoy Gordon.

* * *

Standard Underground Cable Company, Pittsburgh, Pa., is exhibiting in spaces 688-689, Building No. 2, lead-covered and armored cables; all forms of bare and insulated wires; Colonial copper-clad wire; trolley wire; cable terminals of Davis station and Davis open-air types; various forms of subway junction boxes; cable-jointing materials, including "Ozite" insulating compound; paper tubes and copper sleeves. Represented by C. J. Marsh, G. L. Wiley, H. P. Kimball, R. S. Hopkins, T. E. Hughes, R. M. Hirst, S. S. Warner, J. H. Lytle, J. R. Wiley, E. J. Pietzcker, R. B. Wilcox and C. A. Brown.

* * *

National Lock Washer Company, Newark, N. J., exhibits in spaces 650 and 652, Building No. 2, its cam (non-creeping) curtain fixture made of steel tubing with bronze heads and finger pieces. It cannot be drawn out of grooves by rough handling, is readily adjusted and composed of few parts. A strong tension can be put on the roller to make the curtain sit smoothly, to ensure quick action when the curtain is raised, and to hold it firmly when the wind is blowing. This fixture prevents "creeping" by eccentric grip rather than the old-time friction hold and accomplishes release by direct action on the eccentric, the heads remaining stationary in the grooves.

* * *

Rail Joint Company, New York, is occupying space 464, Aquarium Court, with a fine exhibit of all types of rail joints. Sections of base-supporting continuous Weber and Wolhaupter joints are shown; also step joints connecting girder and T-rails. All joints are made to accommodate any standard, as to length, bolt spacing and slotting. The base-supported rail joint eliminates the pounding of the rail ends, insures correct surface and alignment, and permits a continuous wave motion of the rail. Over 50,000 miles of track are now equipped with this company's joints. Represented by L. F. Braine, W. A. Chapman, E. A. Condit, P. Holbrook, G. W. Smith, W. E. Clark, H. O. Hallway, Mr. McCaskey.

* * *

Ohio Brass Company, Mansfield, Ohio, has a comprehensive exhibit in spaces 601-603. This includes line materials, hangers, rail bonds and many types of "O. B." porcelain high-potential insulators. Foremost among the latter is the suspension disk type, which though a comparatively recent development is meeting with great success. The M.C.B. coupler shown complies in every detail with the recent specifications of the Central Electric Railway Association. Leakless diaphragm sanders, whistle valves, and electric tail-light systems are also included in the display. Represented by C. K. King, A. L. Wilkinson, E. F. Wickwire, W. H. Bloss, G. E. Willis, C. H. Tomlinson, M. M. Garland, J. E. Slimp, F. V. Cook, R. J. Deneen, C. T. Anderson, N. Shute, E. C. Brown, A. L. Price.

THE GRIFFIN CAR WHEEL

After some forty odd years of continuous manufacture of wheels for freight, passenger, engine tender and interurban service, we have, by the most careful attention to manufacturing methods and the maintenance of elaborate records, developed a wheel having the essential qualities for economical service.

Iron, in some form or other, is at present the only satisfactory material commercially available for making car wheels.

Pure iron is soft, ductile, and of comparatively low tensile strength, hence entirely unsuited for the requirements of wheels for modern steam or electric railway service unless properly alloyed with some other element to give it the necessary wearing qualities.

When iron is combined with a small amount of carbon, the acquired properties are remarkable, and make possible the production of a material which satisfactorily meets all service requirements.

When melted at a high temperature, iron has a strong affinity for carbon, and takes up 4 or 5 per cent from the fuel,

