Electric Railway Journal

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STUPIDITY IN LEGISLATION

The *Engineering Magazine* is performing a public service in directing attention to two bills now in Congress prohibiting time studies of work done by any employee of the United States government, or paying any premiums, bonus or cash reward to any such employee except for suggestions resulting in improvement or economy in the operation of any government plant. Both of these measures, our contemporary says, have been introduced at the behest of the leaders of the labor unions, and would, of course, put a stop to all plans of scientific management or the introduction of the premium or piece-work system of paying for work and is against the interests of both the employees and the government. The array of expert testimony presented by the magazine in defense of this position, while imposing and impressive, was really not necessary to show the pernicious character of the bill. As Mr. Edison points out, the worst enemy of all workers is an inefficiently managed shop, yet the labor leaders cannot comprehend the fact. We trust that an effective protest will be made in Congress against the passage of this reactionary bill.

DAMAGE FROM ELECTRIC RAILWAY FIRES

Need for safeguarding electric railway carhouses, car equipment, repair shops, power houses and other buildings with more adequate provisions for fire prevention and fire extinction is emphasized by the alarming number of conflagrations which have occurred within the last five months. During this period there have been reported in our columns eleven electric railway fires of serious nature, involving losses estimated at about $650,000.. These disasters include the destruction of eight carhouses, one power house, ninety-eight cars and a number of miscellaneous buildings and equipment. The net loss to the companies affected is represented not only by the factor of lost property value not covered by insurance, but also by the larger loss involved during the period of reconstruction through revenue no longer earned by the destroyed cars, improper maintenance and depreciation of car equipment owing to lack of carhouse and repair shop facilities, and suspension of service owing to disabled power generating equipment. Considering the extent of the losses mentioned a more general adoption of fire-proof or fire resisting materials in construction, a more careful system of protection against fire hazards and a more widespread installation of fire-extinguishing apparatus certainly seem imperative.

FAKE ELECTRIC RAILWAY PROMOTERS

While the spurious electric railway promoter is not in the same class with the personal injury faker, he has, nevertheless, become equally noxious because he reflects upon the integrity of the electric railway industry and is a menace to its future development. The electric railway, as a mode of transportation, appeals to the laymen living in districts where steam railroad transportation is infrequent. Too often the desire for this improved transportation overcomes a community's better judgment, and the people fall an easy prey to irresponsible promoters. The awakening leaves an impression upon the community that is lasting, and in many instances has made it difficult for those who are responsible to obtain the confidence and support they should have to make a prospective electric railway a reality. Whenever these spurious promoters endeavor to deceive the public served by electric railways, the railway managements should make it their business to see that the promoter's irresponsibility is exposed. While it is true that the industry is standing still at this time, the condition is only temporary, and railway managers should at least fortify against the future. On the other hand, these spurious promoters, particularly in the Central West, have been most active during the business depression, and have sought franchise rights along routes which operating companies would seriously consider in more prosperous times.

"MANNERS MAKE THE (PLATFORM) MAN"

A field for work in promoting good public relations is furnished by the employees of the electric railway, particularly those in the transportation department. The number of individual patrons with whom the management can meet is relatively small, but each patron comes into contact with the platform men several hundred times each year. These are trite statements, but they suggest that in the selection of platform men proper attention should be given to getting men who are well-mannered as well as otherwise capable. One can talk indefinitely about courtesy, but talk won't teach courtesy to boors in any walk of life. And in a way, for the reason outlined above, it is just as important to have gentlemen on the platform as in the board room. There are two elements in good manners which are important on the platform; first, a desire to serve, and, second, dignity or composure. The first is a universally inherent quality, as can be proved by asking any chance pedestrian how to find a street or house for which one is seeking. Being inherent, this quality is

capable of development even in grown men. Dignity is a trait difficult of acquirement by most people, who are apt to be irritable, or garrulous, or familiar, or servile, or something else undignified. It is doubtful if these faults can be entirely overcome in the adult. Men afflicted with them should not be placed in positions where they must meet, serve and often placate the public. Highly-polished manners are not necessary, indeed would be out of place, but surely a consistent effort should be made to get good material to begin with, and then to give due recognition to the men who are a real credit to the company.

ADVERTISING ELECTRIFICATION TO TOURISTS

Effective publicity destined to stimulate tourist travel over its transcontinental lines is being utilized at present by the Chicago, Milwaukee & St. Paul Railway, following the completion of the initial electrification of its route over the Rocky Mountains. The days are passed when a change in motive power from steam to electricity could possibly be regarded only from the engineering standpoint. The traveling public is interested in a big task of this kind, involving the electrification in due course of nearly 500 miles of main line, the use of the most powerful electric locomotives ever built, and the supply of power from mountain streams. Even the broad principle of regenerative braking strikes the imagination of the reflective passenger, and the better maintenance of schedules, smoother riding caused by greater evenness of speed, enhanced comforts due to greater cleanliness, and the improvement of views from car windows and observation platforms, due to the elimination of smoke and cinders, are real "talking points" for the railway passenger agent. More and more the interrelation of all departments of a modern transportation company and their combined influence upon the patronage of the public is coming to be recognized. The use of electric power means much to the comfort of the passenger, and the company is wise in expatiating upon its advantages. There is a lesson for the smaller electric railway in this telling advertisement by the St. Paul of new facilities, which will undoubtedly play its part in directing patronage to that progressive system.

VIBRATION THEORY OF RAIL CORRUGATION

In the issue of last week we published an abstract of the somewhat radical ideas on rail corrugation recently put forward by A. Meyer, of the Greater Berlin Street Railways. His theory to the effect that corrugation is due primarily to high-frequency vibrations in the rail (which thus acts like a banjo string) has logical grounds, at least, because the extraordinary regularity of most corrugations gives evidence that vibration must exist somewhere. Mr. Meyer does not deny the existence of contributory causes for the phenomenon, being in accord, as a matter of fact, with R. C. Cram in his belief that the shape of the rail head has an appreciable influence. However, his suggestions for obviating the difficulty are aimed solely toward the elimination of such rail vibrations as may produce waves of sufficient amplitude and frequency to cause displacement of metal in the rail head wherever the wheel strikes the crest of one of them. This answer to the baffling problem of corrugation will, no doubt, be of interest to way engineers, and the proposed remedy of having so flexible a track construction that the vibration period becomes too long to cause severe impacts is well supported by practical experience. On the other hand, the theory, taken in its entirety, is not without weak points. Carried to its logical conclusion it would mean that the worst condition which could prevail would be a rigid track (to produce the greatest severity of vibration) and hard wheel treads (to produce the greatest displacement of rail metal). Such a condition might be considered to be presented by the concrete track supports and chilled-iron wheels that were common some years ago, yet at that time corrugation was apparently less of a problem than it is in the present day, when relatively soft steel wheels and flexible track are more common. As the first book devoted entirely to the exposition of one theory of rail corrugation the publication is interesting. We do not believe, however, that it will accomplish very much in settling the controversy. What is needed is less theory and more actual proof.

"COMING BACK LIKE REAL MEN"

Another great corporation, the Du Pont de Nemours Powder Company, has shown its wisdom by establishing a publicity department. This has been done within the past month. It is, however, with respect to an earlier activity of the same company that its policy affords a suggestion of value to the electric railway fraternity. This activity became known in connection with the trial in New York of a suit for libel brought against the Du Pont company by one of the magazine muckrakers whose name is more or less familiar to the public.

The magazine man got hold of a contract between the Du Pont and a German concern which he construed as an agreement to sell to or exchange government secrets with Germany. The contract was so represented in the articles published in *Harper's Weekly*. Our government was cognizant of the terms of the contract, and the Du Ponts might have disregarded the attack without any more serious consequences than injury to the feelings and reputation of its officials. Instead of ignoring it, however, the company wrote a letter to magazine editors and newspapers setting forth the facts of the case and intimating that the author of the articles in question was not a writer whose productions were desirable to publish. It was on this latter statement that the author sued for libel. The judge took the case from the jury and decided for the Du Pont company, remarking that the statements made in *Harper's Weekly* were libelous *per se*, and that the defendants were "real men for coming back at him as they did."

The application of this incident to the affairs of electric railways is obvious. Instead of letting "libels *per*

se" go unanswered or failing to call their authors to account, every criticism should be answered so effectively that it will not be repeated. In a short time the result of such a policy is to make editors chary of any attack unless they have an unanswerable, or at least a thoroughly investigated, case against the corporation. This is not a theory; it is the practical and proven outcome of nailing every lie that is printed, or, as the judge who tried the Du Pont case said, "coming back" like real men.

Further proof of the practicability and wisdom of such a policy is found in the system adopted recently by John D. Rockefeller, Jr. Every published criticism of the Rockefellers or Rockefeller institutions is answered by a personal letter, accompanied by such data or evidence as may be necessary to show that the criticism or misrepresentation was unjustified. No publication, however obscure or innocuous, is overlooked. If the Red Dog (Ariz.) *Banner* says that the Rockefellers are grinding the faces off the employees of the Bayonne refinery, Mr. Rockefeller writes the *Banner* editor at once with full particulars. The same care is taken respecting such remote charges as that John D., Sr., stole the first dollar he ever had from a blind apple-seller in Cleveland. If such a policy is found necessary and desirable by Mr. Rockefeller regarding attacks which can do him and his interests no real harm, it is vital that electric railways should answer effectively the kind of attacks which really are injurious because they reach the minds of tens of thousands of customers, voters and jurymen.

Action of the kind which we have in mind is instanced by the letters to the *Saturday Evening Post* by W. T. Waters and John A. Beeler, as published in recent issues of this paper. These letters were sent in answer to an editorial criticism of rush-hour car service in that paper and should do a great deal to help hasten an era of more fair-minded journalism. This tendency seems already to have begun in the magazine field, where the popularity of the exposé article, although by no means obsolescent, appears at least to have passed its zenith, owing to an increasing consciousness and dislike of exaggeration on the part of the readers. Nevertheless, many editorial writers in the daily newspapers continue their refusal to weigh evidence in a patient and judicial manner, either because the rush of time and competition incident to daily paper journalism prevents their collecting sufficient data or because they are slaves to a predetermined policy or prejudice which is deaf to facts.

By inaugurating an untiring follow-up system of publicity, as advocated by Mr. Waters, company spokesmen can, to their great ultimate advantage, wield an important influence. The press will gradually regard the chance of being "scooped" on a superficial comment as less dangerous than the fear that unless they give their half-baked, although sincerely written editorials more thorough attention in the oven of investigation the reading public will file their subscription blanks in another part of the stove.

THOMPSON COMMITTEE RECOMMENDATIONS

Although the Thompson committee has not yet completed its investigation, a draft of some of the recommendations made to the present Legislature was published this week. Among the recommendations perhaps the most important was a proposed division of the work of the present Public Service Commission for the First District. According to the plan, the work of supervising the construction of subways in New York would be put in the hands of a new commission, leaving to the present body its present regulatory powers over the public utility companies. Undoubtedly, the work of supervising subway construction in New York, superimposed upon the other regulatory work of the commission, constitutes a tremendous task and gives emphasis to the suggestions made in the last annual report of the American Telephone & Telegraph Company by President Vail that one of the dangers of utility regulation is an overworked commission which cannot give proper attention to all the matters which come before it. We do not believe, however, that it would be at all wise at this stage of the work to divest the Public Service Commission of its powers and duties in the oversight of the construction of the subway systems now being installed in New York. Four years ago the question might have been different, but the work of planning and design is now largely over, and the commission has a large staff of engineers to supervise the actual construction. A change now would not only delay the completion of a work which will be of great benefit to the city, but it would result in a division of the responsibility for the entire work after it is finished, which would be exceedingly detrimental. The old proverb about not changing horses in mid-stream applies here with particular force.

Since it secured its new lease of life about five weeks ago, the Thompson committee has accomplished very little in throwing new light on the conditions surrounding the making of the present subway contracts to which it has been giving the greater part of its attention. Everyone knows that in the negotiations preceeding the final contracts, various plans and the methods by which they could be financed were discussed between the representatives of the city, on the one hand, and the interests back of existing systems, as well as with other financiers, on the other. Some of these plans reached the stage of public discussion and some did not, but all were rejected as inadequate. Therefore, we can see no benefits in resurrecting them now and speculating as to whether the city would not have been better off if one of them had been adopted. The present plan, it is true, makes each of the railway companies in a sense a preferred partner in its undertakings with the city, but this condition was thoroughly understood at the time by both the representatives of the city and the public at large. We do not believe that any mistake was made, but if there was the work cannot be stopped now and negotiations re-begun, and if this is the case, why spend time in discussing plans that were abandoned?

Electric Operation on the C., M. & St. P.

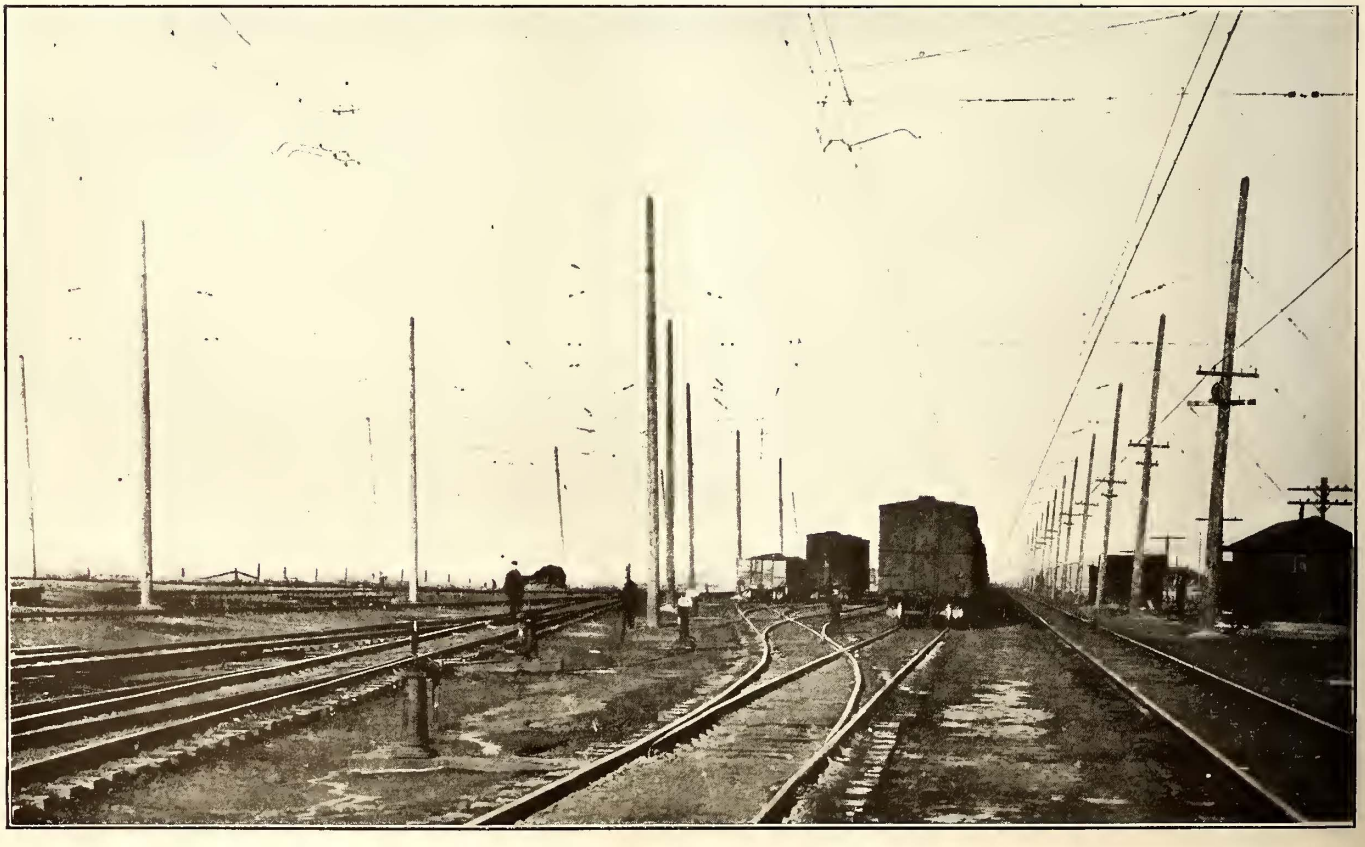
Operation of the First Engine Division of the Electrified Zone Has Been Going on During the Past Three Months with Thoroughly Satisfactory Results—Existing Shop Facilities Are Utilized for the New Equipment—No Changes in Track Construction Have Been Made

THE early stages of electric operation on the Chicago, Milwaukee & St. Paul Railway have been remarkable for their freedom from operating difficulties of any kind. For more than two months all steam freight engines have been off the first of the four divisions to be electrified, and, in addition, electric locomotives have been regularly used to handle the fast transcontinental passenger trains "Olympian" and "Columbian." Until recently, nine electric engines have been doing all the work of the division, which extends between Deer Lodge and Three Forks, but a total of twelve locomotives is to be provided ultimately, and all of these not now in actual service are en route from the General Electric Company's plant at Erie, Pa. This number includes two passenger engines and two freight engines that are equipped with lighting sets and oil heaters for supplying passenger trains with steam heat in case the locomotives are called upon for passenger service. The lighting sets consist of motor-generators that transform the 3000-volt current in the contact wire to 125 volts, this reduced voltage being required for charging the storage-batteries of the regular train-lighting systems, which operate at 86 volts.

On the division at the eastern end of the zone, adjoining the Deer Lodge-Three Forks division, the overhead construction has been in place for some time, although power has not been permanently turned on to the line, and this recently enabled the electric equipment to demonstrate its possibilities in a decidedly novel manner. Early in February, during a very severe cold spell, three steam locomotives of the Mallet type were caught on a siding some miles east of Three Forks and died there. To get these engines into the roundhouse at Three Forks, so that they could be thawed out and returned to service, it was decided to turn power on to the overhead contact system east of Three Forks so that an electric engine could go out onto this division and haul in the three dead steam machines. This was done with so much success that a second trip was made for two other engines which also had died upon an outlying siding.

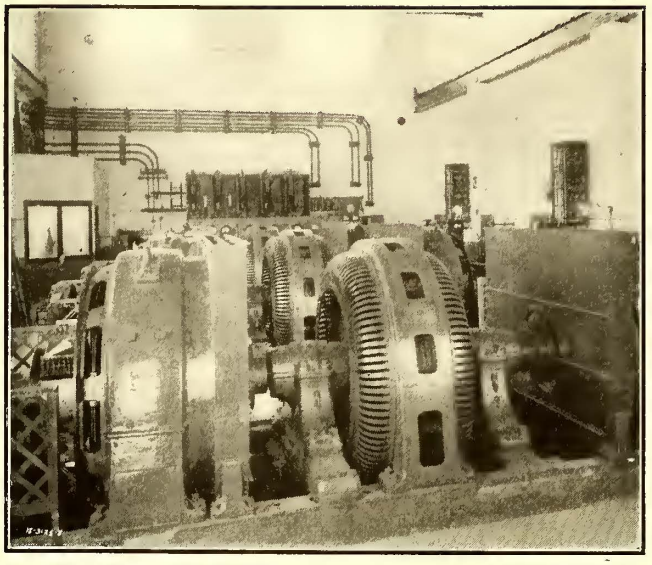
A prominent feature of the early operations has been that the train speeds have been very materially increased. The electrically operated freight trains make the run of 115 miles between Three Forks and Deer Lodge in seven and one-half hours, whereas, under steam operating conditions which formerly existed, the schedule time was between twelve hours and fourteen hours. Electric operation with passenger trains is equally successful, and it is not unusual for the fast train "Olympian" to make up as much as forty-five minutes in the run of 115 miles in case it reaches the electric zone somewhat behind time.

Since electric operation was inaugurated, some three months ago, there has been a complete absence of difficulty of any kind in connection with the equipment,



ST. PAUL ELECTRIFICATION—VIEW OF EAST BUTTE YARD SHOWING ABSENCE OF FROGS IN OVERHEAD CONSTRUCTION

ST. PAUL ELECTRIFICATION—TYPICAL TRACK CONSTRUCTION IN ELECTRIC ZONE



ST. PAUL ELECTRIFICATION—EXTERIOR OF TYPICAL SUBSTATION IN SUBSTATION

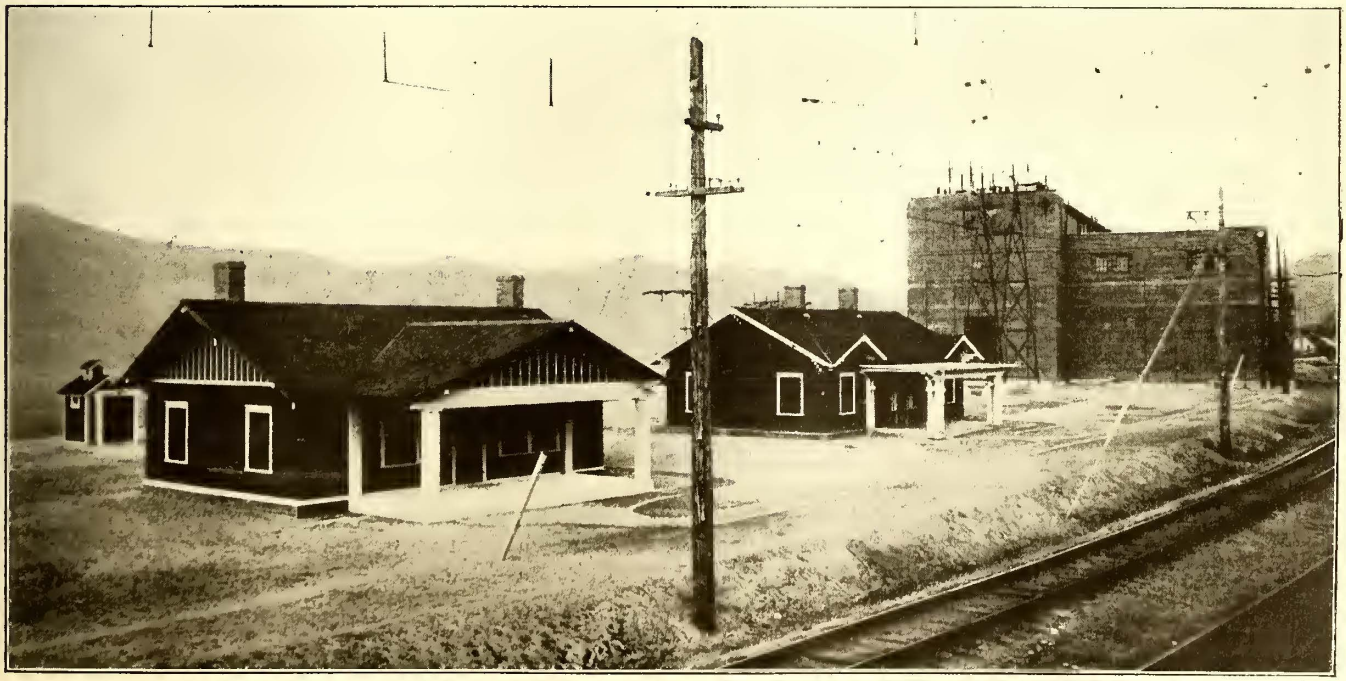
including the new apparatus for regeneration. The overhead contact system is never even mentioned. For this, it may be said, there has been introduced the somewhat unusual plan of having the current collection made by the contact of copper on copper, elaborate tests having demonstrated that, under the existing conditions, this combination was better than steel on copper or steel on steel. The copper pans on the pantographs are lubricated with grease.

Another feature of the overhead construction, which is equipped with double contact wires, is that no frogs are used anywhere on the entire 440 miles of electrified line, and this makes the contact system exceptionally flexible so that arcing between the pantograph and the contact wires is literally negligible. One of the accompanying illustrations shows the manner in which the frogs for turn-outs on the contact wire have been eliminated at the entrance to a yard.

Satisfactory progress is reported in the equipping of the three other divisions that go to make up the complete electric zone. All of the forty-three electric locomotives that will ultimately be operated will be shipped before next November, and, according to present expectations, the complete installation will be in regular operation by Jan. 1, 1917, the Missoula division, lying west of Deer Lodge, being scheduled for complete electric operation during the coming summer. At the western end of the electric zone the six substations will be completed within a few months. The overhead wiring for the 152 miles of route between Deer Lodge and the town of St. Regis has already been erected, leaving only 55 miles of overhead construction between St. Regis and Avery, which should be equipped before the coming summer, to complete the western end of the electric zone.

Utilization of Existing Facilities

For the repairs of the electric locomotives there have been utilized so far as is possible the facilities existing prior to the introduction of electric operation. All heavy repairs are to be made at the shop at Deer Lodge, and running repairs and inspections are now



ST. PAUL ELECTRIFICATION—EXTERIOR OF TYPICAL SUBSTATION AND OPERATORS' BUNGALOWS

being made in the roundhouses at that point and Three Forks. When the whole electric zone is electrically operated, the roundhouses at Harlowtown, Avery and Missoula will also be used for running repairs and inspection.

The roundhouses at each of these points originally had 110-ft. stalls so that they could house the large Mallet engines that are in service on the several divisions. Recently these stalls have been extended by the addition of vestibules to make them 120 ft. long, this length being sufficient to house the electric locomotives. No changes have been found necessary for the roundhouse turntables, since these were originally 115 ft. long. The electric locomotives move onto the turntable at the Deer Lodge shops under their own power, and thence into the roundhouse stalls under power from a low-voltage circuit. The turntable is electrically operated, using 220-volt current, and mounted in the turntable cab is an additional controller from which current at the same voltage is supplied to the locomotives. From this controller a reel pays out the lead running to a socket which has been connected up with the contactor panel on the locomotive, and which is readily accessible from the turntable platform. This plan for using electric power to and from the stalls was developed at the shops after a cable and steam-operated winch had been used for some time.

Since the inauguration of electric operation it has become evident that most of the heavier machine tools with which the roundhouses on the electric zone are equipped will be unnecessary when the entire service is handled by electric engines and the steam locomotives have been taken off all four engine divisions which go to make up the complete electric zone. In consequence, a number of these tools are to be moved to the shop at Deer Lodge, where, as mentioned before, most of the heavy repairs to electric locomotives will be made. However, all of the roundhouses that will be used for inspections and running repairs are built with drop pits so that they will serve for making heavy repairs to the running gear of the locomotives in case an emergency makes that necessary.

No changes are contemplated in the track construction that is used within the limits of the electric zone, and, after nearly three months of operation of the heavy electric locomotives, including those which have been handling passenger trains at high speeds, there appears to be no evidence that any damage will accrue to the rails because of operation of the electric equipment. The weight of rail that is installed is, in part, 85-lb. A.S.C.E. with continuous four-bolt angle bars and, in part, 90-lb. A.R.A. with 100 per cent six-bolt angle bars. Tie plates are installed on all curves, and the rail is double spiked on the outside. The rail joints, of course, have been bonded, the bonds being of the pin-driven type. These are 35 in. long and of 250,000 circ. mil capacity, the pin-type bond having been adopted merely for convenience in installation on the existing track.

Operating Notes

A representative of this journal who recently went over the electrified portions of the road reports that the operating difficulties since the first of this year were greatly increased by the fact that temperatures down to 40 deg. below zero were experienced, snowstorms blocked the lines, and during the highest water since the road opened a main-line bridge was burned. The congestion due to operating difficulties was increased by the fact that freight traffic doubled in the month of February, but in spite of unfavorable conditions the electric locomotives replaced fifteen steam engines in regular service over the 1.6 and 2 per cent grades without a hitch. This is regarded as very satisfactory since the operation of high-voltage equipment was new to all, the overhead construction had barely been completed, and no special repair shop equipment had been provided for the electric locomotives.

Up to the present only very minor difficulties have arisen in the operation of the electrical equipment. Some pantograph trouble has developed which may have been due to the fact that it has not been possible to establish and maintain clearances perfectly at the outset and partly because the operators have not had sufficient experience to foresee the dangers of pantograph trouble. However, no change in weight or design of the pantographs has been deemed necessary. The cause of a flash-over or burn-out which occurred recently in one of the motor armatures has not yet been determined; the armature is now being stripped at the Deer Lodge shops. This accident was not at all serious, because on the next trip to the roundhouse the trouble was located and a spare armature was substituted with only a short layover.

Experience thus far at the Deer Lodge shops would indicate that when electric locomotives have entirely replaced all steam engines handled at this point, the reduction in the shop force will be about as follows: boilermakers, 98 per cent; blacksmiths, 60 per cent; machinists, 20 per cent. At present the shop attendants provided especially for the electric locomotives include three crews, each consisting of three electricians and three helpers.

No difficulty was experienced in developing within a short time proficient crews for all of the electric locomotives from among the local men formerly handling steam equipment. The new men, however, are not put in charge of a locomotive until they have passed a thorough course of training, have become particularly proficient in the location of trouble, and have demonstrated a thorough understanding of the wiring systems which are employed.

Since the regular operation of electric trains began about the middle of January not one of the electric locomotives in regular service has been laid up in the shops for more than a day at a time. In fact, they have been needed constantly for service, and there have been only the brief periods between runs in which to make such inspections, repairs and changes as were necessary.

Report on Swiss Federal Railways Electrification Projects

The Swiss Federal Railways have submitted a report to the Council of Administration in regard to the suggested electrification of the Erstfeld-Bellinzona section of the St. Gothard Railway. It is first pointed out that the three-phase system would be unsuitable for the purpose in view, while the advocates of direct-current operation based their contentions on experience with lighter trains and pressure far below 3000 volts. The single-phase system, which is already employed on the Lötschberg Railway, can now be recommended for adoption without reserve. The report also discusses the problem of uniformity in the form and frequency of current which it is sought to attain in the distribution of energy throughout Switzerland. The Amsted and Ritom power stations, which are proposed for the supply of current for the Erstfeld-Bellinzona section, will be able to furnish energy not only for this section but also for the whole line from Lucerne to Chiasso, the electrification of which, it is now understood, will not be long deferred.

Proceedings at A. R. E. A. Convention

A Clearance Diagram for Structures and Reforestation for Timber for Ties Were Among the Subjects Discussed—New Officers Elected

ABSTRACTS of a number of the American Railway Engineering Association's committee reports which were of special interest to electric railways were published in the ELECTRIC RAILWAY JOURNAL for March 25, and the action taken by the association on their various features is set forth in the following paragraphs.

The convention was opened by the president of the association, Robert Trimble, chief engineer maintenance of way, Northwest System, Pennsylvania Lines west of Pittsburgh, with an address in which he reviewed the progress of the year. Following the reports of Secretary E. H. Fritch and Treasurer G. H. Bremner, the committee report on signals and interlocking was presented. This was largely a report of progress, and it was accepted without discussion.

