Electric Railway Journal

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SIX-CENT FARES ADVOCATED FOR BOSTON

We are glad that President Brush of the Boston Elevated Railway told the legislative committee which is considering that company's economic status that 6-cent fares must come as the ultimate solution of Boston's transportation problem. This is the first time, so far as we recall, that this statement has been made positively at a public hearing by the official of any large city railway system. Six-cent fares have been adopted on some suburban lines, but there has been an undercurrent of feeling among many railway officials that another cent would be too much of a demand to make and would also present difficulties of collection. These two objections, however, do not seem so great on consideration. The increase, it is true, amounts to 20 per cent, but a great many articles which the public has to buy have increased in price more than 20 per cent within recent years. The same, of course, is true in regard to the materials which the railway companies have to buy. As for the difficulties of collecting a 6-cent fare, a conductor may be obliged to make a little more change, but with prepayment operation there is reason to believe that people will be as ready to supply themselves with coppers as well as nickels, and put 6 cents in the box without asking the assistance of the conductor as they are now to put in 5 cents. Finally, there should be no mechanical difficulty in making a fare box to register the extra cent. In civil war times the fare on a great many roads was 6 cents, and in this era of high prices 6 cents for a car ride ought not to appear unreasonable in those cases where a railway company can prove it is necessary as a solution of its financial problem.

SPLIT PHASE FOR SUBURBAN SERVICE

There has been raised the question whether the split-phase equipment with induction motors, which has been proved so satisfactory on the Norfolk & Western's electrified freight division, could be used to advantage in suburban service. Apparently, such an application would be undesirable, not so much because the equipment would require the use of locomotives but rather because of its lack of efficient utilization of power during acceleration. With the induction motor, whose free-running speed is fixed, not by the load but by the frequency of the alternating-current supply, acceleration on resistance must be carried through the entire range between zero speed and synchronous speed, whereas with the commonly used series motor an appreciable part of the acceleration may be made without resistance and at relatively high efficiency. In addition there are inherently increased losses with the induction motor during acceleration, which must be carried out by introducing internal resistance in the rotor and adding to the "slip," as opposed to the variation in voltage (through the introduction of external resistance) used with motors of the series type. For suburban service, where a large part of the current is consumed in acceleration because of the frequent stops, efficiency of acceleration may play an important part in affecting the total input of energy, and since estimates place the range of increase in current consumption during acceleration with the induction motor between 20 per cent and 45 per cent, depending upon relative length of run between stops, suburban service seems hardly likely to become a satisfactory field for it.

INSURANCE COMPANY HOLDINGS

Insurance companies are real investors, and their relative preferences for various classes of securities constitute good evidence of investment values. In considering their holdings, however, it must be remembered that they have not the same freedom as a private investor in effecting a compromise between a high return and safety of principal with stability of income. Hence it is not surprising that, as pointed out elsewhere in detail, insurance companies with more than 97 per cent of the total admitted assets of all American companies decreased their stock holdings during the period 1904-1914 by $50,000,000, or almost 40 per cent, while increasing their mortgage, policy loan and bond holdings. Nor—to disregard the policy loans and the like, which are controlled by policyholders and not by the investment officials of the companies—is it surprising that the great advance of the decade should have been in state, county and municipal bonds, to the extent of $371,000,000 or 227.59 per cent. Such bonds have a safety and stability that have not yet been fully granted to railroad and utility bonds in exchange for the restriction of return under regulation. Bonds of the latter types, however, have been attractive as affording an opportunity for a diversifying of investments, and that many sound issues have been available is evidenced by the increase of $505,000,000 or 67.32 per cent in railroad bonds and $74,000,000 or 67.11 per cent in public utility bonds during the decade. The preponderance of railroad bonds is not unexpected, of course, in view of the relative youth of the utility industry. As for the future, we believe that railroad bonds will continue to have their appeal, and utility bonds increasingly so, but both will be handicapped just as much as public regulation limits return at the expense of safety. Public thought and effort should be directed toward minimizing such a handicap.

PLANNING FOR NATIONAL DEFENSE

In the work of national defense, electric railway companies will constitute an important part. They can help in three ways. In the first place they can arrange with the War Department so that the military authorities can utilize their lines to the greatest extent necessary for transportation of men and supplies; second, they can protect these lines so that transportation over them will be uninterrupted for both commercial and military purposes, and, third, they can assist through the services which individuals connected with the railways can render to the government in a military capacity.

Through its committee on national defense, the American Electric Railway Association is planning to assist the electric railways in carrying out the duty first mentioned. The first step in this consists of making a tabulation of the transportation facilities of the different companies and maps of their lines, the latter showing especially the possibility of trans-shipment over these lines without breaking bulk of troops and supplies from the steam railroads. This is a matter on which the railways can be of great assistance, and the prompt action of each company in answering the inquiries which will be sent to it by the association is most important. Further particulars of the data required are published elsewhere in this issue in the report of the meeting held on March 28 of the association committee on national defense.

As regards the second point, preparedness calls not only for the protection of the vital points on the lines, such as the power stations, substations, tunnels and bridges but provisions by which the service can be maintained even if a considerable part of the force is called away to do regular military duty. This means, as explained editorially in our issue of March 10, that each company should make its plans immediately for increasing its transportation and shop force by the employment of men beyond the military age or with some slight physical defects which would bar them from military service but not prevent efficient work on the railway, and even by the temporary substitution in many positions of women for men. The last plan, as is well known, has been used extensively abroad and may even be necessary here. Indeed, at least one company has already made an extensive study of this subject, planning the work where women substitutes can be used in place of men, looking into the laws governing the employment of women and designing a uniform which would be suitable for a woman conductor.

A third step which demands immediate consideration on the part of every individual connected with a railway company is: "How can I personally best serve my country in the emergency of war?" There is no doubt that the government will need many men in different lines of work and, as we have said before, the semi-military training of a railway man, as well as his expert knowledge of transportation matters, his engineering skill, or his mechanical ability, if a member of the shop force, means that the staff of a railway company can be of great assistance in the national defense. This does not mean, of course, that the best service which every railway man can give is in carrying a rifle or that so many men can leave as to cripple the service. Modern war is won quite as much in the shop at home producing munitions or in directing the transportation of men and supplies or in the military engineers' corps as it is on the firing line. But the government will need the services of a great many men in the case of war and large numbers of them will have to have the expert knowledge possessed by the members of an electric railway organization. By the substitute plan outlined, a considerable number can be spared from their present work, and these the government can use to advantage.

THE ADAMSON LAW AND ELECTRIFICATION

The Supreme Court's recent far-reaching decision on the Adamson law appears to us to have a bearing on the future of steam railroad electrification. This, it would seem, should come even if materially increased interest rates have to be paid after the war for the new capital required (although economists are by no means agreed that such increased prices for capital will be inevitable). The most important reason for this prophecy is that labor charges, which have been mounting steadily for several years, have become an almost insupportable burden upon the railroads, and with the right of wage regulation that has just been accorded to Congress the chances are very strong that still further wage increases will come.

Railroad trainmen are not likely to lose sight of the scare which, by means of a strike threat, they can throw at any time into a controlling body that is inherently timid because of its temporary tenure of office. Consequently, we feel that railroad wages will continue to rise until the day when there comes the unescapable knock-down-and-drag-out fight between the men and the roads—probably over a question of discipline. Even with the recent 20 per cent increase in wages (and the Adamson law provides for nothing but that, regardless of all attempts to obscure the issue by allusions to an eight-hour day) which has been granted to the trainmen, there must not be overlooked the fact that the railroads still have to deal with the shopmen and trackmen and freight handlers and several other classes of employees numbering three times more than the operating personnel. It is inconceivable that the trainmen can get away with a 20 per cent raise and leave the other employees satisfied with the existing wage scales. When these men have received their bit of the general prosperity, the operating charges on the average railroad, including the greatly increased costs for coal and other material, which so far have gone up in price even more rapidly than labor, will make any slightly higher interest charges look small by comparison.

If the railroads are to survive, and we presume that they will do that, they will have to have increased freight rates, but since this matter is not likely to be treated so open-handedly as labor has been, the roads must look for their dividends to improved operating methods.

This is the opportunity for electrification. Admittedly, the cost of its introduction is enormously heavy,

but because of the higher schedule speeds that are possible with a locomotive that, unlike the steam engine, has an overload capacity for starting and for ruling grades and that has a wide range of speeds and loads for efficient operation, there is afforded an opportunity to strike at the major source of the increased operating expense, that is to say, labor charges. If freight trains are regularly moved at schedule speeds of 12½ m.p.h. or more, the effect of the recent wage increase can be largely offset. This is, probably, a practical impossibility with steam unless train tonnage and economy in fuel and repairs are heavily sacrificed. But under electric operation it should be easy, and at the same time enough saving in locomotive repairs should be made to pay many times over for the higher wages that are inevitably coming to the shopmen. In brief, the Adamson law will make the steam railroads begin to look more favorably than ever toward electrification.

PROGRESS IN ELECTROLYSIS STUDIES

The publication of an abstract of the preliminary report of the American committee on electrolysis in last week's issue of the ELECTRIC RAILWAY JOURNAL brings to the attention of the electric railway industry the result of four years of steady work by this national joint committee. This preliminary report was completed last fall and, although not officially "published," it is available to a limited extent in printed form. It it is now before the several interests represented on the committee for such action as they care to take.

The committee has had before it the task of digesting the information available as to methods of mitigating electrolysis trouble and eventually of formulating recommendations as to best practice along this line. A part of the four-year period was required for securing the interest and active co-operation of all the interests concerned in the matter and to organize the committee for work. The remainder of the time has been spent in collecting and studying data and in formulating the preliminary report. A sub-committee is now at work preparing recommendations which will form a part of the final report.

The preliminary report carries the notice that it includes only "statements of facts and does not attempt to draw conclusions or discuss questions of law." Of course, what we wish the committee to tell us eventually is how so to reduce stray currents and their effects as to eliminate all differences of opinion in any particular case as to what mitigating measures are to be taken and how the expense thereof is to be divided. But it must be remembered that there are a number of interests involved in this matter, and they must first agree on the facts before they can take up the matter of procedure. Hence this preliminary report is a distinct contribution to progress. The electric railway representatives on the committee have been Calvert Townley, Prof. A. S. Richey and R. P. Stevens. Bion J. Arnold, Paul Winsor, E. B. Katté, W. S. Murray and others on the committee, while representing other interests, are also familiar with the subject from the electric railway standpoint. This personnel is a strict guarantee to the electric railway industry that the work so far accomplished has been well done.

Naturally there is not much that can be done with a report of this nature except to study it and consider local conditions in the light of the facts summarized in it. The electrolysis mitigation problem cannot be ignored, nor can any one utility be expected to bear all of the expense involved in reducing it to an economic minimum. It should be a part of the duty of the electrical department of every electric railway operating over or near ground occupied by pipe to know the condition of the return circuit. A good return circuit obviously implies small leakage, everything else being equal. If a pipe-owning utility believes that excessive stray current exists in and around its pipe line, it should have the co-operation of the railway or railways in determining the facts and in prescribing the remedy if such proves to be needed. Where the circumstances warrant, an expert should be called into consultation. It is better for the utilities to get together in a friendly manner than to have recourse to outside bodies.

ENGINEERING SUBDIVISION FOR C. E. R. A.

The recent annual meeting of the C. E. R. A., concluding eleven years of most successful association work, was marked by a splendid spirit of communion and a sense of real achievement. The attendance at the three sessions was exceptionally large, but the small number of engineers present suggests the desirability of some plan by which the representatives of this branch of the industry in the central states could be brought together more frequently for conference on engineering subjects. Can this best be done by an engineering subdivision of the C. E. R. A., patterned somewhat upon the organizations possessed by the traffic men and accountants in the central states, or by devoting one or more meetings of the main association during the year to engineering discusions? The former plan has been suggested by several, and we are glad to report that President Wilcoxon says that he personally has no objection to such an organization if the engineer members of the association desire it, although the matter would naturally have to be approved by the executive committee before final action was taken. The project of an engineering subdivision appears to us as commendable. The papers at the last meeting of the Central Electric Railway Association were of especial engineering value and are good examples of the kind of papers which could well be discussed by the engineers of the member companies of the C. E. R. A.

During the present year an opportunity is being presented for a very important contribution by the engineers to prove the value of such a proposed section to the industry. The standard electrical safety code is out on a one-year's trial. If the engineers of the Central Electric Railway Association territory should study this code individually and in conference their criticisms and suggestions would be of especial value as representing the experience of this territory. This is only one of many special activities on which the engineers could well engage to the profit of the industry as a whole.

Handling Freight on a Southern Line

An Analysis of the Practices Which Are Attracting an Increasing Freight Traffic to the Birmingham Railway, Light & Power Company—Company Aims at Efficiency with Least Possible Red Tape

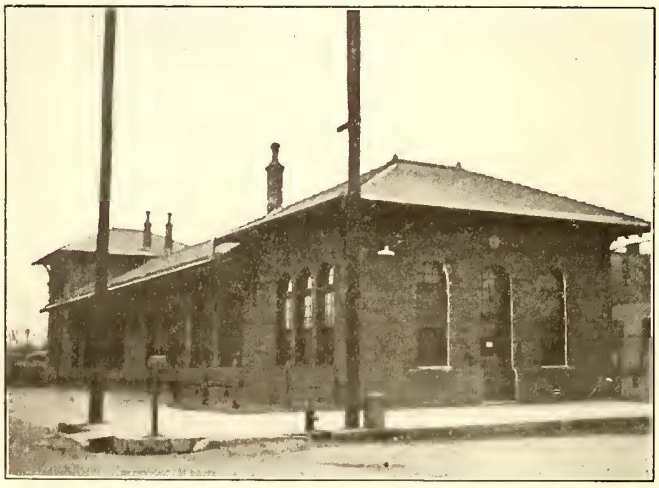
By T. G. BRABSTON
Freight Traffic Manager Birmingham Railway, Light & Power Company, Birmingham, Ala.

THE slogan of the freight department of the Birmingham Railway, Light & Power Company, Birmingham, Ala., is "Express Service at Freight Rates," and the service fully measures up to this standard in every particular. There are now on this property twelve trains daily operating in and out of the central terminal. Shipments are received at this station, the principal distribution point, up to fifteen minutes before the scheduled departure of trains.