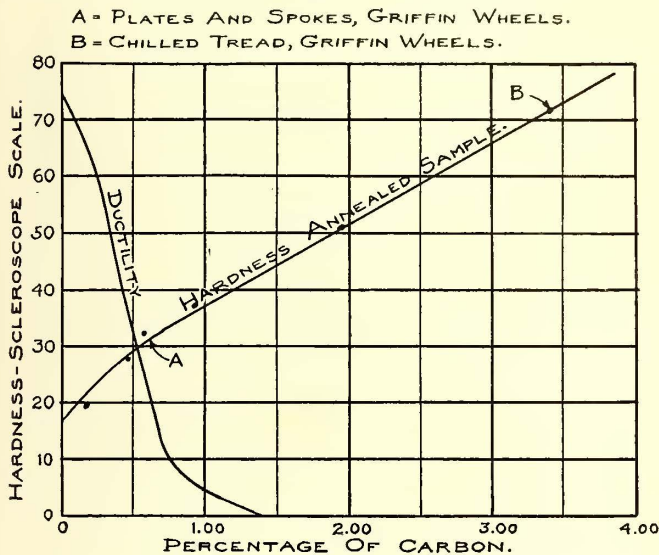


Fig. 1

forming a chemical combination; but after solidification and cooling the carbon may exist in either of two conditions, according to the percentage of carbon present and the rate at which the metal is cooled.

COMBINED CARBON— Fe_3C

First—The carbon may be chemically combined with the iron, in which condition the entire fracture of the metal is always white and the commercial name of "Steel" is given the product, and the name "white or chilled iron" is given to the metal when the percentage of carbon is high (from 2 to 4 per cent).

GRAPHITE, OR PURE CARBON

Second—If the total carbon is sufficiently high and the cooling sufficiently slow, the carbon may separate out as graphite, or pure carbon, being uniformly distributed in the form of small flakes, which give a dark or black fracture to the metal when broken, because the fracture necessarily occurs through the flakes of carbon, which have no strength. If the graphite is formed without reheating the material is called "Cast Iron," but when specially annealed by reheating the name "Malleable Iron" is applied.

It will be noted that as the carbon increases, the hardness increases, but a very small amount of carbon reduces the ductility very rapidly, showing that hardness and ductility are opposed to one another and cannot be produced at the same time in the same metal.

In the car wheel the desirable qualities to be obtained are:

- (1) A hard wearing surface for the flange and tread.
 - (2) A strong soft background to resist all service shocks, loads and stresses, insuring a hub that can be easily machined.
- Experience has shown that if the metal, in the body of a wheel has more than 0.8 to 1.0 per cent combined carbon the wheel will be brittle and likely to be undesirable, but the hardness of the tread is insufficient unless more than this amount of carbon is present.

The original source of iron is from the blast furnace, which produces a product called "Pig Iron," in which state there is about 4 per cent of carbon. In order to secure the required strength for important service it is necessary to reduce the carbon to a point which will produce the desired quality.

There are two methods by which combined carbon can be reduced to meet the severe requirements of wheel service:

First—The Steel Method.

Second—The Griffin Method.

The Steel Method: Carbon may be removed by the ordinary methods employed in producing a material that is homogenous throughout, and, therefore, of uniform hardness, and if used for wheels the hardness of the tread is sacrificed to obtain the necessary low amount of carbon to satisfy the conditions required in the plate of the wheels.

The Griffin Method: In the Griffin method the combined carbon is reduced through the agency of heat treatment in the metal while in a pastry condition prior to solidification. If the metal is cooled quickly (in a few seconds) the carbon will remain combined. If cooled slowly (in a few minutes) the carbon will separate out as graphite. This affords a means of producing different degrees of hardness in the same piece of metal, as in a car wheel, where it is desirable to have the tread and flange of a hard, smooth material, and the balance soft and easily machined.

THE GRIFFIN WHEEL

The above briefly described method of reducing the carbon from the surface of the tread to the hub of the wheel is used in the manufacture of the Griffin wheel, by means of which a composite structure is secured in which the wearing surfaces are composed of a metal harder than the hardest steel, containing about 3.5 per cent carbon, while the plates or spokes and hub are soft on account of the combined carbon being

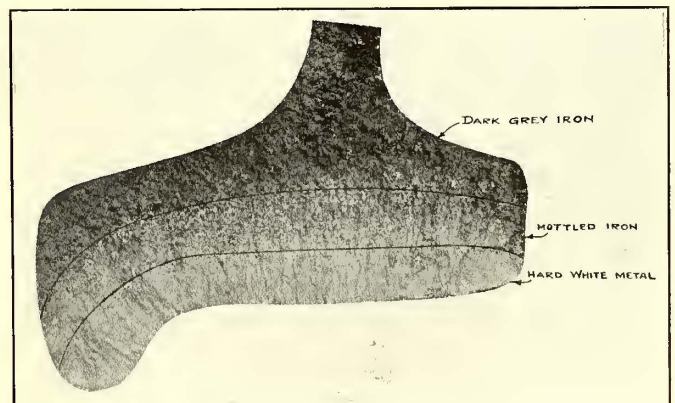


Fig. 2

reduced to about 0.75 per cent and the balance of the carbon, 2.75 per cent by weight or about 10 per cent by volume, is in the form of graphite distributed through the metal.