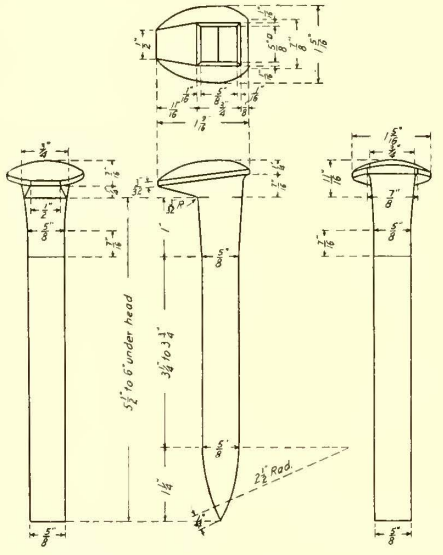
Track construction and flangeways in paved street crossings and in paved streets, which were subjects considered by the committee on signs, fences and crossings, brought out a lively discussion. Some objection was raised to the standard construction recommended by the committee for street crossings, some of those who took part in the discussion being of the opinion that a more permanent form of construction was desirable, and others failing to approve the use of standard section rails laid in the horizontal position to form the flangeways. However, the proposed construction was finally adopted by the association for inclusion in the Engineering Manual.

At an evening session of the association held on March 21, Robert W. Hunt and C. W. Gennet, Jr., presented an illustrated paper entitled "The Nick and Break Test in the Inspection of Steel Rails." This called attention to the merits of the nick and break test, which was abandoned some years ago, as compared with the drop test which was substituted. Experience with the former test at the plant of the Algoma Steel Corporation, Sault Ste. Marie, Canada, gave conclusive evidence that it was a more efficient method of exposing interior mechanical defects than the test now required by the association's rail specifications. A large number of pamphlets containing this paper with illustrations were published and may be had from Robert W. Hunt & Company upon request.

Revised specifications for cross-ties were submitted by the committee on ties, and they were approved for insertion in the Manual with a few unimportant changes. In connection with the report of the commiteee on conservation of natural resources, L. A. Downs, general superintendent Illinois Central Railroad, took issue with the claims for reforestation in so far as railroads are concerned. A number of railroads have reported on the subject of tree planting, and after twelve or fifteen years have found the results of their work a dismal failure. Out of 270,000 trees planted by the Illinois Central Railroad near Du Quoin, Ill., fifteen years ago, as Mr. Downs put it, the company has a "crop of lead pencils and fence posts." In his opinion it took too long and was too expensive for railroads to undertake raising ties by reforestation.

The report of the rules and organization committee on clearances for structures, aroused more interest than any other topic discussed at the convention. In the beginning the discussion related largely to the question of whether a clearance diagram should be adopted at this time. The principal reason for adopting minimum side and vertical clearances at this time was pending state and national legislation which, in the opinion of many of the members, would impel the use of some minimum clearances whether the association expressed itself or not. The form and dimensions of the proposed clearance diagram were discussed at length, and revised dimensions adopted. G. W. Kittredge, chief engineer New York Central Railroad, New York City, opposed approving the diagram as originally submitted because it failed to take into account the adopted standard clearance lines for third-rail and permanent way structures in rolling equipment, and it was decided that the standard third-rail clearances should form the lower 24 in. of the general clearance diagram. The 8-ft. side clearance originally proposed was reduced to 7 ft. 6 in., or 15 ft. for the over-all maximum width of the diagram, and the vertical dimension fixing the overhead clearance line was made to read 22 ft. 6 in. from the base of rail rather than from the top of rail, as suggested by the committee.

A clearance of 13 ft. for parallel tangent tracks in new construction was then recommended by the committee and adopted by the association, attention being called to the fact that this clearance would have to be



PROPOSED STANDARD CUT SPIKE (REVISED DRAWING)

corrected for tracks on curves. To meet conditions where it would be necessary to encroach within the minimum clearance diagram, the committee recommended the following exceptions for new construction: 1. Grade crossing elimination work in cities. 2. Separation of grades in new construction work in cities or other restricted situations. 3. Loading platforms along side tracks, freight houses, warehouses, piers, etc. 4. Doors of engine houses and other buildings, the design of which makes the recommended clearances impracticable. 5. Coach or other yards where the available space is very restricted. 6. New work when the physical conditions make the recommended clearances impracticable. 7. Platforms at coach-floor level in subways and other similar situations. 8. Overhead clearances on track used exclusively for passenger service. 9. Other special situations requiring special clearances. These exceptions were approved by the association. This committee also submitted a number of special recommended clearances for equipment such as switch stands, signal stands, water columns, tanks, coaling stations, etc., which conformed to the minimum clearance requirements.

In connection with the design for cut spikes which was submitted by the committee on track, the chairman called attention to the fact that the wrong design for cut spikes had been printed in the bulletin, and sub-

mitted a sketch of the cut spike which the committee recommended for approval by the association as standard. The sketch shown herewith replaces the one printed last week. Owing to this fact the adoption of the standard cut spike by the association was deferred until the next annual meeting. The revisions of the existing specification relating to the physical properties and tests, were then approved by the association. At the close of this committee report it was recommended that it take up the question of the limit of safe wear of rail on curves and the extent to which the various standards adopted by the association are being used. The new definition for dense and sound Southern yellow pine submitted by the special committee on grading of lumber, was adopted after brief discussion. The tentative grading rules for hemlock lumber, which were submitted at the 1915 convention, were also adopted by the association as standard practice. Owing to the limited time for consideration the approval of the specifications by the committee on rail for medium carbon-steel track bolts with nuts, quenched alloy steel track bolts and nuts, and for quenched carbon and quenched alloy steel joint bars was deferred until the next annual meeting.

At the close of the session Secretary Fritch announced that the following officers had been elected for the ensuing year: President, A. S. Baldwin, chief engineer Illinois Central Railroad; first vice-president, J. G. Sullivan, chief engineer Western Lines, Canadian Pacific Railroad; second vice-president, C. A. Morse, chief engineer Chicago, Rock Island & Pacific Railroad; treasurer, George H. Bremner, district engineer, division of valuation Interstate Commerce Commission, and secretary, E. H. Fritch. On the evening of March 22 the annual dinner of the association was held in the Gold Room of the Congress Hotel. President Trimble acted as toastmaster, and addresses were delivered by Hon. Rodolphe Lemieux, ex-postmaster general of Canada; J. A. Brashear of Pittsburgh, Pa.; A. W. Brunner, architect, New York City, and the Rev. Allen A. Stockdale, Toledo, Ohio.

Railway Signal Association Meeting

The Feature of the Proceedings at Chicago on March 20 Was an Elaborate Study of the Various Indications Provided in Three Standard Schemes of Signaling

At a stated meeting of the Railway Signal Association held at the Auditorium Hotel, Chicago, on March 20, 1916, a number of committee reports were presented and discussed, among them being one by the committee on signaling practice in which there was submitted an analysis of the meanings of commonly-approved signal indications. The analysis covered in particular the aspects involved in the three schemes of signaling that previously had been presented to the association, and the committee discussed in detail the purpose of each of these aspects and the consequent action required of the engine-man. In the report the text was elaborated by a complete set of diagrams illustrating the various conditions involved.

The first of the three schemes covers the simple form of indication given by a single semaphore arm or light on a mast, by means of which can be given the three fundamental signals, namely, stop, proceed with caution, and proceed. Scheme No. 2 is a development of the former which is provided primarily for the purpose of covering medium-speed movements and low-speed movements by means of an additional arm or light upon the mast. Scheme No. 3 includes the fundamental indications of the first scheme as well as those given by the additional arm required in the second scheme, but in addition, by the use of a third arm of short length, it provides for two indications in connection with movements at each of the two limited speeds, one requiring a train to proceed with caution and at the same time not to exceed the specified speed, and the other restricting the movement in no way except as to speed.

The aspects for the stop indication are essentially the same in all three schemes; that is, all arms on the mast, whether there are one, two or three, are horizontal. The action required is that the train should be stopped before its front end passes the signal. If the signal is distinguished by one or more of the approved designations, such as a number plate, a red marker light below and to the left of the active light, or the use of a pointed blade, thus identifying the signal as intended for use under automatic block system rules, the train may proceeed after stopping. Otherwise the train must remain stationary until either some open indication is given, or else movement past the signal is authorized in a prescribed way.

The aspects for the indication, proceed with caution, are also essentially the same in all three schemes; that is, the arm at the top of the mast is in a diagonal position and any other arms on the mast are horizontal. Under the caution indication it is not necessarily the case that a train should be so run that it can be stopped at the known location of the next signal. Because of unavoidable close spacings of signals it is sometimes necessary to give the caution indication at each of two or more signals in the rear of the point where the stop is required, so that a train receiving the indication at the first of such a series of signals will have stopping distance before reaching the stopping point.

The aspects for the proceed indication also are essentially the same in all of the three schemes; that is, the arm at the top of the mast is in vertical position and any other arms on the same mast are horizontal. The action thus permitted is that the train shall proceed under no restriction that might otherwise be indicated by the signal.

In schemes Nos. 2 and 3 the several indications relating to slow-speed and medium-speed have been applied to the control of speed rather than to routes because complete and satisfactory route signaling at interlockings is impracticable and because definite limitation of speed on routes leading over turnouts or crossovers is essential for safe operation. In these schemes, two limits for the speed were introduced because a single limited speed would necessarily have to be low enough to insure safe movement over the shortest turnouts and crossovers generally installed at interlocking plants on the particular road. However, turnouts and crossovers are not all in one class as to the safe speed for movement over them, and therefore it was recognized that provision must be made for signal indications relating to at least one intermediate limit of speed. To this the general term "medium speed" has been used in the wording of the report, so that each road may specify for it any actual rate of speed that suits its own conditions.

In scheme No. 2 the indication, proceed at low-speed, wherein the upper arm is horizontal and the lower one diagonal, requires the train, when passing and proceeding beyond the signal, to move at such a low rate of speed as conditions may require through the low speed territory, this being generally the territory covered by the limits of the interlocking. Beyond that territory the speed must continue to be governed by the conditions, so that the low-speed indication is the caution indication of scheme No. 1 with a low-speed limit added.

The indication, proceed at medium speed, wherein the

upper arm is horizontal and the lower one vertical, is primarily to limit the speed to the prescribed rate and it goes without saying that in a particular case lower speed must be required by conditions having nothing to do with the signals. However, in the absence of any restricting conditions aside from the signals, a train receiving the medium-speed indication is free to proceed at the specified rate throughout the territory covered by the indication, and beyond that territory to increase its speed unless it is restricted by another signal. When a signal gives the medium-speed indication the distant signal in the rear must give the caution indication so that a train which must not exceed medium speed when passing the medium-speed signal will not reach that signal unchecked.

Quite frequently there is but one route for movement over which the medium-speed indication of scheme No. 2 is given at a particular signal. The indication is then practically a route indication also. But if there are two or more medium-speed routes beyond a certain signal the indication, of course, gives no clue to the particular route that is set up. In such cases the control of the signal should be so complete that the medium-speed indication cannot be given unless the route set up is clear for such a distance that a train can safely enter it at medium speed and still have room for stopping after the engineman discovers that the train is on the wrong route.

With regard to the dwarf signal in either scheme No. 1 or No. 2 it may be said that this must be approached with caution by all trains. Consequently the caution indication requires a train to proceed with caution at the signal, or at such low speed as conditions beyond the signal may demand. It is a proper indication for low-speed movement over turnouts or crossovers. The proceed indication should not be given at a dwarf signal when speed is restricted unless the restriction is permanent and affects all movements governed by that signal.

In scheme No. 3 the limited-speed indications have been elaborated by adding to the familiar terms "proceed with caution" and "proceed" the words "on low-speed route" or "on medium-speed route," which make it clear that when the train is to go, the speed is limited to low-speed or medium-speed. Of these indications, the one permitting a train to proceed with caution on low-speed route, which is indicated by a diagonal position for the short lower arm and horizontal upper arm or arms, is used to govern movements over low-speed routes to main tracks with the current traffic when conditions do not permit unrestricted movement at low-speed, to govern movements to sidings and to main tracks against the current of traffic, and to govern closing in or permissive movements. The indication, proceed on low-speed route, is made when the short lower arm moves to vertical and it provides for no restriction by signals other than that of speed. Under this indication the speed may be increased as soon as the train is through the territory covered by the indication. The principal use of the indication is to permit heavy trains to pull through low-speed turnouts or crossovers to a clear main track with the advanced signal, where there is one, at caution or proceed. When a signal gives either of these low-speed route indications the distant signal in the rear should be at caution.

The action required by the indication, proceed with caution on medium-speed routes, which is given by horizontal top and bottom arms and diagonal middle arm, is that the train shall proceed with caution through the territory covered by a caution indication on the track reached by the medium-speed route. Except for closing-in movement, the indication is given for movements over medium-speed routes under any conditions that do not permit the indication, proceed on medium-speed route. The latter indication, in which the middle arm moves to vertical, is of exactly the same effect and is to be given under the same conditions as the medium-speed indication of scheme No. 2. It may govern to a signal in advance, giving the indication, proceed with caution on medium-speed route, when the conditions beyond are such that a train may maintain medium-speed up to that signal.

Still another indication is provided for under scheme No. 3, namely, reduce to medium-speed, given by a diagonal top arm and vertical lower arm or arms. Ordinarily the indication is given as a "medium-speed distance indication" when the signal in advance is giving one of the medium-speed route indications.

With regard to dwarf signals in scheme No. 3, the arm of the dwarf signal in the diagonal and vertical position gives the same indication for low-speed routes as the bottom arm of a high signal in the same position which has the arm or arms above it in horizontal position. The slight elevation of the arm and light above the track distinguishes the open indications of the dwarf signal from those of the one arm high signal. In this scheme, therefore, the arm of a dwarf signal may be in vertical position for movements over a low-speed turnout or crossover in any situation, provided, of course, that the indication, proceed on low-speed route, may properly be given under the existing conditions.

Electric Railway on the Ice

Temporary Tracks Laid on the Frozen Neva River in Northern Russia

IN the northern States in this country, winter is looked upon chiefly by the railway manager as the time when he has to keep his snow plows and sweepers ready for action and keep the tracks clear of snow for the operation of electric cars. In Northern Russia, however, winter affords an opportunity for temporary additional track construction. The accompanying illustration shows an electric car crossing the Neva River near Petrograd on the ice. Temporary tracks have been laid on the frozen surface of the river, and temporary poles have been erected to support the overhead system. Fortunately the winters are sufficiently long near Petrograd to make this form of construction worth while.

TEMPORARY TRACK OVER THE NEVA RIVER

Motors and Phase Converters on the N. & W. Locomotives

Structural and Design Details of the Induction Motors and the Induction Phase Converters Used on the 270-Ton, Single-Phase, Three-Phase Locomotives Which Have Been in Operation for the Past Ten Months Between Bluefield and Vivian, W. Va.*

By J. V. DOBSON

Railway Engineering Department Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

THE power for the operation of the Norfolk & Western locomotives is delivered from the single-phase contact wire to the primary of the locomotive transformer at 25 cycles, 11,000 volts, and is there stepped down to 725 volts. At this voltage a phase converter changes the power from single phase to two phase and then, by means of the well-known Scott connection on the transformer, three-phase energy is supplied to the driving motors. There are four driving motors per cab or eight motors per locomotive, each having an hourly rating of 410 hp. and a continuous rating of 325 hp. at the rated voltage and at 14 m.p.h. The continuous rating at 28 m.p.h. is 375 hp.

The heavy freight service on mountain grades imposes very severe starting requirements. The specifications required that the motors should be able to deliver the maximum drawbar pull for a period of five minutes with the locomotive wheels at rest. Tests taken by a dynamometer car show that the motors are able to deliver 20 per cent in excess of this required starting tractive effort.

The Motors

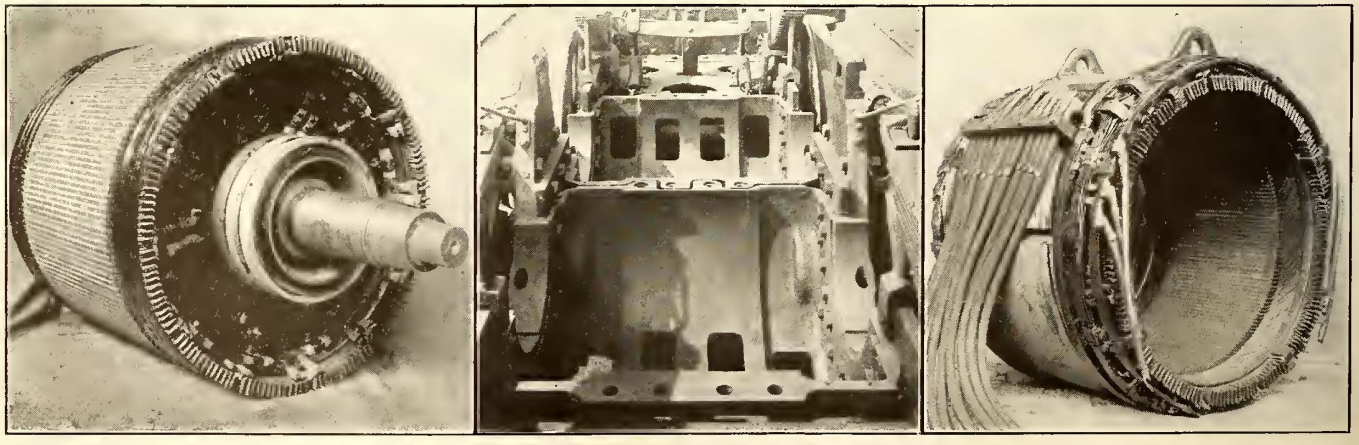
The motors are of the three-phase wound-secondary induction type, of rugged design to withstand the mechanical shocks peculiar to locomotive service. They are mounted in pairs in each truck, with the pinions of each pair of motors meshing into common gears.

In order to provide convenient facilities for overhauling the locomotives some radical departures from usual railway practice have been made in the design of these motors. Vertical lifts with a crane are by far the more convenient, as the crane operator has more control over the apparatus he is handling in vertical lifts than in sidewise movements; especially is this true in the handling of motors, where there is danger of damaging the insulation. With this in view, the cast-steel motor frame was made of semi-cylindrical shape and bolted permanently between the locomotive side frames. The stator, rotor and housings together are lowered into this frame and can be quickly and conveniently bolted into place.

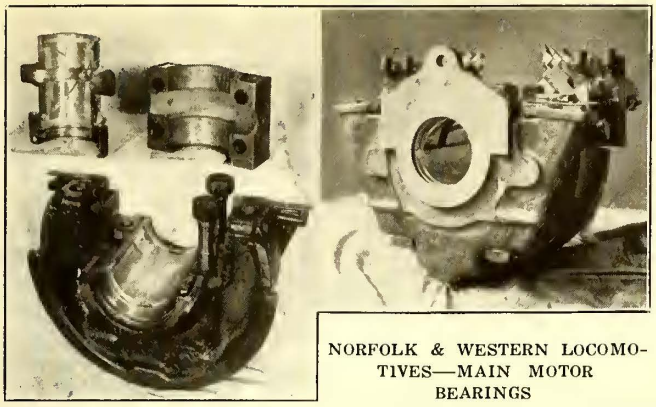
The stator is turned to accurate outside diameter to fit the bore of the frame, and is held in place by two steel keys parallel to the axis and bolted to the motor frame. The stator punchings are built up on a mandrel and riveted between cast-steel end rings under hydraulic pressure. Longitudinal holes in the core provide suitable ventilating ducts. The stator winding is of formed diamond shape coils of strap copper insulated with a high-grade heat-proof insulation. Retaining rings on both the inside and outside of the end winding keep the coils rigidly in place. The wiring around frame details is securely clamped. The rotor core is assembled on a cast-steel spider with the standard dovetailing of punchings on the spider arms, and the punchings are bolted under pressure between end plates, designed also to serve as supports to the coil extensions. The rotor coils are placed in partly-closed slots and secured with fiber wedges. The end windings are banded to care for the centrifugal forces incidental to high rotor velocities. As two locomotive speeds of 14 m.p.h. and 28 m.p.h. are secured by pole-changing in both the rotor and stator, six collector rings are necessary, three at each end of the rotor.

Oil-ring lubrication of the motors is used. A cast-steel housing contains the bearing and provides suitable oil-well capacity, the housing cap being secured by four bolts. Split bronze bearings with babbitted linings are used. The upper half bearing has oil grooves and there are two oil rings, side by side, insuring lubrication even though one of the rings should refuse to turn, due to friction of the ring against the bearing wall. Bearing renewal is accomplished by removing the cap, raising the armature slightly in the air gap and turning the bearing on the shaft. In order to strengthen

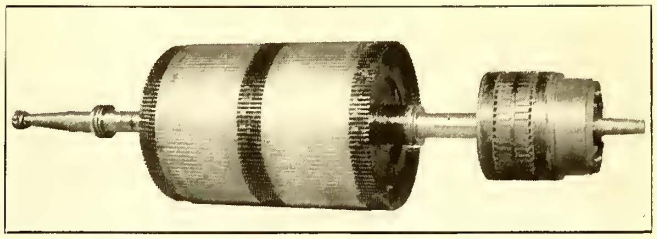
* This installation was described in detail in the issue of the Electric Railway Journal for June 5, 1915, page 1058.



NORFOLK & WESTERN LOCOMOTIVES—VIEWS OF MOTOR ROTOR OR SECONDARY, TRUCK AND MOTOR HOUSING AND WOUND MOTOR STATOR OR PRIMARY



NORFOLK & WESTERN LOCOMOTIVES—MAIN MOTOR BEARINGS



NORFOLK & WESTERN LOCOMOTIVES—PHASE CONVERTER ROTOR WITH STARTING MOTOR ARMATURE

the windings against the injurious effects of deposits of coal dust, both rotor and stator are dipped in varnish and then baked, a process which very materially strengthens the insulation against voltage strains due to creepage. This is an important precaution because, as the locomotives operate in the coal fields, the pushing locomotive is frequently enveloped in clouds of dust from the tops of the cars, some of which is carried into the air ducts and deposited in the windings.

By means of longitudinal ducts in both rotor and stator, forced air is taken in at one end and exhausted at the other. With this method of ventilation there are no sharp corners such as occur with radial ventilation. The ventilating air is secured from a blower mounted on the shaft of the phase converter.

The Phase Converter

To facilitate locomotive overhaul the phase converter is also designed to provide for vertical lifts. The phase converter, starting motor and blower fan are mounted as a unit, readily removable from the locomotive. It is also possible to remove all but the frame, leaving the latter bolted in place. Further, the fan, the starting motor stator and the starting motor rotor are each independently removable.

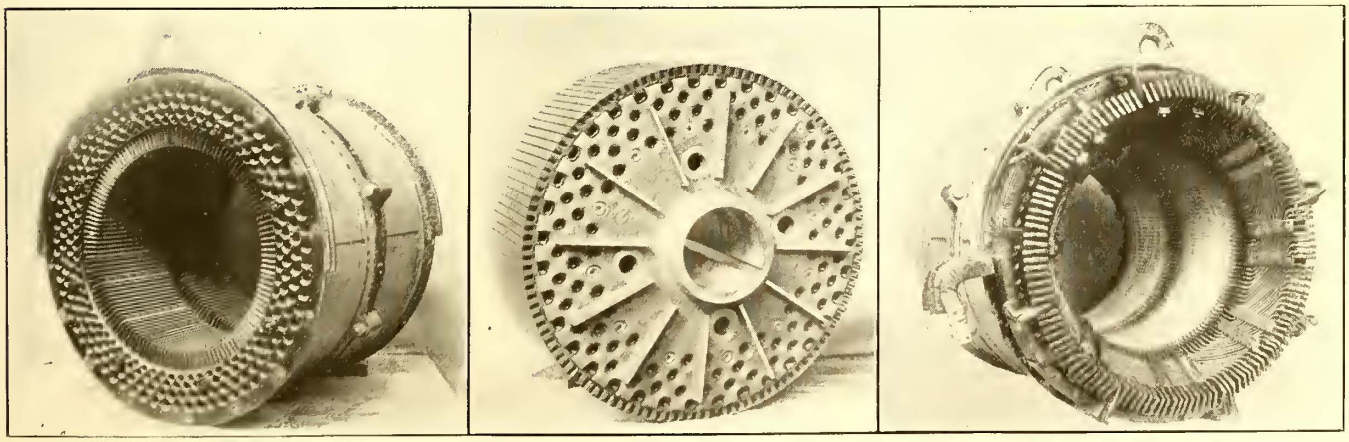
The converter frame is of simple construction. Since the machine delivers but little mechanical torque, the frame has only to carry the converter weight and to withstand the vibrations and shocks due to end thrust. The half-cylinder construction, therefore, is ideal for this service. The starting motor end is liberally ribbed to enable it to withstand locomotive end shocks. The frame is faced on the longitudinal center line; therefore it is possible to bore the stator seat, housing seats and starting motor seat with one setting on the boring mill. This provides for accurate alignment of rotors in the air gap.

It was proved by tests that for this particular type of machine central duct ventilation is both economical and effective. The problem then became one of building up a substantial stator core with suitable ducts without adding too much to the axial length, since this was a limitation in the design. The two halves are built up independently and riveted under pressure between cast-steel end plates. The end plates at the center have machine lugs, a lip on the one engaging a recess on the other which centers the two halves during assembly. In order to prevent flaring of the punchings, brass finger plates are used and, on account of the depth of iron, insulated bolts are used, properly spaced on a circle near the roots of the teeth. In addition, fish-paper U-pieces are placed at the ends of each slot to prevent the end of the iron from cutting into the insulation. A sheet-steel disk is placed between the two halves so that the exhaust air from one end will not oppose that from the other in the duct. The stator winding is securely clamped to enable it to withstand the locomotive vibrations and also the magnetic shocks incident to starting the converter, the bouncing of the trolley and peak starting loads on the main motors.

The rotor, like the stator, is in two halves built up separate and mounted on the shaft with proper slot alignment. The simple squirrel-cage winding of induction motors is used, the rotor bars being electrically brazed to the short-circuit end rings. The converter bearings have oil-ring lubrication, and they are of the split type, so that it is possible to remove them without disturbing any other part of the apparatus. It is evident that the rotor is of the simplest and most rugged design possible.

To check the air-gap, maximum and minimum air-gap gages are used. A cored hole is made in the frame at the proper radius and at the bottom. The gage is here inserted, a maximum gage for new bearings, and a minimum gage to indicate when bearings should be removed.

The starting motor is of the straight-series, commutator type so arranged that its brush-holder bracket, armature or stator can each be removed independently of any other part.



NORFOLK & WESTERN LOCOMOTIVES—VIEWS OF PHASE CONVERTER STATOR CORE, ONE HALF OF ROTOR CORE AND COMPLETE WOUND STATOR

Dangers of Utility Regulation

Theodore N. Vail Points Out Menance of Commissions Usurping Functions of Management—Advocates Control of Wages by Commissions

PURSUING his usual policy of discussing some public utility problem in the annual report of the American Telephone & Telegraph Company, President Theodore N. Vail, in the report for 1915, has turned his attention to the subject of control and regulation. In his opinion, control and regulation have done much to clear away the dangers of arbitrary action and unreasonable demands, both on the side of the public and on the side of utilities, but the experiences of the past reveal dangers that menace the success of the regulatory system.

There are dangers of too many independent boards having jurisdiction over the same questions, and of legislative bodies reassuming delegated jurisdiction, but the dangers which Mr. Vail discusses at most length are the possibilities that commissions may usurp the functions of management and that the multitudinous questions of detail, trivial and negligible, may crowd out the more important questions coming before regulatory bodies.

Deliberate consideration is impossible in an overworked body. Even the unsatisfactory practice of allotting questions to individual members for consideration and report, to be adopted as the opinion of the whole body, will not properly take care of the work. The inevitable tendency is that opinions and decisions are strongly influenced by, if not made by, minor officials and the clerical force. Mr. Vail states that many questions coming before commissions are of such notoriety and are surrounded by so much sensational assertion and misleading information that it is difficult for one not to be influenced in the formation of his opinion by a partial and often distorted presentation of the facts. In the settlement of such cases it is most important, therefore, that there should be abundant opportunity to get at the facts, and ample time for deliberate consideration.

The sole purpose of the creation of regulatory commissions, to Mr. Vail's mind, was to control and regulate, under the legislative power delegated to them. Their operation, therefore, should be strictly confined to control and regulation, and they should never invade the province of management. Management is inherent in ownership and is inseparable from the responsibility of ownership. The boundary line between management and regulation in many cases may be hard to define, but in a large majority of cases it can be determined with definiteness and precision.

Taking up the subject of wages, Mr. Vail says that the revenue of public utilities must be sufficient for all costs of operation, these including wages, maintenance, depreciation, reconstruction and capital charges. While each factor of cost is, in fact, as important as any other, and upon the whole expenditure depends the ability of public utilities to perform their functions, wages are directly personal and to them attaches a superior importance. Wages and conditions of employment should be such as will command the very best service at all times and should be so adjusted that there could be no dispute in respect to them that could not be settled without disturbance of the service. The only excuse for using the power and force of combination to obtain increase of pay, recognition of rights or bettering of conditions, was when increased net profits, due to low wages, all went to the employers.

Mr. Vail avers that where earnings are controlled, where surplus operating revenue after a reasonable return on capital goes back to the public in reduction of charges, in construction of plant for which no capital securities are issued, in improvements in quality or quantity of service, wages also should be controlled. Under existing practice the question of wages is a matter of internal arrangement, or in extreme cases a matter of arbitrary power or of reference to the arbitration of temporary bodies. When regulatory bodies consider costs and sources of revenue, they consider wages not primarily as to their sufficiency or equity, but in an inclusive way with other expenses to assure themselves that costs are not excessive. If these bodies were authorized to intervene in disputes where wages and working conditions were concerned, they would consider them concretely, as to both sufficiency and equity and as a dominant factor in adjusting revenues.

To gain objects or to enforce demands by combination and arbitrary action causing partial or total suspension of service, to the great inconvenience of the public, should not be possible. Such action on the part of utility employees, asserts Mr. Vail, is as unjustifiable and unpardonable as would be an arbitrary suspension of service by the utility. It is an exercise of arbitrary power, a disregard of the interests of the public, which should not be allowed in these days. Public service employees, nominally the employees or servers of the corporation, are the employees or servers of the public. The employees are by tradition regarded as part of the organization and subject to its discipline and control, but to a certain degree this has in some cases been nullified by combination. If this combination or the possibility of it is to be admitted, then so far as is necessary to preserve the right of the public to a continuous and dependable service, it should be under the same control and regulation by the same bodies that the corporation itself is under.