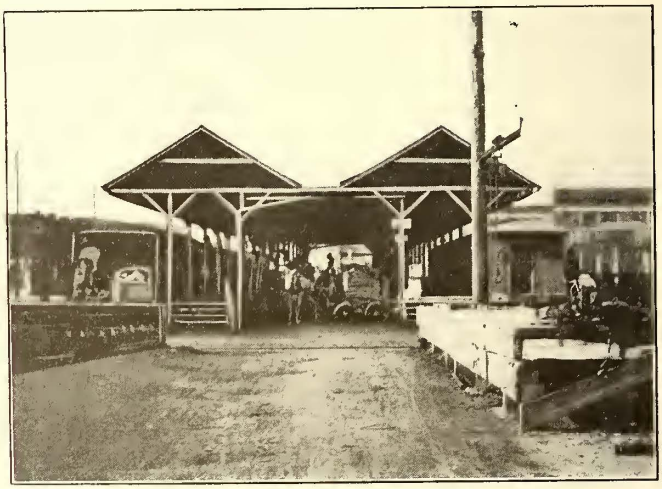
Rapid Freight Receiving and Billing

The method of receiving freight at the central station, illustrated in an accompanying picture, differs somewhat from the practice usually observed, in that two 8-ft. platforms with a driveway and tracks on the outside are provided, both platforms and driveway being covered over. Teams all enter the shed from one direction, and large signs indicate, along these platforms, the principal points for which freight is accepted. The wagons zigzag through this driveway between platforms and distribute freight in front of cars for different destinations, as their loads may require, thereby putting the burden of the distribution on the wagons instead of hand trucks, as is usually the custom. By this method it is necessary only to move freight from the platform into the car opposite it, and a much smaller force of truck men is required. Two check clerks can dispose of a much greater number of wagons per hour by this method than is possible under the old practice. Moreover, the wagons are released promptly at the central station, it being an exception when a wagon is not released within fifteen or twenty minutes after its arrival at the station.

As rapidly as shipping orders are checked, they are passed into the office, where a tariff man assesses the charges. They are then passed along to the bill desk. The manibill system, with regular billing machines having special characters, is used. The machines have numerous keys carrying entire words. For instance, commodities frequently handled, such as meat, hardware, pipe, potatoes and fish, and articles such as boxes, barrels and packages, are written, "1 bbl. fish," "1 box meat," "1 bdl. pipe," without the clerk having to touch more than three keys. This facilitates billing, and two operators turn out from 12,000 to 15,000 bills a month. Three copies of bills are made at once, from a continuous roll passing through the machine. The first copy of this bill serves as a way-bill in transit, and upon arrival at destination becomes an expense bill. The second copy is the station file receipt, and the third copy is retained by the forwarding agent as his record.



HANDLING FREIGHT—TYPICAL JOINT FREIGHT TERMINAL AND SUBSTATION AT BESSEMER



HANDLING FREIGHT—FRONT VIEW OF RECEIVING SHEDS AT THE BIRMINGHAM CENTRAL STATION

Upon the arrival of a train, the receiving agent has only to list the bills on a "freight received' form, and he is ready to turn them out to the consignees before the car is even unloaded. This obviates the old method of expensing freight from blanket way-bills, as is the practice on steam lines and a great many electric lines. It can be readily seen that through the use of this method quick service is assured.

Service Attracts Traffic

The central station at Birmingham is opened at 5 a. m., and remains open continuously until 5 p. m. The early hour of opening is to accommodate the movement of fresh meat, produce and bread shipments to suburban points, since the suburban merchants are dependent on the distributers at Birmingham for their supplies, and the tonnage of these early trains is made up almost entirely of this class of commodity. Owing to the frequency and reliability of the service, the merchants do not carry extensive stocks, as it is so easy to replenish them daily via electric line service. The existing freight schedule is shown elsewhere. The methods in effect aim at the highest degree of efficiency with the least pos-

sible amount of "red tape." With the quick service offered no superfluous practices can be tolerated.

The l.c.l. tonnage varies from 100,000 to 200,000 lb. a day, and fully 50 per cent of this is distributed along the line, in many instances in front of patrons' stores and plants. Even with this plan of distribution and with the rapid service, the claims for losses and damages seldom amount to more than $25 or $30 a month, which seems almost incredible.

The heaviest tonnage is outbound from Birmingham, although with the numerous foundries and factories in the outlying districts there is considerable inbound and interline movement. Cotton in season and truck farm products move freely. Truck farms along the line pro-

BIRMINGHAM RAILWAY, LIGHT & POWER CO.
Freight Traffic Department

B R. L&P. Co

EXPRESS SERVICE AT FREIGHT RATES
Freight Schedule
of
Departure of Freight Trains From
BIRMINGHAM STATION
to

Bessemer & Way Stations	6:00 A.M.	10:00 A.M.	2:00 P.M.
Ensley, Pratt City & Thomas	6:30 "	..	1:15 "
Wylam and Fairfield	6:30 "	..	1:15 "
East Lake, Avondale, Woodlawn, East B'ham and No. B'ham	8:00 "		
Irondale and Gate City	8:00 "		
Boyles and Way Stations	8:00 "		
Tarrant City (Tues. & Fri. only)	8:00 "		

SHIPMENTS MUST BE OFFERED FIFTEEN MINUTES BEFORE TIME OF DEPARTURE TO INSURE MOVEMENT ON A TRAIN OF ANY DESIGNATED NUMBER

Stations with Agents

Birmingham	Woodlawn	Bessemer	Thomas
Ensley	North B'ham	East Lake	Irondale
Pratt City	Avondale	Wylam	East B'ham
		Woodward	

Shipments for the Above Stations May Be Billed Collect
All shipments to stations other than above must be prepaid.
Free delivery to street address in Woodlawn, 47th to 64th Sts., 3rd Ave. South to 4th Ave. North.
Try the store delivery service in connection with the Wren Transfer Co. at Ensley.
Ask for detail information.

Effective May 17th, 1915. Subject to change on legal notice.
Birmingham Station, 1st Ave. at 16th St.
Phones—Frt. Depot, Main 2504; Rec. Shed, Main 2504; Office Freight Traf. Mgr., Main 3705-7.

EXPRESS SERVICE AT FREIGHT RATES
Issued by
T. G. Brabston
Freight Traffic Manager

HANDLING FREIGHT—SCHEDULE POSTER ISSUED BY FREIGHT TRAFFIC DEPARTMENT

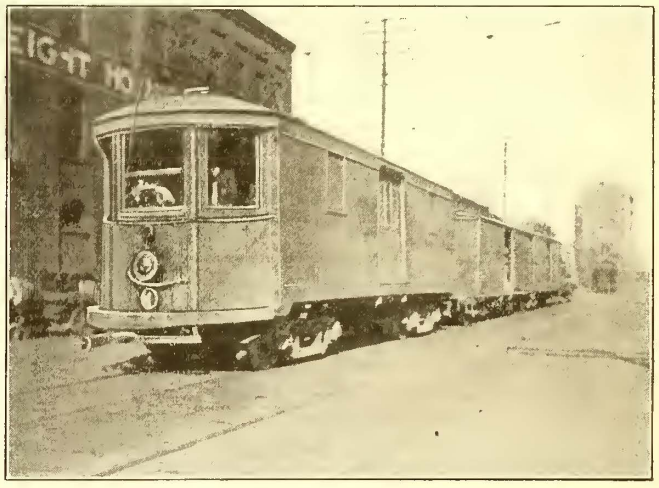
vide a lucrative source of tonnage, and at present there are 1500 acres of cucumbers planted, which will move over the company's lines to a pickle factory. The company is encouraging the production of such traffic sources as this.

Special Services Which Bring Good Returns

In addition to l.c.l. business, physical connections are maintained with the steam line carriers, and local switching service is performed between these connections and the numerous industrial plants, coal yards and team tracks situated along the different lines. One motor car of 300 hp. capacity, equipped with standard M.C.B. couplers and automatic air, is engaged almost exclusively in handling foreign equipment. The number of cars handled a month averages approximately 150 to 200, and earnings vary from $2 to $10 a car, according to the distance traversed.

An extensive business has been built up in the handling of chert, slag and crushed limestone. Track connections are maintained at the sources of supply, and an arrangement is in existence whereby these commodities may be discharged along the main line at points closely adjacent to the work in progress. A crew is maintained for unloading these cars on a per car basis, and a nominal charge covering the actual cost for this work is assessed against the contractor. From 200 to 300 cars of this commodity are handled each month. All of the concrete material for a $500,000 viaduct recently completed over a network of railways was handled by the freight department of this company, although in close competition with steam lines.

An arrangement is in effect with a baggage transportation company enabling patrons at various points along the electric line to check their baggage from their closest station to railway passenger depots and *vice versa*. The conductors are also supplied with baggage checks, and pick up trunks at way stations. The charge for this service is 50 cents per piece of baggage, and settlements are made monthly between the electric line and the transfer company, based on baggage checks lifted. This has proved a great convenience, and a remunerative one.



HANDLING FREIGHT—TYPICAL FREIGHT TRAIN ON A BIRMINGHAM STREET

Statistics of Operation

At the present time twelve freight agency stations are maintained. The company operates a total of 150 miles of main track and sidings. Probably 50 per cent of this is crosstown lines, on which no freight trains are operated. The freight equipment consists of four motor cars, nineteen box cars, four flat cars, and seventeen gondola cars. The floor space occupied in depots exclusive of the Birmingham station amounts to 8400 sq. ft.

Accurate figures for 1916 are not available at the time of this writing, but figures hereafter quoted are approximately correct:

Gross passenger revenue for 1916	$1,925,458
Gross freight revenue	57,126
Gross freight revenue per mile of track	380
Gross passenger revenue per mile of track	12,836
Gross freight revenue per car-mile	0.40
Gross passenger revenue per car-mile	0.23
Average car mileage per day for freight equipment	482
Average car mileage per day for passenger equipment	24,030

In connection with the growth of freight revenue, it may be said that the high-water mark was reached in 1910, when the earnings amounted to $120,000. About this time, however, the advent of the motor trucks occurred. As the result of an aggressive campaign on the part of motor-truck companies, the wholesale distributers, being actuated by keen competition, acquired trucks and began to broaden their delivery limits to such distances that the volume of business moving over the electric line was seriously cut. Gross earnings rapidly diminished until 1915, about which time the motor truck craze began to wane, in so far as abnormally long deliveries were concerned. This change, together with energetic measures on the part of the electric line, served to put the gross earnings on the upward trend again.

Rates Not Commensurate with Service

The unfortunate feature in connection with the freight service on this property is that the rates are nowhere nearly commensurate with the service afforded. When the development of the district was in its infancy, the steam lines established a maximum rate of 10 cents per 100 lb. on l.c.l. shipments, and a minimum of 4 cents per 100 lb. for the purpose of attracting industries. As the electric line is in competition with the steam lines at various points, its general standard of rates must be kept on a par with those of the steam lines. Only in a few instances is the electric line rate higher than that of its competitors. The result is that, although the electric line carries the bulk of the district traffic, it is forced to handle an enormous tonnage to produce an appreciable revenue.

A review of the freight situation on the Birmingham property points conclusively to the fact that frequent schedules, operation with unvarying regularity, and efficient methods of handling with liberal put-off privileges will not only hold but attract traffic. Moreover, the freight department is unquestionably a valuable feeder to the passenger service, since it encourages the building of residences away from the congested city through the supplying of stocks for suburban mercantile centers. This is a feature which is frequently overlooked by operators of interurban properties and one which, because of its importance, is deserving of considerable study.

One-Wear Wheels and Track Building

At Short Meeting the Illinois Association Discusses These Subjects, Pledges Support to President Wilson and Views Electrification Pictures

A SHORT meeting of the Illinois Electric Railway Association, held at the La Salle Hotel, Chicago, on March 23, was presided over by President C. F. Handshy, assistant general manager Illinois Traction System. At the morning session a paper on the "One-Wear Manganese Rim Wheel," by F. A. Lorenz, was read by the author, and another by W. F. Carr on "Track Construction and Maintenance" was read by L. E. Gould, in the author's absence. Abstracts of these papers appear elsewhere in this issue. Mr. Carr was detained from attendance at the meeting on account of a death in his family. During the course of the meeting the association extended to him a vote of sympathy.

Directly after luncheon, A. B. Cole, Westinghouse department of publicity, talked on the progress of electrification work, and showed several reels of Westinghouse electrification pictures. These portrayed electrifications on the Norfolk & Western, the Boston & Maine (Hoosac Tunnel), the Grand Trunk (St. Clair Tunnel), the Pennsylvania (Philadelphia-Paoli division and New York extension), the Long Island, the New York, Westchester & Boston, and the New York, New Haven & Hartford.

One-Wear Manganese Rim Wheel

In connection with his paper on the one-wear manganese-rim wheel, F. A. Lorenz, manager of sales, Davis wheels, American Steel Foundries, presented a series of slides with which he illustrated the method of making the Davis steel wheel, which he said was now in use on more than 350 electric and steam railroads. An article describing the manufacture of the wheel was printed in the issue of the Electric Railway Journal for July 8, 1916, page 69. A special advantage of this wheel in electric railway service, according to the speaker, is that it resists flat sliding very successfully. In fact, the company has never received a report of flat sliding under a self-propelled car operated in single unit. To determine this matter more definitely the company not long ago conducted a test on an electric railway in which a 60,000-lb. interurban car equipped with Davis wheels was slid over a stretch of prepared track from a speed of approximately 25 m.p.h. The stretch consisted of 50 ft. of oiled track, 20 ft. of oiled and sanded track, and 30 ft. of dry sanded track. In both sections the sand was heaped on the rails, and when the car slid over the track the front trucks slid 22 ft. beyond on the dry rails. Immediately after this test the wheels were examined, and bright spots no larger than a dime were seen to have been produced on the tread of the wheels. These really consisted of nothing more than slight ticks on the tread of the wheel. The car was then run up and down on the track to determine whether or not the spots would affect smoothness of operation, but the five people on the car could hear no noise produced by them. When the car reached the carhouse the wheels were again examined, but it would have been impossible to locate the spots, except that their location had been carefully marked on the rim of the wheel.

Mr. Lorenz explained also that the wheel is approximately 20 to 25 per cent lighter than the wrought-steel wheel or the cast-iron wheel for the same class of service, which is an important point, since an appreciable part of the power consumed in accelerating a car is absorbed by the wheels. This lightness is secured because excess metal is not needed in the rim for wear and turning, and also because the steel has a very high tensile strength, approximately three to four times as great as chilled cast iron. At the rate of 5 cents per pound per year to haul dead weight, a saving from 400 lb. to 1600 lb. per car in wheel weight amounts to a large sum. Moreover, with a one-wear wheel, the diameter remains practically constant, which insures even motor load. In brief, the speaker claimed that the Davis wheel, with a hard, tough manganese steel tread and flange combined with a soft ductile steel plate

and hub, is the ideal wheel for electric railway service. Broken flanges, chipped rims, and other common wheel troubles are practically eliminated.

DISCUSSION ON MANGANESE-RIM WHEELS

In reply to questions from several of the members, Mr. Lorenz brought out several additional points regarding the cast-steel wheels. He said the Pacific Electric Railway at Los Angeles was using standard M. C. B. Davis wheels with a 1-in. high flange and 3⅝-in. tread, and was operating these over special work having a ⅝-in. deep groove, in an attempt to reduce the noise of cars crossing special work, so that the entire car weight was carried on the flanges. Under these severe conditions the wheels had made a very satisfactory showing on the Los Angeles property, and no chipped flanges had resulted.