To accomplish this result, the part of the mold against which the tread and flange are cast is made of high grade cast iron,

known as the "chiller," which has a much higher relative heat conductivity than the balance of the mold which is made of sand.

The surface of flange and tread, therefore, solidify almost instantaneously, while the portions farther removed cool much more slowly, giving time for the reaction by which the combined carbon separates into graphite, leaving the interior of the wheel of low combined carbon, and having the required strength to resist all service strains.

These widely varying conditions are plainly visible in Fig. 2, which is the flange and tread section of a double-plate wheel for use in railroad and interurban service. Note the hard white metal forming the wearing surface which gradually is transformed into a metal having a dark fracture showing the presence of quantities of graphite or pure carbon.

The Griffin wheel is what is known as a "one-wear wheel;" that is to say, after having made a mileage of from 40,000 to 150,000 miles according to service conditions and the wheel is unfit for further service, it is removed and returned to the wheelmaker to be re-cast, thus entirely eliminating the cost of placing it in an expensive lathe for restoring it to its original contour at a very considerable reduction in diameter.

show that the metal is of proper composition for the wheel to be poured. It must be remembered that the different degrees of hardness of the metal in different parts of the wheel is secured by the different rates of cooling. It is evident that the same metal in a heavy wheel will give less depth of hard chilled metal than in a light wheel, because the heavy wheel requires a longer time to cool, and this allows a longer time for the carbon to separate out as graphite, and a wheel of thin section cools so rapidly that it will be composed of white metal all the way through unless special precautions are taken.

It is self-evident that the same conditions of metal cannot be used for all classes of wheels, but through practical experience it is learned that the composition of the iron for any given wheel is correct when it gives a certain depth of chill on the test piece.

The regulation of the chill on the test pieces shown in Fig. 3 is obtained by varying the combination of the various elements entering into the metal.

The amount of hard white chill in each test piece is represented by the figures under the test pieces.

Heavy wheels are poured from the mixture represented by the test piece having the high amount of chill, and those of