Mr. Vail states, of course, that if employees are to be controlled they should also be protected. In the past boards of arbitration have been the resort for protection when matters have come to an *impasse*, but special and independent arbitration bodies are temporary, do not possess and cannot appreciate all the factors, and, which is more important, have no responsibility for the effects of their decision on other interests. To adjust properly any question involving expenditure for any part, every factor in connection with the whole business should be considered—the revenues, costs or charges, and everything that affects these. This can be done properly only by one and the same body, which must have jurisdiction over all factors involved. Therefore Mr. Vail feels that the only logical body to regulate and protect public service employees is that which regulates the utility itself and has the responsibility to the public for this regulation.

On the other hand, Mr. Vail states, it is both unreasonable and impossible to expect employees to admit or appreciate the foregoing facts unless at the same time the public recognizes and observes its obligations or duties toward these employees. Courtesy on the part of the public is too often overlooked or forgotten, and too often the public fails to recognize in its bearing and action toward the employees any direct relation or any of those obligations that all employers should have toward those who serve them, and toward those who are, at least for the moment, in a subordinate position. Too often the attitude of the public toward utility employees is in unreasonable and undignified contrast to that which they should give and that which they do give to the employees of their immediate personal establishments.

Other Wisconsin Association Papers

Utility Legislation in Wisconsin and Outdoor Substations Were Among the Topics Discussed at the Milwaukee Meeting of the Wisconsin Electrical Association

THE proceedings of the meeting of the Wisconsin Electrical Association held in Milwaukee on March 16 and 17, together with abstracts of most of the papers, were given in the issues of the ELECTRIC RAILWAY JOURNAL for March 18 and 25. Abstracts of two more of the papers are given below.

Outdoor Substations

BY H. W. YOUNG

President Delta-Star Electric Company, Chicago, Ill.

The ability to serve large areas with electric power at a profit is now largely dependent upon the use of outdoor substations which tap existing transmission lines of power companies or interurban railways. There are hundreds of instances where substations of as small a capacity as 50 kw. are giving satisfactory service at a profit. Such service would be impossible from an economic point of view if it were necessary to construct buildings and use the type of equipment generally considered necessary five years ago. Practically every district traversed by a transmission line or interurban railway has possibilities for electrical development.

The outdoor substation usually comprises a wooden or steel supporting structure, a transformer bank and a simple set of switching, fusing and lightning arrester equipment. The load-break switches are so designed that all phases are simultaneously opened or closed by means of a common handle, which can be locked in either position. By means of arcing horns the main contacts are protected from burning at time of opening.

It is essential that the high-tension fuse be of such a type that it will instantly open or clear the circuit under short-circuit conditions, thus localizing a disturbance and preventing communication to the main line. That such fuse operation is possible has been demonstrated in hundreds of installations, a typical case being as follows: In a large 22,000-volt installation equipped with 60-amp. fuses, a direct short-circuit burned off two No. 4 copper lines and the fuses cleared this heavy disturbance without opening the main line oil switch set at two seconds. This is the class of protection secured with modern high tension fuses, and their use on outdoor substations absolutely insures localization of disturbances.

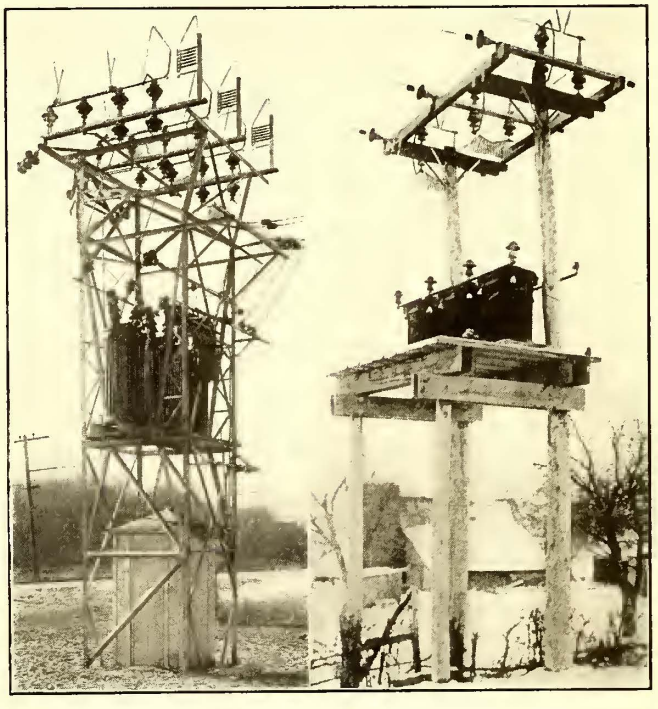
Every transmission line and the equipment connected to it should be safeguarded from lightning disturbance to a point where the increased cost of protective equipment would not be compensated for by the increased amount of protection secured. The small size and limited revenue of outdoor substations dictate the use of relatively simple and inexpensive arresters requiring minimum attendance and up-keep. These conditions, as a rule, result in the use of horn gap equipment.

The simple horn gap without resistance has a wide application and is giving very satisfactory results. Under abnormal conditions the use of this arrester, owing to its practically unlimited discharge capacity, may result in interruptions to service, although the disturbance can be localized by means of a fuse. On small capacity substations, however, an occasional interruption of local service is not serious and cannot be considered a criticism of the general service.

Where a limiting resistance is deemed desirable or necessary it can be easily installed and will limit dynamic current to ground. It should be so constructed that failure of a single resistance element will not open the ground circuit or disconnect the arrester from the line.

A type which has met with success is one in which the resistance is built up in steps, so arranged that it is successively cut in as the arc rises on the horns. Under light static disturbances the resistance is all in series with the discharge horns, but heavy disturbances can break to ground at the point where no resistance is in circuit.

That arresters should have a high discharge capacity and be equipped with more than one relief point to discharge excess pressures can be illustrated as follows:



TYPICAL OUTDOOR SUBSTATION ON STEEL AND WOOD STRUCTURES RESPECTIVELY

Assume that a boiler of a capacity requiring a 4-in. safety valve is equipped with but a 1-in. valve. When the pressure reaches a certain point the 1-in. valve discharges and blows off a certain amount of excess steam. However, if the generation of steam is continued at a greater rate than can be blown off by the 1-in. valve, the pressure will continue to rise until some other outlet is found. This point is demonstrated in lightning arresters having a limited discharge capacity, such as types with a straight series resistance to ground. While the horn gap type of arrester has certain limitations, it has high capacity and at the present time offers the best commercial solution of protecting the majority of outdoor substation installations.

Both wooden pole and steel tower substation structures have certain advantages. Wood will continue to be used in many localities where it is easily secured and low in cost, or where the lowest possible cost must be secured. Steel tower stations are more permanent, have

a better appearance and, under normal conditions, are but little more expensive than wood. When considering steel tower substations care should be taken to select a type which is so designed that the transformers can be quickly handled. This feature is now secured by the use of jib cranes and transfer tables on the platforms. It is now generally conceded that all steel or malleable iron elements of both towers and control equipment should be hot galvanized.

The following points regarding outdoor substations can be emphasized: They must be low in cost, be capable of increasing capacity by simply changing transformers and fuses and be so designed that local disturbances will not spread to the main lines, and they must give good commercial service.

Utility Legislation in Wisconsin

BY JOHN B. SANBORN
Attorney, Madison, Wis.

Not many laws were enacted by the Wisconsin Legislature of 1915 of importance to public service corporations. Perhaps the most important was the act to regulate jitneys. None of the legislation was apparently enacted in a spirit hostile to public service corporations. Both the companies and the public have to a very considerable extent accepted the principles of commission regulation, and the modern legislative tendency in Wisconsin has been to leave to the commission the working out of detailed problems of regulation of public service corporations. Such objections as were manifested to the principle of the commission regulation did not come from the public service companies but from certain municipally-owned plants and from the Socialists and the advocates of municipal ownership, many of whom seem to desire that the principle of commission regulation be discredited.

Regulation of Jitneys

One of the new problems relating to the use of streets by public service corporations that confronted the Legislature of 1915 was that of the jitney. Most of the people of Wisconsin had never heard of a jitney in 1913, but by the middle of the session of 1915 the problem presented by this method of transportation had become acute. Not only were the jitneys crowding the other vehicles off the streets, but they were usually light and unsubstantial cars, operated by persons of no responsibility, and they were a constant menace not only to those who traveled in them but also to others who were using the streets. The public demanded regulation. The problem was, however, a difficult one. Many desired to leave this regulation with the cities, while others were fearful that the regulation would be too strict and that many jitneys would be forced out of business. Finally, Chapter 546 was enacted to take effect on Sept. 1, 1915.†

Financial Legislation

Many of the public service corporations of Wisconsin are forced to look outside of the State for the financial assistance necessary for their promotion. The law relating to the status of foreign banks and trust companies operating in Wisconsin was somewhat confused prior to the last Legislature. It might have been asserted that they were required to comply with Section 1770b of the Wisconsin statutes relating to foreign corporations generally, but there were other provisions in the statutes which made it impossible for them to comply with that section if they so desired. The situation was cleared up by Chapter 26, which allows foreign banks or trust companies to do business in the State without being licensed, to loan money therein and to take, hold and enforce notes, bonds, mortgages or trust deeds given to secure money so loaned. The only requirement is that the bank or trust company must file a statement with the Secretary of State, constituting him its attorney for the service of process.

Prior to 1915 bonds of public utilities and street railways were not legal investments for trust funds in Wisconsin unless such investment was expressly authorized by the instrument creating the trust. Chapter 536 now allows the investment of trust funds in such bonds under various restrictions as to the size of the city where the utility is located, the earnings of the utilities and the maturity of the bonds. This act is not of great importance to the public service corporations, but it is a proper recognition of the financial strength of the securities issued by these corporations in the State of Wisconsin.

Franchises and Home Rule

In spite of the theory of the indeterminate permit, the Wisconsin statutes prior to 1915 contained provisions for competitive bidding for municipal franchises by corporations to be based upon a proportion of the receipts of the utilities. These were, of course, entirely out of harmony with the public utility law, and they were very properly repealed by Chapter 254.

The fundamental principle of the public utility law that contracts between the public and the public utility corporations should not be for fixed terms, but should be indeterminate, so that the capital cost should not all be charged against the public during a comparatively brief term, was recognized by Chapter 490. This allows contracts for street and public lighting and heating for an indeterminate term if the prices for the services are subject to adjustment at intervals of not more than five years.

Chapter 366 exempts municipally-owned utilities in cities of less than 5000 from reporting to the commission in the detail required of utilities generally. This apparently unimportant act was the result of a great deal of agitation. Early in the session bills began to appear which exempted, more or less completely, municipally-owned utilities from the control of the commission. At first blush it would seem that such bills were of no interest to privately owned utilities. It was soon apparent, however, that they were of very vital concern. In the first place, a weakening of the control of the commission over municipalities would mean the unscientific operation of their plants with a false showing of profits or service furnished at less than cost. This would give opportunities for misleading comparisons between the privately and publicly-owned utilities. Then it was evident that these efforts of certain municipalities to escape commission control were parts of a so-called "home rule" movement which aimed also to attack the commission control of privately-owned utilities. The efforts to encroach upon the powers of the commission were unavailing and only resulted in the enactment of Chapter 366, above referred to.

Of more direct importance to the public service corporations were the so-called Vint bills. One of these (250A) was a repeal of nearly all of the public utility law, and the other (630A) was a repeal of that law as far as it applied to Milwaukee. Much of the support which they received was socialistic or from those who favor municipal ownership. It was asserted that regulation, by either a commission or a commission council,

†The author's summary of the law is omitted because of the digest published in the Electric Railway Journal of Aug. 28, 1915, page 378.

is yet to be proved a success. One of the principal objections to commission regulation was that commissions feel bound to allow a return high enough to induce investments in utilities.

But these bills also commanded some support from those who favor "home rule." That rather indefinite doctrine has many virtues, but like any good principle it can be carried to an extreme. As applied to utilities it means either the discarded idea of franchise bargaining or regulation by common councils. The old fixed-term franchise, with fixed rates and its permission to the utility to make all it could during the franchise period, had certain advantages to the utility, but I am sure that association members would not care to return to it. Regulation by common councils is not efficient, economical, unprejudiced or practical. The politician, not the public or the utility, benefits by it.

The Vint bills were reported adversely by the Assembly committee and were decisively beaten, but I feel that the thing that the public service corporations must face in the future is the fight between State and local control. The plea for "home rule" brings to the support of local control some well-meaning persons. The local politician can make much of the decisions of a commission in favor of the corporations, entirely ignoring those against them. He can tell how much lower rates and what better service he could obtain. A commission that tries to be fair to the utilities is constantly subjected to the charge that it is favoring them. The only practical method of regulation so far devised is a central board or commission. The public service corporations must understand this and must do what they can to see that the commissions get the same fair treatment which I know the Wisconsin commission at least tries to extend to both the corporations and the public.

Central Committees Appointed

List Given from "Brown Book" of Central Electric Railway Association Just Issued

THE annual Brown Book of the Central Electric Railway Association has just been published. It gives the officers of the association elected at the annual meeting on Feb. 24-25 and already published in this paper. It also contains a list of member companies, the new officers elected, the report of the secretary-treasurer, copies of bulletins No. 71 on charges for interchange of equipment and No. 84 on charges for repairs to foreign equipment, the annual report of the chairman of the Traffic Association, a list of the committee membership of each association and other matter of interest to members of the associations. The personnel of the committees follows:

Auditing Committee (Standing)—Walter Shroyer, chairman, auditor Union Traction Company of Indiana; L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company; E. L. Kasemeier, auditor Ohio Electric Railway; Irwin Fullerton, auditor Detroit United Railway; H. H. Bullitt, auditor Louisville & Interurban Railroad.

Advertising and Publicity—W. A. Carson, chairman, general manager Evansville Railways; A. D. B. Van Zandt, publicity agent Detroit United Railways; J. H. Drew, president Drew Electric & Manufacturing Company; R. A. Crume, general manager Dayton & Troy Electric Railway; C. J. Laney, traffic manager Cleveland, Southwestern & Columbus Railway.

Annual Transportation—H. A. Nicholl, chairman, general manager Union Traction Company of Indiana; S. W. Greenland, general manager Fort Wayne & Northern Indiana Traction Company; C. P. Wilson, president Interstate Public Service Company; C. J. Laney, traffic manager Cleveland, Southwestern & Columbus Railway; C. O. Sullivan, traffic manager Western Ohio Railway.

Bureau of Standards—Adolph Schlessinger, chairman, superintendent transmission and substations Terre Haute, Indianapolis & Eastern Traction Company; G. H. Kelsay, superintendent of power Union Traction Company of Indiana; J. J. Brennan, superintendent of transportation Fort Wayne & Northern Indiana Traction Company; M. J. Kehoe, electrical engineer Ohio Electric Railway; E. J. Burdick, superintendent of power Detroit United Railway.

Constitution and By-Laws—A. W. Brady, chairman, Union Traction Company of Indiana; C. N. Wilcoxon, president Chicago, Lake Shore & South Bend Railway; E. F. Schneider, general manager Cleveland, Southwestern & Columbus Railway; J. F. Collins, general manager Michigan Railways Company; G. O. Nagle, general manager Wheeling Traction Company.

Finance Committee—F. D. Carpenter, chairman, general manager Western Ohio Railway; W. H. Forse, secretary Union Traction Company of Indiana; T. J. Minary, president Louisville & Interurban Railroad; H. E. Vodermark, auditor Fort Wayne & Northern Indiana Traction Company; T. A. Ferneding, general manager Dayton, Springfield & Xenia Southern Railway.

Hotel and Arrangement Committee—L. J. Drake, chairman, Galena Signal Oil Company; S. D. Hutchins, Westinghouse Traction Brake Company; W. H. Bloss, Ohio Brass Company; L. G. Parker, Cleveland Frog & Crossing Company; T. H. Henkle, Electric Service Supply Company; J. G. McMichael, Atlas Railway Supply Company.

Joint Folder Committee—E. B. Peck, chairman, vice-president Terre Haute, Indianapolis & Eastern Traction Company; C. N. Wilcoxon, president Chicago, Lake Shore & South Bend Railway; F. W. Coen, vice-president and general manager Lake Shore Electric Railway; W. S. Whitney, general passenger agent Ohio Electric Railway; J. F. Keys, general passenger agent Detroit United Railway.

Meeting Registration Committee—W. D. Hamer, chairman, Electric Service Supplies Company; H. C. DeCamp, Westinghouse Electric & Manufacturing Company; J. H. Drew, Drew Electric & Manufacturing Company; W. A. Carson, general manager Evansville Railways; T. J. Brennan, general superintendent Dayton, Covington & Piqua Traction Company.

Program Committee—E. B. Peck, chairman, vice-president Terre Haute, Indianapolis & Eastern Traction Company; J. J. Stanley, president Cleveland Railway; C. L. Henry, president Indianapolis & Cincinnati Traction Company; E. F. Schneider, general manager Cleveland, Southwestern & Columbus Railway; F. D. Carpenter, general manager Western Ohio Railway; W. H. Bloss, Ohio Brass Company; W. S. Whitney, general passenger and freight agent Ohio Electric Railway.

Publicity Committee—L. E. Gould, chairman, Western manager Electric Railway Journal; H. F. Kenfield, president *Electric Traction;* E. H. Farr, A. H. Pugh Printing Company.

Rules Governing the Interchange of Equipment—H. A. Nicholl, chairman, general manager Union Traction Company of Indiana; C. D. Emmons, general manager Chicago, South Bend & Northern Indiana Railway; S. W. Greenland, general manager Fort Wayne & Northern Indiana Traction Company; E. L. Kasemeier, auditor Ohio Electric Railway.

Standardization Committee—L. M. Clark, chairman, master mechanic Terre Haute, Indianapolis & Eastern Traction Company; H. H. Buchman, master mechanic Louisville & Northern Railway & Lighting Company;

F. J. Foote, master mechanic Ohio Electric Railway; Charles Sigler, superintendent of motive power Winona Interurban Railway; J. R. Fairchild, master mechanic Western Ohio Railway; P. J. Woods, master mechanic Northern Ohio Traction & Light Company; A. F. Ralston, superintendent of motive power Columbus, Delaware & Marion Railway; S. Potter, master mechanic Detroit United Railway.

Supply Men's Committee—S. D. Hutchins, chairman, Westinghouse Traction Brake Company; L. G. Parker, Cleveland Frog & Crossing Company; John F. Ohmer, Ohmer Fare Register Company; L. J. Drake, Galena Signal Oil Company; W. H. Bloss, Ohio Brass Company; J. H. Drew, Drew Electric & Manufacturing Company; John Benham, International Register Company; H. C. DeCamp, Westinghouse Electric & Manufacturing Company; G. F. Allen, Railway Materials Company; A. G. Olberding, American Brake Shoe & Foundry Company; W. H. Sigourney, General Electric Company; W. D. Hamer, Electric Service Supplies Company.

Transportation Committee—G. K. Jeffries, chairman, general superintendent Terre Haute, Indianapolis & Eastern Traction Company; H. C. Warren, general manager Toledo & Indiana Railroad; E. Smith, general manager Toledo, Fostoria & Findlay Railway; Frank Smith, vice-president Interstate Public Service Company; H. G. Gilpin, assistant general manager Ohio Electric Railway; C. E. Morgan, general superintendent Michigan Railway; J. F. Keys, general passenger agent Detroit United Railway; C. F. Franklin, general superintendent Winona Interurban Railway; J. H. Lahrmer, superintendent Columbus, Delaware & Marion Railway.

Track and Roadway Committee—T. R. H. Daniel, chairman, chief engineer Terre Haute, Indianapolis & Eastern Traction Company; T. H. Sundmaker, chief engineer Ohio Electric Railway; W. A. Carson, general manager Evansville Railway; E. Smith, general manager Toledo, Fostoria & Findlay Railway; L. A. Mitchell, superintendent track and rolling stock Union Traction Company of Indiana; Chas. H. Clark, engineer maintenance of way Cleveland Railway; H. D. Sanderson, chief engineer Michigan Railway.

Committee on Uniform Charges for Interchanged Equipment—S. W. Greenland, chairman, general manager Fort Wayne & Northern Indiana Traction Company; H. B. Cavanaugh, auditor Cleveland, Southwestern & Columbus Railway; S. R. Dunbar, purchasing agent Union Traction Company of Indiana.

Vigilance and Membership Committee—F. R. Coates, chairman, president Toledo & Western Railroad; B. J. Jones, general manager Steubenville & East Liverpool Railway & Light Company; F. J. Green, general manager Springfield, Troy & Piqua Railway; R. A. Crume, general manager Dayton & Troy Electric Railway; T. F. Grover, general manager Terre Haute, Indianapolis & Eastern Traction Company; J. N. Tabb, treasurer Kanawha Traction & Electric Company; Samuel Riddle, superintendent of transportation, Louisville & Interurban Railroad; E. C. Price, secretary Indianapolis Switch & Frog Company; E. M. Haas, Electric Railway Journal.

COMMITTEES OF CENTRAL ELECTRIC TRAFFIC ASSOCIATION

Auditing Committee—Walter Shroyer, chairman, auditor Union Traction Company of Indiana; L. T. Hixson, auditor Terre Haute, Indianapolis & Eastern Traction Company; E. L. Kasemeier, auditor Ohio Electric Railway; Irwin Fullerton, auditor Detroit United Railway; H. H. Bullitt, auditor receipts Louisville & Interurban Railroad.

Booster Committee—F. D. Norveil, chairman, general passenger and freight agent Union Traction Company of Indiana; C. O. Sullivan, traffic manager Western Ohio Railway; J. H. Crall, general passenger and freight agent Terre Haute, Indianapolis & Eastern Traction Company; O. H. Murlin, general passenger and freight agent Dayton & Troy Electric Railway; J. H. Pound, general passenger and freight agent Benton Harbor-St. Joe Railway & Light Company.

Conference Committee—F. D. Norveil, chairman, general passenger and freight agent Union Traction Company of Indiana; C. O. Sullivan, traffic manager Western Ohio Railway; J. A. Greenland, general passenger and freight agent Fort Wayne & Northern Indiana Traction Company.

Constitution and By-Laws—C. J. Laney, chairman, traffic manager Cleveland, Southwestern & Columbus Railway; Bert Weedon, general passenger and freight agent Interstate Public Service Company; E. Hamprecht, general passenger and freight agent Toledo, Bowling Green & Southern Traction Company; B. E. Parker, general superintendent Public Utilities Company; J. F. Keys, general passenger agent Detroit United Railway.

Interchangeable Mileage Ticket.—F. D. Norveil, chairman, general passenger and freight agent Union Traction Company of Indiana; W. S. Whitney, general passenger and freight agent Ohio Electric Railway; O. H. Murlin, general passenger and freight agent Dayton & Troy Electric Railway.

Interline Baggage—O. H. Murlin, chairman, general passenger and freight agent Dayton & Troy Electric Railway; C. O. Sullivan, traffic manager Western Ohio Railway; J. A. Greenland, general passenger and freight agent Fort Wayne & Northern Indiana Traction Company.

Joint Passenger Tariffs—W. S. Whitney, chairman, general freight and passenger agent Ohio Electric Railway; F. D. Norveil, general freight and passenger agent Union Traction Company of Indiana; C. J. Laney, traffic manager Cleveland, Southwestern & Columbus Railway.

Joint Freight Tariffs—J. H. Pound, chairman, general freight and passenger agent Benton-Harbor-St. Joe Railway & Light Company; L. W. Henry, chief clerk Indianapolis & Cincinnati Traction Company; C. B. Kleinhans, auditor Toledo & Indiana Railroad; W. D. Stansifer, general freight and passenger agent Winona Interurban Railway; J. O. Bradfield, general freight agent Scioto Valley Traction Company.

Official Interurban Map—G. M. Patterson, chairman, traffic manager Fort Wayne & Northwestern Railway; J. H. Crall, general freight and passenger agent Terre Haute, Indianapolis & Eastern Traction Company.; O. H. Murlin, general freight and passenger agent Dayton & Troy Electric Railway; W. S. Whitney, general freight and passenger agent Ohio Electric Railway; J. H. Pound, general freight and passenger agent Benton Harbor-St. Joe Railway & Light Company.

Official Interurban Guide—C. O. Sullivan, chairman, traffic manager Western Ohio Railway; J. M. Brick, general freight and passenger agent Springfield, Troy & Piqua Railway; F. D. Norveil, general freight and passenger agent Union Traction Company of Indiana; J. F. Starkey, general passenger agent Lake Shore Electric Railway; J. A. Greenland, general freight and passenger agent Fort Wayne & Northern Indiana Traction Company.

Joint Exception Sheet—C. O. Sullivan, chairman, traffic manager Western Ohio Railway; J. H. Crall, general freight and passenger agent Terre Haute, Indianapolis & Eastern Traction Company; H. R. Biery,

assistant to general manager Indianapolis & Louisville Traction Railway; G. M. Patterson, traffic manager Fort Wayne & Northwestern Railway; J. H. Pound, general passenger agent Benton Harbor-St. Joe Railway & Light Company; W. S. Whitney, general freight and passenger agent Ohio Electric Railway; F. D. Norveil, general freight and passenger agent Union Traction Company of Indiana.

Rules Governing Settlement of Freight Claims—F. D. Norveil, chairman, general freight and passenger agent Union Traction Company of Indiana; F. I. Hardy, superintendent of transportation Chicago, South Bend & Northern Indiana Railway; J. S. Clark, auditor Marion & Bluffton Traction Company; C. B. Kleinhaus, auditor Toledo & Indiana Railway; C. O. Sullivan, traffic manager Western Ohio Railway.

Joint Weight and Inspection Bureau—J. H. Crall, chairman, general freight and passenger agent Terre Haute, Indianapolis & Eastern Traction Company; F. D. Norveil, general freight and passenger agent Union Traction Company of Indiana; W. S. Whitney, general freight and passenger agent Ohio Electric Railway; F. I. Hardy, superintendent of transportation Chicago, South Bend & Northern Indiana Railway; O. H. Murlin, general freight and passenger agent Dayton & Troy Electric Railway.

Massachusetts Regulation Discussed

In Connection with Question of Consolidating Commissions Chairman McLeod of Public Service Body Explains Scope and Difficulties of Work

FREDERICK J. McLEOD, chairman Massachusetts Public Service Commission, appeared recently before a special legislative committee to present information relative to the work of the commission, its problems and administrative costs. The committee was one appointed to consider Governor McCall's message, of which an important feature has been a proposal to consolidate various commissions in Massachusetts. In Mr. McLeod's opinion the best results would be attained by having a commission operating wholly within a certain definite field and dealing with related problems.

Replying to a question as to the volume of work now handled, Mr. McLeod stated that at present the board has jurisdiction over 185 different companies, that the capital represented by these corporations exceeds $2,000,000,000 and that the annual income is more than $400,000,000. No commissioners that might be appointed, no matter how able, energetic or wise, would find the supervision of this field not sufficient to call forth every power and energy. One of the incidents of the change from the Railroad Commission act to the Public Service Commission statute was an increase in the salary total and also a change from three members to five. This increase in membership was caused only in a very small degree by the fact that the jurisdiction over telephone companies was vested in the new commission.

In reality, the whole scope of the work of the commission was enlarged fully tenfold. This came as the natural result of imposing on the board the authority over the fixing of rates, which is the most important power that the Public Service Commission possesses. The old Railroad Commission had no such power. The fact that the commission received authority to fix rates established a different standard in every department. The accounting department and the engineering department existed before, but only for the purpose of checking up new issues of securities. At the present time this function is only incidental to the much larger function performed by these departments in connection with the elaborate investigations which the commission is obliged to make in the large number of rate cases coming before it.

Former Rate-Fixing Methods Gone into Discard

Mr. McLeod said that the members of the former Railroad Commission exercised their functions under the law with the greatest industry, intelligence and public spirit, and that any limitation in their action was caused by a limitation of law more than by any defect on the part of the commission. The old system was for the commissioners to hear the parties upon some controversy in regard to rates or other matters; the case would be presented in an extremely sketchy way by both parties, and the board would then consider the available evidence in the light of its general knowledge of existing conditions, reach a conclusion that on the whole a certain thing should or should not be done, and made a recommendation accordingly. But this system, remarked Mr. McLeod, has all gone into the discard. The public will not in the future accept the fiat of any two, three or five men that a certain rate shall prevail. The public has a right to know the facts upon which every decision of every public tribunal is based, and the commission as now constituted under the law endeavors to make a complete and searching analysis of all the facts in each case.

When these facts have been found, the commission, under the law, is bound to follow them to their inexorable results. The functions of the commission are in many respects analagous to those of a court, but in the magnitude of the interests involved they are in many ways more important. The duties are also in many ways more onerous. Before a court the case is decided only upon the record, but the commission is obliged not only to consider the facts presented in evidence by the parties but also to make an independent investigation of the case, and to reach a decision which is justified by all existing facts and conditions.

Difficulties of the Commission's Position

The commission, stated Mr. McLeod, is placed in a very difficult position from the fact that it is between the upper and the nether millstone of two tremendous contending forces. On the one hand, certain representatives of public service companies believe that if they can show that they need the money or, in other words, have not enough money at the present time to pay all the dividends they think the company ought to pay, this fact ought to be conclusive in determining the case. They assert that the utilities have been created by private capital, but must necessarily be supported by the public, and if the revenues are not sufficient to pay a proper dividend, the Public Service Commission must raise the rates to permit additional revenue. In the judgment of such representatives the question as to whether present conditions are due to mismanagement and causes within the control of the company, is one which is an entirely superfluous matter for the commission to consider.

On the other hand, according to Mr. McLeod, some persons are inclined to believe that the board is betraying the public if it looks into the entirely irrelevant matter of finance. In their view, the only function of the companies is to give service to the people, and the question as to whether the company is getting any return on its investment is of no consequence. It is under trying conditions such as these that the commission has to perform its public functions. Any commission, concludes Mr. McLeod, which meets these problems and deals with them with consistency and courage, is likely to meet some opposition, not from one side or the other but from both sides, but such criticism is incidental to any form of public service.

Boston Elevated Reports on Safety

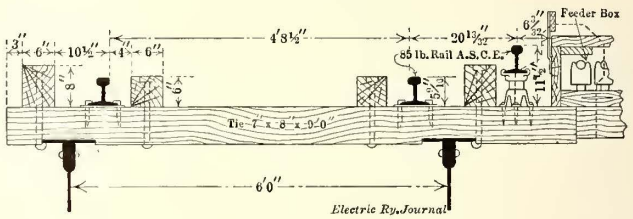
Company Explains to Public Service Commission the Impracticability of Relocating or Covering Third-Rail and Outlines Feasibilty of Various Suggested Precautions Against Fire Hazard in Subways and Tunnels

THAT it is entirely out of the question practically either to cover or relocate the third-rail on the Boston Elevated Railway is affirmed in a comprehensive report to the Massachusetts Public Service Commission signed by President Bancroft in response to a safety investigation conducted several months ago by Prof. William L. Puffer of Boston, consulting electrical engineer of the board. Neither does the company favor transferring the control of feeder and third-rail switches to adjacent station platforms, in view of the present satisfactory responsibilities of the load dispatcher in this connection. In many other respects, however, the company is in substantial accord with Professor Puffer's recommendations, notably in relation to the provision of fireproof cars in future purchases for subway and tunnel service, the separation of wire services, distant control of ventilating fans, use of emergency exit markers, and care of combustible materials.