As to mileage obtainable with these wheels, Mr. Lorenz said there were so many factors entering into this that he had not as yet been able to secure many data. With the conditions prevailing on one property, or on one line of a property, a comparatively low mileage might indicate extremely good life as compared with other types of wheels, while with conditions prevailing on other properties or other lines, a mileage of several times this amount might not be a good life for the wheels. Thus a statement of mileage figures did not carry much meaning, unless all of the operating conditions were clearly understood. He said that on a very heavy traffic interurban line, on a car equipped with the 30-in. standard wheels weighing 30,000 lb., and operating at a speed of 45 m.p.h., the Davis wheels had shown a life of 100,000 to 200,000 miles.

President Handshy spoke of a very satisfactory experience with this type of wheels, and said that there was a notable absence of chipped flanges and slid flats.

As to cost comparisons, Mr. Lorenz stated that his company had been called upon within the last twelve months to make at least 150 different designs of wheels for electric railways, and that this, of course, had been a factor in the cost. The price of the one-wear manganese-rim wheel, he said, was approximately the same as that of the multiple-wear wrought-steel wheel. This, however, did not tell the story, as the increased mileage and the elimination of a large item of labor which was saved through the fact that the wheels did not need to be taken off and turned and pressed on again, produced a less cost per 1000 miles than other types of wheels.

Mr. Lorenz had as yet been unable to get authoritative mileage costs, as he said so few companies keep any accurate record of their wheel costs. Since it is unnecessary to remove the wheel from the axle, except when entirely worn out, it is usually unnecessary to change the bearing brasses, as is frequently the case when replacing a turned wheel. It had also been found that the life of a solid wheel and a solid gear was approximately the same. This introduced a saving and made for better gear efficiency, since there was no altering of the meshing of the gear with the pinion, as might be the case where the wheels were changed more frequently. The labor saving, he said, is the great advantage which the manganese-rim wheels carry.

J. B. Tinnon, Joliet, said that the special-work manufacturers had found trouble from the crystallization of manganese-steel special work, and wondered how it was possible, with the great vibration to which car wheels are subjected, to prevent a similar trouble in the wheels. Mr. Lorenz explained that this was due to the particular characteristics of the manganese steel used for the wheels, which was different from that used in special work. He said that manganese steel, with from 1 to 2½ per cent of manganese, has very favorable characteristics, including high tensile strength, high elastic limit, etc., and that the wheels were made of this type of steel. With more than this amount of manganese the steel became brittle and had poor characteristics. Then again at from 9½ to 13 per cent of manganese the steel had about the same characteristics as the 1 per cent and 2 per cent manganese steel. He said the 13 per cent manganese steel was known as the Hatfield product, and was the type used for crossovers, but that this was not suitable for wheels, as it would flow slightly under continued hammering.

OTHER IMPORTANT MATTERS

Dr. H. E. Fisher, Chicago Elevated Railways, made an appeal to the association members to enlist the services of their respective physicians in an endeavor to prevent the general passage by state legislatures of a bill being promoted by the American Association for Labor Legislation, which provides for compulsory health insurance. This Dr. Fisher said, had been tried out in all the principal European countries during the last twenty to twenty-five years, and had proved an absolute failure. It was a measure supported by reformers and insurance companies, which placed a great burden upon the medical profession, since it compelled the physicians to give medical attention to all industrial employees in certain specified areas. Any employee receiving less than $100 a month was included in the benefit, and his employer was required to bear 50 per cent, the employee himself 30 per cent, and the state 20 per cent of the cost of any medical attention, including prescriptions and hospital bills. This also applied to such an employee's family with the same percentages. Such a bill would, of course, affect the electric railways, since many of their employees would be included in the class for which the legislation is intended. It would bring a new burden upon the corporations, but is principally a burden upon the medical profession. A bill is now before the Massachusetts Legislature which, if passed, will probably be tried out in that State for a short period before it is introduced in other state legislatures.

H. B. Adams, Aurora, then introduced a resolution to send the following telegram to President Wilson, which was unanimously approved:

"The Illinois Electric Railways Association, representing the electric railway network of the State of Illinois, by unanimous vote, at its meeting in Chicago on March 23, begs to extend to you and to the government of the United States, its loyal support in the eventualities of a declaration of war, and to offer the utmost services of these railroads whenever they may be useful."

Proposed Additions to University of Illinois Engineering Facilities

The College of Engineering and the Engineering Experiment Station of the University of Illinois have prepared for the Governor and the General Assembly of the State a synopsis of the achievements and needs of these institutions. The brief is illustrated with pictures of the work of prominent graduates. The college and station have cost for the two years ending July 1, 1917, about $761,000 for operating expenses. It is proposed to double this expenditure for the next biennium. A program of buildings, estimated to cost somewhat under $5,000,000, is also outlined. This, together with the grounds and departmental equipment, involves a cost of about $6,000,000. It is hoped that appropriations can be secured so that this program can be gradually carried out.

Track and Roadway*

The Author Discusses a Number of Points in Connection with the Upkeep of Permanent Way That Have Been Found to Be of Advantage in Reducing Maintenance Costs and in Improving the Line and Surface of Track

By W. F. CARR
Engineer Maintenance of Way, Chicago, Ottawa & Peoria Railway

TO get results in track maintenance I believe in well-directed red tape and in printed forms. On our railroad we have more than twenty printed forms for the maintenance department, because we have found that a foreman will fill out an arranged set of questions with greater ease and dispatch than if the subject is left to his own treatment. We have found further, that he is careful not to exaggerate a signed written statement. When these reports reach the maintenance office they are filed away on wall boards, each wall board containing a certain form. If we need to refer to any particular performance, we can turn to the report without loss of time.

We believe also in schedules. Our linemen have a schedule for the patrol of the line, and our track men have a schedule for the performance of their work. These schedules are made broad enough to allow the man to take care of any emergency conditions that may arise, and after he has cared for that condition, he goes back and resumes his work according to his schedule. Our foremen have certain days for the tending of switch lamps.

The first thing that is done by our track foremen at the break of spring is to devote one or two weeks to the picking up of low spots or churning joints. As soon as the low spots have been picked up, we begin to renew the cross ties and to surface and line the track. The entire season's work is carried along in this manner.

In establishing a schedule we take conditions into consideration and to some extent we work out an individual performance. For instance, where the ties are not too greatly scattered, one man should renew ten ties in ten hours. This will include spiking, tamping, lining, filling in, dressing up and leaving everything complete. Where the ties are renewed as the surfacing is carried on, one man should average 30 ft. or 35 ft. of track, including the renewal of two or three ties to the rail. This will include the raising, lining and spiking of the new ties, or in other words, the work finished up complete. It might be worth while to state that this schedule stirs up considerable competition among the different foremen and they take pride in beating it if they can. Such schedules may be made by a brief study of the conditions and average performances. Men must be instructed and must have a pace laid out for them. This is just as necessary for the track men as for the trainmen.

Labor-saving tools for the maintenance department are not only economy but, with the scarcity of labor, an absolute necessity. Steam shovels or ditching machines to handle excavations or cleaning of cuts, automatic dump cars, portable cranes for the handling of materials, pneumatic tampers, power drills, arc welders, and such devices are money savers and necessities if the work is to be done well and in its season. A higher wage can well be paid to the operator of a labor-saving device. Most executives of this day would not allow their property to be without a concrete mixer. It has already proved its value, just as the more recent labor-saving devices are proving their value in reducing costs.

*Abstract of paper presented before Illinois Electric Railway Association, March 23, 1917.

Roadbed

Every single-track roadbed should be not less than 18 ft. wide and should be kept at that width. When the shoulder slips down, clean out the cuts and build it up. Enough shoulder must be maintained to withstand the lateral pressure thrown out by the weight of a moving mass over the track.

Avoid a barrow pit as a pestilence. Any sort of berm that may be left soon slips down into the pit. The toe of the slope is almost always wet and this accelerates the slipping of the shoulder of the roadbed. Even the right-of-way fences fall into a barrow pit after a while. It is a source of complaint from your neighbor, the farmer. He contends that it keeps a stretch of wet land in his fields, and he can almost always prove it before a jury of his kind. There are very few barrow pits that are not trouble makers, and in the end it is real economy to pay overhaul on the embankment material in the beginning.

If there is a wet cut on a railroad, tile it out and be done with it. Sometimes tiling can be circumvented by ditching, but if the cut is not very wide more money can be spent on a ditch in five years than what a 10-in. tile laid through the cut will cost. Fill over the top of the tile with cinders or some other porous material that will allow drainage to get into the tile. At this time of the year, with the breaking up of winter, the drainage truth is manifesting itself. Now is the time to find out where ditching is needed.

At the last convention of the American Electric Railway Engineering Association, 12 in. of gravel under the ties for main-line track was recommended. Personally, I think this is more than most electric railways can afford. It is our standard practice to put 8 in. of ballast under the ties, whether of cinders or bank-run gravel. A 12-in. lift necessitates going over the track with a surfacing gang two or three times in a season in order to compact the ballast. In resurfacing use only as much ballast as is necessary and pack it firmly by means of a tamping bar. Too great a depth of ballast acts like a feather bed; the superstructure sinks into the uncompacted ballast.

In still another respect we do not agree with the members of the way committee, who recommend washed gravel ballast ranging in size from ¼ in to 2 in. We insist that all washed gravel be one-fourth sand. Washed gravel cannot be compacted unless there is sand with it. The gravel rolls over the roadbed; it has a tendency to go anywhere but to the place where it is wanted.

Ties, according to our experience, cannot be too carefully inspected. Untreated red oak, black oak, beech, elm or gum ties had better be left out of the track than put in. They will decay inside of three or four years, and, in the case of elm or gum, will check so badly in a short while that they are unfit for use. An undersized tie should not be bought. It is not capable of perform-

ing its proper duties as a bearing surface. Pole ties or ties cut from young white oak should have a width of face not less than 6 in.; otherwise the sapwood portion of the tie will rot off in a couple of years and the result is a fence post about 4 in. in diameter.

Another point that should be watched very carefully is that treated ties are cut from live, sound wood. I have seen well-treated ties which were so brashy that, when they were thrown from the car to the ground in unloading, they broke like sticks of punk. Just as good ties are needed for sidings as for main track, because a siding usually cannot and does not receive the same amount of attention that main tracks do, and when a siding is tied up it should be tied up with good, sound timber.

It is well to bear in mind that the life of a tie is always determined by the length of time that it will hold a spike. This life may be prolonged by pulling the spike when it begins to work up, driving in a tie plug and redriving the spike. It is worth while to do this in a great many cases, and in every case where a railroad is well maintained, as it will prolong the life of ties for a year or two. Economy in maintenance forbids the removal of a tie that will give service for six months, except at public or private road crossings. This rule can be adhered to in ordinary maintenance without any risk, because the average track foreman is too much inclined to make a clean sweep of tie renewals, and a check like this should be placed upon him.

Rail and Rail Joints and Bonds

At the present price of steel a rail costs from $13 to $25, and it is worth your attention. It should not be thrown from a car or unloaded while a car is in motion, except when an approved unloading device is used. It is economy to buy standard steel shims and have two men on the gang to see that the shims are properly placed, and, when the rail is fastened, remove the shims and take care of them. The standard steel shims will be paid for after the first winter's contraction of the steel through savings in broken bolts in improperly spaced joints. At the foot of a heavy grade or incline the expansion should be more than at the top of the grade, as the tendency of rail is always to creep downhill.

In renewing steel, the track should be placed in good line and surface before the rail renewals are made. Once a rail is surface bent, it has been started toward ruin.

All rail should be saw cut. I have seen printed instructions for chisel cutting rails, and I always feel like destroying the print. When your man marks his rail with a chisel, and then raises it and drops it, you are just as likely to find that it will break out a part of the web and flange as to break off square along the marked line. He will try to cover up the damage, and you will find the rail, in a year or so, butted up against a $300 piece of special work, which has been ruined. It may take two hours to saw the rail, but that is cheap compared with the cost of the rail. Even the cost of the rail is cheap compared with the cost of ruined special work.

The shame of track is loose joints. A loose joint is ruinous, first to the rail, second to the tie, and third, but far from being the least, to the rolling stock. Three things combine to make a loose joint: First, an improper application of the joint; second, an improper bolt; and third, the lack of muscle on the wrench. Rust or scale should be cleaned and knocked off before the joint is applied. Threads on bolts should be cut and not pressed, so that the threads in the nut will fit. The nut should be tightened by a long-handled wrench, power being applied to the wrench by a steady pull and not by a series of jerks. An improperly tightened joint soon ruins the bonds. It surface-bends the rail or gives a lippy joint that ruins one of the adjoining rails by the shear of wheel flanges.

A defective bond not only destroys the negative return circuit, but if it is not repaired it will burn out the rail in from six months to two years, dependent upon the flow of the negative current. A bond under maximum cost conditions is worth an insignificant amount compared to the cost of the rail, yet tons of rail are thus being burned up annually.

Bad bonds occur in alternating patches. When a car lurches over a loose or low joint it reacts on the next joint or two, and soon you have several bad joints and several bad bonds where you had only one to start with. A bad bond is seldom found on a well-kept joint. Not infrequently we find railroads that have the bonding of track in the overhead or electrical department. It should be under the maintenance department, because when a bond is applied the joint should be tightened. No bonds should be applied to low joints. The track gang should precede the bonding gang, surfacing low joints and tightening them. The bonding gang should be supplied with bolts and long-handled wrenches, and behind the bonder should come one or two men to tighten bolts.

Every day that an armature is dragged over poorly bonded track its coils are being heated. Some day the armature will burn up, or you will snap a crystallized rail in two, or break an axle. The bad bonding has been showing up in your power bill right along, but you have been blind to it. Please consider that a set of armature coils or a steel rail is worth more than a bond, and please consider further that you are paying for the bond in your power bill. A bad bond may be hard to find, but it is like the overcoat on the expense account—it is there just the same.

In concluding this subject it seems fit to say that if we would search more deeply for waste, and be prepared to show our executives the waste of allowing bad conditions to remain, we could get any necessary money. The modern engineer is not an inspector. If he is, he is not fulfilling his job. He must be able to present orderly and logical reasons for every betterment that he suggests, and he should work out not only the cost of doing a piece of work but the cost to the company of not doing it. He should present facts so clearly for each proposed improvement that there will be no putting him off.

Analysis of Chicago Automobile Traffic

Under the direction of M. J. Faherty, president Board of Local Improvements, Chicago, a census of the automobile traffic in the Chicago downtown district was taken during six days last June and has just been made public. During the six days 43,761 automobiles entered and left the downtown district, but as many entered and left several times, the extent of the downtown traffic is measured better by the number of movements, which were 299,762 in and out of the loop. A record was also kept of the machines which stopped in the downtown district to permit the driver to do business. Those which passed through were counted as "pleasure cars." On this basis 87 per cent of the cars was shown to be used for business purposes. Adding those of the others known to be used by their owners in their regular occupations, Mr. Faherty concludes that 95 per cent of all machines owned in Chicago are used for business as well as recreation.

Making a Traffic Survey for Workers

Chicago Traction and Subway Commission Presents an Analysis of the Residential Distribution of Employees of Industrial and Commercial Establishments as an Aid in Determining New Routes

As part of the work leading up to its final report, the Chicago (Ill.) Traction and Subway Commission made a study to determine the places of residence and routes of travel of a large proportion of the workers in factories and in the offices and stores in the loop district, in order that it might ascertain whether the present facilities were adequate and whether the existing routes of travel to and from work were direct or round-about. This study forms the subject matter of Chapter VII of the supplemental report of the commission, the main report having been abstracted in the Electric Railway Journal of Dec. 9 and Dec. 23, 1916.