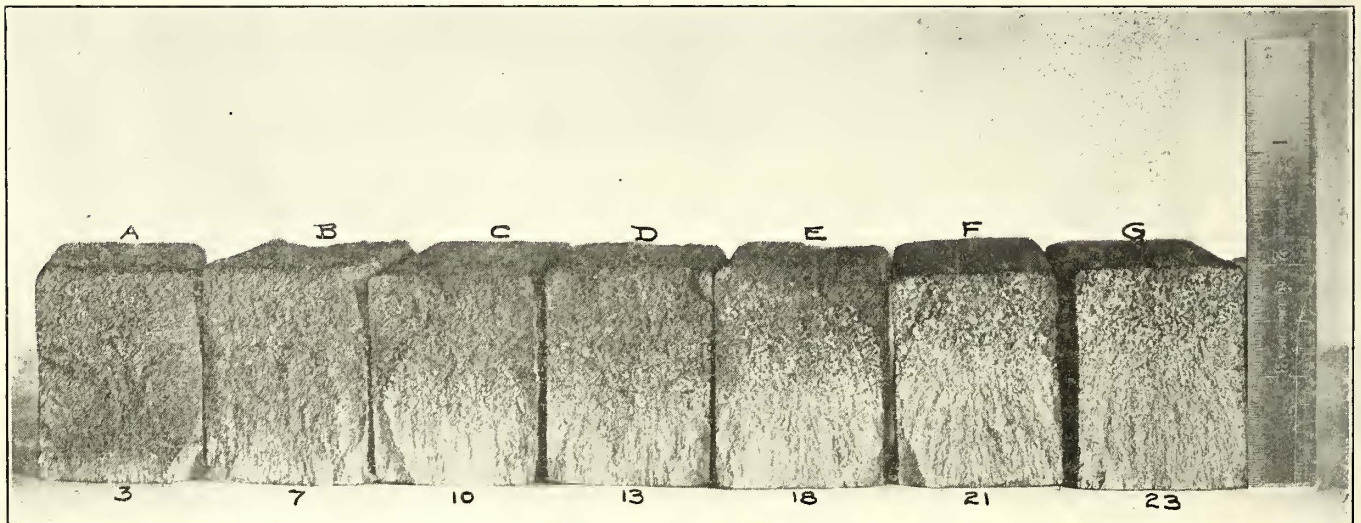


Fig. 3

In the manufacture of these wheels the surface of the tread and flange to a depth of $\frac{3}{4}$ inch is made of a material corresponding to glass-hard 3.5 per cent carbon steel, beneath which the material rapidly changes to one of low combined carbon with the graphite interspersed.

All of this is clearly shown in Fig. 2. The white portion near the surface of tread is the hard steel or white iron, below which is the mottled iron by which it is united to the dark gray iron of the plates.

The method of manufacture requires careful study and extreme attention in order that the required amount of hard metal may be secured, for if the whole section of the wheel were made of this material it would not have sufficient resistance to shocks and would break in service, and if not deep enough, while the wheel will be thoroughly safe, it will be deficient in wearing qualities, and there will be a corresponding reduction in the mileage service rendered.

In the Griffin wheel there is just enough hard metal to allow for the maximum amount of wear, say $\frac{1}{2}$ inch, making the total reduction in diameter of the wheel one inch.

The method by which the depth of white chilled tempered metal at the surface of the tread of the wheel is assured is shown in Fig. 3, which represents test pieces for showing the depth of chill which are taken prior to casting the wheel to

thin section are poured from a mixture in which the test piece has an intermediate chill.

The rapidity with which combined carbon separates out as graphite is influenced by a good many conditions in the mixture. Some elements hasten the reaction, others retard it. High temperature applied to silicon, manganese and titanium tend to hasten the change or soften the iron, whereas low temperatures, and certain alloys tend to retard the reaction, resulting in a hardening of the material.

It is, therefore, possible to make any desired combination to give the exact amount of hard chill for any condition of wheel service. The above outline is sufficient to illustrate the absolute control in producing any desired depth of 3.5 per cent hard white iron at the surface of any wheel of any weight.

On account of the hard surface of the tread, and soft plates and hub insuring a high factor of safety, it necessarily follows that the amount of mileage secured will be greater than from other types of wheels having the same hardness in both tread and hub.

Because of the absence of ductility and greater hardness in the tread of the Griffin wheel there is no change of form or flowing of metal at the rim of the wheel, regardless of the load carried or the amount of pounding the wheel may receive,

and therefore the wheel maintains its absolute roundness and will not wear flat unless braking conditions cause the wheel to slide, which causes slid flat spots.

DIAMETERS.

On account of the slow wearing away of the metal, and the fact that the wheels are one-wear wheels, there is very little difference in the diameters of the old and new wheels, which is a considerable advantage in keeping proper adjustment between the working of the different motors on the same car, as in the case of unequal diameters the motors which drive the axles of the large wheels are likely to do more than their share of the work and burn out quickly, while the motors driving the small wheels, which originate very excessive wearing down of the tread and turning in the machine shop, will be running idle and shirking their full duty. This is a very important item with respect to motor repairs.

Where the diameters do not vary the car is maintained at a constant elevation, so there is no danger of the motors striking the pavement on account of reduced diameters.

FRICTION.

The hard wearing service of the tread and flange of the Griffin wheel becomes highly polished, and offers the least possible resistance to motion, and the friction between the tread, flange and rail is small; consequently there is a minimum wearing away of the wheel, rail and brake shoes without interfering with the retardation of the car when the brake shoes are applied.

SAFETY.

The factor of safety of the Griffin wheel can be made as great as desired, providing our recommendations, which are based on extended experience and records, are followed.

The percentage of failures is exceedingly small, and if the work required of the wheel is considered, and the metal proportioned accordingly, there will be no broken wheels. Owing to the small amount of flange wear there is always an adequate factor of safety in the flange, and a broken flange is of very rare occurrence if the proper design is used.