Third-Rail Protection

With regard to covered third-rails, the company investigated the use of such equipment throughout the world, finding that in no case is there a covered third-rail system in operation where the distance from the inside gage line of the running rail nearest the third-rail to the center of the latter is less than 26 in. The corresponding distance on the Boston Elevated is 20⅜ in. This distance of 26 in. on other systems is required by the mechanical construction of the beam which carries the third-rail contactor and which is attached directly to the journal boxes. The company has been unable to design a covered third-rail for a spacing of less than 26 in. If an attempt were made to cover the rail in its present position, this cover, extending up and across above the contactor beam and third-rail shoe, would strike the truss rods or steel car sills. These extend under the side for nearly the full length of the car, the bottom being about 12½ in. down from the car body, or 12½ in. above the third-rail, the distance varying with the load and sway. The distance from the top of the third-rail to the top of the beam construction which carries the third-rail contactor is 13 in. Thus there is an overlapping condition which makes it impossible to place a third-rail cover over the present rail that would extend over the top of the beam and still clear the bottom of the truss rods or steel car sills.

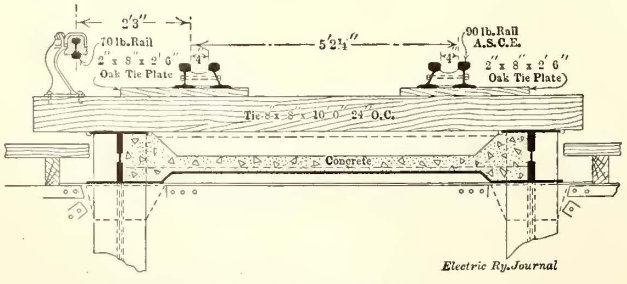
The suggestion was made that it might be feasible to so lower the third-rail as to permit lowering the contactor beam, which in turn would give room for the third-rail covering between the bottom of the truss rod and the top of the beam. It was found, however, to be absolutely necessary in order to allow for third-rail wear and provide proper tension in the contactor spring, not to exceed 2 in. in the relative heights between the running and third-rails. To lower the third-rail a sufficient distance to permit this provision of 2 in. and to permit of the contactor beam being low enough in its attachment to the truck frame to permit of the cover being over it and still be in the clear for the truss rod, would leave the top of the third-rail substantially flush with the top of the running rail. Operation under this condition would be impossible, for at points where special work occurs in the track the contactor would strike the special work at crossings and frogs. The alternative of moving the third-rail a few inches farther away from the running rail is equally undesirable, as the portion of the truck which carries the contactor would extend 4 in. beyond the edge of the car body and



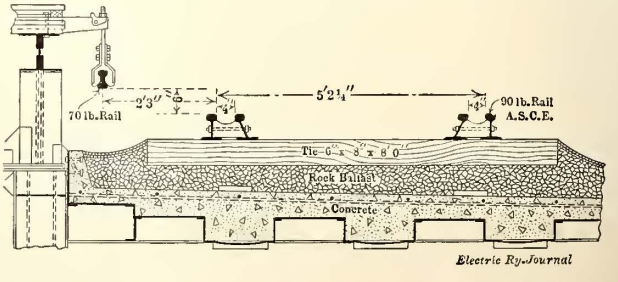
THIRD-RAIL CLEARANCE—DESIGN ADOPTED IN BOSTON IN 1901

endanger workmen on the structure, in subways or in yards, who would be justified in assuming that if they were in the clear of the car body they would be in the clear of other car obstructions. Such a plan would also involve radical and expensive changes on the elevated structure and at stations.

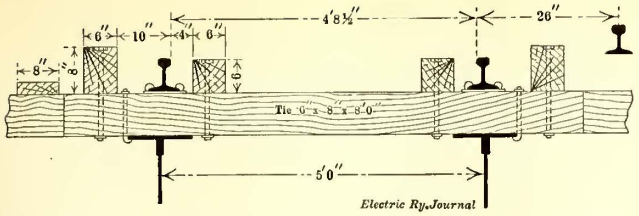
The third-rail location on the Boston system was developed at a time when little or no inverted or covered third-rail was in use and was restricted by the conditions in the Tremont Street subway, temporarily used for train service. The present wooden guard was instituted for the safety of employees in the belief that the third-rail when visible was less dangerous than when hidden. It is impossible to place the third-rail at Boston between the running rails on account of lack of clearance, and even if clearance existed there would then be no opportunity to cover the third-rail. It is also impossible to make contact with the third-rail on the side instead of on top, due to the variation in the lateral



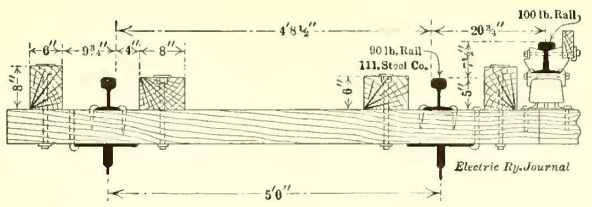
THIRD-RAIL CLEARANCE—PHILADELPHIA RAPID TRANSIT COMPANY'S BRACKET DESIGN



THIRD-RAIL CLEARANCE—PHILADELPHIA RAPID TRANSIT COMPANY'S TOP-SUPPORT DESIGN



THIRD-RAIL CLEARANCE—LOCATION DIAGRAM FOR NEW YORK RAPID TRANSIT PROJECTS



THIRD-RAIL CLEARANCE—MANHATTAN ELEVATED RAILWAY DESIGN, 1902

motion of the truck frame, which amounts to as much as 1⅞ in.

The present method of protection, as approved by the Railroad Commission originally, consists of a strip of board about 4½ in. wide fastened to uprights parallel to and 6 in. outside the third-rail, which, in connection with the footwalk and guard timber, has served its purpose well. From early operation in 1901 to April 20, 1915, there were but fifteen serious accidents relating to third-rail service, nine of these being fatalities. In seven of the fatalities the victims were employees, and in five of the nine cases it is probable that the deceased was struck by a train before coming in contact with the third-rail. Two of the cases injured were trespassers. The total passengers carried from the opening day of service was 1,368,068,223, or 91,204,548 passengers per serious third-rail accident. It is the company's intention to continue to study the problem.

Control of Power Switches

The control of heavy power circuits from adjacent station platforms appears unwise to the company because of the confusion and possibility of dangerous conditions resulting from taking the control of these away from the load dispatcher at the South Boston station, and again, because the third-rail sections controlled by these switches are so arranged that in case a section should be killed by a station master, there is a considerable possibility that a moving train would pass from a live to a dead section, causing the blowing of shoe fuses on cars, with heavy flashes, smoke and possibly arcing. This would be apt to cause panic among passengers, and the passing of a train from a live to a dead section would energize the latter, an extremely dangerous practice.

The present feeder system is under the control of the load dispatcher, who is the one man on the road who knows from minute to minute the exact arrangement of the system. No change is made in the feeder system except by his orders. He is the only man who has at all times the information necessary to issue correct orders in case it is necessary to cut the power off any section. The present method of communication with him has proved satisfactory, but under some conditions might be too slow. To improve this, it is proposed to install a signal-box system connected with the load dispatcher's and chief train dispatcher's offices, with boxes on every station platform and between stations. An alarm rung in from any of these boxes will sound the corresponding number on tappers and record its number on tape, and immediately upon receiving such alarm the load dispatcher will have all power cut off from the section or sections involved.

Miscellaneous Safeguards

The company intends to equip all emergency exits and telephone stations with a significantly shaped globe of a blue color, and to install additional fire extinguishers at such stations in subways and tunnels. The company also intends to equip all ventilating fans for operation from two independent sources of power controllable from station platforms, with automatic transfer of feed in case of the failure of either. The company does not feel warranted in changing the general direction of air movement in subways and tunnels, since the original construction by the Boston Transit Commission provided a specific manner in which ventilation should be carried out. The company also plans to fireproof the Boylston Street subway lighting switchboard room by installing a reinforced concrete floor and steel furniture, and, by isolating the local Edison transformers, will provide outside ventilation. The removal of return feeders from conduits containing power cables, separation of telephone, signal and lighting cables from power cables, and other improvements are under way or immediately in hand.

It is the intention to purchase wholly fireproof cars in the future for underground service, but the company does not consider it possible to replace the present wooden floors of the wood or semi-wooden cars used in the Washington Street tunnel with fireproof floors. This could only be done at the prohibitive cost of replacing the existing car bodies by steel bodies. It is felt that the floors are now protected where fire is likely to occur, and taking into consideration the fact that during the fourteen years in which these cars have been in operation there has never been a case where such additional fireproofing would have been of value, the expense of further protecting the car floors is not warranted.

The installation of a new signal system for the East Boston tunnel and its extension had been authorized previously to the receipt of Professor Puffer's report, and installation was about to begin at the writing of the reply. The company has been unable to find any automatic stop suitable for high-speed surface cars used in subways and tunnels, but the signal companies as well as the Boston Elevated organization are still actively at work on the problem.

Arrangements have been made for the collection and removal of rubbish from subways and tunnels three times a week. It is considered unnecessary to remove from underground routes all combustible equipment such as wooden column shields, seats, shelves at newsstands, switch boxes, sand boxes, turnstile drums, fences, etc. In most instances this would be slow-burning material and would cause little damage. To prevent fires from spontaneous combustion of dust on the wooden trolley trough of the Tremont Street subway, frequent cleaning is proposed, together with a coat of fireproof paint every two years.

Wooden switch boxes are now lined with asbestos. It is more important that switch-box material should be non-conducting than non-combustible. Such boxes are located either on the ground or in wall niches, and offer little opportunity for serious fire troubles. Care will also be exercised in the location of wooden tool boxes, permanent boxes being of fireproof material. Considerable blocking is kept in subways, but it is necessary for use in case of accident and offers little fire risk. Fireproof receptacles for sawdust, asbestos sheathing for sign operators' towers, and metal lockers are to be provided.

COMMUNICATIONS

Tripping of Circuit Breakers with Cars Descending Grades

[NOTE.—A correspondent recently inquired regarding the causes of the opening of circuit breakers when cars are descending steep grades with power on. As F. E. Wynne of the Westinghouse Electric & Manufacturing Company had made a special study of this phenomenon he was asked to give our readers the benefit of the result of this study. He has done so in the following letter.—EDS.]

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURGH, PA., March 14, 1916.

To the Editors:

Regarding your inquiry on this subject I would say that I have frequently noticed opening of the circuit breakers on cars descending steep grades at high speeds.

I think that this circuit-breaker tripping is due to excessive currents resulting from a momentary interruption of current which is followed by the restoration of full voltage. Such a condition may be produced by the trolley wheel jumping on the wire, by brushes jumping on the commutator or similar causes. In case the trolley wheel jumps, the interval before power is restored may be sufficient to let the motor field die out so that the restoration of power may produce sufficient current to trip the circuit breaker even though the motors do not flash.

Either jumping trolley wheels or brushes may produce a flash which, of course, would account for the circuit breakers opening. Practically all cases which I have noted have been of motors of the non-commutating pole type. With motors of this type it is also probable that a sudden rise in voltage at the car, due to power being thrown off other cars, while not in itself producing sufficient current to trip the breaker, might yet cause a flash with the resulting excessive draft of power.

F. E. WYNNE,
Engineer Railway Section
General Engineering Division.

Car Operation Efficiency

L. B. STILLWELL, CONSULTING ENGINEERS
NEW YORK, March 20, 1916.

To the Editors:

I have read with interest Mr. Chappelle's analysis of the "Fundamental Principles of Car Operation Efficiency," as based upon the coasting element in the speed-time curve, which was published in the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 15, 1916. The theory of the coasting element of the speed-time curve, as measured by the coasting clock, was discussed in a paper on "Power Economy in Electric Railway Operation—Coasting Tests on the Manhattan Railway, New York," presented by me before the American Institute of Electrical Engineers on June 28, 1910.

The analysis now made by Mr. Chappelle reaches the same conclusions as were then presented, excepting that Mr. Chappelle has extended his analysis to include a general solution of the problem, and includes also a study of the relation between platform expense and the most economical schedule speed for any given equipment and condition of operation. This is a very interesting addition to the subject and should be of value to operating companies.

The useful energy absorbed in moving a train or car from one point to another depends only upon the train resistance, which, of course, includes the resistance due to grades and curves. The wasted energy appears as rheostat losses in acceleration, motor losses and energy absorbed in braking. Where the equipment for a road is already installed the useful energy required for a run over a given portion of the road is practically constant. As has been frequently pointed out, any method of operation that results in the application of the brakes at a lower speed tends to produce a saving in the energy used. Any method of operation that increases the amount of coasting decreases the speed at which the brakes are applied and tends to reduce the amount of energy wasted in braking, and hence also tends to reduce the amount of energy required for the operation of the train. In railway equipments as usually installed the relationship seems to be that an increase of 1 per cent in the amount of coasting results in a saving of approximately 1 per cent in the total amount of energy used.

It has been called to my attention that in my paper above mentioned the paragraph referring to a momentary pause on the series point during acceleration and the effect of such a pause on the amount of energy used shows a result inconsistent with the general principle as set forth above. The general principle, however, is controlling in this case also, the discrepancy being caused by factors resulting from the use of the starting resistance.

The pausing on series position of the controller for a few seconds should not be confused with such operation as occurs in short runs encountered in congested districts of a surface line route, or in approaching curves and switches where series operation only is a special and unavoidable condition, with an equipment selected for normal multiple operation in reference to the average conditions encountered in service.

The result of a pause on the series point in acceleration is a reduction in the average rate of acceleration, and this results in a decrease in the amount of coasting, an increase in the speed at which braking is begun, and therefore an increase in the energy wasted in braking. There would then be a corresponding increase in the energy actually used in the operation of the train, unless it is offset by the reduction in the energy absorbed in the rheostat, due to the elimination of a part of the rheostat losses in the multiple position. The energy absorbed in the rheostat is not actually used in the movement of the train, but is absorbed in the rheostat before it reaches the motors. If the reduced voltage on the motors could be obtained in some other way, the general principle would hold true in this case as in all others. In the case where rheostat control is used, however, a slight pause on the series position in acceleration results in cutting out a material portion of the rheostat losses in the multiple position, because of the increase that has occurred in the speed of the train. This reduction in rheostat losses tends to offset the additional energy required because of the lower average rate of acceleration. For a very short pause on series, in acceleration, amounting to from one to three or four seconds, depending on the maximum speed of the equipment used and the rate of initial acceleration, the reduction in the energy losses in the rheostat may equal or exceed the increase in the actual energy input to the motors caused by the resulting lower average rate of acceleration. Under such circumstances there will be but little or no increase in the total energy taken by the equipment, or it may even decrease.

As the rheostat is in circuit in the multiple position for from, say, four to fifteen* seconds only, depending upon the maximum speed of the equipment and the

*This long period is found in heavy electric traction.

initial rate of acceleration used, the possible pause that can produce this effect must, of course, be of short duration. As the saving in energy, if any, resulting from this method of operation increases the wear on brake-shoes and wheels and endangers the maintenance of the schedule, motormen should be instructed against pausing on the series point during acceleration. The best all-round results are obtained by getting up to speed as rapidly as practicable.

The disadvantages of rheostatic control have been long recognized, but the rheostat is the most practical device available for d.c. motor control. Where it is possible to obtain voltage control directly, as in alternating-current operation or by field regulation in direct-current operation, then the general principle is of universal application. It can be stated generally, therefore, that any method of operation that increases the amount of coasting decreases the amount of energy required for the operation of the train.

H. S. Putnam.

American Association News

Chicago Section Hears Lucid and Instructive Lecture on Multiple-Unit Equipment—New Haven Section Recently Summed Up the Winter's Experience on Snow Fighting

Chicago Elevated Section

One hundred and twenty-five men attended the March 21 meeting of the Chicago Elevated Railroad Company section. The secretary reported a total of 217 applications for membership with 183 members paid up. Copies of the constitution and by-laws were distributed in the form of a neat paper-covered booklet. The president was instructed to appoint a librarian to preserve section copies of publications. The section approved the design for the company section badge.

The speaker of the evening was Henry Cordell, general foreman, Northwestern shops, his topic being "Multiple-Unit Train Control." By starting with the fundamental principles and leading his listeners on step by step he was able, with the aid of excellent lantern slides, to make a somewhat intricate subject quite clear.

In addition to the technical explanations Mr. Cordell gave some interesting historical information regarding the multiple-unit equipment on the local lines. He directed attention to the fact that when electric equipment replaced steam locomotives on the South Side Elevated Railroad, the first multiple-unit apparatus ever built was installed on that road. He said that the same apparatus which was installed in 1898 is upon the cars at the present time and is satisfactorily operating under present-day service requirements, which are so much more exacting than the service which was in the mind of Frank J. Sprague when he developed the apparatus. He said further that no type of multiple-unit equipment has ever been removed from the cars on account of being replaced with modern apparatus, as all of the various forms have been maintained and are in successful everyday operation.

Snow-Fighting Discussion at New Haven

At a recent meeting of the Connecticut Company section the paper on snow fighting presented at an earlier meeting by Harold Bates was discussed by W. P. Bristol, manager Hartford; M. E. Stark, roadmaster Bridgeport; W. F. McCoy, master mechanic Bridgeport; F. P. McKaig, roadmaster Hartford. This discussion is appropriate in summing up the experience of the past winter while the experiences are fresh in mind.

Mr. Bristol said that there is no railway work other than snow fighting where there is practically no time to make preparation. Even at the beginning of a storm it is impossible to tell what to expect. There is little opportunity to break in men for this class of work, as they must be trained by working with experienced crews or individuals. In Hartford the cost of hauling snow by team is 30 cents per yard, and for hauling by motor car and flats, 11 cents per yard. The latter cost could be reduced by increasing the numbers of trains and men used. Mr. Bristol recommended the placing of noses or shares, possibly with removable blades, on cars suitable for handling heavy materials in season. Thus for the price of one car a company would have practically two.

Mr. Stark referred to the difference of opinion among railway men as to the relative merits of sweepers and plows. He believed that too much dependence should not be placed on either alone. The sweeper is useful in city streets, especially on hills, while the plows can keep suburban and interurban lines open, buck drifts and help out the sweepers in heavy snow. The equipping of express and other work cars with plows is worthy of attention. One advantage of using regular equipment, equipped with plows and scrapers, is that this is usually on the road when a storm starts and can be put to work promptly. Mr. Stark also advocated the use of both permanent and portable fences to prevent snow from drifting on the track. He had had excellent success with these.

Mr. McCoy told of his experience in Bridgeport with steel brooms for rotary sweepers. The cost of equipping a sweeper with them is $40 as against $26 for rattan. The cost of threading with steel is $2 more so that the total difference in cost is $16. The steel is practically indestructible. The sweepers with steel brooms must be stored in a dry place in off seasons to prevent rusting. On the division of the system with which Mr. McCoy is connected all snow-fighting equipment is in the fall sent out on the road for testing. This discloses defects and allows time for repairs before winter sets in.

Mr. McKaig emphasized the importance of systematic preparation for snow and of apportioning duties of snow fighters. About the end of October the company's track department cleans ditches, culverts and catch basins and provides good track drainage. Snow fences are placed, where necessary, 25 ft. to 50 ft. to the windward of the track. Some property owners require a small rental where fences are placed on their premises. As the track forces are continually changing a snow drill is given every fall. Each foreman takes his men over their routes and instructs them in the performance of their duties. The foremen familiarize themselves with the men's home surroundings so as to be able to locate them promptly when needed. In salting grooved rail in Hartford in order to keep the groove from clogging two work cars equipped with spouts are used.

EQUIPMENT AND ITS MAINTENANCE

Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

Contributions from the Men in the Field Are Solicited and Will Be Paid for at Special Rates.

Reclaiming Oxidized Babbitt

BY DANIEL DURIE
Master Mechanic, West Penn Railways, Connellsville, Pa.

Oxidized babbitt, which is always present on the surface of a melting pot, may be almost entirely reclaimed. In the shops of the West Penn Railways, all oxidized babbitt is carefully skimmed from the melting pot, and after a sufficient quantity has been collected it is reheated in the pot after mixing with sal ammoniac, which acts as a deoxidizer. The mixture is composed of 1 lb. of sal ammoniac and 100 lb. of oxidized babbitt. After this rendering the residue remaining is spread over a steel plate with a trough at one side which leads to a mold. The sal ammoniac crystals are sprinkled over the babbitt oxide and mixed with it, after which heat is applied beneath the plate and the molten babbitt flows off into the mold. After the second rendering a certain amount of residue is left, and this is sold to a babbitt manufacturing concern which reclaims the remainder of the babbitt. The average price obtained for this residue is about 25 per cent less than the cost of new babbitt.

In the shops of the West Penn Railways approximately 300 lb. of dross is collected every three months. The first rendering of this babbitt oxide reclaims approximately 100 lb. of good babbitt, and the second rendering reclaims approximately 46 lb., making a total of 146 lb. of babbitt recovered in all. The remaining 154 lb. is sold to a local babbitt dealer. Whenever babbitt is melted charcoal is sprinkled over the surface to reduce to a minimum the amount oxidized. Regardless of this precaution, however, the above-mentioned 300 lb. of dross is collected during the rebabbitting of approximately 250 bearings.

Light-Weight Interurban Cars

BY R. W. PALMER
Manager Cleveland & Erie Railway, Girard, Pa.

The Cleveland & Erie Railway has recently placed in service two center-entrance steel cars which were built by the Niles Car Company and which have proved to be very satisfactory and popular with the traveling public. In their design a departure from the usual practice has been made in that the smoking compartment has been placed in the rear, which arrangement, in the writer's opinion, has several advantages. One reason for this belief is that all roads at times handle passengers who have been drinking more or less, and who are objectionable to other patrons, especially women or children, on account of their actions or talk. The conductor, however, is not always justified in ejecting them. This class of people usually ride in the smoking compartment, and with the smoking compartment in the rear they do not come in contact with those occupying the forward compartment nor are they in view. In other words, it is practically the same as though the smoker was a separate car.

In addition the rear smoking compartment permits the location of the cab in the main compartment, and the passengers there are less liable to try and enter into conversation with the motorman or otherwise attempt to distract his attention from his duties or interfere with him in the proper operation of his car. By locating the motorman's cab on one side, instead of using the full width of the car, space is gained for two additional seats. This arrangement also permits an unobstructed view of a large percentage of the passengers in this compartment, which feature has proven quite popular, as evidenced by the fact that the seats toward the front are usually filled first, and as the front and rear portions of the car are most attractive, passengers move away from the entrance, relieving the congestion at this point.

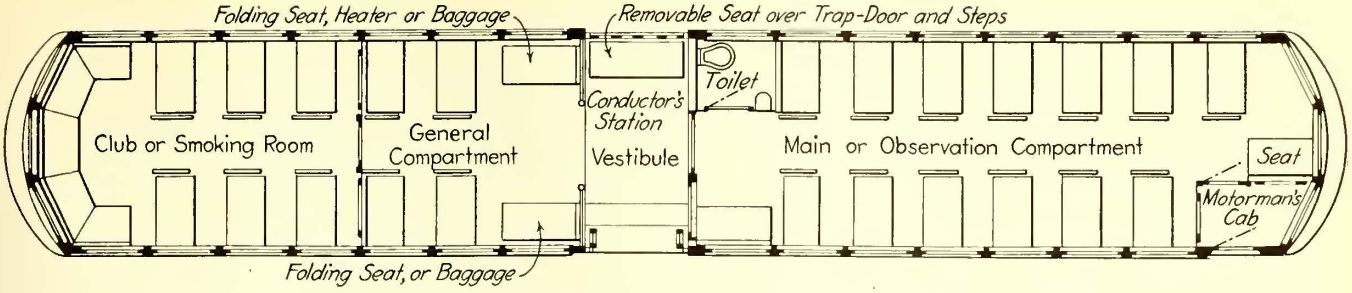
The motorman's cab in the new Cleveland & Erie cars occupies the space of one seat and is made of steel, having space cut out on the back and aisle sides, which openings are inclosed with sash so as to allow the motorman a clear view on all sides. These openings are covered with roller shades on the inside of the cab so that the motorman can cut off the light from the car at night. The cab is just large enough to accommodate comfortably the necessary apparatus and one man, but not large enough to accommodate two men. This arrangement prevents the objectionable feature of passengers or employees and officials riding with and talking to the motorman, distracting his attention from his duties, a practice, no matter how strict the rules, that is quite common on practically all interurban roads where there is unnecessary room on the front platform.

CLEVELAND & ERIE CENTER-ENTRANCE INTERURBAN CAR—IN WINTER TRIM

Inasmuch as it was not considered practical to reserve half the car for smokers, a bulkhead was built, dividing the smoker from the center compartment; this space acts as an overflow in case the other two compartments are filled. The two longitudinal seats in the center compartment next to the wall are arranged so that they may be folded up to admit of carrying light baggage when necessary.

All seats in the car, with the exception of the longitudinal seats, face forward, each seat having ample knee room in front for comfort. The seats are Hale & Kilburn No. 11, C. E. non-reversible type, upholstered in green plush in the main compartment and Fabrikoid imitation leather in the other compartments.

The interior finish is mahogany with Agasote head-



CLEVELAND & ERIE CENTER-ENTRANCE INTERURBAN CAR—SEATING PLAN

lining painted buff color so as to reflect the light, which is supplied from the 40-watt Mazda lamps with Alba shades placed in a row over the aisle in the center of the ceiling. A separate circuit of five 40-watt lamps is used in connection with classification signals, toilet room and tail lights, the lamps for the tail lights being located on brackets over the circular seat in the rear in such a manner as to afford both light for the inside of the car end and at the same time furnish ample illumination for the red bull's-eyes located in the letterboard above the rear windows. Two extra lamps located over the steps on either side of the center platform are wired in on this auxiliary circuit and are used for supplying additional light at the center entrance openings when current is not required for classification signals. In addition to the two electric tail lights an Adams & Westlake No. 15 oil lamp with 8-in. red lens is suspended from a bracket in the center of the rear panel below the window.

The windows are equipped with Edwards fixtures and pantasote curtains on Rex spring rollers. Ventilation is provided by fourteen Globe ventilators, and the Peter Smith hot-water system is used for heating, one folding seat being removed in the winter to accommodate the stove. The center-entrance openings are equipped with four 9-in. folding doors operated by an air engine under control of the motorman on the cab side of the car and manual control operated by the conductor on the opposite side, it being the intention to load and discharge most of the passengers through the doors that are operated by the motorman.

The construction of the cars, which are steel throughout, consists of a light, strong underframe made of 6-in. continuous channels extending under the center-entrance openings, to which are riveted continuous "T" posts running from one side of the car to the other, forming roof supports. The posts are covered on top with galvanized steel roofing riveted to each post or carline, and this steel roof in turn is covered with 1 in. of compressed cork and canvas. The sides under the windows are covered with steel riveted to each post and lined with 1 in. of cork and paneled with ¼-in. Agasote. All bulkheads and the toilet room are of steel, being built in so as to add strength to the car.

The electric equipment consists of single-end H L control and four Westinghouse 306-V motors on one car and four GE-57 remodeled and semi-ventilated two-turn motors on the other, the gear ratio being 26-29.

Air-brake apparatus consists of S. M. E. Westinghouse equipment and National BB-2 compressors. In addition to the motorman's valve a conductor's emergency valve was installed with cord running to the rear, so that the car can be stopped by the conductor instantly in case of necessity when the car is being backed around the wyes at terminals or at other points. This cord is also within easy reach of the conductor from the center platform for use in emergency cases.

The cars are mounted on Baldwin trucks bushed throughout with case-hardened bushings. There are case-hardened bolts in the brake work, and these have spring washers, castellated nuts and cotter keys tending to produce high brake efficiency. On one car the trucks are equipped with the "One-Ball" center bearing, which is a universal joint, the whole weight on each center plate coming direct on the truck bolster on a frictionless, case-hardened ball which rotates in a bell-metal bearing, thus producing high efficiency on curves and flange economy. The front trucks are equipped with air-operated Root spring scrapers, and in the winter the regular wood pilot is replaced with a steel nose for handling snow.

In the design and selection of these cars it was the desire of the management to secure an attractive, easy-riding, strong, light-weight car, which would comfortably seat a large number of passengers and, on account of frequent stops, admit of loading and unloading quickly as well as prevent the accidents caused by passengers boarding and leaving the car while in motion. In actual practice, up to date, the cars have met their requirements very nicely.

DIMENSIONS AND WEIGHTS

Length over bumpers	51 ft. 0 in.
Extreme width	8 ft. 8 in.
Seating capacity without stove	61
Width of aisle	23¾ in.
Width of seats	38 in.
Height on trucks from rail to top of trolley board	12 ft. 10 in.
Weight of car body complete	28,618 lb.
Weight of trucks completely equipped	27,520 lb.
Total weight of car complete on track	56,138 lb.
Weight per seated passenger	920 lb.

As the tendency at the present time is toward lighter equipment, the car described above, seating sixty-one passengers comfortably, weighing complete 28 tons, offers a good example of equipment that is as light as practical consistent with strength. As it is capable of attaining a speed of 50 miles per hour with its 50-hp. motors it appears to be a car which might be operated especially profitably in connection with suburban or interurban service.

Safe Test Lead Contact Handle

BY BERNARD DOYLE
New York Railways

The accompanying illustration shows a test lead contact handle which insures safety to the operator. It consists of a wooden handle turned with a large flange on the end. A sharp-pointed steel terminal is screwed into the wood, and a flexible insulated wire, led through

SAFE TEST LEAD CONTACT HANDLE

a hole drilled in the rounded end of the handle, ends in a spring switch inside the handle. This spring is operated by a push button which must be depressed before the wire is electrically connected with the contact point. The essential feature of this device is the push-button switch, which makes it necessary for the operator to keep his hands on the wooden handles, thereby eliminating any chance of him touching live parts.

Emergency Snow-Fighting Equipment

BY W. G. MURRIN

General Superintendent British Columbia Electric Railway, Ltd.