Various industries of the city were visited by representatives of the commission, who were given access to the address lists of the employees. From these, tabulations were made on special forms recording for each employee the place of occupation and the quarter-mile section of the city in which he lived. When all of the larger factories in any locality had been summarized, they were combined into a group, and the total group figures were then platted on maps to show graphically the number of workers living in each quarter mile for the particular factory group location.

Tabulating the Survey Results

Information was obtained in this manner from 591 industrial and commercial establishments having a total of 350,007 employees and averaging 592 per industry. The individual industries varied from less than 100 employees to 12,790 for the largest concern checked. After tabulating the data for each factory group location and summing up all groups, it was found that 24 per cent of the workers lived within 1 mile of their places of employment and were assumed to be walkers; 18.6 per cent lived between 1 and 2 miles away; 12.7 per cent lived between 2 and 3 miles away, and 12.7 per cent, 3 and 4 miles. The total of 44 per cent living between 1 and 4 miles was classed as surface car riders, and these with the walkers totaled 68 per cent. The remaining persons, about 32 per cent, lived more than 4 miles from their places of employment and were classed as rapid-transit riders. The percentage of employees living in these zones decreased steadily with the distance of the zone from the location of work until the suburban class was reached, when an increase was shown. This increase was largely caused by the great area tapped and the rapid commutation service supplied by the various steam railroads. The average distance traveled by all riders in the groups was 4.23 miles.

Portion of Rush-Hour Riders Determined

From the surface lines and elevated traffic checks it was determined that there are approximately 1,262,500 rush-hour riders in the two rush periods of the day—that is, from 6 a. m. to 9 a. m. and from 4 p. m. to 7 p. m. The industrial population check covered 350,007 persons, who, traveling twice each day, make a total of 700,014 trips. Of these 700,014, 24 per cent were found to be walkers, leaving a total of 525,000 passengers checked who ride in the rush hours. These then compose practically 42 per cent of the total rush-hour passengers in the city. Inasmuch as the periods counted as rush hours are three hours long in each case, it is probable that some persons, other than workers proper, were included in the railway lines rush-hour periods. Therefore, it was considered entirely proper to adopt a figure of 50 per cent of the total rush-hour travel of the city as being covered by this industrial check, or, in other words, to consider that 50 per cent of all the working population of the city was reached and tabulated by the method above discussed.

The extent to which the industries of the city are grouped in the central business district is indicated by the fact that 48 per cent of the total of 350,007 persons checked are daily employed in an area of 5 square. miles in this downtown district, extending from Division Street to Twelfth Street and from the Lake to Racine Avenue. An extension of this district to 12 square miles includes only 53 per cent, with the remaining 47 per cent distributed throughout the city. Further extensions of these areas show that each doubling of the area will add about 10 per cent until at 64 square miles 91 per cent of the total workers are included, while of the remaining 9 per cent, 7 per cent are located in the several manufacturing groups of the Calumet District.

A study of the various groups of factories with reference to their proximity to rapid transit lines showed that groups employing 231,000 were at present within reasonable walking distance of the elevated railroads, while by the improvements planned to be made immediately additional groups employing 74,000 workers would be brought directly into rapid transit connection with the principal residence districts of the city. This would enable 305,000 or 87 per cent of the workers checked to live in any of the three main divisions of the city and reach their work by high-speed rapid transit lines. The remaining groups, employing 45,000 workers, would be reached in the later additions and extensions to the system.

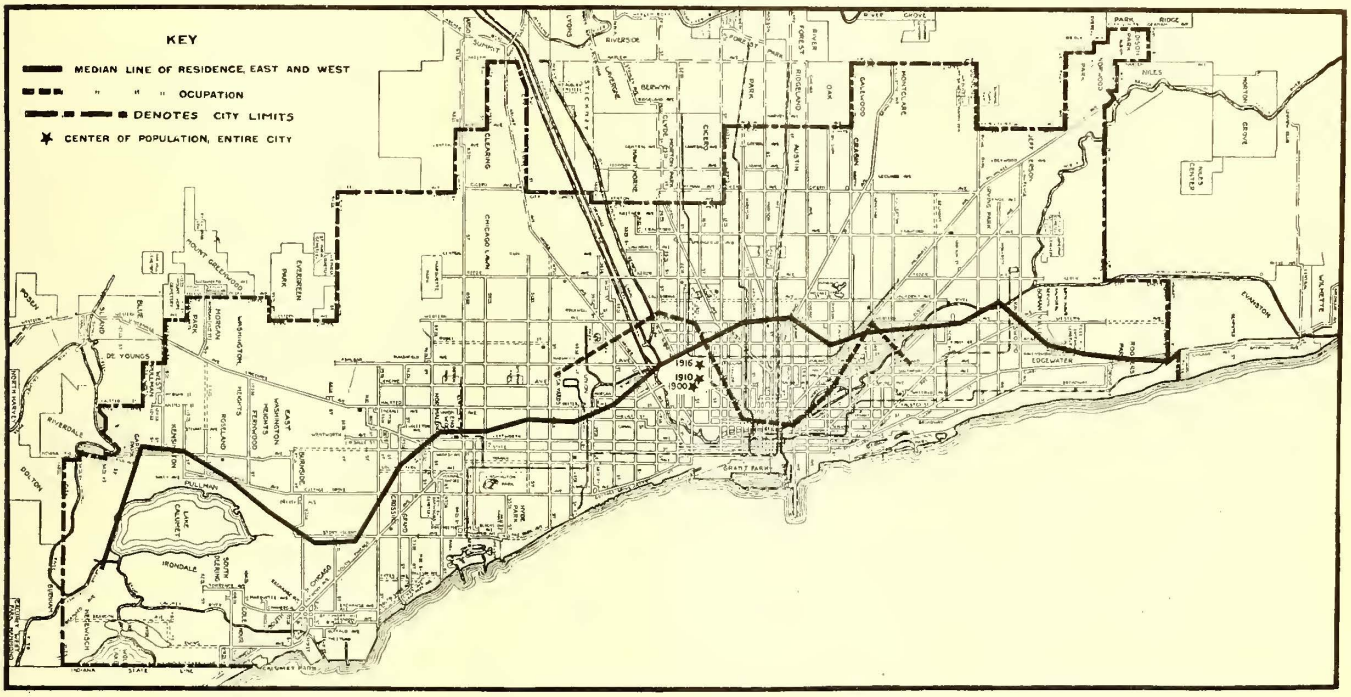
Travel of Loop District Employees

In studying the traffic requirements of the employees in the loop district, or the first group, the commission gathered data comprising 136 concerns including banks, office buildings, stores, wholesale houses, factories and miscellaneous establishments. These concerns were listed in four parts, divided approximately on the lines of Clark Street and Madison Street, and each quarter of the loop was studied as a separate group. The studies covered a total of 115,085 employees divided among the four sections as follows: Southeast quarter of the loop, 36,203; southwest quarter, 34,723; northeast quarter, 32,246; northwest quarter, 11,913. Only 3.7 per cent of the 115,085 workers checked in the loop walk to their work, and the indications were definite that these came from the section of the city just north of the Chicago River. The percentage for the loop group of workers living at various distances from the loop was found to vary quite distinctly from that for other groups outside the loop, in that the former percentage increased steadily to the 4 to 5-mile distance before it began to decrease. In practically all the other groups the percentage decreased with increasing distance from the

point of occupation to residence. This fact shows the loop workers to be long-distance riders, indicating the necessity for high-speed rapid-transit service for their accommodation.

An analysis of the method of transportation of loop district workers showed that of the 115,085 employees checked, 64,847 were elevated riders, 43,344 were surface car riders, 3921 were steam-road riders and 2973 were walkers. By the above segregation of the loop workers into four sections, it was also found that of the 34,723 workers in the southwest quarter of the loop, 8150 lived on the South Side of the city and consequently had no direct service to their work in the morning, while 7876 living on the North Side had no direct service from their work to their homes in the evening. Each of these groups must cross the loop, one in the morning and the other in the afternoon, thus adding to the pedestrian congestion. Similarly, of 32,246 in the northeast quarter of the loop, 8621 from the North and Northwest sides of the city and 10,656 from the South Side were all checked. In this district, bounded by Division Street, Racine Avenue, and Twelfth Street, are found most of the badly congested traffic points in the city, and the correction of its local difficulties will so far solve the general transportation problem that the remainder of the city can be treated in detail. Bordering on the edges of this district are most of the over-populated localities, with their serious housing problems. Better and more diversified transportation, the commission states, will tend to distribute the population and relieve these conditions.

In comparison with the loop and central business district, comprising the four groups mentioned above, many of the older established factory groups show very heavy percentages of walkers, while the newer established plants, those of the Western Electric, Sears, Roebuck and Crane companies have the same general percentages of walkers, surface car riders and rapid transit riders, but the number living at great distances is not so marked as in the case of this central district.



MEDIAN LINES OF RESIDENCE AND OCCUPATION FOR CHICAGO IN 1916

inadequately served, since they must walk back and forth across the loop in the morning and afternoon. Of 11,915 workers in the northwest quarter of the loop, 4025 from the West Side were insufficiently served in the morning. The report points out that the importance of convenient transit facilities for the loop workers cannot be overemphasized, for it comprises practically one-third of the total workers canvassed. Moreover, any improvements which care for these riders also provide for the convenience of many thousands of shoppers and pleasure seekers who travel to and from this district throughout the day and well into the night.

TRAVEL FOR OTHER GROUPS

This same method of analysis was carried out by the commission in connection with the three other groups in the central business district and with other groups outside. For the combined groups in the central business district it was found that 9.3 per cent of the workers lived within walking distance (1 mile); 42.1 per cent within surface car radius (4 miles) and 48.6 per cent at rapid transit distance (more than 4 miles). The four groups comprise 169,975 workers or 48 per cent of

In the opinion of the commission, it is to be expected under normal conditions that when the newer plants shall have been for a longer time in their present localities, the traffic characteristic of their workers will gradually change so that more of them will reside within walking distance, as is the case with the older established groups, such as the International Harvester Company and the Stock Yards industries. Already there are indications of this change in the building of residences about the newer plants. The fact remains, however, that more than 30 per cent of all these workers live at rapid transit distances from their places of employment, and for them rapid transit connections should be provided.

INFLUENCES DETERMINING RESIDENCE

The commission states that there seemed to be three factors entering into the determination of the residential locality of factory groups, as follows: (1) The age of the factory, the general rule being that the older factories have large groups of their employees concentrated in their immediate neighborhood with comparatively small numbers coming from any considerable

distance. (2) Similarity of occupation, *i.e.*, where groups widely separated employ the same classes of labor, the employees of all of the groups will be found living in the same neighborhood. (3) Convenience of transportation, which probably covers both of the others. Its discussion in this connection is aimed to bring out the fact that it is impossible to consider any grouping of workers by occupation. There must be convenient transportation in all directions connecting all factory groups with all residential areas in the city, or those residential areas which are not so connected will not be fully or quickly settled.

Proving the New Rapid Transit Routes

From these studies it was possible for the commission to determine not only the degree of service which was being rendered by the present transportation systems, but to gain a very definite idea as to where the principal travel would be, provided it progressed in the most direct route. The information brought out by the various group studies aided materially in laying out the proposed new transportation routes. By grouping the quarter-mile residence districts to indicate the number of workers living within a distance of ½ mile on either side of a given street, whose daily occupation would take them to districts served by the rapid transit line proposed along this street, it was possible to determine the relative advantages between two streets as a proposed route for a rapid-transit line.

Such an analysis of the proposed Ashland Avenue north and south rapid-transit line showed that 80,000 workers living along the line and traveling to factory districts were included in the commission's industrial investigation. On the other hand, along Halsted Street, which parallels Ashland Avenue about a mile farther east, it was found that the half-mile district on either side contained only 56,000 workers whose daily occupation would take them to the districts canvassed in this investigation.

In classifying the workers along these two streets by the mode of transportation they would require, according to the distance away from their work, it was found that of the 80,000 workers checked along Ashland Avenue, there would be a total of 33,600 walkers and surface riders and 46,400 possible rapid-transit riders; while of the 56,000 workers living along Halsted Street, there would be 28,600 walkers and surface car riders and only 27,400 possible rapid-transit riders. This indicated that 19,000 more workers would be benefited by a rapid-transit route along Ashland Avenue than by a similar route on Halsted Street.

Following this method of reasoning and using the industrial population checks for the different groups along the rapid-transit lines as a basis, the commission was able to develop a load curve for the proposed Ashland Avenue line during the rush-hour period and during the entire day. In this manner it was found that for a single rush-hour period the north-bound Ashland Avenue line would carry a load of more than 9000 passengers from the workers checked, which may be rated up to 15,000 in accordance with the ratios of those checked to other passengers who were not reached in the industrial check. Similarly, the total south-bound traffic was estimated at 10,000 passengers during the rush period. By using the ratios found on the present transit lines as between rush-hour and all-day loads, it was assumed that the total daily load of the Ashland Avenue line would be 80,000 passengers within a reasonably short period after its opening for traffic.

Median Lines of Residence and Occupation

Another of the studies used by the commissioners in arriving at the best location for rapid transit routes was the establishment of a median line of residence and another of occupation across the length of Chicago. It was found that the median line of residence followed the general trend of the lake shore at a distance of from 2 to 3 miles west, while the median line of occupation showed a distinct contrast to the population line. The concentration of a large number of workers in the loop district pulls this line far to the east through the north and south central portion of the city. With these two lines established, the report states that it is obvious that a transportation line cutting across these two median lines of residence and occupation the most often will develop the greatest number of passenger rides, provided the lateral distribution is ample at all points. In this respect, it was shown that Ashland Avenue was peculiarly well situated, since it cuts across the median line of residence twice and the median line of occupation four times in its length. Ashland Avenue is also well situated with respect to lateral distribution, inasmuch as it directly intersects six lines of present rapid transit from the west.

A. R. E. A. Action on Committee Reports

An Abstract Is Given of the Proceedings of the 1917 Convention as Far as They Relate to Electric Railway Practice

PRESIDENT A. STUART BALDWIN, chief engineer Illinois Central Railroad, presided over the sessions of the American Railway Engineering Association's convention in Chicago, March 20 to 23. In his address, he reviewed the work of the association during the year and commented on steam railroad electrification work. In this connection he said that a few years ago the demand on the part of the public for electrification of steam railways was more insistent than it is at present.

"It is becoming recognized that the cases in which steam railroads are justified financially in electrifying are exceptional; that in the present state of the art it is only where unusual conditions prevail that the change from steam to electric traction is justified, such as, for instance, the necessity for the elimination of smoke from tunnel operation; the requirements for the expansion of business in congested districts, exceptional possibility of economical power production, whether by fuel or water, or an unusual combination of excessively heavy traffic with high gradients. It has been further proved that the proportionate responsibility of railroads in large cities for the smoke nuisance has been greatly exaggerated."