Under modern, high-speed cars, of heavy weight, the amount of heat developed when retarding the car, either for making stops or on descending grades, is an item which must be thoroughly considered. It is plainly evident that when the tread of the wheel becomes hot and the plates of the wheel remain cold there is an unequal expansion, which produces an intense tension in the plate of the wheel. Our experience shows just how much metal is required to safely resist this tension and make the wheel absolutely safe.

The tendency is to overlook this item in wheel design and to demand a light wheel on account of supposed economy, leaving out of consideration all manufacturing considerations and the work which the wheel is called upon to perform.

The reliability of the Griffin wheel is best shown by the results of 10,000,000 wheels in freight, engine and passenger service and 600,000 wheels in street and interurban railway service, and as the process is continually being made more perfect by more care exercised in manufacture and inspections, the element of safety is as nearly perfect as can be made.

NOISE.

The smooth, hard, polished surface of the tread eliminates all rubbing, squealing and other disagreeable noises, hence in cases where the amount of noise made by the car wheel is an

object to be avoided the Griffin wheels will be found most satisfactory.

The spoke and double plate patterns are well adapted for breaking up such noises as do originate, and whatever noise is made is of a low pitch and carries but a very small distance.

MILEAGE.

The life of the Griffin wheel, in miles, depends upon the amount of work which the tread of the wheel has to perform. In dense city service, where the number of stops is large and a high average speed is maintained, it is necessary to have powerful motors to produce rapid acceleration, the entire work of which is transmitted to the metal in contact between wheel and rail, and the equally rapid retardation represents an equal amount of work between the brake shoe and the tread of the wheel. These two items are practically independent of mileage and are important factors in the service rendered by the wheel. Under severe conditions the average mileage of the wheel may drop as low as 30,000 or 40,000 miles.

In interurban service, where the stops are less frequent, and therefore less brake service, the mileage ranges from 60,000 to 120,000 miles.

It is not at all uncommon in steam railroad service for wheels to run from 150,000 to 200,000 miles under passenger equipment.

Hence, the life of the wheel is entirely dependent upon the amount of work performed, and may be taken broadly as 45,000 to 50,000 miles for city service, 60,000 miles for interurban service and 100,000 miles for steam railway passenger service.

COST

The Griffin process of regulating the amount of combined carbon in the tread, as compared with the body of the wheel, is far more simple than any other possible method or process for obtaining a high percentage of carbon in the tread and low percentage of combined carbon in the plates and hub which, coupled with the availability of the materials and the fact of operating nine plants from Boston, Mass., to Tacoma, Wash., requiring short shipping distances to most street and interurban railways, insures the customer against a high wheel cost.

TYPES OF WHEELS

Under heavy modern electric cars, equipped with powerful motors, especially where speeds are high, or where heavy grades exist requiring severe brake applications to control the speed of the car, an adequate relation between the metal in the wheel and the work which it accomplishes must be carefully considered.

Our experience and records demonstrate that there is no economy in reducing the weight of the wheel to the lowest minimum, because of the impossibility of regulating the depth of hard chill at the surface of the tread, at the same time making the spokes or plates of proper quality.

A heavy body of wheel is always a good investment, as it insures the maximum amount of safety, and permits also of the maximum wearing value.

To demonstrate what has been accomplished in this line, a street railway using 400 lb. spoke wheels, against our recommendation, had a great many broken rims and broken wheels, with an average mileage below 38,000. After changing to our 500 lb. double plate wheel all their wheel troubles immediately disappeared, and the average mileage was easily raised to 50,000 miles.

Another example of what our heavy design chilled iron wheel can accomplish is demonstrated by an interurban railway running out of Chicago, which is equipped with 36-in., 800-lb.

Griffin wheels. The best of satisfaction is being obtained, and the wheels now in service have reached 60,000 miles.