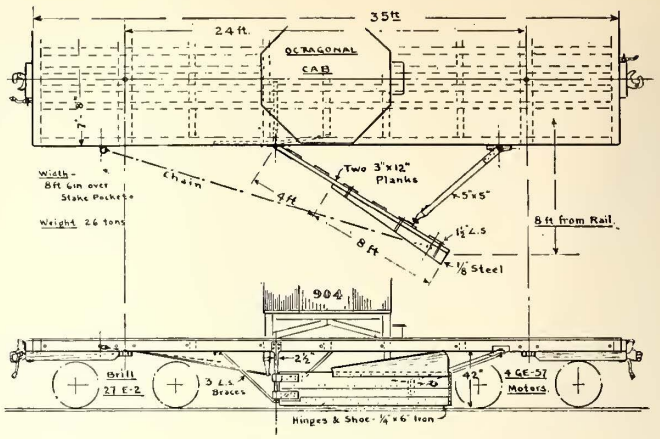
Mention was made in a recent issue of the ELECTRIC RAILWAY JOURNAL of the record snowfall during the first week in February in the British Columbia coast cities. Nevertheless the policy of "preparedness" of the British Columbia Electric Railway enabled it to maintain practically a full service throughout the whole ten days beginning Jan. 30, during which time more than 3 ft. of snow fell, following a series of lighter storms during the month of January, the total fall of snow being more than 5 ft.

Although the climate on the Pacific slope during the winter is usually mild, with considerable rainfall, snow is not unknown, particularly close to the mountain ranges, and previous experience led the British Columbia Electric Railway to provide for such an emergency. On its interurban system, which extends eastward between the Fraser River and the international boundary for a distance of 76 miles from Vancouver, snow falls more frequently as the distance from salt water increases, and to provide against this two 50-ton locomotives were equipped with steel plows. For the short lines around Vancouver, and between that city and New Westminster, on the banks of the Fraser, one of the lighter engines was converted into a shear plow, with flangers.

With this equipment the interurban lines were able to operate without any interruption more serious than a slight disorganization of schedules on Feb. 2, when about 18 in. of snow fell followed by a high wind which caused some drifts to form. In this connection it is interesting to note the advantage gained with multiple-unit trains, in which the rear cars running on rails cleared by the leading car are able to push it ahead, when a single car would be likely to become stalled. The trains over the Fraser Valley line arrived less than half an hour late, while both the Great Northern and Canadian Northern Pacific steam lines had their trains either several hours late or stalled completely.

To keep the city lines open the company had four rotary, long-broom sweepers in Vancouver and one in

VIEW ON GRANVILLE STREET, LOOKING NORTH FROM GEORGIA STREET



IMPROVISED WING PLOW

New Westminster. When the big storm set in these sweepers had already been doing considerable work with the result that their brooms were more or less worn, and great difficulty had been experienced in obtaining proper material to renew them. However, the sweepers were able to keep all lines open, the only result being occasional bunching of cars on some of the longer routes, but as the snow became deeper all vehicle traffic took to the tracks, getting in the way of cars and tramping the snow back into the rail grooves again as fast as the sweepers took it out. Motor trucks frequently became stalled and had to be helped out of the way, causing still more aggravation and heartaches to the traffic officials.

At the end of the first day's battle it was seen that to get rid of this trouble caused by other vehicles, some means must be had to clear the snow farther from the tracks. For this purpose one of the work cars was hastily requisitioned and equipped with a heavy wingboard. Work was started the second morning of the storm, and by 10 o'clock that night the machine had a trial on one of the worst streets. Banks of snow more than 5 ft. in height were easily thrust back 8 ft. from the rails, and by the time regular service began the next day more than 50 miles of track had been gone over, the sweepers first cleaning the tracks. After this the service was maintained through almost continuous snowfalls for the following week, till the last storm of wet snow got the better of the now partially-disabled brooms, and the packing of snow on the pavements raised a new difficulty. This was promptly met by devising a sort of harrow, attached to another work car, which broke up the icy mass between the rails sufficiently to enable the sweepers to remove the worst of it. Only three unimportant lines were tied up by this storm, and in one case traffic was diverted to a near-by street so that the patrons were not seriously inconvenienced.

The accompanying sketch shows how the wingboard was rigged up, at a total cost of about $40. Another shunter was similarly fitted up but, as the storm had ended, this was not required.

In addition to the foregoing equipment, a large force of men was employed in cleaning out switches and curves, using large quantities of salt which was distributed to convenient points on a special car. The total amount of salt used was approximately 40 tons, and the total extra cost of keeping the 250 miles of city and interurban lines open during the ten days was about $14,000.

Some compensation for all this work was realized in the increase in both passenger and freight traffic. After the first day the jitneys, which had averaged about seventy-five in Vancouver, and twenty to thirty over

the paved highway between Vancouver and New Westminster, gave up completely. Owners of private cars put them away and used the street cars. Motor delivery vehicles confined their operation to streets which were opened by the electric railway or local service, leaving a large quantity of suburban freight to be handled by the interurban express trains, so that in addition to the difficulties arising from the snow, schedules were rendered more difficult by heavy loads. In spite of all these handicaps a continuous service was maintained, and for the time the traveling public cheerfully accepted the situation, thankful that at least one means of getting around town was to be depended upon. Many letters of appreciation were received by the electric railway officials, including a resolution from the Board of Trade, and the daily press not only pointed out how absolutely dependent the city was upon the street cars, but called attention to the miserable failure of the jitneys to assume any responsibility to the public as common carriers. Nevertheless, when the storm was over and the railway had cleared the streets for them, they crawled out of cover and found a good many people had forgotten who had saved them from being snowbound.

An Automatically Operated Track Cleaner

BY E. C. SHERWOOD
Superintendent of Equipment Manhattan & Queens Traction Corporation, Long Island City, N. Y.

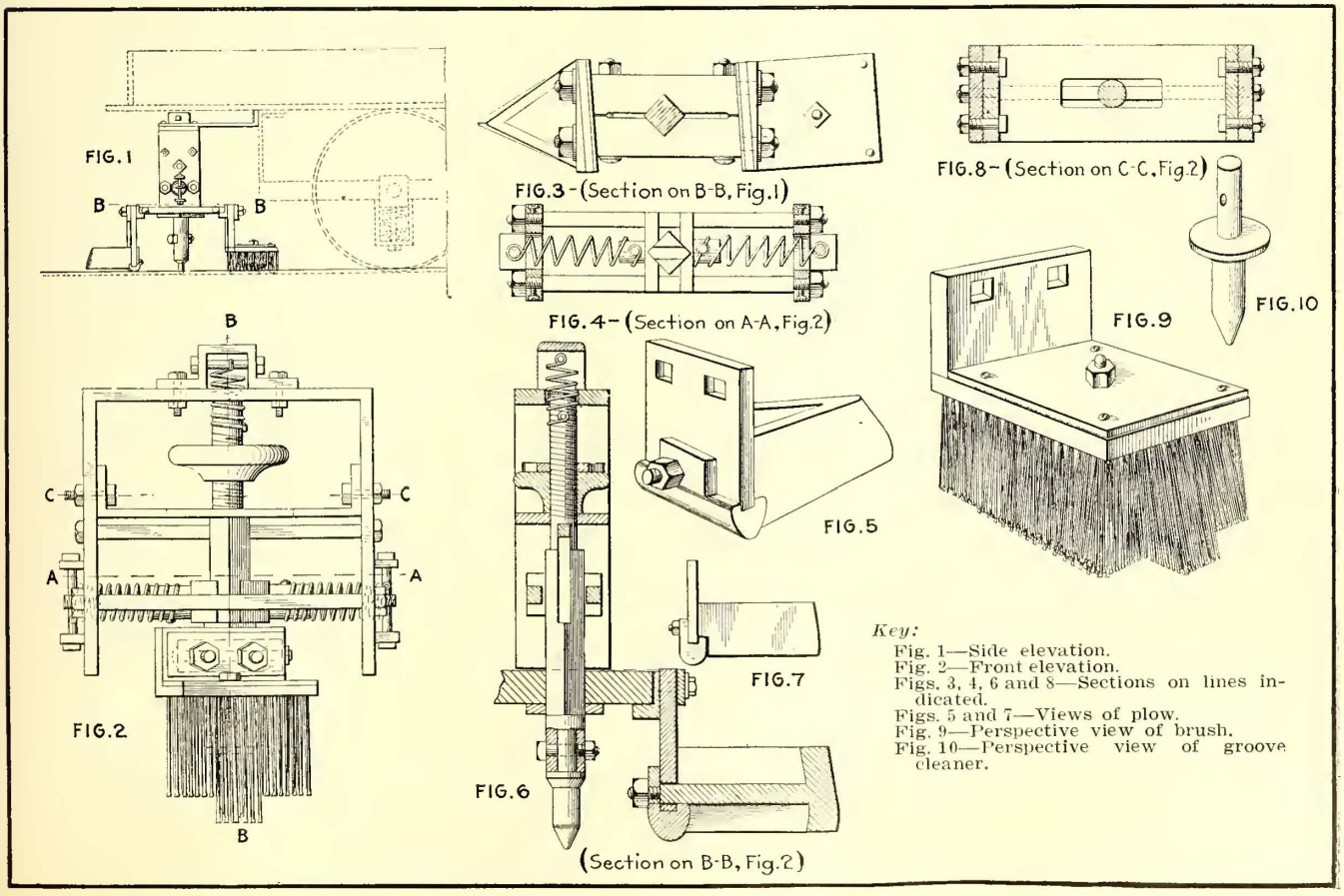
This company has recently completed a satisfactory test with a patented track cleaner which is arranged to clean out the grooves of the grooved rail, and at the same time brushes away the dirt from the rail by means of a steel brush. The cleaner rides over crossovers, frogs, etc., without any trouble, and can be raised when not in use free and clear of the rail. As considerable trouble is experienced by many railways which use grooved rails, owing to the chipping of cast-iron wheels by obstructions in the grooves, which may also cause derailments, particularly in cities where considerable construction work is going on or where streets are being repaired, such a device seems to have a good field. A number of drawings of the device are reproduced herewith, and the construction can be followed by means of the key given with them. The drawings are diagrammatic only, several different scales being employed as best served the purpose for which each sketch was shown.

Essentially the device consists of a flexibly-mounted vertical rod which carries at its lower end the cleaning devices, and which is carried by a supporting and guide frame mounted on a bracket attached to the truck frame.

As shown in Figs. 1, 2 and 6, the frame is of inverted U-form, and it is provided with guide strips designed to hold the vertical rod in a central position, but capable of some movement in the plane of the frame. Flexibility of the rod in a vertical direction is provided by a spring on the top, and in a horizontal direction by means of two springs which in their normal position hold the rod centrally. The upper end of the rod is threaded to accommodate a pair of nuts for adjusting the vertical play, while the lower end is of square cross-section to prevent rotation.

The lower end of the rod carries a blunt-pointed steel pin which acts as a groove cleaner, and also a plate on one end of which is a plow and on the other a steel brush.

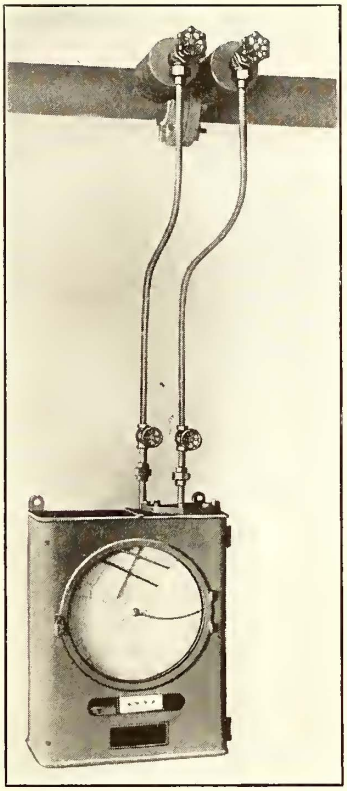
From this description and the drawings it is evident that the plow and brush, while constrained by the springs, have sufficient freedom of movement in two directions to enable them to pass over or around obstructions.



DETAILS OF AUTOMATICALLY OPERATED TRACK CLEANER

New Form of Flow Meter

A meter designed for the measurement of the flow of steam, water and gases in pipes has recently been placed on the market by the Bailey Meter Company, Boston, Mass., and it contains a number of valuable features that are distinctly novel. The operation depends upon the measurement (by a mercury float-gage) of the difference in pressure on the two sides of an orifice plate that is introduced into the pipe line containing the fluid that is to be measured, the orifice being in the form of a segment of a circle. The pressure loss thus caused is never more than about 1 lb., less than the loss caused by an ordinary elbow, globe valve or non-return valve with present-day velocities. The integration of the pressure differences is effected by a clock-driven disk and a follower that is connected to the float-gage.



NEW FORM OF FLOW METER

The orifice plate is made of 1/32-in. Monel metal, and is corrugated near its outer edge so that it can be introduced between a pair of flanges, forming its own gasket without any other packing. Test plates have been taken out from high velocity steam lines after more than one year's constant service, and it is said that they show absolutely no wear, the square edges being just as sharp as when they were put in.

Two pipes connect the meter to the steam main, one being placed on either side of the orifice, and these are kept full of condensed steam or water. To assure this condition condensers consisting of short lengths of copper tube with a number of washers, or fins, are introduced between the main and the connecting pipes, serving to keep the water level constant, and maintaining substantially equal temperatures in the connecting pipes.

The meter provides, in addition to the integration, a recording chart. There are but two moving parts in the latter part of the meter, and these are not subjected to the direct action of the steam, hot gases or other fluid that is being metered. The pressure difference, which is transmitted through the connecting pipes, is applied to opposite sides of a specially-shaped bell which is sealed in mercury, and this acts like a frictionless piston, using the buoyant action of the mercury on the walls of the bell to balance the force due to the pressure difference. The bell has a variable cross-section, so that the recorder gives a reading that varies in direct proportion to the rate of flow. Consequently, charts with uniform graduations are used and the records can be easily read or totaled with a radiimeter. There are no springs, diaphragms, flexible connectors, magnets, cams, or other complicated mechanisms involved in the construction.

Another valuable feature is an automatic shut-off, which prevents blowing out of the mercury, or other damage, when the pressure in either connecting pipe is excessive because of an abnormally high rate of flow, improper opening of valves, or even the breaking of one of the pipes. This shut-off is effected by soft gaskets at the top and bottom of the bell, which close either opening at which the pressure may be abnormally reduced, and this prevents the escape of the mercury in the bell.

The meter may be provided with either or both pressure and temperature-recording pens in addition to the flow-recording pen, these recording near the center of the same chart on which the flow is marked. They are operated by the well-known Bristol or Foxboro helical tubes connected respectively to the arm of the bell casing and to a thermometer bulb located in the steam line.

Manually-Operated Door and Step Control

The Buffalo & Lake Erie Traction Company has recently purchased ten sets of manually-operated door and step control furnished by the National Pneumatic Company, Chicago and New York. The cars equipped with this control are in city service. It was believed by the management that the desired speed in door and step operation for its service conditions could be obtained with the type of manual control adopted.

The National Pneumatic Company's well-known interlocking safety door control will also go on these cars. This signal control speeds up schedules, besides furthering safety, for the controller is on the first notch at the moment the closing of the doors flashes the light signal to the motorman. This is the system also installed on the Springfield and Worcester cars changed from open to prepayment type, as described in the ELECTRIC RAILWAY JOURNAL for March 25.

A description of the manual door and step control follows:

DOOR PARTS

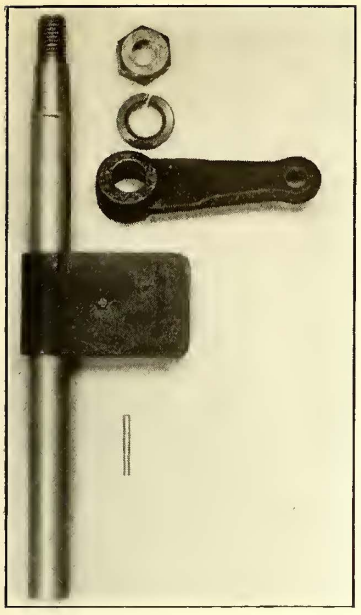
As in the case of this maker's pneumatic control, advantage is taken of oxy-acetylene welding wherever possible. As an example, the crosshead for the door-connecting rod is welded instead of being held by pins or set screws. Thus, sliding of the crosshead is impossible.

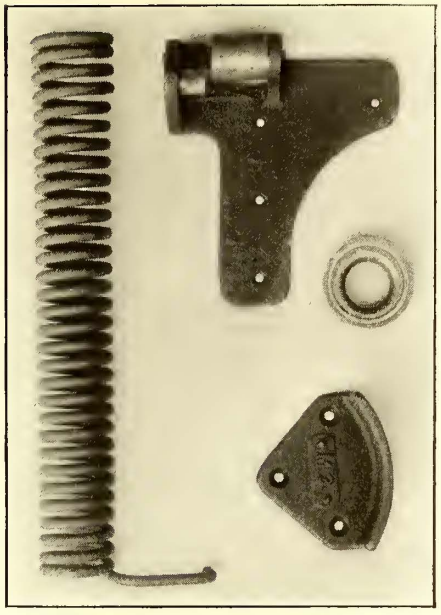
Turn-bolts fitted with cotter keys are used on the cross-head and all terminals.

The threads on the ends of the connecting rods are cut in a geometric die. This die opens automatically in such a way that the threaded rod can be withdrawn without permitting the threads to be torn by the chips cut off the rod. For the convenience of the user, every connecting rod is marked to show exactly where it is to go on the car, thereby preventing a shopman from picking up the wrong rod and shortening it to suit his purpose.

The three clips with which the door shaft is rotated are made of pressed steel with dies to insure an accurate fit. These clips are put on with tapered pins, the holes for which are jig-drilled, not only to get good spacing but to keep the clips in line; otherwise the shaft, which is stiffer than the door, could pull the door out of line. Each shaft is stamped with the position and car number, as CV 125, for conductor's vestibule of car No. 125.

At the foot of the door shaft is a lever attached by means of a taper to permit the lever to be set in any position desired and then to be tightened with a nut. This is the lever connected to the control shaft of the motorman and conductor. It acts through an angle of about 90 deg.





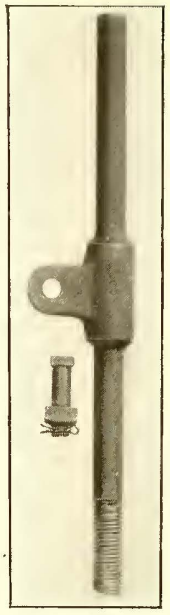


FIG. 1—DOOR SHAFT WITH PRESSED STEEL CLIP, SHAFT LEVER, ETC.; FIG. 2—BOTTOM DOOR GUIDE AND CATCH, STEP COUNTERBALANCE SPRING, DOOR SHOE AND BALL BEARING; FIG. 3—WELDED CROSSHEAD FOR DOOR CONNECTING ROD; FIG. 4—CONTROL STAND

By using ball bearings at both ends of the door shaft, three objects are attained: Easy running, flexible adjustment to platform sag (whereas a straight bearing would bind) and eventual renewal of the ball bearing alone without cutting the shaft or retainer.

In ordinary construction, if a door warps it is allowed to drag along and make hard work for the operator. In this construction the bottom door guide and catch is furnished with a roller which gives an easy bearing along the edge of the platform. The top of each door is held securely against the header by means of a door shoe which gives a weathertight joint. The bottom of each door is held securely against the platform by means of locking pins. Instead of using wood, the door tracks are of angle iron to insure a satisfactory guide.

Control Stands

The manufacturer's practice of drilling from jigs is well illustrated in the spreader casting for the lower bearing of the motorman's control stand. This spreader, which is bolted under the crown plate of the car, holds the lower bearing of the motorman's control stand at the proper height. The spreader varies in length from ½ in. to 4 in., as may be required for the proper position of the rods underneath the car.

The conductor's control stand is made of 2-in. pipe to be rigid enough to bear the brunt of passenger contact. The top casting, which serves as a crown, is welded onto the pipe. In some installations, braces have been welded between the crown and the pipe to serve as hand-holds for children. However, the type of farebox installed by the Buffalo & Lake Erie Traction Company did not permit the use of such braces.

The top casting placed on the 2-in. pipe just below the crown is drilled and countersunk for the hanging of barrier chains to block the aisle on either side of the car, as may be desired. A boss is also provided on this casting for a barrier of enameled pipe. The wiring and conduit for the conductor's signal to the motorman is carried up through the 2-in. pipe to a push-button pad which is located on the top casting previously mentioned.

Both the top and bottom castings on this pipe are fitted with ball bearings. Adjusting screws are installed on the bottom casting whereby the conductor can throw the locking lever about 5 deg. past center.

Owing to variations in car types and consequent variations in centering, the bottom casting is fastened with a set screw instead of being welded.

Step Mechanism

In designing the step mechanism substantial steel members were used to meet the abuse that a step receives in fouling paving or other obstructions and from the free-hearted leaps of athletic passengers. Furthermore, the manufacturer appreciated the fact that proper allowance must be made for the weight of the step and its tread. Hence the use of a counterbalance spring to take up variations in step weight. One end of this spring is fixed, adjustment being secured by transferring the other end from one notch to another in the ratchet of the left-hand step shaft bearing.

The thrust of the step is taken by bolt heads on the projection of the step shaft bearing. The addition of washers under the bolt heads will bring the lowered step to any desired angle. Lock washers are used under the nuts.

The step hanger castings run on ball bearings. Square holes are made in the step hangers to insure that any type of bolts used by the railway will hold. The step shaft bearings can be replaced without affecting the rest of the step equipment. It may be added that the jaw on the step-connecting rod is interchangeable with that of the door-connecting rod.

A plan, which has been prepared by the Swedish State Railway Department for railway construction up to and including the year 1923, contains a program for the electrification of a number of state railways. According to this plan, the sections which ought to be electrified first are as follows: Kiruna-Lulea; Stockholm-Upsala-Krylbo; Stockholm-Gothenburg; Katrineholm - Norrköping; Järna - Nyköping; Malmö-Trelleborg; and Gothenburg-Malmö. The cost of the electrification of these lines is calculated at £2,650,000, which figure, however, only covers the cost of the necessary lines and transformer stations, but not the cost of power stations and electric locomotives.

LONDON LETTER

Effect of War on London Bus Service—Brief Review of Subjects Discussed at Annual Meetings

(*From Our Regular Correspondent*)

Statistics published in the annual report of the London traffic branch of the Board of Trade show the extent to which the metropolitan omnibus services have been reduced by the withdrawal of vehicles for military purposes and the calling of employees to the colors. The number of motor omnibuses licensed fell from 3522 in 1913 to 3057 in 1914, and by June 15 last the total had further declined to 2602. By the end of 1914 more than 4000 workers had left for military duty. Nevertheless, the number of passengers carried in that year was 756,591,000, an increase of 22,660,000. Cabs also have been largely reduced in number. At the end of June, 1914, a total of 9953 motor cabs were licensed. A year later the figure was 6638, a reduction of 3315. This decrease is attributed directly to the war, many drivers having either rejoined the colors or enlisted. Of the 3315 cabs withdrawn from service 1100 were owned by companies and 2215 by individuals. It is estimated that the aggregate number of passengers carried by tramways, omnibuses and local railways in Greater London during 1914 was approximately 2,064,612,000, or 276.5 journeys per head of the population. So recently as 1903 the total of these passengers was put at 972,465,000, equivalent to 144.9 journeys per head.

The results that have been achieved in working the London County Council Tramways during the first four months of the financial year 1914-1915 showed some improvement, but the war has thrown many additional burdens on the tramways and the outlook for the year 1915-1916 is far from satisfactory. It is anticipated that the strike of motormen and conductors which occurred on the tramways in May will result in a loss of about £100,000; increased wages owing to the war bonus to men receiving up to 40s. a week, and other unavoidable expenditures, will tend to swell the total abnormally. The number of fatal accidents during 1914 attributed to omnibuses was 124, or 0.051 per vehicle, calculated on the average number of vehicles working. Fatal accidents per million miles run were 1.17, and per mile of route operated 0.23.

An exceptionally good report is presented by the Bristol Tramways & Carriage Company for the past year. The total number of passengers increased from 58,301,600 to 60,272,400, and the gross receipts from £454,800 to £512,400. The greatest advance has occurred in the motor-bus section, which now earns more than the tramway department, the gain in this branch alone last year being £49,000, or at the rate of 23 per cent. Working expenses increased, but the net revenue was £98,900, an increase of £16,300.

The Birmingham tramways committee was asked a short time ago to consider the desirability of using trailers on account of the shortage of drivers. London and Grimsby are the only towns in England where trailers have been adopted. After the experience of the metropolis has been ascertained the subject will be considered by the committee.

The Halifax Town Council has authorized the application by the tramways committee to the minister of munitions for the tramways and electricity departments of the corporation to be taken over as controlled establishments.

It is said that half of the staff of the Edinburgh tramways has enlisted—514 men out of a total of 1100, including 122 drivers, seventy-seven men in the engineering departments and twenty-seven cleaners. This large withdrawal of men and the employment in their places of substitutes unfamiliar with the working of the cable system, which is in use in that city, has resulted in frequent suspensions of service recently.

The Liverpool Overhead Railway reports an increase of 1,720,558 passengers carried over the previous year. This is a new record for the company. The increase was equivalent to 16 per cent in the first-class traffic, 12 per cent in the third class and 16 per cent in workmen. This was attributable to the abnormal conditions prevailing in the port of Liverpool, whose docks had never at any time been so fully occupied. It was announced that the Great Central Railway had acquired the land for the Seaforth & Sefton Railway, and that the construction of the line would be commenced as soon as circumstances permitted. When that new railway was connected with the Liverpool Overhead Railway at Seaforth the interchange of traffic should prove beneficial.

At the recent annual meeting of the London, Brighton & South Coast Railway, the chairman referred to the fact that the war necessitated a suspension of part of the work of equipping the suburban lines for electric traction, but stated that it was now being steadily proceeded with. The existing electrical services are working most satisfactorily and showing excellent results. Last year the number of passengers carried by these services was nearly 70 per cent in excess of the last years of steam traction, and since their inauguration five years ago 40,000,000 more passengers had been carried by them.

At the annual meeting of the North London Railway Lord Rathmore stated that, owing to adverse circumstances, the hopes which had been expressed in regard to the electrification of the line had not yet been realized. The scheme formed part of the greater scheme for the electrification of the London & North-Western suburban lines. They were at present unable to fix a date for through service by electric train between Watford and Broad Street. It was hoped, however, by September next to work the present service between Broad Street and Kew and Richmond by means of electric trains.

At the annual meeting of the London & North-Western Railway it was stated that of the total amount expended on capital account £651,625 was in connection with the Euston & Watford Electric Railway. The further amount estimated to be expended this year was £928,000, of which £630,000 is in connection with that railway. The extension of the Bakerloo tube to Queen's Park was opened in February of last year, and, pending the opening of the through route to Watford, arrangements were made whereby certain of the tube trains had since May last run through from Queen's Park to Willesden, where connection was made with main-line and local London & North-Western trains. In conjunction with the North London Railway, it is hoped to work the present services between Broad Street and Kew and Richmond by electric trains as from September next. It is still impossible to say when the electric service to Watford will be opened.

Reference was made to the electrification of suburban portions of the London & South-Western Railway at the annual meeting of the company. Up to the end of last year the company had spent £970,000 on electrification work. Two months ago it opened the circular service via Richmond and Kingston and the Shepperton line, and the service to and from Hounslow has been commenced. It was stated that the delay in the completion of the power house had caused the company to conduct its work under very serious difficulties. One result was that overcrowding occurred in the electric trains on the circular service during the morning and evening rush hours. Comparing the week just prior to the opening of the circular electric service with the second week after the service was begun, there was an increase of 16 per cent in the bookings.

As mentioned in the preceding paragraph, electric trains are running on the Hounslow loop line of the London & South-Western Railway, and a new station has been opened at Barnes Bridge. The service of electric trains between Hounslow, Isleworth, Brentford, Kew Bridge, Chiswick, Barnes Bridge and Waterloo is half-hourly on week days, with extra steam trains at business hours. Hounslow trains complete the loop via Richmond, thus giving two extra trains both ways each hour between Twickenham, Richmond, Barnes, Putney and Waterloo.

Between seventy and eighty women conductors are on duty on the buses run by the London General Omnibus Company, and this number will be gradually increased as the needs of the situation demand. The women will be paid at exactly the same rates, on a mileage basis, as the male conductors, and will have the same duties and hours. Special arrangements have been made to train them at the company's school at Chelsea. They are employed under an agreement between the company and the Licensed Vehicle Workers' Union which confines their term of service to the period of the war, or until such time as the male conductors return.

A. C. S.

NEWS OF ELECTRIC RAILWAYS

STRIKE FIZZLE IN NEWARK

Efforts of organizers of the Amalgamated Association of Street & Electric Railway Employees of America to foment discord among the employees of the Public Service Railway in Newark and other cities of New Jersey have so far proved unavailing. A special effort was made on the night of Saturday, March 25, to call a strike for Sunday. That it was unsuccessful is indicated by the company's receipts on that day, which were 6 per cent greater than on the corresponding Sunday of 1915. No reasons for calling the strike have been advanced.

The Saturday night meeting comprised not more than fifteen Public Service men, delegations of union men from Yonkers, N. Y., and Trenton, N. J., and local union men of other crafts to make up a total of about 200. It was the outcome of efforts begun last November and followed by the arrival of the organizers about two weeks ago. The apparent plan has been to enlist the support of organized labor outside the electric railway ranks. At the meeting the chairman moved that a strike be called, and after an affirmative vote he distributed printed cards announcing that local No. 531 had declared a strike of railway employees.

After the meeting those in attendance went in jitneys at midnight to the Sixteenth Avenue carhouse in an endeavor to interest the men in the strike. The plan was to repeat this performance at other carhouses. The net result was that up to Monday night thirty-five men out of 1500 in the affected division failed to report, and the ranks were filled from the extra list without difficulty. The company was in no way embarrassed. There was little rowdyism. By Wednesday conditions had become entirely normal.

As an evidence of the attitude of the men 164 motormen and conductors attached to the Montgomery Street carhouse on Tuesday signed a communication addressed to N. W. Bolen, superintendent of transportation, pledging loyalty and expressing appreciation of the fact that he had stood by them for thirteen years. Similar assurances were received from the Hoboken, West Hoboken, West New York, Greenville, Fredonia and Hudson carhouses in the Hudson division. While the main efforts of the organizers were concentrated in the Essex division, in which Newark is located, the railway men in the Hudson division learned that the plans included them. In fact a delegation made an attempt to bring them in line on Wednesday night. They accordingly stated their position to Mr. Bolen.

George Keenan of Rochester, N. Y., a member of the executive committee of the Amalgamated Association, who was on the ground, expressed disappointment at the failure of the men to respond to the effort to organize them, but said that this would not prevent the continuation of the work.