During the three-day session of the Engineering Association, the hearing of standing committee reports occupied practically the whole time. A very large part of the material submitted in the committee reports was received by the association as "progress reports" or as "information" for publication in the proceedings. The committee on wooden bridges and trestles reached several general conclusions which were summarized in the issue of this paper for March 24. These conclusions were approved by the association with one exception, which was a statement that "creosoted timber trestles are more economical than concrete, except when the cost of the concrete structure is less than one and one-half times the cost of the wooden structure." This conclusion involved certain assumptions on the part of the committee which were not thoroughly explained in the report, and the experience cited by a number of the members threw a reasonable doubt over the conclusions, and the association voted to refer this back to the com-

mittee for further consideration. An abstract of the discussion appears in the department on "Equipment and Its Maintenance" elsewhere in this issue.

The report of the committee on conservation of natural resources was adopted with the exception of that part referring to electrification of railways, which was held over and ordered not printed in the proceedings, pending investigation. This report, looking to the prevention of accidents and consequent damage claims and the conservation of human life, included a recommendation that laws be enacted making trespassing upon railroad track a misdemeanor.

The design and specifications for a standard cut track spike and a standard screw spike, recommended by the committee on track, were adopted by the association with one or two minor modifications. The discussion in this connection brought out the fact that it had been impossible to get some of the manufacturers to make spikes in accordance with these specifications, since it was impossible for them to make the spike with existing automatic machines. However, the committee reported that it had been assured that automatic machines could be made which would turn out this design of cut spike as rapidly and as cheaply as the designs at present in use. The balance of this committee's report was received as information.

The following conclusion of the committee on ballast was adopted by the association: "It is generally conceded that stone ballast is the most effective ballast, and experience has demonstrated that the best quality of each of the various kinds of ballast should fall in about the following order of effectiveness: Stone, washed gravel, broken slag (not granulated), pit run gravel, chatts, burnt clay or gumbo and cinders." The committee's recommendations on the depth of ballast was adopted by the association with an amendment, and reads as follows: "The depth of ballast under the tie, on roadbed material such as clay, loam, etc., subject to deformation by the application of live load, should seem to be not less than the spacing, center to center, of ties."

The recommendations of the committee for a 12-in. sub-ballast blanket of cinders were also adopted. But the recommendation for a standard ballast section for Class A track with a sub-ballast and top-ballast, and a sub-grade width, was voted down, and as the two previous recommendations for ballast and sub-ballast and the standard section are interdependent, they were all referred back to the committee for further study.

Specifications for constructing concrete piles as submitted by the committee on masonry were referred back to the committee, to be reported with drawings next year, as were also specifications for driving concrete piles.

The specifications submitted for surface finishing of concrete were adopted. The same disposition was made of the design for retaining walls and formulas for designs of retaining walls and these will be inserted in the Manual. The association also adopted the specifications and methods of tests for Portland cement which had previously been adopted by the American Society for Testing Materials.

The committee on wood preservation made certain revisions in the association's specifications for creosote oil analyses, including changes in the method for fractioning, and added several new sections to the specifications. These changes and additions were approved by the association and will be published in a supplement to the Manual which will be issued this year.

NEW OFFICERS ELECTED

At the close of the afternoon session, March 21, the election of the following officers for the ensuing year was announced:

President, John G. Sullivan, chief engineer Canadian Pacific lines west, Winnipeg, Man.; first vice-president, C. A. Morse, chief engineer Chicago, Rock Island & Pacific, Chicago; second vice-president, Earl Stimson, engineer maintenance of way Baltimore & Ohio, Baltimore, Md.; treasurer, George H. Bremner, district engineer division of valuation, Interstate Commerce Commission, Chicago; secretary, E. H. Fritch, Chicago.

Illuminated Maps of Railway System

Transparent Paints on Plate Glass Aid British Columbia Company in Publicity Campaign

TWO transparent electric map signs, believed to be the first of their kind on this continent, have been installed at the entrance to the interurban station of the British Columbia Electric Railway Company, Ltd., at Vancouver, B. C. The object sought was the education of the passing public to the actual layout of the company's city and interurban systems, as well as the importance of the company in the surrounding districts.

Each sign is 5 ft. 1 in. x 10 ft. 1 in. x 6 in. deep, framed of 1½ in. x 1½ in. x ¼ in. angles to which are

ILLUMINATED MAP IN TRANSPARENT COLORS SHOWS ELECTRIC RAILWAY'S SYSTEM

riveted twenty-two-gage galvanized iron back and sides. The signs are wired in three divisions, and so constructed that each may be removed if it becomes necessary to replace the 40-watt lamps, of which there are four to each division.

The maps are painted on plate glass divided into three removable pieces which are separated by copper beading. In the accompanying illustration is shown the interurban map on which in transparent colors the company's lines are shown in red, rivers, lakes and sea in blue, names in white, stations in red and land in black. On the opposite side of the entrance a second map shows the city, system, while over the opening there is an ordinary electric sign "B. C. Electric."

The installation is part of a broad policy of publicity intended to promote good-will toward the company and has been the object of much curiosity.

The National Association of Manufacturers directs attention to the "Safety Picture Books," which may be purchased at cost, $2.50 per hundred or $20 per thousand, from the Conference Board on Safety and Sanitation, West Lynn, Mass. These books are suitable for slipping into pay envelopes.

What Are Fair Rates of Return?*

Not Measured by Security Yields but by Net Earnings Sufficient to Attract Necessary Capital—Surplus Earnings Are Demanded by Investors—Other Terms Necessary to Induce Investors to Furnish Capital

By HALFORD ERICKSON
Hagenah & Erickson, Consulting Engineers, Chicago, Ill.

WHAT constitutes fair returns upon a fair valuation of the investment, while it embraces many ethical features, is primarily a question of facts. These facts are found in the business world. Fair return in its broadest sense means fair allowances for rent of land, for wages of labor, for interest on the capital used and for profits on the services of the *entrepreneur*. That is, it means reasonable compensation for each of the factors of production. In a narrower sense fair returns are limited to reasonable amounts for interest and profits. While interest and profits thus represent the returns for two separate factors of production, the resemblances between them are close enough for them to be discussed together. Fair returns for interest and profits depend upon so many conditions, and differ so much from one set of conditions to another, and from time to time, that it is, and probably always will be, impossible definitely to lay down in a law or a decision a fair rate of return under each set of conditions.

In interpreting what is meant by the term fair returns, for example, some hold that it is the return or cost at which the necessary capital for proper developments can be had. Others say that the fair return is measured by the income basis upon which the existing securities of an enterprise, or similar securities of other enterprises, are selling in the open market. The former of these two views seems to be in line with the best interests of both the public and the investor; the latter appears unjust to both.

Security Yield in Open Market Is Not Fair Return

The yield or income basis upon which securities are ordinarily selling in the open market does not, as a rule, represent a fair basis for returns for interest and profits. There are several reasons for this. The income bases computed from the rates of interest and dividends borne by the securities and from the market prices of these securities do not represent the net earnings and the amount of property required by the investor for the protection of the securities in order that they may sell in the market on the income bases in question. Moreover, the market price of the securities, as a rule, fails to take into account such expenses as the discounts at which the securities may have had to be sold, the commissions charged for marketing the securities, and the legal and other costs connected with issuing them. It also frequently happens that the securities, for special reasons, such as the desire for control, or family and other relations, are selling at much higher prices than would be obtained if the yield or income was the only element that entered into their price.

Among the conditions upon which investors can be induced to furnish capital is, protection against risks to both the principal and the income thereon. Bonds, in order to be safe, must have behind them much more property than their face value, and much greater net earnings than the amount required for interest on the bonds. Likewise, the stock, in order to be reasonably safe, must also have property and equities behind it, as well as much greater net earnings than the amounts or rates regularly paid as dividends thereon. These excesses in property value and net earnings over the face value of the securities, and over the interest and dividends directly paid thereon, constitute a margin of safety which must exist or be reasonably well assured if capital is to be had upon terms favorable to both the plants and the public. It is clear, therefore, that the real cost of the capital and of the *entrepreneur* is represented not by the income bases, but by the combined amounts of what is regularly and fairly paid as interest and dividends, plus such margins for safety as the investor may require. Yet there are many who still cling to the income basis view and endeavor to put their views into effect. These efforts are extremely detrimental to all concerned. They are unfair to the plants and injure their credit. They are also harmful to the public, for they ultimately retard extensions of the service and tend to lower the quality of such service.

One is thus forced to fall back upon the first of the two sets of views outlined above, namely, the one which holds that the fair returns are represented by such net earnings as those upon which the necessary capital can be had. Such net earnings include not only the necessary annual interest and dividend charges, but the average annual proportion of all necessary discounts, commissions and other expenses connected with the issues, together with such margins of safety in the way of surplus earnings as the investors may require for their own protection.

What the Investors Require

As already stated, what is a fair rate of return for interest and profits is largely a question of facts. In order to throw some light on this complicated question, extensive inquiries have been made into the terms and conditions upon which investors can be induced to furnish capital under various conditions. Since the facts collected represent actual experience in such matters, it is believed that the terms disclosed for public utility investors are approximately correct. They may be summarized as follows:

Investors in order to furnish capital on bonds on a 5 to a 5½ per cent interest basis appear to require that the principal of such bonds shall be protected by property and equities worth not far from twice as much as the par value of the bonds; that the interest charges on such bonds shall be protected by net earnings that amount to about twice as much as such interest charges; that the future prospects of the road or utility shall be such that as far as can be judged the financial condition of the plant is likely to improve, and that the stated income basis shall not, as a rule, include the cost of discounts, commissions and issuing expenses. Such expenses must, therefore, be borne by the plant in addition to the interest charges.

*Abstract of paper presented at meeting of Wisconsin Electrical Association, Milwaukee, March 14-15, 1917.

Investors, in order to furnish capital on stocks, mostly appear to require that such stock shall not amount to much more than the amount by which the fair value of the property and equities exceed the par value of the bonds which come ahead of such stock; that the net earnings of the company on such stock shall amount to from one and one-half to twice as much as the ordinary dividends of, say, 6 per cent, which are regularly paid in such cases; that in addition to such regular dividends the stock also receive occasional extra dividends; that existing stockholders be permitted to subscribe for new stock at lower prices than those which the stock in question brings in the market; and that the future prospects of the plant, in so far as they can be foreseen, shall be such that the present relations between such stock on the one hand and the net earnings on the other are at least likely to be maintained in the future. In addition, there may also be expenses for discounts, commissions, etc., to be borne by the plants.

When the demands of the investors are less drastic, it is usually because of special conditions which happen to obtain. Bonds and stocks which are not so well secured as those specified in the above requirements must be placed on terms which, as a rule, are much less favorable to the borrowers. Securities which do not come within these rules are usually regarded as speculative in character and are taken by speculators rather than investors. They are so taken on terms and conditions that are supposed to be favorable enough to the taker to offset the speculative features or extra risks involved. These terms are usually such as to make the cost of capital too high for most business purposes.

The Need of Surplus Earnings

The terms and conditions, including the margins for safety which are thus demanded by the investors, plus the cost of discounts, commissions and certain other expenses, represent the true cost of capital which, in the long run, must be borne by the public or those who use the service. It is true that a part, at least, of this cost is sometimes shifted from the consumers to the investors through refusals to grant reasonable rates. Under normal conditions in other respects, however, such shifting is not fair, and cannot become permanent. The utilities must pay the ruling prices for all the labor, material and capital which they employ in the service. These prices are fixed, in the open market, by forces over which the utilities have little or no control. If these outlays are not covered by the rates which the utilities are permitted to charge, they cannot permanently remain in the business. This applies as much to the surplus earnings as a margin of safety, which is demanded by the investors for their protection, as it does to any other item of cost. Such surplus net earnings constitute a part of the compensation, over and above the regular dividends, which investors demand for the risks they assume.

Risk is a factor that varies, but there are no industrial undertakings in which it is not present. When its cost is not covered by surplus earnings, it is included in the higher interest, dividend and other charges which the investors exact. The money cost to the public of the capital obtained is, therefore, likely to be fully as great under the lower as under the higher earnings. Under normal conditions there appears to be no way in which the public will derive any permanent benefit from refusing to allow rates for the service obtained that are high enough to yield the small surplus that is necessary to maintain the credit of the utilities. Even if there were instances where the direct money cost would be a little less when no surplus is provided for in the charges for the service, the slight savings from this source would certainly, in the long run, be fully offset by poorer facilities and services and by less adequate provisions for safety in other respects.

Price of Capital Varies

The price of capital varies from one period to another. The investigations upon these points indicate that bonds, which are protected by such surplus property and net earnings as those demanded by the investor, were selling on about a 4 per cent income basis from about 1900 to about 1907. In the latter year, however, the yield demanded increased to about 4½ per cent, and remained at this figure up to about 1909, when it again increased to about 5 per cent. In 1913 and 1914 it rose to over 5 per cent. On investment stocks of the kind described above the yield demanded by the public, in addition to a surplus for safety, was from 1 per cent to about 2½ per cent greater than the yield thus demanded on the bonds.

Such increases in the cost of capital is felt more strongly in the junior and weaker securities than in the better underlying first mortgage bonds. The prices on first mortgage bonds of the better kinds, both in times of stress and in times of prosperity, usually change so slowly that the yields on their market price do not furnish a very accurate index to the course of the cost of capital. But, while all this is true, there has been a marked tendency, during the last ten years or more, on the part of the better bonds to fall in price. The main reason for this is undoubtedly found in the effect of rising prices of commodities on the purchasing power of the income from the bonds.

Effect of Regulation

Under strict regulation, most speculative opportunities are eliminated. Those who hold stocks, for instance, may not be permitted any benefits from increasing values due to social growth, or any considerable proportion of the increased profits derived from growths in the business and from general developments. Speculative opportunities of this kind are much cherished. They have in the past regularly caused investments to be made on much lower bases of returns than those at which capital could otherwise have been had. With the growing tendency under regulation to take away such speculative opportunities, there has also arisen a tendency on the part of the investors to demand higher rates of income.

The effect, upon the rates of return or on the cost of the capital, of adverse political conditions and actual or proposed legislation may also be illustrated by the case of the steam railroads. These points are not mentioned as an argument against regulation, for regulation in some form is necessary and has come to stay. They are simply cited as examples of how easily the credit situation may be disturbed in such a way as to injure public interest, and how necessary it therefore is for the commissions to be guided by sound economic and business principles.

What the Utilities Need

Many roads and many other utilities are not in such a situation with respect to their credit or property and earnings that they are likely to be able to secure all the additional capital they need on reasonable terms and conditions. Even where the value of the plants and of the business equals the outstanding securities the earnings on the stock are frequently far from high enough to place such stock on an investment basis, or to induce investors to furnish capital thereon. In fact, the situation with respect to the earnings is often distinctly unfavorable; that is, the earnings are often too low to

be reasonable and much below the level at which new capital can be had, particularly on stocks. This forces utilities to obtain additional capital on bonds alone, and this, in turn, tends to cause the proportion of the bonds of the total capitalization to become too high for safety. In hard times an unduly large bonded indebtedness is likely to mean receiverships with all the losses and disturbances that are entailed thereby. It is seldom safe to let that part of the capitalization which is represented by bonds greatly exceed 65 to 75 per cent of the total amount of both the stocks and the bonds.