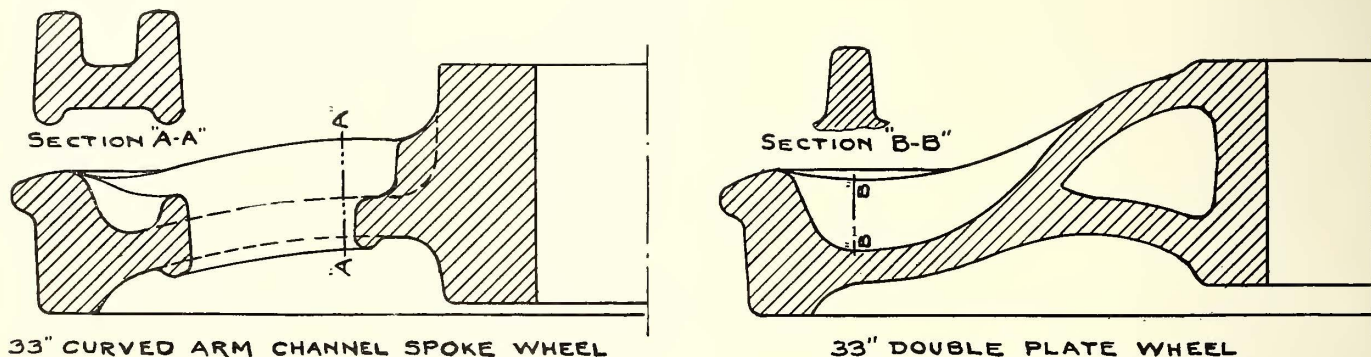
STANDARDS

Under light cars, in city service, the spoke type of wheel will give the greatest service with the least amount of metal; but as cars approach the weight of 40,000 lbs. the double plate will give the greatest strength and wearing value with the least amount of metal. These heavy wheels, on account of our design, are stronger structurally, and can be worn to the limit without fear of breaking.

In order to get the best results from wheels, operating conditions must be closely observed, wheels and brakes specially harmonized, and more attention given to the relation of wheels to track, especially since the introduction of manganese-steel crossings, frogs, etc.

The only effect on the Griffin wheel is chipping the flange, and where this occurs it is always an indication of improper gauges, or obstructions in the flangeway, for the track should be laid in such a manner that the flanges will pass through without striking.

The guard rails should always be in such a position that the flange is carried through frogs without striking the bottom of



WEIGHT OF CAR	CITY SERVICE 2 1/2" TREAD		INTERURBAN SERV. MED. SPEED 3" TREAD		INTERURBAN SERV. FAST SPEED 3 1/2" TREAD		INTERURBAN SERV. FAST SPEED M.C.B. FLG. & TREAD			
	SPOKE	DBL. PL.	SPOKE	DBL. PL.	SPOKE	DBL. PL.	SPOKE	DBL. PL.		
32000	440	⊗	490	⊗						
36000	460	⊗	510	⊗						
40000	480	⊗	530	510	⊕	560	⊕	590		
44000	500	480	550	530	⊕	580	⊕	610		
48000	520	500	570	550	⊕	600	⊕	630		
52000	540	520	590	570	⊕	620	⊕	650		
56000	560	540	610	590	⊕	640	⊕	670		
60000	580	560	⊕	610	⊕	660	⊕	690		
64000	600	580	⊕	620	⊕	680	⊕	710		
68000	620	600	⊕	650	⊕	700	⊕	730		

⊗ DOUBLE PLATE WHEEL NOT RECOMMENDED.
 ⊕ SPOKE WHEEL NOT RECOMMENDED.

Fig. 4—Recommended Weights of 33-in. Griffin Wheels for Street Car and Interurban Service

Fig. 4 shows a section of the spoke type of wheel, and also the double plate, with the approximate weight for various widths of tread for each design for various classes of service; for any particular service it is necessary to consider the special requirements and design accordingly.

As yet, there is no such thing as standardization of street and interurban railway wheels. A great variety of dimensions are required, in height and thickness of flange, width of tread, length and diameter of hub and position of hub with reference to the gauge line.

The Griffin wheel of necessity adapts itself to these various conditions, as patterns are made with loose rims, flanges, and hubs, so that the desired width of tread, height of flange and size and position of hub can be produced without extra cost for manufacture.

the flange-way or the point of the frog, and if these recommendations are carefully observed chipping of flanges will be almost entirely avoided.

The problem of securing the greatest economy in wheel service must be worked out by a close coöperation between the user and the maker. Neither alone can accomplish the best results.

A careful study of all the conditions entering into the car operating cost, such as power consumption, both for driving the cars and for shop purposes, motor repairs, track renewals, wheel and brake shoe renewals, machine shop cost, etc., cannot fail to show that the Griffin wheel will produce the very lowest operating cost per mile, and the highest factor of safety.