FIGHT ON CANADIAN FRANCHISE RENEWAL

Representatives from all parts of the Niagara district attended the annual meeting of the Niagara District Hydro-Radial Railway Association held in St. Catharines recently. Resolutions were unanimously adopted opposing any renewal or extension of lapsing railway charters to this district and expressing the view that any such extension would seriously interfere with the proposed system of hydro-railways desired by the municipalities of this territory and for which surveys have already been made. The St. Catharines board of trade on the same date took an opposite stand and voted down the same resolution.

The meeting was called to consider the application of the Niagara, St. Catharines & Toronto Railway for a renewal of the franchise to build a trunk line from Toronto to the Niagara frontier through St. Catharines under the name of the Toronto, Niagara & Western Railway. A resolution was also passed declaring strongly in favor of the hydro-radial movement, but welcoming any trunk line, and an amendment by Mayor Burgoyne to insert the word "steam" was voted down. The mover of the amendment declared that the Hydro-radial Association was not opposed to the company operating a steam road, but was opposed to electricity as motive power. The meeting decided that it would be unfair to restrict the road to steam as the tendency is toward electricity.

The bill was before the Commons railway committee on March 2. It was finally laid over for a week to give the conflicting interests a chance to effect a settlement. There was strong opposition from the Hydro-Electric Union, the Ontario government, the city of Toronto and a number of municipalities. Those who have followed the discussion have little idea that a settlement will be effected, unless it be on the lines of concession of running rights to the hydro-radials. The bill will come up again on March 9.

Frank Cochrane, Minister of Railways and Canals for the Dominion, is reported to have expressed his intention to vote for the extension. He is reported to have said:

"Railways or lines held by the Canadian Northern Railway are partly the property of the people, who are interested in the company to the extent of 40 per cent. A vote against its application for an extension of its time limit to acquire the Niagara, St. Catharines & Toronto line is a vote against the interests of the people.

BRIBE STORY BEFORE THOMPSON COMMITTEE

The work of the Thompson legislative committee the latter part of the week ended March 25 and early in the week just ended was marked by two important developments. One was the admission on March 25 by Timothy S. Williams, president of the Brooklyn Rapid Transit Company, that the suggestion had been made to him that a city official, now dead, in consideration of the payment of $500,000 would vote in the Board of Estimate in favor of the Brooklyn Rapid Transit Company obtaining the dual subway contracts. The other development of importance was the presentation by the committee of a report recommending changes in the rapid transit law and the introduction at Albany of five bills embodying preliminary recommendations of the committee. Colonel Williams refused to give the name of either the emissary who had come to him or the city official who was represented as sending him. He rejected the suggestion. Colonel Williams denied that Charles H. Hyde, who was City Chamberlain under Mayor Gaynor, was in any way connected with the incident.

On March 27 both Colonel Williams and William R. Willcox, former chairman of the Public Service Commission, were called to the witness stand. Colonel Williams continued to refuse to name the individual, asserting that as he was now dead no good end would be served by making his name public. Mr. Willcox denied that he had said Colonel Williams had told him that "Mayor Gaynor was in the market if opportunity arose and somebody had the money." The committee took an adjournment until March 31.

On March 27 the five bills embodying the preliminary recommendations of the Thompson committee were introduced at Albany. The measures would take from the first district commission authority over subway construction and vest it in a rapid transit commission of seven members to be appointed by the Mayor of New York. The Mayor and City Comptroller would be two of the members. It also would be provided that the Mayor and Comptroller shall be directors in railroad corporations which lease subways from the city. The salaries of the five members are to be fixed by the Board of Estimate, and they shall hold office at the pleasure of the Mayor. The salaries of the legal, engineering and clerical force of the new commission are to be fixed by the Board of Estimate and Apportionment and the expenses of the commission are to be a city and not a State charge. Each of the five boroughs would have a representative among the five appointive members. The present New York City Public Service Commission is continued for other than subway construction work.

FRANCHISE BURDENS IN OAKLAND

G. K. Weeks, president of the San Francisco-Oakland Terminal Railways, Oakland, Cal., has written a letter to the secretary of the Downtown Property Owners' Association, in Oakland, explaining why the company is not anxious to build an extension to its city lines, suggested by that association, even when the association offered to lend its "assistance in financing the construction of the line." Mr. Weeks points out that for some years past the company has not been able to obtain new money for capital expenditures, and if the proposed financial assistance was simply a loan to the company such action would merely add to the difficulties under which the company is now suffering. The letter then points out the principal reasons why the only kind of franchises which can now be obtained under the Oakland city charter do not attract the investment of capital. One is that the maximum life is only thirty-five years, with no provision as to what may become of the property at the end of that time. Another is that electric railway companies have to pay from 2 per cent to 5 per cent of their gross earnings to the city, as well as 5¼ per cent to the State. They also have to do a large amount of paving and repaving, which, in some cases, takes as much as 10 per cent of the gross receipts, and perhaps averages 5 per cent. This means that some 15 per cent of the gross earnings of the electric railway are absorbed for taxes, licenses and compulsory contributions for public works. But even if these taxes were less, the situation would not be solved unless there were some provision by which the investment made by the company in its property would be safeguarded.

STRIKE DECLARED IN TOLEDO

Objection by Company to Union Button Used as Pretext to Tie Up System

About 800 of the motormen and conductors of the Toledo Railways & Light Company, Toledo, Ohio, struck on March 28 because the company refused to allow them to wear union buttons while operating their cars. The badges of membership were distributed in the forenoon. The men had been informed previously, however, that the company would not permit buttons to be worn. President F. R. Coates of the company pleaded with the men to defer the time of putting on the buttons until the arrival of Henry L. Doherty, chairman of the board, who was expected in Toledo by 10 o'clock on March 30.

The first men to wear the buttons were those who went on duty at 3 o'clock in the afternoon. Inspectors warned the men to remove the buttons, but, instead of heeding the warning they ran the cars into the carhouses. Other men congregated about the houses. By 4 o'clock operation of the road was at a standstill. No cars, excepting the interurbans, were run, and they did a heavy business for the remainder of the afternoon and evening.

Mr. Coates talked over the telephone with Mr. Doherty in New York and the latter approved the stand that the company officials had taken. The men were told that Mr. Doherty would be in the city to discuss matters with them if they would continue to operate the cars until the morning of March 30 without the buttons, but they decided at a meeting not to comply with his wish. The company made the following statement:

"The company deeply regrets the inconvenience to which Toledo is being placed by the general tie-up of its street railway system. The company has made no effort whatever to prevent the organization of its men. No stone was placed in the path of the union organizers. Our only request was that the use of buttons be deferred, as it placed the men not members of the organization in a very embarrassing position before the public using their cars. During this present situation it is not our intention to import any men to man our cars."

The local branch of the union published the following statement:

"We issue this statement so that the public may fully understand that we are not responsible for the present existing conditions. Our men exercising their right as American citizens reported for work on Tuesday at noon with the emblem of their union on the lapel of their coat. They were informed by the officers of the company that they would not be allowed to operate their cars unless this emblem was removed. This the men refused to do and the company then ordered the cars to the carhouses. We would further request the locked-out carmen and their sympathizers so to conduct themselves as to merit the confidence and respect of the public at large."

The men had made no demand whatever of the company and had not met with any interference on the part of the company officials in the formation of the new organization. Officers of the union now say that the men will not return to work on consent of the company to wearing the buttons, but will insist on the reinstatement of two men recently discharged and a contract fixing a new scale of wages.

The strike has caused much inconvenience in Toledo, especially among the large manufacturing concerns, such as the Willys-Overland Company, which employs more than 15,000 men. Every kind of conveyance was pressed into use, and jitneys, which had been housed over winter, have come out in large numbers. The interurban cars that pass through the city in different directions have been a great aid to many.

CHANGES IN KANSAS CITY RAILWAYS

Many changes are being made in the designation of officers of the Kansas City (Mo.) Railways, and in the assignment of duties. All the officials involved, however, are men of long service with the various companies that preceded the Kansas City Railways, and all the appointments are in effect promotions. The appointments became effective on April 1.

James E. Gibson, formerly general superintendent, has been made general manager. W. C. Harrington, formerly assistant general superintendent, becomes superintendent of transportation, in active charge of transportation matters. S. H. James, formerly assistant general superintendent, will be assistant superintendent of transportation. D. L. Fennell, formerly secretary to Mr. Gibson, will be in charge of the building at Fifteenth Street and Grand Avenue. Julien E. Harvey, formerly a division superintendent, is made the head of a new department, with the title of superintendent of efficiency with headquarters at Fifteenth Street and Grand Avenue. A. E. Harvey, chief engineer, has been named as superintendent of way and structures. G. J. Smith, master mechanic, will be superintendent of rolling stock and shops. C. E. Fritts, formerly electrical engineer, has been made superintendent of power and electrical distribution. Chester C. Smith, who entered the service of the Kansas City companies with P. J. Kealy and has been an assistant to the board of control, has been appointed assistant to President Kealy.

Division superintendents will hereafter be known as division supervisors; track supervisors will be roadmasters. Dispatchers in the transportation department will be on three shifts of eight hours, instead of two shifts of twelve hours.

The creation of a traffic division is announced, a head to be named later. The incumbent of this office will report to the superintendent of transportation and will have charge of the preparation of all schedules and the checking of all traffic. Schedules will be made by W. J. Moberly, supervisor of schedules. Outside inspecting and checking will be in charge of D. F. Hatfield, now chief dispatcher. It is announced that division supervisors must have served three to five years in the transportation department, either in the traffic division or the train service.

AGREEMENT REACHED ON CLEVELAND CHARGES

At a conference between the street railway committee of the City Council and the officers of the Cleveland (Ohio) Railway on March 24 an agreement was reached whereby the company is to be allowed to take from its earnings each month a sum which will reduce the deficit of $564,000 in the maintenance, renewal and depreciation account and finally wipe it out. The company, however, agrees that this sum shall not be so large as to allow the interest fund to fall below $300,000 and thus necessitate an increase of the fare. The city agrees to hasten the charging off of the old deficit of $956,572. It is probable that part of the interest fund will be applied to the deficits instead of the car-mile allow-

ance being increased as was suggested to the Council by the company.

The operating report for February, made to the board of directors on March 25, showed that the income for the month was $720,972, or $109,670 more than that for the same month last year. The increase in the number of fares collected was 3,655,683. The interest fund received $58,712, making it now $653,496. It is believed that the March report will result in an increase in the interest fund to $700,000, where the fare would be reduced automatically by dropping the transfer charge. This reduction in fare would not follow, however, if an amount be taken from the fund to reduce the deficits.

East Cleveland will shortly advertise for bids for a new street railway line on Noble Road, between Euclid Avenue and Mayfield Road.

Fielder Sanders, street railway commissioner, has arranged to check the East Cleveland business of the Cleveland Railway to see whether the company is losing money at the 3-cent fare to that city. The claim has been made that there is a great deal of short-haul business within the limits of East Cleveland, on which there is a profit.

The injunction suit brought by East Cleveland to compel the Cleveland Railway to pave between its tracks on Euclid Avenue in that city has been dismissed in Common Pleas Court. The court said that the suit was premature and that the officials of that town should have waited until the paving work was begun and then, if the company did not do its part, bring suit to compel it to do so.

Vote on Municipal Ownership in Massachusetts.—The committee on street railways of the Massachusetts Legislature voted on March 23 to report a bill for a referendum vote next November on the question of state ownership of street railways.

Service Into Mexico Stopped.—The street cars of the El Paso & Juarez Traction Company, controlled by the El Paso (Tex.) Electric Company and operated between El Paso, Tex., and Juarez, Mex., have been ordered stopped in Juarez on the recommendation of the military authorities.

Annual English Tramway Congress.—It has been decided to hold a one-day congress of the Tramway & Light Railway's Association in London, England, on June 30. The papers and lecture will be presented at 2.30 p. m. An informal dinner will be held at 7.30 p. m. There will be no official guests at this congress and no musical entertainment will be provided.

Two Hundred and Ten Permanent Men Replace Wilkes-Barre Strikers.—At the present time the Wilkes-Barre (Pa.) Railway has 210 permanent employees in the place of the men who went on strike some time ago. These new employees are all residents of the vicinity. All of them have been broken in and they are courteous, efficient and courageous employees. The riding is increasing despite the occasional outbreaks of lawlessness and the attempts of strikers to intimidate the people. The temporary injunction secured by the company against its former employees is still in force, and within a week or so it is expected that there will be an argument on the matter of making that injunction permanent.

Bridge Collapse at Johnstown.—The steel bridge spanning the Conemaugh River at Maple Avenue, Johnstown, Pa., collapsed on March 21 at 5.30 p. m., under the combined weight of six trolley cars and a crowd of about 500 workmen from the local plant of the Atlantic Refining Company. Over a score were injured, none seriously. According to reports the failure was gradual. The bridge dropped suddenly a foot or more and then fell to the bottom of the river, a distance of 12 to 15 ft. The depth of the water at this point was not over 3 ft. at the time. The cars remained upright and the trusses, though bent out of line, did not fall on the cars or pedestrians. The cars were standing close together, and when the bridge went down were wedged into the shape of a broad V, the position in which the bridge remained after it fell.

Extension Order of Missouri Commission Upheld.—The St. Louis Circuit Court has refused to grant the petition of the United Railways to set aside an order made by the Public Service Commission directing the company to apply to the Board of Aldermen and the Mayor for permits to construct certain extensions. The action of the court upholds the Public Service Commission's order made last May. This order specified that the permits be obtained within a month. The company obtained a suspension to enable it to apply to court for cancellation of the order. The extensions included some downtown loops and a switch on Lindell Avenue between Grand Avenue and Olive Street for a loop to be used during rush hours.

Special Agent Appointed to Investigate South American Markets.—Stanley H. Rose, commercial agent in charge of the New York office of the Bureau of Foreign and Domestic Commerce, announces that Philip S. Smith has been appointed special agent of the bureau to investigate and report on the present conditions as well as the future prospects in the South American market for electrical goods of all character. Mr. Smith proposes to be at Room 409 in the Custom House in New York from April 24 to April 27 and will be very glad to meet American manufacturers and exporters of electrical apparatus and supplies. Appointments may be made with Mr. Smith, by addressing Stanley H. Rose, commercial agent in charge, Bureau of Foreign and Domestic Commerce, 409 Custom House, New York.

Short Strike in Mexico City.—A newspaper dispatch from Mexico City, Mex., dated March 28 stated that energetic measures taken by General Pablo Gonzalez promptly stopped a threatened general strike of employees and laborers of the Mexico City Tramway. The demonstration that threatened to suspend traffic was instigated by agitators of the Mexican branch of the Industrial Workers of the World. The laborers at the electric plant of the company went on strike, demanding a 60 per cent wage increase. These strikers urged the conductors and motormen to join them, and many of the latter, fearing difficulties, returned their cars to the barns. General Gonzalez dispatched troops and gendarmes to protect the electric plants and to force the strikers to resume work, promising an increase in pay in the near future. The agitators were arrested and traffic was resumed later.

"Dawn of the Electrical Era in Railroading."—Under the caption "Dawn of the Electrical Era in Railroading" the Chicago, Milwaukee & St. Paul Railway is running in the principal daily newspapers of the United States an advertisement 8½ in. wide by 11 in. high which it concludes as follows: "Electrification, added to its other advantages, makes the 'St. Paul' more than ever the road of efficiency, comfort and charm. Remember this fact when planning your next trip to the Pacific Northwest." The paragraph headings are as follows: "440 Miles Electrified," "Giant Locomotives," "Power From Mountain Streams," "Regenerative Braking" and "Increased Efficiency." The company says that it "has inaugurated this great epoch by accomplishing the longest extent of main line electrification in the world, through a region demanding the utmost of energy and efficiency in locomotives." A striking line cut shows one of the electric locomotives hauling a train over the mountains. In the company's passenger office in Chicago a handsome plaque is on exhibition, announcing the inauguration of the service.

President Wilson Urges Action About Transportation.—President Wilson wrote to the Democratic leader of the House, Mr. Kitchin, on March 28, urging consideration of the shipping bill and the resolution for the investigation of conditions of railway transportation and legislation. The letter to Mr. Kitchin follows in part: "I write to express the hope that the Senate joint resolution No. 60 for the investigation of the condition of transportation by railway, may find an early opening in the business of the House for its consideration. The railways of the country are becoming more and more the key to its successful industry, and it seems to me of capital importance that we should lay a new groundwork of actual facts for the necessary future regulation. I know that we all want to be fair to the railroads, and the proposed investigation is the first step toward the fulfillment of that desire. I hope that this important matter can be disposed of without putting anything in the spokes of the wheels that we are now trying to make go around in the matter of legislation."

Financial and Corporate

ANNUAL REPORTS

United Railways of St. Louis

The comparative statement of income, profit and loss of the United Railways of St. Louis, St. Louis, Mo., for the years ended Dec. 31, 1914 and 1915, and comparative traffic statistics follow:

	1915	1914
Revenue from transportation	$11,589,488	$12,359,219
Revenue from operations other than transportation	91,712	91,706
Total operating revenues	$11,681,200	$12,450,925
Operating expenses (including depreciation)	8,176,356	8,644,736
Net operating revenues	$3,504,844	$3,806,189
Taxes	749,833	767,794
Income from operation	$2,755,011	$3,038,395
Income from other sources	98,484	87,901
Gross income	$2,853,495	$3,126,296
Deductions from income	2,587,968	2,618,255
Net income	$265,527	$508,041
Dividends on preferred stock	.....	.....
Surplus	$265,527	$508,041
Revenue passengers	232,771,390	248,040,033
Transfers	124,043,205	127,444,829
Total passengers	356,814,595	375,484,862
Percentage of passengers using transfers	53.29	51.38
Average fare per passenger (cents)	3.23	3.27

The passenger revenue for 1915 was less by $764,715, or 6.23 per cent, than that of the preceding year. During the first six months of the year the passenger revenue decreased $550,797, or 8.85 per cent, while during the second six months the decrease was only $213,918, or 3.53 per cent. The decrease in passenger revenue was brought about by the fact that the number of revenue passengers for 5 cents decreased 15,319,957, or 6.3 per cent, while the revenue passengers for 2.5 cents increased 51,314, or 1.5 per cent. The decreased traffic was caused by the industrial business depression rather than by jitney competition. It is said that although the jitneys in the downtown section at times seemed to be numerous the total of their business was insignificant and had no effect on the railway's showing for the year.

The number of transfer passengers in 1915 decreased only 3,401,624, or 2.6 per cent, so that the percentage of revenue passengers using transfers during the year was 53.29, as compared to 51.38 in 1914, an increase of 1.91 per cent. These figures indicate the hauling of a greater percentage of free transfer passengers in the last year. The percentage seems to be constantly increasing, it now being almost 8.5 per cent above the 44.85 per cent figure for 1909. This increase in transfer passengers has had the effect of diminishing the average fare for passengers from 3.40 cents in 1909 to only 3.23 cents in 1915.

Other revenue from transportation decreased $5,016 on account of the cancellation on Nov. 1 of the contract with the United States Government for carrying mail. The revenue from operations other than transportation showed a nominal increase, but miscellaneous income from other sources increased $10,583, or 12.04 per cent, so that the gross revenues and other income together showed a decrease of $759,141, or 6 per cent. This total decrease in earnings, however, was not entirely reflected in net income, which showed a loss of only $242,514 on account of economies in operation, lower taxes and less fixed charges.

The total operating expenses, including depreciation, decreased $468,380, or 5.42 per cent. The total depreciation was $1,337,309. The amount of money paid out in wages was $4,096,294, or 35.07 per cent of the gross revenue, as compared to $4,304,408 and 34.57 per cent of the gross revenues in 1914. The tax payments decreased $17,961, or 2.3 per cent, but the company still maintains its position as the largest taxpayer in the State. The deductions from income showed a decrease of $30,287, or 1.1 per cent. During 1915 the company expended and charged to capital account for added property the sum of $53,540. During the year 0.52 mile of track were added and 1.17 miles removed, making the trackage on Dec. 31, 1915, 457.54 miles. The total track reconstruction, renewal and extension for 1915 was 28.05 miles.

The average cost to the company of all purchased power during 1915 was 0.714 cent per kilowatt-hour. The average cost of power generated in the company's plant was 1.02 cents per kilowatt-hour, without making a charge for interest on investment, taxes, insurance or depreciation. It is said that in comparing the relative costs of purchased and generated power at least 0.5 cent should be charged against generated power for fixed charges, which would make the total cost of generated power during the year something more than 1.5 cents per kilowatt-hour. The average cost of all power during the year was 0.743 cent per kilowatt-hour. The average distribution of power on a kilowatt-hour basis during the year was as follows: The Electric Company of Missouri, 59.5 per cent; Union Electric Light & Power Company, 32.2 per cent, and United Railways plants, 8.3 per cent. The plants of the railway company were operated only as peak plants, and the peak load was distributed in the following manner: Electric Company of Missouri, 41.7 per cent; Union Electric Light & Power Company, 27.4 per cent, and the United Railways' plants, 30.9 per cent. The average week-day peak load was 52,800 kw., and the total kilowatt-hours used during the year were 179,660,620, a decrease of 2.4 per cent as compared to 1914. The average total load factor decreased from 40.5 per cent to 39.8 per cent. Two new substations were built and put into operation during the year, but in order to take care of anticipated traffic increases, future provision, it is said, should be made for additional power of a least 3000 kw.

Cleveland, Painesville & Eastern Railroad

The railway operating revenues and the non-operating income of the Cleveland, Painesville & Eastern Railroad, Willoughby, Ohio, were $407,029 for the year 1915, a loss for the first time since 1902. The decrease for the year amounted to $1,462 or 0.36 per cent, this being a drop from the largest preceding increase of $34,296 in 1910. Of the decrease for 1915, $1,021 arose mostly in connection with the income from funded securities, while $441 came from railway operating revenue. The loss in railway operating revenue was occasioned by the following decreases and increases: decreases—passenger, $6,816; express, $920; milk, $93, and rent of tracks and terminals, $193; increases—special car, $674; milk, $27; rent of equipment, $55; rent of buildings, $259; power, $6,542, and miscellaneous, $25.

The loss in earnings was more than met by a decrease of $2,846 in the $192,037 of operating expenses. Thus despite a rise of $704 in taxes the operating income at $185,541 showed an increase of $1,701 and the gross income at $188,519 an increase of $679. The decrease in operating expenses resulted from decreases of $5,119 for conducting transportation and $7,641 for power expenses, and increases of $82 for maintenance of way and structures, $5,804 for maintenance of equipment, $495 for traffic expense and $3,524 for general and miscellaneous expenses.

Interest on funded debt increased $4,222 and miscellaneous debits $1,292, while interest on unfunded debt dropped $4,534, so that the deductions from gross income showed a net increase of $979. The surplus at the end of the year, amounting to $55,267, was $300 less than at the end of the preceding year. The company's operating revenue per mile was $10,544, a decrease of $11, while the operating expenses per mile were $5,001, a decrease of $74, giving an increase of $63 in the net operating revenue per mile of $5,533. The ratio of operating expenses to operating revenues was 47.52, a decrease of 0.70 per cent, and the ratio of operating expenses and taxes to operating revenue was 54.07, a decrease of 0.48 per cent. The total expenditures for additions and betterments for the year were $28,554. During the year three 42-ft. old-type Brill cars were entirely rebuilt and converted into 48-ft. semi-steel cars, and a number of other cars were remodeled and practically rebuilt.

Dominion Power & Transmission Company, Ltd.

The statement of income, profit and loss of the Dominion Power & Transmission Company, Ltd., Hamilton, Ont., for the year ended Dec. 31, 1915, follows:

Gross earnings	$2,353,956
Operating expenses	1,352,001
Net earnings	$1,001,955
Transfer to maintenance and renewal account	109,640
Balance	$892,315
Bond and other interest	384,772
Surplus earnings	$507,543
Balance from 1914	1,020,405
Total	$1,527,948
Dividends declared	386,613
Bad debts, etc., written off	2,076
Reserve account	500,000
Balance for 1915	$639,259

The gross earnings of the company suffered a decrease of $42,011, or 1.7 per cent during 1915, while the operating expenses also decreased by $38,846, or 2.8 per cent, so that the net earnings lost only $3,165, or 0.3 per cent. The unexpended allowance transferred to the maintenance and renewal reserve, however, increased $8,617, or 8.5 per cent, and the amount for interest payments $7,666, or 200 per cent, with the result that the surplus earnings for the year decreased $19,448, or 3.6 per cent. During the year the company continued its policy of setting aside an allowance of 20 per cent of the gross earnings for maintenance and renewals.

The depression and unfavorable business conditions of 1914 continued during the first six months of the year and even through August, 1915, and during this period the decline in the earnings continued. The falling off was somewhat emphasized during June, July and August on account of jitney competition, and up to the end of August the gross earnings had declined $128,438, as compared with the same period in 1914. During the remainder of the year, however, the showing was reversed, so that the net decrease was only $42,011, as before stated. The largest part of the recovery took place in November and December, which seems to augur well for 1916. Of the company's employees eighty-three have joined the military forces of the empire.

Toronto Railway

The statement of income, profit and loss of the Toronto (Ont.) Railway for the year ended Dec. 31, 1915, follows:

Gross earnings	$5,694,136
Operating, maintenance charges, etc.	3,250,612
Net earnings	$2,443,524
Interest on bonds	$167,357
Percentage on earnings	868,254
Pavements, taxes, etc.	215,424
Total	$1,251,035
Surplus earnings	$1,192,489
Balance from last year	4,792,370
Total	$5,984,859
Dividends, four of 2 per cent	957,952
Surplus carried forward	$5,026,907

During 1915 the company showed a loss of $432,690 or 7 per cent in gross earnings, but in view of the abnormal traffic conditions brought about by the continuation of the European war, and in view of the showings for the period made by other Canadian companies, it is believed that the company on the whole made a better showing than might have been expected. The operating, maintenance charges, etc., were less by $278,934 or 7.9 per cent than in 1914, so that the net earnings made a better showing, the decrease for the year being $154,026 or 5.9 per cent. Reductions in bond interest of $15,142 or 8.3 per cent, and in civic tax requirements of $58,842 or 5.2 per cent, made a further improvement in the amount available for dividends, which in view of the existing conditions were earned by a satisfactory margin.

The surplus earnings on the company's capital stock were at the rate of 9.93 per cent, which compares with 10.56 per cent in 1914 and 14.85 per cent in 1913. It should be noted that while there was an improvement in operating expenses, the operating ratio for 1915 being 57.9 per cent as compared to 58.4 per cent in 1914, the rate is still higher than that in any year from 1905 to 1913, inclusive, some preceding low figures being 51.4 per cent in 1909, 51.6 per cent in 1910 and 52.2 per cent in 1913. The passenger earnings in 1915, amounting to $5,611,297, suffered a decrease of $432,216 as compared to the 1914 results. This was brought about by a decrease of 10,904,895 in the total of passengers carried, the traffic for the year being 142,061,258 passengers. There were 62,398,638 transfers, a decrease of 3,379,384.

Bay State Street Railway, Boston, Mass.—The Massachusetts Public Service Commission has concluded the hearing on the application of the Bay State Street Railway to the commission for permission to issue 7357 additional shares of first preferred stock to be offered to stockholders at par; $400,000 of first mortgage bonds of the Boston & Northern Street Railway and $300,000 of like bonds of the Old Colony Street Railway.

Birmingham, Ensley & Bessemer Railway, Birmingham, Ala.—Counsel for the bondholders of the Birmingham, Ensley & Bessemer Railway, which was bought in by the reorganization committee for the bondholders at receivers' sale, are reported to have said that the Birmingham Railway, Light & Power Company has signified its willingness to take over the property for $1,500,000, which is much less than the original cost of the system. It is stated that the bondholders of the Birmingham, Ensley & Bessemer Railway are not in position to refinance the company and that it is proposed to sell the property to the Birmingham Railway, Light & Power Company, with an option to the city to be permitted to take over the lines at some future time if it desires to do so and it can be done legally.

Brooklyn (N. Y.) Rapid Transit Company.—The New York Public Service Commission, First District, has ordered that a public hearing be held on April 3 on the application of the New York Municipal Railway Corporation for permission to issue $697,500 of additional capital stock. The authorized capital of the company is $2,000,000, of which $100,000 was approved by the commission in January, 1913, and issued; an additional $100,000 was approved by the commission in August, 1913, and issued, making $200,000 outstanding at the present time. The new issue of $697,500 is wanted to pay commissions for the sale of $60,000,000 of six-year 5 per cent notes of the Brooklyn Rapid Transit Company, issued toward the purchase of a like amount of first mortgage 5 per cent gold bonds, to enable the company to finance immediate obligations under the dual system contracts, and counsel fees in the same matter.

Freeport Railway & Light Company, Freeport, Ill.—Application has been made to the State Public Utilities Commission of Illinois for permission to merge the Tri-County Light & Power Company, with head offices at Aledo, Ill., and the Freeport Railway & Light Company, Freeport, Ill., with the Illinois Northern Utilities Company, with head offices at Dixon, Ill.

Fresno (Cal.) Interurban Railway.—The Fresno Interurban Railway has filed with the Railroad Commission of California an application for authority to issue $150,000 of bonds and $60,000 of stock to cover the cost of construction of its main line to the Centerville Citrus District, and to issue $150,000 of certificates of indebtedness at 6 per cent, for not more than fifteen years, for which subscriptions are to be obtained from property owners along the line of a proposed railway extension. The company proposes to amend its articles of incorporation for the changes in its line, and to give a new deed of trust to provide $180,000 to redeem the bonds already issued and to be issued under the new deed, and $175,000 of bonds for the planned Centerville extension. This series will be respectively A and B.

Galveston-Houston Electric Company, Galveston, Tex.—The 1915 annual report of the Galveston-Houston Electric Company filed with the city of Houston is said to show a small return on the investment. The net earnings for reserves, depreciation and dividends was a deficit of $141,437 on an investment of $2,944,000 in bonds and $1,650,000 in stock. The gross earnings totaled $433,916, while operating expenses (not including depreciation) amounted to $198,006, taxes to $17,754, interest charges to $166,835, and bond sinking-fund charges to $29,465. The poor showing made by the company is attributed mostly to the damage and loss of

traffic caused by the storm during last August. The expenditures for storm damage repairs totaled $163,293.

Hagerstown & Frederick Railway, Frederick, Md.—The Hagerstown & Frederick Railway has asked permission of the Maryland Public Service Commission to issue $200,000 of first and refunding bonds to retire $200,000 of first mortgage 6 per cent bonds falling due on May 1.

Houston (Tex.) Electric Company.—According to the annual report for 1915 filed with the city officials, the Houston Electric Company on its outstanding stock of $5,000,000 and bonded indebtedness of $2,500,000 secured net earnings for reserves, depreciation and dividends of only $46,805. The gross earnings amounted to $1,002,088, while operating expenses (not including depreciation) were $697,880. Taxes amounted to $79,036, interest charges to $135,470, and bond sinking-fund charges to $37,500. Repairs necessitated by the damages from the storm last August cost the company $5,396. The small earnings of the Houston company are considered to have been caused by jitney competition. Since the beginning of 1916, however, reports show that the loss from this source is rapidly growing less. Many of the jitney operators are going out of business, stating that the steadily increasing cost of gasoline, lubricants and tires renders their business unprofitable.