Under ordinary conditions utilities must have net earnings for interest on bonds, dividends on stock and a surplus for safety, altogether amounting to not less than about 8 per cent on the fair value of the plant, its equities and business. With such net earnings, and when the bonds do not cover more than from 50 to 75 per cent of the total value, the bonds would probably sell in the market on about a 5 to 5½ per cent income basis, while the stock would be likely to sell at prices on which the yield would amount to from 1 to 1½ per cent more than this. With a much lower net income than about 8 per cent the plant could not very well be placed in the investment class.

Progress in Accident Reduction

Some Information Regarding the Safety Work of the Railways Honored This Year by the American Museum of Safety

As announced in the issue of the ELECTRIC RAILWAY JOURNAL for March 17 the Anthony N. Brady memorial medal has been awarded by the trustees of the American Museum of Safety to the Connecticut Company, New Haven, Conn., L. S. Storrs, president. Honorable mention was also accorded to the Pacific Electric Railway, Los Angeles, Cal., Paul Shoup, president, and to the Interstate Public Service Company, Indianapolis, Ind., Chester P. Wilson, president. The readers of the ELECTRIC RAILWAY JOURNAL will naturally wish some detail of the safety work of these companies in view of their selection by the committee on award of the medal for this signal honor. A brief summary of this work has, therefore, been prepared.

OPERATING CONDITIONS IN CONNECTICUT

The Connecticut Company operates 689 miles of track in Stamford, Norwalk, Bridgeport, Derby, Ansonia, New Haven, Waterbury, Meriden, Middletown, New Britain, Hartford, Torrington and Winchester and between a number of these cities. In some of these cities the streets are narrow and far from straight, and at many points the population is considerably congested.

During the year covered by the award the company operated 1519 passenger cars, thirty-four freight cars and 314 miscellaneous cars, requiring the services of 2408 men connected with the movement of cars and 1904 industrial employees, the average total number of employees being 4218.

The safety work of the company has of late been rendered more difficult than usual on account of the influx of population due to the increase in manufacturing resulting from the war. The Winchester Repeating Arms Company and the Marlin Fire Arms Company in New Haven, the Remington Union Metallic Cartridge Company in Bridgeport, the American Brass Company and the Farrel Foundry Company in the Naugatuck Valley, the Scovill Manufacturing Company in Waterbury and the Colt's Fire Arms Company in Hartford, are among the many concerns which have expanded enormously in the last few years. The peak loads on the railway system caused by the opening and closing of these factories have made safe railway operation very difficult.

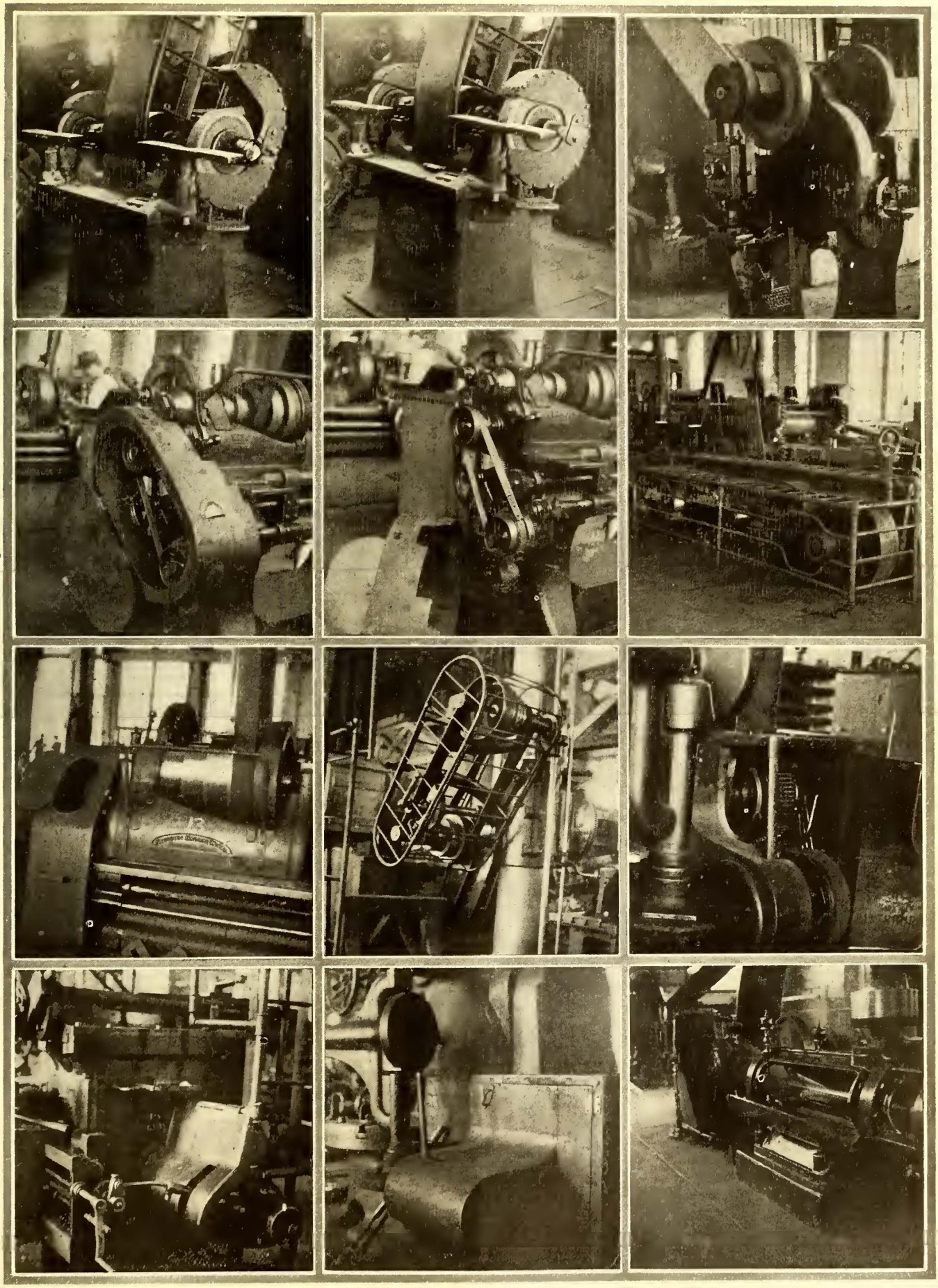
Furthermore, the demand for capable mechanics on the part of the manufacturing companies has been so great that the railway has found difficulty in retaining the services of men competent to maintain the equipment, and, in some cities, there was even a shortage of men suitable for car crews.

In addition to the endeavor to maintain equipment in the best possible operating condition, to safeguard operation at grade crossings, and to reduce industrial accidents to a minimum, the company has made an unusual effort to stimulate public interest in safety. For example, for several years back the New Haven division has conducted a contest among school children, as described in earlier issues of the ELECTRIC RAILWAY JOURNAL. One feature of this was to have the motormen who passed the several schools in the city make reports, covering a week each, upon the number of children who appear to be school children who step carelessly from the curb to the street. The children in the schools were then told that they had been watched at a period in the past and would be watched at a period in the future, and that a reward was to be given for the school which had made the greatest improvement. Later the same motormen made reports on similar observations, and from these reports the school having the best record was determined. The company furnished this school with the necessary number of cars to take the teachers and pupils to one of the local amusement parks for an afternoon, a holiday being granted for the purpose by the school authorities.

In order to secure the co-operation of the schools over the whole territory touched by the company's lines, prizes were offered last year for the best essay by a school child on the subject "How I Keep Safe Upon the Streets and Roads." Nearly 1000 essays were submitted in this competition. Three awards each of $20 and $10 gold pieces, were made in high schools, grammar schools and rural schools respectively. The prizes were awarded with appropriate exercises and the newspapers gave hearty co-operation in the contest, the more prominent Sunday papers featuring it with reproductions of the winning essays and pictures of some of the winning pupils.

Among the employees the policy of interesting all of them in the efforts of the company to protect them as well as the public from accident is systematically followed. Typical of this are the line foremen's meetings, which are held monthly. In these there are general discussions as to methods of construction, standards, safety measures and other practical matters. Another helpful feature has been the posting on bulletin boards of the records of the several divisions, giving comparative standings of divisions on the basis of passengers injured in relation to passengers carried.

For the benefit of the men, the company issues to all interested neatly bound books on the following subjects: "Rules and Regulations for Employees," "Instructions for Safety of Employees," and "Rules for Resuscitation



Safeguarding Machinery on the Pacific Electric Railway

Typical Illustrations Showing Some of Schemes Which Were Used for Surrounding Gearing and Other Dangerous Parts of Tools, Etc., in the Shops and Power Plants of This Company

from Electric Shocks." The rule book is revised periodically by a committee composed of managers and superintendents, and later the changes and additions are discussed in a meeting of all the managers and superintendents.

The management of the company considers also that the local company section of the American Electric Railway Association has been a factor in promoting interest in safety matters. Addresses on the subject have been given before large audiences, supplementing the efforts made in the several departments.

Accident Record of the Company

During the year covered by the report made to the medal committee but one person was killed in train accidents and there were no fatal accidents among industrial employees. Twenty persons were killed in casualties other than train accidents, but of these a number were individually responsible. Reduced to unit figures it appears that for each 1,000,000 car-miles run 0.035 person was killed in a train accident and 0.7 in other than train accidents, while 6.0 and 31.5 were the corresponding numbers of those injured. The injuries to industrial employees, many of which were trifling, not resulting from the movement of cars, were at the rate of 23.6 per 1000 employees.

It is the custom of the company to set aside at the beginning of each fiscal year an arbitrary percentage of the gross earnings as a casualty and insurance reserve. This is estimated for each division and the division records are kept separately so as to create a friendly spirit of rivalry among the local managers in the interests of safety. This procedure also seems to provide an accurate method of bookkeeping. The reserves for the nine divisions together with the actual percentages spent based on passenger earnings were as follows: New Haven, reserve 5 per cent, spent 2.55 per cent; Meriden, 2, 1.08; Middletown, 3, 0.42; Hartford, 4, 1.72; Stamford, 5, 2.02; Bridgeport, 4, 3.28; Waterbury, 5, 3.41; New Britain, 5, 1.84; Torrington, ½, 0.22. A table compiled for eleven years shows results fairly consistent with these figures, although there are, of course, occasional exceptionally high expenditures.

During the year covered by the report on which the award was made the company spent 2.39 per cent of the gross passenger earnings on claims cases and claims settlements, including the necessary legal, medical and other administration expenses in connection therewith, together with all expenses under the compensation act. The company did a freight and express business of more than $500,000 also, and if this is included the percentage is 2.26. This record is considered unusually satisfactory in view of the fact that on account of the high wages in the territory larger settlements for injuries are necessary than would have been made earlier for accidents of the same seriousness to the same individuals.

Operating Conditions on the Pacific Electric Railway

The Pacific Electric operates a total mileage, in single-track equivalent, of nearly 1060. The number of passengers carried during the year 1915-1916 was more than 75,000,000. The system comprises lines in a large number of cities in southern California and extensive interurban mileage. During the last seven or eight years the interurban passenger and freight business of the company has increased in large proportion. The population served aggregates about 750,000 and the system covers about fifty cities and towns.

The company handles the safety problem very systematically through a committee in each of the four divisions. Each of the committees is made up of the division superintendent (chairman), the assistant superintendent, a trainmaster, a dispatcher, an interurban conductor, an interurban motorman, a city-line conductor, a city-line motorman, a freight conductor, a freight motorman, a representative each from the claims, maintenance-of-way, electrical and mechanical departments, and a secretary. The committee meets monthly and the matters which are discussed affect division practices solely. Where no investment is required the necessary actions are concluded by these committees.

On matters pertaining to systems, standards and practices, or involving investment, the division committees present their conclusions in the form of recommendations to the central safety committee. This comprises the general manager (chairman), the general superintendent, the superintendents of the four divisions, the assistant chief engineer in charge of maintenance, the electrical and mechanical superintendents, the general claim agent, the general storekeeper and a secretary.

As a result of the work of these committees during the past four years hundreds of recommendations have been considered and many have been put into effect.

The accompanying photographs are reproduced to illustrate the care with which the dangerous parts of machines in the shops and power houses of the Pacific Electric are safeguarded. No care or reasonable expense has been spared to protect workmen, and the same principle has been applied to the equipment on the cars.

Interstate Public Service Company

The Interstate Public Service Company is a subsidiary of the Middle West Utilities Company and operates under lease the Indianapolis, Columbus & Southern Traction Company, which connects Indianapolis, Greenwood, Franklin, Edinburg, Columbus, Seymour, with connections for Louisville, Ky. It has a trackage of 9.4 miles in city limits and 52.6 miles on private right-of-way.

While during the year covered by the report two persons were killed in train accidents, these were trespassers, and there were no other fatalities in any department of the service. Moreover, the injuries to persons in train accidents were few and there were practically no other accidents of any other kind. The company holds frequent meetings of trainmen and other employees, and makes a special feature of safety advertisements in its cars.

Safety Medals Awarded

The American Museum of Safety, Arthur Williams, president, has announced the findings of the jury of awards covering four of the five gold medals which are given annually by the Museum for noteworthy achievements in the realm of safety. The medal not yet awarded is the E. H. Harriman medal which recognizes safety work in the steam railroad field. A preliminary announcement, authorized by the museum trustees, of the award of the Anthony N. Brady medal and replicas, and of the recognition of the commendable safety activities of two railways by "honorable mention," was made in the March 17 Electric Railway Journal. The article just preceding is an elaboration of that announcement. The Scientific American medal was awarded to the Pullman Company for originating the Dean end frame for passenger cars. This device is a reinforced 8-in. channel beam bent in an inverted U-shape to form the side of the vestibule connecting door between cars. The beam is carried under the car platform to a union with a steel underframe of the car. The Dean end frame

armors the end of the car against telescoping. The Louis Livingston Seaman medal was given to the Julius King Optical Company, New York City, as a recognition of its scientific investigation of the effect of colored lenses worn by workmen whose eyes are exposed to the blinding glare of metal melting and refining operation, oxy-acetylene welding and electric arc welding. The award also covers work done by the company in perfecting safety goggles for chippers and sanitary and efficient helmets for industrial workers. The Travelers' Insurance Company medal was given to the Commonwealth Steel Company, St. Louis, Mo., for its safety systems, protective devices, sanitary methods applied throughout the plant and fellowship work among employees.

Action for National Defense

Association Committee Has Conference with Secretary of War and Outlines Plans for Immediate Adoption by Electric Railway Companies

THE committee on national defense of the American Electric Railway Association, the outgrowth of the committee to co-operate with the War Department authorized at the 1916 mid-year meeting, has been actively engaged in preparing a program to be followed by the electric railways toward national defense. The plan is to work in connection with the National Council of Defense, and a meeting with this council and the executives of eighteen trunk line railroads was held in Washington on March 1. The electric railway representatives in attendance were General Harries, chairman, and Messrs. Storrs, Allen and Burritt. Plans were made which were laid before the full committee on national defense of the American Electric Railway Association on March 26.