Louisville (Ky.) Traction Company.—Churchill Humphrey, son of Judge Alex P. Humphrey, counsel for the Louisville Traction Company, has been elected a member of the board of directors. He succeeds J. R. Turner, Jersey City, N. J., who was chosen under the New Jersey resident director law. All the old officers of the company were re-elected at the meeting of the board in Louisville.

Philadelphia (Pa.) Rapid Transit Company.—The Philadelphia Stock Exchange has been notified that the proposed plan for the extension of the Philadelphia Rapid Transit Company voting trust agreement to Feb. 20, 1921, has been declared operative and that until further notice voting trust certificates will be received for stamping of the extension and certificates of stock of the company received for deposit under the agreement. The plan for the extension of the agreement was noted in the Electric Railway Journal of Feb. 12, page 333.

San Francisco, Napa & Calistoga Railway, Napa, Cal.—Although the San Francisco, Napa & Calistoga Railway had heavy damage suits to meet as the result of a wreck in June, 1913, it came through the year 1915 with a deficit of only $10,325. This made a total deficit of $84,913, a deficit of $74,588 having been incurred in 1914. The total operating receipts for the last calendar year were $227,749, while the operating expenses, including injury claims, damages, etc., amounted to $147,901, making the net operating income $79,843. From this was deducted interest on funded debt, taxes, rents, etc., to the extent of $90,168, leaving a deficit of $10,325. The company has 44.697 miles of main tracks, sidings and turnouts. The foregoing figures are taken from the yearly statement made to the State Board of Equalization.

Steubenville (Ohio) Railway.—The Steubenville Railway, controlled by the Virginia & Ohio Securities Corporation, has been authorized by the Ohio Public Utilities Commission to issue car trust certificates in the sum of $12,600. The notes are to be in favor of the J. G. Brill Company, Philadelphia, Pa., in the sum of $3,150 each, payable in twelve, twenty-four, thirty-six and forty-eight months from date and are to bear interest at 6 per cent. The certificates are to be issued as evidence of deferred payments for three cars purchased from the Brill Company.

Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio.—The Toledo, Bowling Green & Southern Traction Company has applied to the Ohio Public Utilities Commission for permission to sell $141,500 of its first mortgage bonds to reimburse the company for improvements already made and to provide funds for improvements in contemplation.

Toronto (Ont.) Civic Railway.—The operation of the Toronto Civic Railway at a 2-cent fare or six tickets for 10 cents has resulted in a deficit of $380,000 since the lines were placed in service three and a half years ago. The revenue increased from $166,994 in 1914 to $199,300 in 1915. Works Commissioner R. C. Harris, who is general manager of the lines, has always wanted a 3-cent fare, but the City Council decided against that rate. The newly-appointed Transportation Commission will have to deal with the civic car deficit as one of its most pressing questions.

Trans-St. Mary's Traction Company, Sault Ste. Marie, Mich.—The Lake Superior Corporation through the subsidiary Algoma Steel Corporation has arranged for the sale to the Great Lakes Power Company, Ltd., of its water-power interests and its street railway and ferry business at Sault Ste. Marie, Ont., controlled by the Trans-St. Mary's Traction Company and the International Transit Company. The purchaser, a new $2,600,000 corporation, pays a large sum in cash to the Algoma Steel Corporation, which the latter will use in the development of its steel plants. The Great Lakes Power Company, Ltd., will spend about $2,000,000 in power and industrial development at the "Soo." Some 15,000 additional electrical horsepower will be developed at the rapids, making 30,000 in all on the Canadian side. With this deal the Algoma Steel Corporation withdraws from the power, street railway and ferry business and will give its sole attention to the steel plant.

United Gas & Electric Corporation, New York, N. Y.—In connection with the declaration of a dividend of 1¾ per cent on the $9,453,000 of first preferred stock of the United Gas & Electric Corporation, payable on April 1 to stock of record of March 23, it was announced that hereafter dividends on this stock would be paid quarterly beginning April 1 instead of half-yearly as heretofore.

United Railways Investment Company, San Francisco, Cal.—It is reported that refinancing plans are under discussion by the United Railways Investment Company, the holding company of the United Railroads of San Francisco. The purpose of the board is said to be to work out an adjustment which will enable the company to retire or fund its outstanding preferred dividend scrip and make cash disbursements on its cumulative 5 per cent preferred stock. The preferred dividend scrip contains a provision that so long as any of it is outstanding no cash dividends can be paid. On May 1, 1906, a dividend of 4.75 per cent was paid on the preferred stock in full for accumulated dividends to Sept. 30, 1905. This payment was made in interest-bearing scrip instead of cash, owing to the earthquake and fire in San Francisco. In July, 1906, and January, 1907, additional scrip dividends of 2.5 per cent each were paid, but none has been paid since that time.

DIVIDENDS DECLARED

Athens Railway & Electric Company, Athens, Ga., quarterly, 1¼ per cent, preferred.

Bangor Railway & Electric Company, Bangor, Me., quarterly, 1¾ per cent., preferred.

Cincinnati, Newport & Covington Light & Traction Company, Covington, Ky., quarterly, 1⅛ per cent, preferred; quarterly, 1½ per cent, common.

Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.

City Railway, Dayton, Ohio, quarterly, 1½ per cent, preferred; quarterly, 1½ per cent, common.

Columbus, Newark & Zanesville Electric Railway, Springfield, Ohio, quarterly, 1½ per cent, preferred.

Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1 per cent, prior preferred.

Elmira Water, Light & Railroad Company, Elmira, N. Y., quarterly, 1¾ per cent, first preferred; quarterly, 1¼ per cent, second preferred.

Greene & Coates Streets Passenger Railway, Philadelphia, Pa., quarterly, $1.50.

Harrisburg (Pa.) Railways, 1½ per cent, preferred.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, quarterly, 2 per cent.

International Traction Company, Buffalo, N. Y., quarterly, 1¾ per cent, 7 per cent first preferred; quarterly, 1 per cent, 4 per cent preferred.

Iowa Railway & Light Company, Cedar Rapids, Iowa, quarterly, 1¾ per cent, preferred.

Manchester Traction, Light & Power Company, Manchester, N. H., quarterly, 2 per cent.

Mohawk Valley Company, New York, N. Y., quarterly, 1½ per cent.

Nashville Railway & Light Company, Nashville, Tenn., quarterly, 1¼ per cent, preferred.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent, preferred.

Omaha & Council Bluffs Street Railway, Omaha, Neb., quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Philadelphia Company, Pittsburgh, Pa., 6 per cent, preferred.

Philadelphia & Western Railway, Upper Darby, Pa., quarterly, 1¼ per cent, preferred.

Porto Rico Railways, Ltd., Ponce, Porto Rico, quarterly, 1¾ per cent, preferred.

Public Service Corporation of New Jersey, Newark, N. J., quarterly 1¾ per cent.

Republic Railway & Light Company, Youngstown, Ohio, quarterly, 1½ per cent, preferred.

South Carolina Light, Power & Railways Company, Spartanburg, S. C., quarterly, 1½ per cent, preferred.

Tidewater Power Company, Wilmington, N. C., 3½ per cent, common.

United Gas & Electric Corporation, New York, N. Y., quarterly, 1¾ per cent, first preferred.

United Railways & Electric Company, Baltimore, Md., quarterly, 50 cents, common.

Washington Water Power Company, Spokane, Wash., quarterly, 1¼ per cent.

Western Ohio Railway, Lima, Ohio, quarterly, 1¾ per cent, first preferred.

West India Electric Company, Ltd., Kingston, Jamaica, quarterly, 1¼ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

Period		Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
ATLANTIC SHORE ELECTRIC RAILWAY, SANFORD, ME.						
1m., Feb.,	'16	$21,081	*$19,004	$2,077	.....	.....
1 " "	'15	20,960	*19,977	983	.....	.....
AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.						
1m., Feb.,	'16	$144,233	$93,455	$50,778	$45,503	$5,275
1 " "	'15	130,652	88,772	41,880	41,922	†42
8 " "	'16	1,317,415	840,499	476,916	361,193	115,723
8 " "	'15	1,372,173	870,131	502,042	345,980	156,062
CITIES SERVICE COMPANY, NEW YORK, N. Y.						
1m., Feb.,	'16	$673,406	$18,357	$655,049	$44,186	$610,863
1 " "	'15	388,164	13,047	375,117	40,833	334,284
12 " "	'16	5,002,685	183,453	4,819,232	495,485	4,323,747
12 " "	'15	3,942,499	130,266	3,812,233	443,333	3,368,900
CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.						
1m., Jan.,	'16	$213,184	*$133,393	$79,791	$65,851	$13,940
1 " "	'15	194,212	*120,141	74,071	62,568	11,503
12 " "	'16	2,655,336	*1,519,039	1,136,297	795,697	340,600
12 " "	'15	2,523,323	*1,457,429	1,065,894	757,851	308,043
DALLAS (TEX.) ELECTRIC COMPANY						
1m., Jan.,	'16	$173,132	*$101,619	$71,513	$36,812	‡$36,700
1 " "	'15	179,353	*105,019	74,334	33,417	40,917
12 " "	'16	1,822,267	*1,116,775	705,492	407,958	‡300,735
12 " "	'15	2,187,161	*1,264,280	922,881	377,599	545,282
EL PASO (TEX.) ELECTRIC COMPANY						
1m., Jan.,	16	$105,282	*$48,568	$56,714	$4,672	$52,042
1 " "	'15	92,402	*43,996	48,406	4,185	44,221
12 " "	'16	994,769	*525,632	469,137	50,855	418,282
12 " "	'15	1,041,481	*569,919	471,562	51,258	420,304
HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.						
1m., Jan.,	'16	$24,835	*$17,041	$7,794	$5,522	$2,272
1 " "	'15	20,015	*16,026	3,989	5,604	†1,615
12 " "	'16	281,480	*158,552	122,929	66,435	56,494
12 " "	'15	274,511	*179,686	94,825	67,058	27,767
INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.						
1m., Feb.,	'16	$3,036,983	$1,197,042	$1,839,941	$1,167,939	‡$709,234
1 " "	'15	2,707,690	1,035,026	1,672,664	1,077,932	‡644,687
8 " "	'16	23,053,762	9,085,816	13,967,946	8,977,633	‡5,364,771
8 " "	'15	21,857,127	8,547,437	13,309,690	8,669,525	‡5,020,996
PHILADELPHIA (PA.) RAPID TRANSIT COMPANY						
1m., Feb.,	'16	$2,036,166	$1,150,743	$885,423	$816,738	$68,685
1 " "	'15	1,833,777	1,090,922	742,855	812,145	†69,290
8 " "	'16	16,607,058	9,311,215	7,295,843	6,529,309	766,534
8 " "	'15	15,777,296	9,163,401	6,613,895	6,472,515	141,380
PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.						
1m., Jan.,	'16	$669,593	*$431,271	$238,322	$182,650	$55,672
1 " "	'15	670,885	*421,650	249,235	178,139	71,096
12 " "	'16	7,558,290	*4,764,384	2,793,906	2,186,496	609,410
12 " "	'15	8,367,824	*4,994,023	3,373,801	2,123,097	1,250,704
TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.						
1m., Feb.,	'16	$810,420	$523,051	$287,369	$136,345	$151,024
1 " "	'15	717,749	493,881	223,868	129,893	93,975
2 " "	'16	1,640,703	1,066,250	574,453	282,296	292,157
2 " "	'15	1,489,794	1,025,421	464,373	273,849	190,524

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

STEUBENVILLE RATES UNREASONABLE

Conclusions of Interstate Commerce Commission in Steubenville-Follansbee Case

In the case of the city of Steubenville, Ohio, against the Tri-State Railway & Electric Company the Interstate Commerce Commission has decided that the commutation passenger fare of $8, for 100 rides between Steubenville, Ohio, and Follansbee, W. Va., is unjust and unreasonable, and has prescribed a maximum fare of $3.70 for fifty-two rides for the future. In concluding its decision the commission said:

"While the facts and figures relative to the cost, earnings, and operating expenses of the Steubenville company are interesting as showing that the company has suffered from its relations with affiliated companies and that it is in position to make better arrangements with respect to the matters specifically referred to, they do not furnish the sole standard from which to determine what are just and reasonable fares between Steubenville and Follansbee. Complainant submits comparisons with other fares between points on defendant's line and with the fare between Steubenville and Follansbee via the Pittsburgh, Cincinnati, Chicago & St. Louis Railway to show that the present fares charged by defendant are unjust and unreasonable.

"The 30 cents per car-mile which defendant pays for the use of the 1600 ft. of track in Market Street amounts to approximately one-fourth of a cent per passenger, which, added to 2.5 cents per passenger for the use of the bridge, makes a total deduction of 2.75 cents per passenger. In the following table this amount has been deducted from the Steubenville-Follansbee and Steubenville-Weirton fares in order to compare the net earnings per passenger.

	Miles	Net Earnings per Passenger	Net Passenger Mile Earnings
Steubenville-Follansbee:			
Single fare—			
Present	2.9	$0.0725	$0.025
If bridge toll and track rental reduced 40 per cent	2.9	.0835	.029
Commutation fare—			
Present	2.9	.0525	.018
If bridge toll and track rental reduced 40 per cent	2.9	.0635	.022
Proposed: $1 book of fourteen tickets with present deductions	2.9	.0439	.015
If bridge toll and track rental reduced 40 per cent	2.9	.0549	.019
Steubenville-Weirton:			
Single fare—			
Present	5.7	.0725	.013
If bridge toll and track rental reduced 40 per cent	5.7	.0835	.015
Commutation fare—			
Present	5.7	.0525	.009
If bridge toll and track rental reduced 40 per cent	5.7	.0635	.011
Wellsburg-Follansbee: Single fare	4.4	.05	.011

"It will be noted from the above table that the net earnings per passenger for the 2.9 miles between Steubenville and Follansbee are the same as for the 5.7 miles between Steubenville and Weirton, and greater than for the 4.4 miles between Follansbee and Wellsburg. It will be further noted that the net earnings from a $1 ticket for fourteen rides between Steubenville and Follansbee would not compare unfavorably with the net earnings between the other points shown.

"The Pittsburgh, Cincinnati, Chicago & St. Louis Railway has a branch line running between Steubenville and Follansbee. The distance via this line is 4.4 miles, and it sells monthly fifty-four-ride commutation tickets for $3.25, or a net one-way fare of about 6 cents. The train schedules of this line, however, are such that the employees of the industrial plants at Follansbee cannot use the service.

"Upon consideration of all the facts of record it is the finding and conclusion of the commission that defendant's charge of $8 for 100 rides between Steubenville and Follansbee is unjust and unreasonable, and that a reasonable maximum charge for the commutation service between said

points would not exceed $3.70 for fifty-two rides. The record does not warrant a finding that the one-way or round-trip fares are unreasonable."

WHAT IS GOOD SERVICE?

The *Electrogram*, published by the Puget Sound Traction, Light & Power Company, Seattle, Wash., contained in its issue of March 23 under the caption "What is Good Service?" the following:

"The basis of many a criticism of the street railway business, in general and in particular, is the statement that the street car company is not giving 'good service.' This seems to be the cause for much public dissatisfaction. The individual is inconvenienced just once by some wait, delay or discomfort, and decides forthwith and for all time that the service is bad.

"Before condemning the street car company for not giving good service, it is only fair to determine in your own mind what good service is. Just what do you expect from the street car service? What is the longest time that you think a person should ever be obliged to wait for a car? Do you think a person should ever be obliged to wait for a car? Do you expect to find a car waiting for you every time you are ready to go anywhere? Do you grow impatient when the car stops at other corners before arriving at your corner?

"In other words, do you expect taxicab service from the street cars? And if so, aren't you looking for a dollar's worth of service at the price of 5 cents?

"Street car service is not perfect. It is not 'individual service' such as you get at a high-class hotel. Rather it is a general service made to fit the general need, and at a very low price. But being a general service, sometimes the individual is obliged to accommodate himself to the service, because it cannot accommodate his personal wish. Thus he may find it necessary to take a car leaving a few minutes sooner than he cares to leave, because the majority of patrons want to leave at the earlier time, and there is not traffic enough to operate another car at his leaving time.

"It would be ridiculous to claim that our service is 'perfect.' We are selling transportation 'in bulk,' and we cannot give the same attention to each individual 5-cent sale which the taxicab company gives to each individual $1 or $2 sale. We believe we give every comfort, facility, protection we know how, under the conditions.

"In considering street car service you may compare it with 'perfect' service, or you may compare it with no service at all. Of course, neither comparison is fair. But they are about equally extreme.

"Before you determine, even in your own mind, that the street cars are not giving 'good service,' stop long enough to consider just what you expect, what you think it is fair to expect, and then see if the service is not 'good service,' everything considered."

ANOTHER COMPANY PUBLICATION DISCUSSES WOMEN AS MATERIAL FOR TRAIN CREWS

W. P. Strandborg, editor of *Watts Watt*, published by the Portland Railway, Light & Power Company, Portland, Ore., dedicated the issue of March 24 principally to the fair sex. Mr. Strandborg has been thinking about the employment of women on the cars in Europe. In projecting himself into the future he rambled on in this entertaining fashion:

"Several days ago as we were on our way over to Verdun to ask the Crown Prince to stop picking on Joffre and the rest of the boys, an old friend of ours remarked that in London and Glasgow the women folks were serving as conductors on the trams and were making a go of it.

"'Why doesn't the old Reliable Service Company try it?' he asked.

"Whereupon we thought out loud as follows and to wit:

"'They oughta make better motormen or motorines or whatever the feminine gender might be in a case like that.'

"'And why?' says he.

"'Oh, they'd be so handy with the switches; need only a hairpin or a buttonhook or something like that and in the winter time they could hang them in front of the radiator and they wouldn't need to bed 'em down with rock salt to thaw 'em out.'

"'But, you couldn't use 'em on the Broadway line,' he argued.

"'And, for why?' we came back.

"'Too many theaters and matinees and candy shops and things,' retorted he.

"'All right, put blinders on 'em, or else turn them loose on the Twenty-third Street line, where there are a lot of streets named after men, and it's Leap Year, at that and—'

"'Of course,' interrupted our friend, 'it wouldn't ever do to try the fair sisters on any of the East Side lines. It would take them all afternoon for each bridge, but, anyhow, I can see a good many advantages if we did have women running our street cars in spite of the bridge stuff and other such things to interfere with schedules. If you had a sweet and charming little miss a-hold of the controller in the front vestibule and a large round matron of sixty punching the transfers, yuh'd never have to tell the boys twice to "step forrud in the aisle, please!"'

"'Yes, but there's a rule against talking to the motorman, or the motoress, as it would be in this case.'

"'But, there's no law against looking and smiling and casting a cheerful and pleasant influence all around the vestibule, is there?'"

MODIFICATION OF BROOKLYN "CAR FULL" ORDER PROPOSED

Haven Emerson, health commissioner of New York, has appealed to the Public Service Commission to supply him with the data necessary for a modification of his "car full" order so that it can be extended to cover all the transit lines in Brooklyn. In his letter to Chairman Oscar S. Straus, Commissioner Emerson states that "it is apparent that universal compliance would be impracticable if the order already issued by the Department of Health to some of the lines was extended to all the lines in Brooklyn."

In his letter Commissioner Emerson said:

"Modification of the department's order might be considered under that following four headings:

"1—A modification demanded by the physical limitations of track, equipment and switching facilities.

"2—A modification during certain hours of the day, to be specified precisely for each particular line.

"3—A modification, according to weather conditions, on certain lines; discretionary power to be vested in the operating company, subject to report to and control by the Department of Health.

"4—A modification according to the type of car used on each particular line, some cars being so constructed as to permit standees, with safety to health, to a number exceeding 50 per cent of the seating capacity, whereas, with certain types of cars, notably the cross-seat cars, the allowance of 50 per cent standees, in addition to the seating capacity of the car, would be impracticable and dangerous to health.

"May I request consideration, by your commission, of this matter, so that the Department of Health may cooperate effectively with the Public Service Commission, to obtain traffic conditions which will not continue to menace the health of the community, as the present conditions do, and to accomplish this without increasing unduly the burdens of the operating companies or inconveniencing the traveling public more than is necessary, in their own interest?"

GOVERNOR SIGNS NEW JERSEY JITNEY BILL

The Governor of New Jersey has signed the bill passed by the Senate and the General Assembly concerning auto buses, commonly called jitneys, and their operation in cities. The words "auto bus," as used in the bill, are intended to include any automobile or motor bus commonly called a jitney, which indiscriminately accepts and discharges persons who offer themselves for transportation. No auto bus as defined in the bill is to be operated along any street in any city until the owner has obtained consent to operate from the board or body having control of public streets in the city. Moreover, no consent of any city for the operation of such a vehicle is to become effective until the owner

has filed with the city an insurance policy in the sum of $5,000 secured from a company duly licensed to transact business under the insurance laws of New Jersey, to provide against loss from the liability imposed by law upon the auto owner for damages on account of bodily injury or death to any person as a result of an accident. Consent to operate an auto may be revoked by the governing body of a city after notice and hearing whenever it appears that the person to whom the consent was granted has failed to furnish and keep the insurance in force, or to comply with any terms or conditions imposed by the board which granted the license to operate.

On or before the tenth day of each calendar month every person included in the terms of the bill must file with the city treasurer of the city in which he operates a statement verified under oath showing the gross receipts from the business of the auto during the preceding calendar month and must pay to the treasurer of the city at that time 5 per cent of the gross receipts as a monthly franchise tax for the use of the city streets. If the route over which the auto is operated extends beyond the limits of the city, the operator must include in the statement made to the city the length of the route over which the auto is operated, both within and without the city, and pay as a franchise tax to the city 5 per cent of such proportion of the gross receipts as the length of the route in the city bears to the length of the whole route. The sum paid to the city in accordance with this requirement is to be in lieu of all other franchise taxes and municipal license fees. A fine of $100 for each offense is fixed in the case of all failures to meet this requirement. Any person operating an auto bus in any of the streets of any city in New Jersey at any time after sixty days of the date when the act becomes effective without having complied with the provisions of the act is to be deemed guilty of a misdemeanor and subject to the penalties provided by law.

TRAFFIC RULES FOR SAN FRANCISCO JITNEYS

Prominent business firms on Market Street, San Francisco, Cal., various improvement and other clubs and the United Railroads framed and filed a petition with the Board of Supervisors asking that the jitneys be prohibited from traversing Market Street eastward of Sixth Street. Charles N. Black, vice-president of the United Railroads, also filed with the Supervisors a separate statement in which it was set forth that so destructive have the jitneys become to the business of the company that unless relief is extended to the company it will have to curtail the service to the outlying districts.

On March 16 the Board of Supervisors decided to leave with the police department the regulation of jitneys on Market and Fillmore Streets as requested by the business men of these thoroughfares. The department took up the matter of regulating jitney traffic. As a result Police Sergeant Charles Goff, head of the traffic squad, promulgated the following rules, which went into effect on March 22:

Motor cars to run in two lines outside of the street car tracks on Market Street from the ferry to Sixth Street.

Jitneys to run in the line next to the curbs and privately owned vehicles on the inside.

Stopping places for jitneys near sidewalk fireplugs to be mapped out.

Jitneys prohibited from passing one another unless the car ahead is either stopped or disabled, and from cutting across the line of private automobiles.

Violations result in a trip to police headquarters, and in the event of a second offense the culprit's license will be revoked.

Increase in Freight Rates Asked.—The Birmingham Railway, Light & Power Company, Birmingham, Ala., has applied to the Public Service Commission of Alabama for permission to increase its freight tariffs 25 per cent.

Head Rests Provided on Interurban Cars.—The Illinois Traction System, Peoria, Ill., has decided to provide head rests for the backs of seats in interurban cars. These head rests will be maintained in a sanitary manner and are said to be the first of the kind ever provided by an electric line in the United States.

Selling Waste Paper.—The Kansas City (Mo.) Railways has made a contract for the sale of its waste paper at 20 cents per 100 lb. to a local waste paper company, which will furnish sacks and collect the waste. It is estimated that there will be about 10 tons a month. The company has been burning its waste.

Kentucky "Jim Crow" Bill Killed.—The "Jim Crow" bill, which had passed the Senate of the Kentucky Legislature, died in the House during the rush hours of the closing days of the session. It was not called for by the rules committee. Mayor John H. Buschemeyer, Louisville, has suggested an organized effort to establish a custom of voluntary segregation.

Suit for Reduction of Fare Discontinued.—The City Council of Belleville, Ill., has instructed the city attorney to dismiss the fare suit of the city against the East St. Louis & Suburban Railway, East St. Louis, Ill. This suit is now pending before the Illinois Public Utilities Commission. The city sought a reduction in fare between Belleville and East St. Louis.

Portland Jitney Test Case Dismissed.—On the ground that no points had been cited not already passed upon by the State Supreme Court when it held the law constitutional, Federal Judge Bean at Portland, Ore., has dismissed the complaint in the suit filed by Louis Mertz to test the Portland jitney ordinance. Mr. Mertz, a jitney driver, brought the case against Mayor Albee in person.

2,485,700 Passengers Handled in a Day on 213 Miles of Line.—On March 20 the Interborough Rapid Transit Company, New York, N. Y., carried the largest number of passengers of any single day in the history of the company, the number being 2,485,700, from which revenues amounting to $124,285 were derived. The company operates 85 miles of subway and 118 miles of elevated line.

Toronto Seeking Drastic Car Act.—Notice is given by the city of Toronto, Ont., that an application will be made by the city to the Legislative Assembly of Ontario for an act to compel the Toronto Railway to build, equip and operate upon its system 200 additional cars, or pay to the city a penalty of $500 a day for every breach of the act after the lapse of a period of three months from the passing of the act by the Assembly.

Jersey Accident Faker Gets Nine Months.—Maurice Abrams, the accident faker apprehended by the Public Service Railway, Newark, N. J., an account of whose arrest was published in the ELECTRIC RAILWAY JOURNAL of March 18, 1916, page 583, was sentenced on March 22 by Judge Seufert of the Special Sessions Court of Bergen County to serve a term of nine months in the Bergen County jail.

Decrease of 18 Per Cent in Accidents in St. Louis.—The pamphlet report of the United Railways, St. Louis, Mo., for the year ended Dec. 31, 1915, shows that the total number of accidents during 1915 as compared to those during 1914 decreased 18 per cent. The boarding and lighting accidents, which constituted the most numerous class, decreased 38 per cent. All classes of accidents showed a large decrease with the exception of collisions with automobiles, which showed an increase.

New Transfers in Use in Hartford.—It was announced that starting on April 1 the Connecticut Company would issue a new kind of transfer. The order announcing the change was posted recently and described the transfer as one that would have the day and date stamped across the face of the ticket. The transfer is to be in two parts. The center will be so arranged as to allow half of the ticket to be torn off for the morning, and in the afternoon, when a transfer is issued, it will not be good for any point, but will be punched from car to car.

Des Moines Rerouting Plans Made.—A change in street car routes and schedules proposed by the Des Moines (Iowa) City Railway will affect every line in the city except University, Fourth Street and Scott Street. Crosstown service will be instituted and two lines, one from East Des Moines and one from West Des Moines, will loop practically the entire shopping district between Ninth and Second Streets. The purpose of the long loops in the business district is to provide through service downtown and

to cater to more short-haul business. It is expected that the crosstown service will speed up the cars.

Oakland Jitneys Bow to Ordinance Excluding Them from Business Zone.—The jitney drivers in Oakland, Cal., were inclined at first to ignore the ordinance passed recently fixing a district in downtown Oakland from which the machines were barred. The police were prompt to act and in a few days 165 cases involving disobedience of the ordinances were cluttering the police courts. The operators evidently thought better of the matter, however, for a compromise was reached with the prosecuting authority under which the cases were dismissed, a pledge being exacted that there will be no further violations by the original offenders.

Maryland Bus Company Suspends—The Maryland Motor Transportation Company, with offices in Baltimore and Laurel, Md., has applied to the Public Service Commission of Maryland for permission to abandon its franchise. In its petition the company states that it has been operating for the last ten months, but that the revenues were just sufficient to meet expenses, with gasoline at the former price. With the increase in the price of fuel, the company says, it would be impossible to continue service without entailing a loss. The petition states that all creditors will be paid in full but that the stockholders will probably lose their original investment.

Jitney Franchise Ordinances Before Memphis Council.—Three jitney franchise ordinances have passed their second readings before the Board of City Commissioners of Memphis, Tenn., over the protest of the Memphis Street Railway, which urged amendments out of justice to the company. Lovic P. Miles, attorney for the railway, protested on the ground that there was no necessity for additional transportation facilities, that the operations of jitneys would make it difficult, if not impossible, for the railway to comply with ordinances under which it is operating, and that the routes set down for the jitneys cover 69 per cent of the mileage already occupied by the company. Mr. Miles suggested amendments to provide a privilege tax on each car and indemnifying bonds to protect the city.

Commission Issues Statement on Scranton Jitney Case.—The Public Service Commission of Pennsylvania on March 21 issued the following statement regarding its decision in the Scranton jitney cases: "The decision of the commission on the complaints of the Scranton Railway vs. M. J. Walsh and others, in relation to the operation of autobuses, applies only to those particular cases and to the conditions there prevailing. These autobuses ran upon fixed routes, upon regular schedules, charged uniform fares and carried everyone who demanded their service. These the commission held to come within the provisions of the public service law. The Public Service Commission has made no decision where passenger buses or jitneys are operated under other conditions." The decision of the commission in this case was reviewed in this paper for March 25, page 627.

An Object Lesson.—The Rochester *Democrat and Chronicle* said in part in an editorial in its issue of March 17: "The plucky battle with the storm carried on by the New York State Railways, Rochester Lines, was so successful that all city lines were kept open, in spite of high winds, heavy drifts and the most difficult traffic conditions. The matter deserves some emphasis because of the efforts made last summer to bankrupt the street railroad system and substitute for it several hundred jitney buses. If the street cars had been taken off last summer, when the jitney fever was at its height, and the streets permanently turned over to their competitors, what would have been the plight of the workingmen and women of Rochester in the season of stormy weather and heavy snow? They would have had to walk, when walking was most difficult and conditions were most disagreeable, or else remain at home. Only a great organization could emerge triumphant from such a battle with the elements as had to be waged for three consecutive days this week. Persons who are prone to jump to the conclusion that operating a street railroad is like shoveling money out of the mint have had another set of facts impressed upon their minds. The street railway system does not suspend business when conditions of operation become difficult, and leave its patrons to flounder through snow drifts."