This committee, which has recently been appointed, consists of the following:

Gen. George H. Harries, chairman, president Omaha Electric Light & Power Company, Omaha, Neb.

F. R. Ford, vice-chairman, Ford, Bacon & Davis, New York.

L. S. Storrs, vice-chairman, president The Connecticut Company, New Haven.

B. I. Budd, vice-chairman, president Metropolitan West Side Elevated Railroad, Chicago.

C. Loomis Allen, vice-chairman, Allen & Peck, Inc., Syracuse.

P. H. Gadsden, vice-chairman, president Charleston Consolidated Railway & Light Company, Charleston, S. C.

L. C. Bradley, vice-chairman, Stone & Webster, Houston, Texas.

W. R. Alberger, vice-chairman, vice-president and general manager San Francisco-Oakland Terminal Railways, Oakland.

A. H. Ford, vice-president and general manager Cumberland County Power & Light Company, Portland, Me.

D. A. Belden, president Massachusetts Northeastern Street Railway, Haverhill.

M. C. Brush, president Boston (Mass.) Elevated Railway.

R. S. Goff, vice-president Bay State Street Railway, Boston.

A. E. Potter, president Rhode Island Company, Providence.

W. O. Wood, president New York & Queens County Railway, New York.

E. A. Maher, Jr., vice-president and general manager Third Avenue Railway, New York.

Capt. A. R. Piper, general freight agent Brooklyn (N. Y.) Rapid Transit System.

Thomas N. McCarter, president Public Service Corporation, Newark.

F. S. Whitten, secretary-treasurer Jersey Central Traction Company, Wilmington, Del.

C. L. S. Tingley, second vice-president American Railways, Philadelphia.

T. A. Cross, vice-president and general manager United Railways & Electric Company, Baltimore.

R. D. Simms, treasurer Capital Traction Company, Washington.

J. N. Shannahan, chairman board of directors Newport News & Hampton Railway, Gas & Electric Company, Hampton.

Raymond Hunt, assistant general manager Tidewater Power Company, Wilmington, N. C.

H. C. Foss, general manager Savannah (Ga.) Electric Company.

M. S. Sloan, general manager New Orleans Railway & Light Company, New Orleans.

Alba H. Warren, manager Galveston (Tex.) Electric Company.

B. M. Warner, general superintendent San Diego (Cal.) Electric Company.

J. H. Wilson, president Mobile Light & Railroad Company, Mobile.

Paul Shoup, president Pacific Electric Railway Company, Los Angeles.

A. W. Leonard, president Puget Sound Traction, Light & Power Company, Seattle.

F. T. Griffith, president Portland Railway, Light & Power Company, Portland, Ore.

This committee held a meeting in New York on March 28, those present being Messrs. Harries, Storrs, F. R. Ford, A. H. Ford, Allen, Goff, H. B. Potter, Anderson, Wood, Piper, Schneider, Tingley, Simms, Hunt and Gadsden.

Announcement was first made of the appointment of a vice-chairman of the committee for each military district, to be responsible for the collection of data and other work required from the railways in the program of national defense. The list follows:

Northeastern District, L. S. Storrs, New Haven.
Eastern District, C. Loomis Allen, Syracuse.
Southeastern District, P. H. Gadsden, Charleston, S. C.
Southern District, L. C. Bradley, Houston, Tex.
Western District, W. R. Alberger, Oakland, Cal.
Central District, Britton I. Budd, Chicago.

General Harries explained that the steam railroads have been districted in the same way by the American Railway Association. The vice-chairman of the electric roads with the vice-chairman of the steam roads and the district military commander will form a committee of three under the War Department to take charge of all transportation matters in that district.

Frank R. Ford then explained what data would be required from each company. The first thing to do is to prepare a map of the company's lines and fill out a data sheet which will be sent to each company by the committee. These maps will all be to the same scale and will show the interurban electric lines, the steam railroads, the locations of power houses, substations, government posts, fortifications, mobilization points, bridges, viaducts, tunnels, whether the clearances are of the American Railway Association standards or not, grades over 2 per cent, safe loading of bridges, transmission lines if other than 600 volts d.c., etc. It is the purpose of the committee to send to each company an outline map of the territory covered by its lines, this map to show coast lines and rivers, and on it the railway data can be indicated by the company. The committee will also send a sample map as a guide to the way in which these maps should be prepared. Such a sample map prepared by The Connecticut Company for the district about New Haven was submitted at the meeting of the committee.

The data sheet which will be sent to each company will call for information concerning minimum headway possible, extent of shop facilities and certain physical features of the property, especially the extent to which the lines can receive steam railroad equipment and steam locomotives. This will indicate whether in the shipment of men and supplies it will be necessary for the government to break bulk in shipment.

At present it is proposed to prepare these maps for lines within 10 miles of the coast, as this is considered by the National Council of Defense the most important information desired. When this is obtained, the committee will get similar information for lines back as far back as 100 miles and then for the entire country.

American Committee on Electrolysis Completes First Stage of Work

Comments of Prominent Engineers in Several Fields Actively Identified with American Committee

THE preliminary report of the American committee on electrolysis, of which Bion J. Arnold, Chicago, Ill., is chairman, is now before the interests which co-operated in its production, for their consideration and approval. While, of course, the report speaks for itself, the fact remains that it has so far not been given extensive publicity. As the organizations interested have not in general expressed themselves regarding the report the committee does not yet feel justified in publishing it formally. However, it is highly desirable that the electric railway industry be familiar with what the committee has done in order that the results of its work may be utilized. Copies of the report can be procured at $1 each from the secretary of the American Institute of Electrical Engineers, New York City.

In order to obtain for the readers of the Electric Railway Journal an estimate of the work so far accomplished, a representative of the paper interviewed several members of the committee, one each from the groups most closely related to the electric railways in the solution of electrolysis mitigation problems. Among these was F. N. Waterman, consulting engineer, New York City, one of the A. I. E. E. members of the committee.

Mr. Waterman's Remarks

Mr. Waterman said that he believed that the thought which inspired President R. D. Mershon of the American Institute of Electrical Engineers to propose the formation of a joint committee to investigate the subject of electrolysis was that it should be possible for a body of broad-minded engineers, connected with the affected interests, to agree upon a sufficiently large number of fundamental facts, growing out of their experience; to remove the subject from the field of mere legal controversy and establish it as a definite engineering problem capable of analysis and, therefore, of definite remedial treatment. Such an agreement would point the way for further investigation and accumulation of data and promote that mutual understanding of the divergent points of view which is a necessary prerequisite to co-operation in the application of protective measures.

The report recently submitted represents those statements of fact which the representatives of several organizations have been able to agree upon, and the spirit of friendly co-operation which has been manifested in its preparation is, in itself, evidence of the wisdom of the original thought.

It can no longer reasonably be contended that there is no such problem, that the problem does not arise by reason of stray currents, that the fundamental conditions occasioning it cannot be ascertained, or that the damage cannot be reduced by proper construction of and remedial measures applied to both the current distributing and the affected structures.

The report goes far toward the justification of the original hope that the whole subject might be placed upon a sound engineering basis, that it might be approached in a spirit of co-operation instead of antagonism and that, eventually, it may be possible so far to assemble the facts and principles involved that definite recommendations can be agreed upon as to conditions which should govern construction and remedial measures which may be applied.

A Word from the Water-Works Utility

Alfred D. Flinn, deputy chief engineer Board of Water Supply, New York City, was one of the representatives of the American Water-Works Association on the Committee. In Mr. Flinn's opinion the preliminary report of the committee has not received the general notice which is its due. This report, he stated, is notable for several reasons. It has demonstrated that under proper leadership, with tenacity of purpose, representatives of present-day technical organizations can be brought together to accomplish constructive work; that they can harmonize differences, and that men of ability occupied with many important duties will take time for such service when convinced that the object to be attained is worth while.

On the specialized subject of electrolysis, heretofore much beclouded by incompleteness and inaccuracy of statement, the preliminary report presents a body of facts with a completeness, clarity and accuracy of statement unattainable except by such a co-operation of minds trained and experienced in the consideration of the many sides of this problem. Very naturally, patience, tact, fair-mindedness, prolonged study and honest endeavor to see "the other fellow's side" as well as one's own, were necessary, but the result has justified the hard work and the time consumed. An unusually valuable technical report was unanimously adopted by representatives of interests which, at the outset, were reputed to be so far apart and so antagonistic that they could not be brought to agree, even upon a statement of facts in the case. Even camps so wide asunder as water-works men and electric railway engineers found a basis for co-operation, and have at least begun to see possibilities for the adjustment of their apparently mutually conflicting interests so as to conserve the properties of both at a reasonable cost for protective measures.

It was very clearly established by the committee's conferences that all the services rendered by the various interests represented were demanded by modern communities; that in some instances, one, and in other instances, another of these interests had been the first in the field, and that all depend for their financial success upon the individual and communal prosperity of the inhabitants of the territory served. It became evident that co-operation and mutual fair play are more advantageous to all concerned than the bitter and costly legal contentions arising from disregard of the rights of others or ignorance of remedies for physical difficulties, which have heretofore been too common a feature of the attempts to settle electrolysis troubles. Definition of the rights and control of the practice of the several interests by the community through laws or ordinances, have been shown to be possible and effective.

A firm foundation of fact having been laid in this preliminary report, let the committee proceed courageously in the same earnest spirit of co-operation and fairness to accomplish the remaining portion of its task, namely, the preparation of a report which will set forth reasonable and practical rules for the control of electrolysis and the prevention or mitigation of its ill effects. The preliminary report should be read carefully by all persons interested in any way in the subject of electrolysis.

Professor Ganz Speaks From the Gas Industry Standpoint

Albert F. Ganz, professor of electrical engineering, Stevens Institute of Technology, Hoboken, N. J., was a representative of the American Gas Institute on the committee. In commenting on the matter Professor Ganz called attention to the lecture which he delivered this month before the New England Water-Works Association on the subject of electrolysis troubles and their remedy. He took occasion in this lecture to direct attention to the committee report. In the professor's opinion the committee has already accomplished a great deal

toward producing a closer co-operation among the interests owning the electric railways and those owning the underground structures. It is his hope that the future work of the committee will result in the unanimous adoption of recommendations which will reasonably safeguard underground piping systems against electrolysis.

The point of view from which Professor Ganz looks at this matter is that the railway companies in common with the pipe-owning companies are public utilities operating under public franchises and utilizing city streets. It is, therefore, the duty of both of these utilities to co-operate in order that the causes and extent of any danger from stray current can be more readily ascertained. Further, the satisfactory solution of the electrolysis problem is one which requires the co-operation of all the interests concerned. In the past the "red flag" has been waved too much, and some owners of underground property have made unreasonable demands. The result has been that the electric railway companies have hesitated to co-operate for fear that they would be asked to make excessive expenditures.

There is no real reason for this condition, as electrolysis presents engineering problems and can be handled by engineering methods in such a manner that hardship neither need be imposed nor should be imposed on anyone. There is no reason why the negative feeder system should not be laid out along the same engineering lines as the positive feeder system, and if the electric railway companies realized this and the owners of underground properties would co-operate in a practical way, we could obtain a satisfactory and practical solution of the whole problem. As an example he cited the fact that often the judicious installation of a few insulating joints in a pipe line would save a lot of money in railway track feeders and, of course, in such cases the joints should be installed. In view of all of these facts the formation of the joint committee constitutes a most important step toward securing the co-operation which is absolutely necessary to obtain adequate and permanent relief from electrolysis.

MR. TORCHIO MAKES PLEA FOR CONTINUED CO-OPERATION

In the opinion of Philip Torchio, chief electrical engineer New York Edison Company, a representative of the National Electric Light Association on the committee, the fact that the representatives of the several interests concerned have agreed upon it should commend the report to engineers generally. This fact indicates recognition of the principle that electrolysis mitigation is a problem for all concerned. While much has been done the greater difficulties of the work are in the future. To arrive at any conclusions as to what should be done in a particular case, it is necessary that the engineer and the executive shall have before them a complete analysis of the situation and of the relevant existing facts. The interests affected are of such great magnitude that no one would dare to theorize in the matter.

No decisive step can be taken toward complete agreement in all fundamental matters affecting electrolysis mitigation unless all parties have complete confidence that the facts are actually as they appear. They must be sure that the recommendations made will, if followed, be of actual benefit and that the remedies advised will not be too expensive to the railways. From the very magnitude of the work it cannot be accomplished quickly; it will require years. Furthermore, it will require the active financial support of every party involved in providing ways and means for collecting the necessary data. In giving this support they will require complete confidence in those who represent them in the committee. Their representatives must be men thoroughly capable of taking a broad view of the study and of its results.

If the pipe-owning utilities and the electric railways give in the future that degree of co-operation which they have shown in the preparation of the preliminary report, and which have been so essential up to this point, the successful completion of the remainder of the task is assured. In due time there is no doubt that the committee can accomplish work which will save money for all concerned, both in reducing actual losses and in eliminating causes of dispute.

There should be no great difficulty in connection with new construction in the future, but the principal difficulty will be in ameliorating conditions with existing structures. The work of the committee should eventually result in plans for reducing electrolytic corrosion to an economical minimum in ways which will be acceptable to the electric railways, and which will give a result satisfactory to the pipe-owning utilities.

Enemies of Publicity*

Politicians and Public Officers Deny to Corporations an Equal Right of Laying Their Case Before the Public

BY IVY L. LEE
New York, N. Y.

BUSINESS was once done in secret; now corporations are taking their cases to the people in the form of advertising. But this new activity is encountering strange obstacles. Politicians, who once urged publicity in business, now object that corporations are making their publicity effective.

The Bethlehem Steel Company recently advertised its position with reference to its bids for making United States naval shells. It makes no difference whether the case of the company was strong or weak. Any one is free, of course, to comment upon any company's position as he sees fit. But Secretary Daniels, in a public statement, seemed to take exception not only to the company's position itself, but to the fact, as he stated, that the company has "been filling the papers with advertisements," setting forth its position.

The fact was that the company had no thought of criticising Secretary Daniels. The company itself had been under criticism and had simply attempted in this straightforward manner to state its own position to the people. Long before this episode, in a widely published bulletin and advertisement dated April 13, 1916, the company had announced:

"We have allowed irresponsible assertions to be made for so long without denial that many people now believe them to be proven facts. We shall make the mistake of silence no longer. Henceforth we shall pursue a policy of publicity. Misinformation will not be permitted to go uncorrected. It is and has been the policy of our company to deal with the American government in the frankest and most liberal manner. We expect henceforth to place the details of all those relations before the American people."

If any corporation has a story to tell, ought it not to be commended for telling that story frankly and sincerely? Its story may not be convincing, and no one is compelled to agree with it. But is not the policy of at least being perfectly straightforward about a thing something of itself?