Personal Mention

Mr. **W. R. Hall** has resigned as general manager of the North Alabama Traction Company, New Decatur, Ala., to become connected with the Muscle Shoals power development.

Mr. **John Catherman** has resigned as assistant engineer of the maintenance of way department of the Illinois Traction System, with headquarters in Springfield, Ill., to become connected with the sales department of the Buda Manufacturing Company, Chicago.

Mr. **Pakenham W. Beatty** has resigned as chief engineer of the Lacroze Tramway Company, Buenos Aires, which position he has occupied since June, 1913. He will take the post of chief engineer of the Buenos Aires underground railway, belonging to the Anglo-Argentine Tramway Company, Buenos Aires.

Mr. **D. I. Clough** has resigned as master mechanic of the United Railways, Portland, Ore., and the Oregon Electric Railway and as superintendent of shops of the Spokane & Inland Empire Railroad, Spokane, Wash., to become master mechanic of the East St. Louis & Suburban Railway, East St. Louis, Ill.

Mr. **Marion G. Charles** has been appointed master mechanic of the United Railways, Portland, Ore., and the Oregon Electric Railway and superintendent of shops of the Spokane & Inland Empire Railroad, Spokane, Wash., to succeed Mr. D. I. Clough, whose appointment to the East St. Louis & Suburban Railway is noted elsewhere in this column.

Mr. **Julien H. Harvey**, recently appointed superintendent of efficiency of the Kansas City (Mo.) Railways, entered the service of the former Metropolitan Street Railway as a timekeeper. He served also as secretary to Bernard Corrigan, former president, before being made a division superintendent. He is not related to Mr. A. E. Harvey, superintendent of way and structures of the company.

Mr. **W. R. Speer** has been appointed general manager of the North Alabama Traction Company, New Decatur, Ala., to succeed Mr. W. R. Hall, resigned. Mr. Speer has been connected with the company for a number of years. Some time ago he was promoted to the position of superintendent. Before that he was electrical engineer and superintendent of overhead construction of the company.

Mr. **W. J. Curle**, Toronto, Ont., has been appointed general manager of the Chatham, Wallaceburg & Lake Erie Railway, Chatham, Ont., to succeed the late William Norris, who died a short time ago. Mr. Curle was formerly connected with the Canadian Pacific Railway and the Canadian Northern Railway, the latter road having control of the Chatham, Wallaceburg & Lake Erie Railway.

Mr. **James B. Walker**, assistant secretary of the Public Service Commission for the First District of New York, on March 20 was elected secretary of the commission, to succeed Mr. Travis H. Whitney, who became, by appointment of the Governor and confirmation by the Senate, a member of the commission. Mr. Whitney had been secretary of this commission from July, 1907, up to the time he was promoted to a commissionership. Mr. Walker has been assistant secretary since January, 1908, and has acted as secretary during the absence of Mr. Whitney.

Mr. **William C. Harrington**, who on April 1 became superintendent of transportation of the Kansas City (Mo.) Railways, was born on Aug. 31, 1872, in County Tipperary, Ireland. He came to the United States in 1882 and went to work for the Corrigan Consolidated Railway, Kansas City, in 1888, as stable boy at Fourth and Wyandotte Streets. He was successively promoted to driver, gripman, cable splicer, motorman and division superintendent. In August, 1909, he became connected with the general offices as assistant general superintendent under President Bernard Corrigan of the Metropolitan Street Railway.

Mr. James E. Gibson, who was appointed general manager of the Kansas City (Mo.) Railways, effective April 1, was born on Aug. 20, 1881, at Kansas City. He is the son of Mr. James S. Gibson, formerly judge of the circuit court. He was educated in the Kansas City public schools and was graduated from the University of Missouri in 1902. He acted as secretary to Congressman Cowherd in 1902-1904. He entered the service of the Metropolitan Street Railway on Dec. 1, 1904, and in June, 1905, was appointed secretary to Bernard Corrigan, then president. Mr. Gibson was made a division superintendent of the company in March, 1909, and was appointed general superintendent in June, 1910, serving in this capacity through the receivership of the Metropolitan and the reorganization of the company as the Kansas City Railways.

Mr. Alonson E. Stewart has resigned as roadmaster of the New York & Stamford Railway, the Westchester Street Railway and the Stamford and Norwalk divisions of the Connecticut Company to become connected with the Hartford Sand & Stone Company as vice-president and superintendent with offices at Hartford, Conn. Mr. Stewart was graduated from the Sheffield Scientific School, Yale University, in June, 1912. He entered business at once with the New Haven division of the Connecticut Company as a draftsman in the engineering department. Later he was connected with the track department and was made a sub-foreman and afterward a foreman. In December, 1913, he was promoted to roadmaster with headquarters at Port Chester, N. Y. Mr. Stewart is a member of the Connecticut section of the American Electric Railway Association, the Connecticut Society of Civil Engineers and the Yale Engineering Association.

Mr. A. S. Baldwin, chief engineer of the Illinois Central and the Yazoo & Mississippi Valley Railroads, and first vice-president of the American Railway Association, was elected president of that organization at the annual convention in Chicago during the week ended March 25. Mr. Baldwin was born at Winchester, Va., in 1861. He was educated in private schools, and after teaching school one year, entered railroad service in 1880. From 1884 to 1886 he was in the employ of the Baltimore & Ohio Railroad on the construction of its Philadelphia extension. He then went to the Chicago, Milwaukee & St. Paul Railway as principal assistant engineer on the construction of its bridge across the Missouri River at Kansas City. Following this, after a short period on the construction of what is now the Louisville, Henderson & St. Louis Railway, he entered the service of the Louisville & Nashville Railroad, where he remained from 1887 to 1901, serving successively as assistant engineer, assistant to chief engineer, and roadmaster. In the fall of the latter year he came to the Illinois Central Railroad as principal assistant engineer. In May, 1903, he was made engineer of construction, and in March, 1905, was appointed to the office of chief engineer, which position he now holds.

Mr. E. H. Le Tourneau, whose appointment as efficiency engineer of the Portland Railway, Light & Power Company, Portland, Ore., was noted in the ELECTRIC RAILWAY JOURNAL of March 18, was graduated from the University of Minnesota in the class of 1905 as an electrical engineer. He spent the summers during his university course with the Chicago Edison Company, as relief operator, and immediately upon graduation spent fourteen months in the testing department of the General Electric Company, at Schenectady, N. Y. Mr. Le Tourneau was next employed for approximately four years, beginning in July, 1906, by the New York Central & Hudson River Railroad, in the electric power division in New York City, and acted at various times as operator, load dispatcher, tester, inspector and office assistant under Mr. W. G. Carlton, superintendent of power. During the summer of 1910 Mr. Le Tourneau was employed as superintendent of the Exchequer Power & Mining Company, in charge of a small hydroelectric installation on the Merced River in California. In the autumn of 1910 he entered the employ of the Portland Railway, Light & Power Company as draughtsman, and worked on the design of hydroelectric and steam plans and substations. He was appointed superintendent of an hydroelectric plant of the company at Oregon City, Ore., and later was made assistant engineer under Mr. O. B. Coldwell, general superintendent of the company.

Construction News

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

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

RECENT INCORPORATIONS

***Highland Park & Royal Oak Railroad, Detroit, Mich.**—Incorporated to construct a line between Highland Park and Royal Oak. Incorporators: Burnette F. Stephenson, Robert E. Barber, John L. Austin, Charles S. Davidson, Carl G. Trebein, John B. Chaddock and Henry Wineman, Jr., all of Detroit and Highland Park.

FRANCHISES

San Pedro, Cal.—The Pacific Electric Railway has filed with the Railroad Commission of the State of California a petition for authority to abandon portions of its line in San Pedro, known as the "narrow-gage line," and also for authority to reconstruct instead a connecting track at grade between the Gardena-Dominguez main lines.

Henderson, Ky.—The Henderson Council has completed preparation of its new street railway franchise. It calls for an extension to Fernwood Cemetery, a reduction of fares to six tickets for 25 cents, 70-lb. rails on all lines within the year and $20 monthly franchise tax to be devoted to park maintenance. It would provide for free use of the city lines by the Evansville Railways and use of the tracks of the Henderson Traction Company by builders of other interurban lines touching Henderson. The present franchise of the Henderson Traction Company expires in October of this year.

Baltimore, Md.—The United Railways & Electric Company has asked the Council for a franchise across the new Hanover Street bridge.

Boston, Mass.—The Park and Recreation Commissioners have granted permission to the Boston Elevated Company to construct a loop track in Franklin Park, off Seaver Street and opposite Humboldt Avenue in connection with the company's plans for more extensive use of the Seaver Street line and the Egleston Square elevated station.

St. John, N. B.—An agreement has been entered into between the city of St. John and the St. John Railway, under which the company's charter, expiring in 1918, will be extended for five years. The company agrees to pay the city $5,000 for each single mile of track for laying concrete foundations under the rails as the street paving operations proceed.

Cincinnati, Ohio.—Stanley Shaffer, secretary of the West End Rapid Transit Company, notified the Cincinnati City Council on March 24 that the franchise intended for his company, as revised by the Republican Executive Committee, is not acceptable to it. Unless the franchise is restored to its original form and passed at an early date, Mr. Shaffer said the company will withdraw its application for a franchise. The company proposed to build a road 6½ miles long to bring the cars of the Cincinnati, Lawrenceburg & Aurora Electric Railway from Anderson's Ferry to Third and Race Streets in the heart of the city. [Jan. 1, '16.]

Warren, Ohio.—The Mahoning & Shenango Railway & Light Company has received a franchise from the Council of Warren to construct an extension on Main Street from South Street to Pine Street and on Pine Street to the southerly limits of Warren; also on South Main Street from Walnut to Second Street, on Second Street to Highland Avenue to Hoyt Street and on Hoyt Street to Tod Avenue.

Portland, Ore.—The Portland & Oregon City Railway recently petitioned the Council for a six months' extension of time on its franchise in which to complete its line within the city limits of Portland. The line has been completed in the city, as far as Bybee Avenue, and cars are operating between Bybee Avenue and the town of Milwaukie. Construction of other portions of the line in Portland, provided in the franchise, has been delayed because

of difficulty in obtaining rails, inclement weather experienced during the winter months, and difficulties encountered in securing an agreement with the Spokane, Portland & Seattle Railway, the Oregon-Washington Railroad & Navigation Company, and the Portland Railway, Light & Power Company, for track connections and common user privileges on certain streets where the line must use tracks of the companies named. The Portland & Oregon City Railway has asked the Council, unless the other companies make an agreement with it for common user privileges, etc., in the near future on an equitable basis, to proceed to outline the terms of such an agreement.

*Ephrata, Pa.—The Reading & Ephrata Street Railway has asked the Council of Ephrata for a franchise to construct a line on West Main Street from the Reading & Columbia Railroad to Church Street and Church Avenue to the borough limits. This company proposes to construct a line from Ephrata to Reading via Stevens, Denver, Reinholds Station, Galen Hall and Wernesville.

Sharon, Pa.—The Mahoning & Shenango Railway & Light Company has accepted the East Side street railway franchise passed by the Council on March 7.

West Reading, Pa.—The Reading & Womelsdorf Transit Company has received a franchise from the Council to construct double tracks on Penn Avenue from the bridge to Eighth Avenue.

Salt Lake City, Utah.—The Salt Lake & Utah Railroad has asked the Board of County Commissioners for a franchise to construct an extension through Granger and Pleasant Green, 15 miles.

TRACK AND ROADWAY

Northern Electric Railway, Chico, Cal.—This company plans to rebuild its bridge over the American River just outside of Sacramento.

Fresno, Hanford & Summit Lake Interurban Railway, Fresno, Cal.—Owing to financial conditions, this company's project to construct a line between Fresno and Hanford has been abandoned.

Municipal Railways of San Francisco, San Francisco, Cal.—The Board of Supervisors recently voted $5,000 for the preparation of plans and specifications and for the purchase of materials for the new Twin Peaks tunnel railway. The sum of $3,755 was also voted for preliminary investigations and reports by the city engineer on projected extensions of the Municipal Railway system, including the Market Street portion of the Church Street extension, Potrero Avenue, Fifteenth Street and Park Hill, Townsend Street, Sunset district, transpark railway and Stockton Street line to Third and Townsend Streets.

Capital Traction Company, Washington, D. C.—This company expects to begin the removal of its tracks from M Street to the new Pennsylvania Avenue bridge over Rock Creek about April 15 and it is expected that the bridge will be opened to traffic about May 15.

Urbana & Champaign Railway, Gas & Electric Company, Champaign, Ill.—This company is relaying with new ties and heavier ballast its Oregon Street line through the campus of the University of Illinois.

Southern Illinois & St. Louis Railway, Harrisburg, Ill.—It is reported that all preliminaries pertaining to the construction of this company's proposed line to connect Harrisburg, Marion, Pittsburg, Johnston City, West Frankfort and Herrin have been completed and construction will be begun about April 1. W. H. Schott, Chicago, president.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—An extension of the city line of this company at Wabash to the City Park and to the plant of the Service Motor Truck Company has been planned.

Gary & Interurban Railroad, Gary, Ind.—This company plans to construct an extension on Buchanan Street.

Richmond, Ind.—The Chamber of Commerce of Richmond has approved the proposed subsidy of $100,000 for a traction line to connect Richmond with Union City and to connect with the Cincinnati, Bluffton & Chicago Railroad. The county commissioners have been asked to call an election in Richmond and in Wayne Township to vote on the proposed subsidy. [March 18, '16.]

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—The Public Utility Commission of Kansas has granted the Kansas City, Kaw Valley & Western Railway the right to use a part of the old bridge across the Kaw River to reach the south bank. From the north side a bridge of pilings will be constructed between the old and new bridges. The road will operate on this to a point where the narrowing space between the bridges will not permit it to proceed further between them and at that point the rails will turn to the old bridge. The possibility of crossing the river before the new bridge is completed will, it is thought, hasten the extension of the interurban line from Lawrence to Topeka.

Bangor Railway & Electric Company, Bangor, Me.—This company is planning extensive repairs and improvements on both its local and interurban lines. The State Street tracks in Bangor will be replaced with heavier rails, the Old Town division will have new and heavy rails in places where the track has not already been renewed, and new rails will be laid through the village of Orono and at other points on the line.

Holyoke (Mass.) Street Railway.—A preliminary survey has been made by the engineers of this company and town officials of the proposed extension of the South Hadley Falls line.

Plymouth & Sandwich Street Railway, Plymouth, Mass.—Plans are being considered by this company to construct an extension from Fresh Pond to Sagamore Beach.

*Highland Park & Royal Oak Railroad, Detroit, Mich.—Plans are being made by this company to construct a line between Highland Park and Royal Oak. The line will connect with the proposed extension of the Detroit United Railway on Oakland Avenue at the Six-Mile Road, extending north, northwest and west for about 6 miles to the Rochester interurban line on the Ten-and-a-Half Mile Road. The right-of-way for the line has been acquired by the Troyoak Land Company, whose officers and directors are practically the same as those of the railway company. The company proposes a four-track system, two tracks for fast limited service and two for local traffic. Robert E. Barber, secretary, Troyoak Land Company, Highland Park, is interested.

Kansas City (Mo.) Railways.—This company has recently let contracts for material to be used in the rehabilitation of its lines, as follows: 4000 tons of 7-in. T-rails to the Lorain Steel Company at $160,000; five carloads of track spikes to the Illinois Steel Company at about $6,000; 60,000 white oak ties to the Hobart Lee Tie Company at about $50,000.

Southwest Missouri Railroad, Webb City, Mo.—This company will reconstruct about 3 miles of track in Joplin, using 80-lb. Shanghai and 70-lb. A.S.C.E. rails. New rock and concrete foundations and new ties will be used.

Brooklyn (N. Y.) Rapid Transit Company.—Work has been begun by this company on the third-tracking of the Myrtle Avenue elevated line between Willoughby Avenue and Palmetto Street and the four-tracking of the Brighton Beach elevated line between Church Avenue and Malbone Street.

New York & Queens County Railway, New York, N. Y.—The Board of Estimate has voted to appropriate $144,000 for the repaving of the roadway of the Queensboro Bridge in accordance with the plans of the bridge department. The inside trolley tracks, which are used by the New York & Queens County Railway, will be torn up and not replaced, thus necessitating the operation of all bridge trolley cars on the one pair of tracks located on the bridge shelves.

Hamilton, Ont.—It is reported that arrangements have been made with the Dominion Power & Transmission Company by which the hydro-radial railways will operate over the tracks of the Hamilton Street Railway on their route through Hamilton.

Southern Oregon Traction Company, Medford, Ore.—Operation was begun on this company's line from Jacksonville to the eastern limits of Medford on March 27. It is reported that the company is considering the construction of an extension from Jacksonville to the Blue Ridge Mine, 30 miles, the city of Medford to assist in financing the scheme.

Pittsburgh (Pa.) Subway Company.—Plans have been submitted to the Pittsburgh Council by this company for the construction of a subway from Point District, Liberty Avenue and Ferry Street, along Oliver Avenue to Grand Street, thence to Webster Avenue and Fullerton Street, through Herron Hill to Grant Boulevard, along Center Avenue to East End. The cost is estimated at $15,000,000 to $20,000,000.

Nashville & Eastern Electric Railway, Smithville, Tenn.—It is expected that construction on this company's line will begin within the next month. The road is to be built from Smithville to Lebanon, connecting there with the Nashville, Chattanooga & St. Louis Railway. C. T. Edwards, Alexandria, is interested. [Jan. 22, '16.]

Corpus Christi (Tex.) Traction Company.—This company has accepted the franchise granted to J. H. Caswell last summer and will immediately begin work on the construction of an interurban line from Corpus Christi to Ward Island, 8 miles. A bond issue of $100,000 will be made. A. R. Ponder has received the contract for construction material, including engine and cars to handle the material. [Feb. 5, '16.]

San Angelo, Tex.—Representatives of Stone & Webster have completed a survey of conditions in San Angelo and have returned to Boston to render a report which is expected to determine whether or not this corporation will ask the municipality for franchises for a street railway system in San Angelo.

***Williamsburg, Va.**—A survey has been begun for an electric railway from Williamsburg to the proposed dynamite plant of E. I. duPont de Nemours & Company of Wilmington to be erected on York River about 4 miles from Williamsburg. It is also proposed to construct a line in Williamsburg. E. G. Mercer of the Mercer Engineering & Construction Company, Richmond, is interested.

Chester & City Point Railway, Chester, Va.—Surveys have been begun on this company's proposed line from Chester to Hopewell. The line will connect at Chester with the Seaboard Air Line Railway. As soon as the preliminary work is completed, construction on the track and roadbed will be begun and it is expected that the line will be ready for operation this summer. The line will be built by the Vaughan Construction Company of Roanoke. H. D. Eichelberger, Chester, president. [Feb. 26, '16.]

SHOPS AND BUILDINGS

Muscatine & Iowa City Railway, Muscatine, Iowa.—Work will be begun April 1 by this company on the construction of new shops and roundhouse at Muscatine.

Burlington County Transit Company, Mount Holly, N. J.—This company's repair shop and carhouse at Hainesport containing nine cars were completely destroyed by fire on March 29. The loss is estimated at $50,000.

Tidewater Power Company, Wilmington, N. C.—This company, which recently lost by fire its carhouse and machine shops at Ninth and Orange Streets, Wilmington, has begun work on the construction of a new repair shop, which is to be completed by May 1. All contracts for replacement on account of the fire have been closed.

Scioto Valley Traction Company, Columbus, Ohio.—Plans for the new terminal to be built for the Scioto Valley Traction Company at Columbus have been submitted to the Public Utilities Commission of Ohio.

POWER HOUSES AND SUBSTATIONS

Wilmington & Philadelphia Traction Company, Wilmington, Del.—The National Properties Company has placed an order with the General Electric Company for an additional turbine for the account of the Wilmington & Philadelphia Traction Company in Wilmington.

Madison Light & Railway Company, Madison, Ind.—The Public Service Commission of Indiana has granted the Madison Light & Railway Company permission to issue $13,000 in securities, the proceeds to be used for improvements to its power plant.

Lake Erie, Bowling Green & Napoleon Railway, Bowling Green, Ohio.—C. G. Taylor, receiver for this company, has been authorized by Federal Judge Killits to buy new boilers for the company's main power plant.

Manufactures and Supplies

ROLLING STOCK

People's Railway, Dayton, Ohio, is reported in the market for five new cars.

Lincoln (Neb.) Traction Company is not building any new cars, as recently reported.

International Railway, Buffalo, N. Y., is asking for prices on twenty large center-entrance cars.

Stark Electric Railroad, Alliance, Ohio, has ordered three all-steel center-entrance cars for city service.

Phelps-Dodge Company, New York, N. Y., is inquiring for prices on a small gasoline industrial locomotive.

American Sheet & Tin Plate Company, Pittsburgh, Pa., is reported as inquiring for prices on five motor and five trailer cars.

Scranton (Pa.) Railway is expecting to purchase five new cars, through the American Railways Company, Philadelphia, Pa.

Burlington County Transit Company, Mt. Holly, N. J., on March 29 lost nine cars in a fire which destroyed its carhouse and repair shops.

Holyoke (Mass.) Street Railway has ordered five car-bodies from the Wason Manufacturing Company and five from the Laconia Car Company.

Altoona & Logan Valley Electric Railway, Altoona, Pa., is expecting to purchase five new cars, through the American Railways Company, Philadelphia, Pa.

Public Service Railway, Newark, N. J., on March 26 lost by fire one of its cars near its car barn at Newton Avenue, Camden. Two snow sweepers were damaged.

Everett Railway, Light & Water Company, Everett, Wash., has ordered four cars of the Birney type from the American Car Company. The order was placed through the Stone & Webster Management Association, Boston, Mass.

Puget Sound Traction, Light & Power Company, Bellingham, Wash., has ordered four light Birney type cars from the American Car Company. The order was placed through the Stone & Webster Management Association, Boston, Mass.

San Antonio (Tex.) Traction Company has ordered fifteen cars from the American Car Company and fifteen from the St. Louis Car Company. The cars will have a seating capacity for thirty-six passengers and will be of the two-man type.

Schenectady (N. Y.) Railway was mentioned in the last issue as expecting to purchase sixteen new cars. The cars will be ordered, but the figure of total cost, owing to a typographical misplacement of the decimal point, appeared in type much too large.

Kankakee & Urbana Traction Company, Urbana, Ill., noted in the ELECTRIC RAILWAY JOURNAL of March 4 as being in the market for an express car, has purchased from the Niles Car & Manufacturing Company one 51-ft. baggage and express car.

Wisconsin Railway, Light & Power Company, Winona, Minn., has specified the following details of equipment for the seven prepayment, double-end inclosed cars which were recently ordered from the St. Louis Car Company:

Seating capacity	38
Weight of car body	17,000 lb.
Bolster centers, length	20 ft.
Length of body	28 ft.
Length over vestibule	42 ft.
Width over sills	8 ft. 6 in.
Width over all	8 ft. 9¼ in.
Height, rail to floor level,	3 ft. 3½ in.
Rail to trolley base	11 ft. 5⅜ in.
Body	semi-steel
Interior trim	cherry
Headlining	Agasote
Roof	arch
Underframe	steel
Air brakes,	Nat'l Brake & Elec. Co.
Control	West. K 51-A
Fare boxes	St. Louis
Fenders	H. B.
Gears and pinions	Nuttall
Handbrakes	St. Louis
Heaters	Peter Smith
Motors	2 307C V 1
Paint	Patton Paint Co.
Sanders	O. B.
Seats,	Pressed steel and cane, reversible
Step treads	Universal
Trolley base	U. S.
Trucks	St. Louis
Varnish	Patton Paint Co.
Ventilators	Peerless
Wheels	Griffin

Southwest Missouri Railroad, Webb City, Mo., has just completed three new cars and will purchase six additional cars as soon as orders can be placed. All cars have previously been built in the railway company's shops, but business has increased to such an extent lately that the cars cannot be built fast enough. All new cars will be double-end like those in service. Smoking compartments will be omitted from new cars.

Bangor Railway & Electric Company, Bangor, Me., has specified the following details for the three prepayment, center-entrance, radial truck cars which were recently ordered from the Laconia Car Company:

Seating capacity.....42	Couplers .....Laconia
Weight of car body...12,500 lb.	Curtain fixtures .....National
Single truck wheelbase....13 ft.	Curtain material.....Pantasote
Length over all.....33 ft.	Destination signs.....Hunter
Length over vestibule....32 ft.	Fenders .....Libby
Width over sills.....8 ft. 2 in.	Hand brakes.....Lord
Height, rail to sills..2 ft. 1¾ in.	Heaters .....Consol.
Height, sill to trolley base, 10 ft. 2½ in. approx.	Headlight .....Golden Glow
Body .....Composite	Journal boxes .....Laconia
Interior trim .....Bronze	Motors. West., 532-B, outside hung
Headlining .....Agasote	Sanders .....Kilbourn
Roof .....Arched	Seats.....Heywood Bros.
Underframe .....Steel	Seating material.....Rattan
Air brakes .....West	Step treads.....Mason
Cables .....West	Trolley catchers.....Wilson
Car trimmings.....Laconia	Trucks.....Phila. Holding Co.
Conduits and junction boxes, Crouse-Hinds	Ventilators .....Automatic
Control K-36	Wheels .....Griffin

TRADE NOTES

Baldwin Locomotive Works, Philadelphia, Pa., have moved their New York office from 50 Church Street to 120 Broadway.

Imperial Rubber Company, New York, N. Y., on and after May 1, 1916, will have its New York offices located in the Equitable Building, 120 Broadway.

Electric Storage Battery Company, Philadelphia, Pa., will on April 1 move its St. Louis office from the Fullerton Building to larger quarters at 1508 Federal Reserve Bank Building.

Holden & White, Chicago, Ill., have taken over the general sales agency of the Garland Ventilator Company, Chicago, and will represent the Drew Electric & Manufacturing Company, Indianapolis, Ind., in the Chicago territory.

ADVERTISING LITERATURE

General Electric Company, Schenectady, N. Y., has issued separate folders describing its form K trolley frog and its double-beam section insulator, form L 4.

Lincoln Bonding Company, Cleveland, Ohio, has issued the first number of the *Lincoln Magazine* which contains a description of the company's rail-bonding process.

Cowan Truck Company, Holyoke, Mass., has issued a catalog describing the various uses of its transveyor, a low-built hand truck for moving and storing heavy machinery and other material on movable wooden platforms.

Redmond & Company, New York, N. Y., have issued a reprint of an article which recently appeared in the *Independent*, entitled "Buying Bonds as Business Insurance." The article emphasizes the necessity for a reserve fund of high-class marketable bonds in all business organizations.

Tool Steel Gear & Pinion Company, Cincinnati, Ohio, has issued a folder which contains lists comprising nearly all the electric railways in Indiana and Ohio, which are users and most of which are contract customers or companies which have made repeat orders for tool-steel gears and pinions. The companies listed as users of this equipment operate 7121 motor cars as against only 192 motor cars operated by non-using companies.

Curtis Pneumatic Machinery Company, St. Louis, Mo., has issued Catalog No. 63, describing and illustrating its various types of air compressors, air hoists, trolleys and trolley systems, sand blasts, pneumatic and hydropneumatic elevators and jib and traveling cranes. Railway companies will find of interest the illustrated descriptions of pneumatic straightening presses for reclaiming wrecked steel cars, hoists on single I-beam trolleys for removing ashes from boiler pits, bracket jib cranes, mast jib cranes and self-supporting jib cranes for unloading rails.

Buda Company, Chicago, Ill., has issued a binder which includes all catalogs comprising its complete line of materials. These include motor cars for railroad inspection, section and maintenance service; track gages and levels; hand and push cars, track-laying cars and velocipedes; track-bonding drills; safety crossing gates; electric headlights; storage-battery shop, warehouse, industrial and freight-house trucks; station bumping posts; repair links for wrecking chains; rail benders; switch and semaphore stands; switch rods; tool grinders; car replacers and jacks.

Bailey Meter Company, Boston, Mass., has issued Bulletin No. 5, which describes briefly some of the different types of recording meters and testing instruments which have been developed during the past six years in the mechanical engineering department of the Fuel Testing Company, through the personal work and direction of E. G. Bailey. These meters and instruments are particularly adapted to the many needs of modern power plants, steel mills, and miscellaneous uses for measuring and recording the flow of steam, water, air and gases for any other fluids under practically all conditions of pressure, temperature and capacity.

Atlas Preservative Company of America, New York, N. Y., has issued a handbook entitled, "How to Keep a Clean Track," which contains information and instruction on how to obtain the best and most economical results through the use of the Atlas "A" weed killer and track preservative. The booklet contains a number of photographs showing excellent results obtained on electric railways. The data included in the booklet is based on years of practical experience with all types of vegetation throughout the United States, Central America and Cuba, Philippine Islands, Hawaii, Porto Rico and Canada. This company has also issued a booklet entitled "Atlas the Weed Killer," which treats in a more general way the uses to which this preservative can be employed.

Western Electric Company, New York, N. Y., has issued a catalog entitled "The Voice of the Road," which outlines and illustrates the necessary uses of the telephone equipment for interurban and street railways. The bulletin explains telephone dispatching means best management; cuts platform expense by adjusting service to the minute; improves headways by uniform spacing of cars after a blockade; allows quick rerouteing during such occasions as street parades; localizes blockades such as those caused by fires; procures a flexible schedule; keeps in touch with work cars, thus saving much unnecessary mileage for emergency trucks; allows for the ordering of short line cars with minimum inconvenience for passengers; meets complaints quickly; allows employees to obtain accurate time; accelerates first aid after accidents and allows for prompt investigation of accidents by the claim department.

NEW PUBLICATIONS

For the Railroads. By H. T. Newcomb, Bond Building, Washington, D. C. 192 pages, paper.

This book has been prepared by Mr. Newcomb for the railroads in order to place before the public some of the principal arguments against unwise statutory restrictions. The booklet is a compendium of useful data and general information in regard to the operation and regulation of steam railroad carriers.

Principles and Practice of Cost Accounting. By Frederick H. Baugh. Published by the author, P. O. Box 682, Baltimore, Md. 194 pages. Cloth, $3.

This book is a practical discussion of cost accounting, more attention being paid to the technique of the accounting involved in reaching an accurate determination of cost than to theoretical discussions of wage plans, efficiency tests, and the like. Mr. Baugh has ably summarized the general principles upon which cost accounting for manufactured articles is based, the application of these principles to the most common types of manufacture, and the illustration of the details involved. To his mind, the real value of cost accounting is found in a close analysis of the various contributing expenses, their classification and apportionment, and the assembling of statistics to show the composition of the total cost. The book is well supplied with tables and forms, and by no means the least interesting chapters are the final two, showing with concrete figures how departmental cost accounts are developed.