In the 5 per cent rate advance case of the railroads in 1913, an aggressive publicity campaign was carried on. The purpose was frankly stated to the Interstate

*Abstract of address before annual dinner of League of Advertising Women at Hotel Astor, New York, on March 20, 1917.

Commerce Commission before the campaign was undertaken. Every detail of the work was done in the light of day, and everybody knew what was going on. Senator La Follette, speaking in the Senate on May 12, 1914, criticised the fact that "*advertisements* have been run in several of the leading trade journals . . . in the interests of the railroads." Senator La Follette put into the *Congressional Record*, as what he called a "monument of shame," a complete file of the publicity material issued by the railroad in that case, together with the letters and petitions which resulted from the activity of the railroads. In that campaign the entire expenditure of the railroads for publicity amounted to about $12,000. Curiously enough, it cost the people of the United States just about $12,000 to print the material in the *Congressional Record*.

Senator Cummins also violently criticised the railroads for their campaign of publicity. Yet Senator Cummins recently conducted a very active campaign to defeat the reappointment of Mr. Daniels to the Interstate Commerce Commission. Senator Cummins was simply attempting in this way to bring the same kind of pressure —the pressure of public opinion—to bear upon the Interstate Commerce Commission which he had objected to the railroads bringing in their frank campaign of publicity.

People Are Ultimate Fountain of Power

The fact is that commissions, Congress, legislatures and courts are under the domination of the people. The ultimate fountain of power in a democracy is, and must be, the people. Corporations should take their case to the people. If their case is sound, the fact that it is presented to the people will secure its approval. If their case is weak, the active presentation of it will but give critics an opportunity thoroughly to bombard it. The people gain in either event. People who attempt to interfere with the progress of advertising in these borderlands of publicity are bound to encounter the same fate as those primeval men who sought to obstruct the progress of civilization in pioneer regions.

The greatest need of the moment is for the railroads, for example, to take their story directly to the people, over the heads of the commissions, legislatures and Congress. If rates are raised, the people must pay the bill, and they will want to know why. Who can determine the adequacy of service except the people themselves? The people are entitled to say what service they want; they are entitled to make it clear to commissions and to Congress that they are willing to pay the cost of providing the facilities which they must have.

Commissions should of course examine all the facts and see to it that everything is "on the level." But is the business discretion of a commission something sacred, embodying a wisdom transcending the wishes of an enlightened public opinion? The fact is that those commissions or the public officers which refuse to accord to the people the right to obtain what they unmistakably desire, are as certain to be overridden by the popular will as the darkness is driven away by dawn.

Nevertheless, railroads and many corporations are to-day reluctant to do that advertising which otherwise they might be inclined to do for fear that they will be criticised by commissions and public officers. They would be accused of trying to buy up the press. They would be accused by commissions of using money to "poison public opinion" which ought to be used in the improvement of service. Yet politicians and public officers, indeed, members of commissions themselves, consider that they have a right without limitation to spread their views before the public and to "sweeten" public opinion.

Newspapers, advertising men and all interested in the progress of democratic institutions—whose ultimate safety must depend upon a fully informed public opinion—should omit no opportunity to make it clear to public officers, commissions, even Congress, that the people want to know. It should, of course, be made equally clear that no one by aggressive publicity methods or by extensive advertising campaigns can expect to secure support for an unsound position. But it should be made so plain that no one can misunderstand that any interest—public or private—which earnestly, sincerely and candidly takes its case to the people shall have strong public support for that fact if for nothing else. In other words, every man is entitled to a full hearing, to his day in the court of public opinion.

COMMUNICATIONS

Safe Tonnage for Wheel Pressing

Wheeling Traction Company
Wheeling, W. Va., March 27, 1917.

To the Editors:

From personal observation of broken axles I am convinced that an excessive tonnage used in pressing on wheels is sure to be followed by disastrous results. In all cases of broken axles that have come under my observation the failure has occurred at the wheel seat or gear seat, due to a flaw which was the result of the stress at that point caused by the expansion and contraction of the axle.

Axles of 5-in. and 6-in. diameters are pressed on at tonnages ranging from 150 to 475, and often no means are provided to show what pressure is used. The railway companies should require the manufacturers to press on wheels at tonnages which do not exceed a safe value for the size of axle used, and if the wheels are assembled in the railway shops the wheel press should be equipped with a pressure gage. I have never known of an axle of 0.35 to 0.45 per cent carbon that broke when the tonnage at which the wheels were pressed on was specified.

Harry Branson,
Master Mechanic.

Proposed Conference of Publicity Men

Denver Tramway Company
Denver, Col., March 26, 1917.

To the Editors:

A short time ago I had a two-day visit from W. P. Strandborg of the Portland Railway, Light & Power Company, who gave me a wonderful lot of information about what his company was doing in the way of electric railway publicity. About two minutes after we had started talking I had a notebook out and was scratching down about half the things he said, and five minutes after I started to talk he had his notebook out and was jotting down things I said. What were we talking about? Street railway publicity work; nothing more nor less. I was bringing up problems in connection with my work, and he was telling me how he handled those things on his road. He was asking me how we did this and that in Denver and I was telling him, and the information we gave each other was so good and so usable and we got so much of it from each other that we needed notebooks.

I have before me as I write a typewritten summary of the valuable tips, ideas, methods and suggestions he gave me during that two-day convention of two electric railway publicity men, and it covers six sheets, single space. I have been using the information I learned

in those two days, and if I had to buy the information outright I'd pay $500 for it.

Some time later this idea occurred to me:

If a two-day "convention" between two publicity men was so valuable to me (and to the other fellow), what would be a four-day conference between all the electric railway publicity men in the country be worth to me as one of them? And what wouldn't it be worth to the other men? And then I thought of the annual conference of the Associated Advertising Clubs of the World at St. Louis during the first week in June and of how tremendously worth while it would be to all of us to sit in a sort of a "round table" of electric railway publicity men in an atmosphere of the big publicity men of the country. And by a round table I do not mean one of these affairs where everybody has a neat little paper to read on some abstract subject. I mean a gathering of men who will split up in twos and threes or quartets and open up wide and discuss their problems and the other fellow's way of doing things in a spontaneous, unreserved manner.

Acting upon this idea I mailed a feeler to a number of other electric railway publicity men and asked them to let me know how such a meeting appealed to them. Twenty of them in as many cities have replied and have promised to be at St. Louis for the proposed conference. This early indication of success of the plan has exceeded any of our hopes. Letters indorsing the whole scheme are coming in at the rate of two to three a day, in nearly every case accompanied by an agreement to attend. A meeting with the American Electric Railway Association at Atlantic City was contemplated, but that suggestion was discarded after discussion with electric railway officials who had attended these conventions. The reasons for this action are best set forth by the following extracts from a letter written by E. E. Soules, publicity manager of the Illinois Traction System:

> Your observation in regard to the American Electric Railway Association is, to my mind, exactly correct. I have been attending the conventions at Atlantic City for three or four years past and in fact have served time as chairman and member of the passenger traffic committee. I am not a traffic man, neither am I an operating man, and I have felt right along that I could be of a lot more good and could get a lot more out of these conventions if allowed to serve on a committee which had under discussion matters of real interest to the publicity man. Even if such a committee existed, which I have advocated for some time, I realize that it would be a matter of a formal presentation of papers and reports on subjects recommended by the executive committee, and we would go away from the convention with very few practical thoughts. And this is not decrying the good or advisability of co-operating with the American Electric Railway Association. The very nature of the street railway business makes that convention about 90 per cent technical.
>
> "With the Associated Advertising Clubs of the World, however, it is different. I have been identified with the work of this organization to some extent also. I was the first president of the Peoria Club, and I believe that the organization is good and alive. Your idea of a round-table gathering is just right. I believe that the utility-publicity man can get a lot of good out of such a meeting. St. Louis is centrally located and easy of access to the majority of fellow publicity men. We can get back in a corner and have a real old-fashioned talk fest that will do us all a lot of good, and, at best, cannot do any harm."

Undoubtedly this is correct. Such a conference as proposed at the Associated Ad Club's gathering would enable us to get a new grip on the public's viewpoint and feeling. The rule in Denver is that the publicity man must be the voice of the public and must never lose the spirit of sympathy with the public's contrariness. In other words—the publicity man ought to keep away from the technique of electric railways.

The electric railway publicity men of the country have never gotten together in such a session, if I am correctly informed. We trust this meeting will be a great success. J. C. DAVIDSON, Publicity Manager.

Setting Trolley Poles with a Rake

SAULT STE. MARIE BRIDGE COMPANY

SAULT STE. MARIE, MICH., March 15, 1917.

To the Editors:

The publication of a letter from C. R. Harte, commenting upon my ELECTRIC RAILWAY JOURNAL article on the desirability of setting poles vertically, leads me to make some further remarks along the same line.

It seems to me that Mr. Harte and many other engineers are prejudiced in this matter, due to the fact that on their roads there are many miles of pole line set with the rake to which I object. As far as the preferences of municipal authorities are concerned, it is my conclusion based on observation that such authorities are far more likely to allow vertical than raked poles to remain on business or residence streets.

Mr. Harte refers to Hogarth's line of beauty as expressed by triangle or arch, but it must be remembered that unless these are plumb they lose their beauty.

J. G. KOPPEL, Electrical Engineer.

Electric Engines Cause Less Delay

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY

BUTTE, MONT., March 29, 1917.

To the Editors:

In the abstract of my paper before the New York Railroad Club, published in your issue of March 24, you make me say in one place that "electric engine failures have caused more delay than steam engine failures." This is an error as the facts are entirely the opposite. Please arrange to publish a correction at an early date. R. BEEUWKES, Electrical Engineer.

[Note.—We are glad to print this correction of our abstract of Mr. Beeuwkes' paper.—EDS.]

AMERICAN ASSOCIATION NEWS

Sub-Committee on Engineering Manual

A meeting of the sub-committee on revision of the Engineering Manual, a part of the committee on equipment of the Engineering Association, met in New York on March 27. Those in attendance were E. W. Holst, chairman, Boston; R. H. Dalgleish, Washington; H. A. Johnson, Chicago; Daniel Durie, Connellsville; W. S. Adams, Philadelphia, and A. L. Broomall, Pittsburgh. The members went over the parts of the Engineering Manual, particularly those on "recommended practice" which seemed to be obsolete or otherwise could be omitted and decided that these parts should be brought up to date and offered to the electric railway press. This plan will reduce the size of the Manual and make it more usable.

Duties and Troubles of the Purchasing Agent

John Fleming, purchasing agent Capital Traction Company, was the principal speaker at the meeting of company section No. 8 held on March 8. Mr. Fleming gave an interesting account of the duties and troubles of a purchasing agent and outlined the system in use by the Capital Traction Company in the purchasing and handling of material and supplies.

President Morrill presided at the meeting, which was attended by sixty-three members and guests. A program of musical numbers, consisting of vocal solos and orchestral selections, furnished entertainment for the section, and at the conclusion of the meeting a buffet luncheon was served.

Practical and Economical Solutions of Problems in

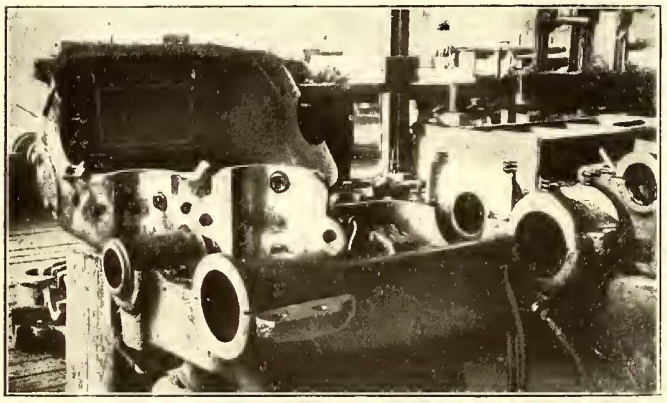
EQUIPMENT AND ITS MAINTENANCE

Every live shop, track, line and power plant man is doing something that others would like to know about. Such men have a splendid opportunity to assist the industry by notifying the editors of this paper of new things that have been done. Information may be sent in the form of rough notes or short articles, and special rates will be paid for all accepted material.

Automatic Adjustment to Take Up Wear on Old-Type Armature Bearings Proves Successful

BY G. J. SMITH
Superintendent of Rolling Stock and Shops
Kansas City (Mo.) Railways

In the Electric Railway Journal for Aug. 26, 1916, page 369, was published a method of eliminating the lubrication difficulties resulting from loose armature bearings in the GE-57 and GE-67 type motors as developed by the Kansas City Railways Company. At the time data for this article were secured, there was no definite information available as to just what was to be gained by this improvement. Such information is now available, however, and it shows such a marked saving as the result of the general use of this device on our cars, that



ARMATURE AND AXLE-BEARING CAPS EQUIPPED WITH SPRINGS TO TAKE UP BEARING WEAR

we feel justified in calling attention to the scheme a second time, and in presenting the actual experience.

We have in service 488 GE-57, form H, two-turn motors and 746 GE-67, form A, three-turn motors. The bearings in these are held in position with a cap in which there is a ⅝-in. dowel pin. This dowel pin in time becomes worn on account of the movement of the bearing, and allows the lubrication slot in the bearing to get out of alignment with the slot in the oil or grease box, and thereby permits the oil to pass on outside of the bearing instead of onto the shaft, with resulting lubrication troubles.

Many methods have been resorted to in the past to overcome this result of bearing wear. One method was the insertion of an additional dowel pin, and another, the use of a key or feather in place of the dowel pin. Still another method was to rebore the motor frame with a consequent change of standards in bearing diameters. This latter process, of course, was elaborate and costly, making necessary the use of a large horizontal boring mill. All three methods were more or less temporary in character, since they overcame the trouble for the time being but gave no permanent relief. The method to which we finally resorted and which was described in detail in this earlier issue of the Journal, was the insertion of short coil springs in the armature and axle caps, which would bear against the bronze bearings. Considerable difficulty was encountered in securing the proper spring, but after this was overcome the results in the first few motors in which the experiment was installed were so gratifying that it was decided to equip all motors of these types with the device. By the end of 1916, approximately 90 per cent of the GE-57 and GE-67 motors on our property had been equipped. The following table shows the decreasing number of armature and axle bearings installed during 1915 and 1916, and also the number of armature coils used during the same period, the latter being included for the purpose of showing the reduction in the number of armatures wound and attributed to the better lubrication secured, which prevented hot bearings and armature damage from contact with the pole shoe.

	1915	1916	Reduction
Bronze armature bearings (pairs)	956	392	564
Bronze axle bearings (pairs)	2,056	981	1,075
Armature coils used	27,666	23,965	3,701

The reduction in the number of bearings used is attributable entirely to the use of this spring device for taking up the wear in bearing and dowel pin. As a comparison, our armature failures on motors of a later type which were originally designed for oil lubrication, increased in 1916 over 1915 in approximately the same ratio as the increased mileage made by the motors, while the reductions in the bearings used on the GE-57 and the GE-67 motors was made against an increase in the mileage of the cars equipped with these motors, over the former year.

Heat Box for Calibration of Car Thermostats

Simple Method of Checking the Performance of Thermostats Without Heating Up the Cars

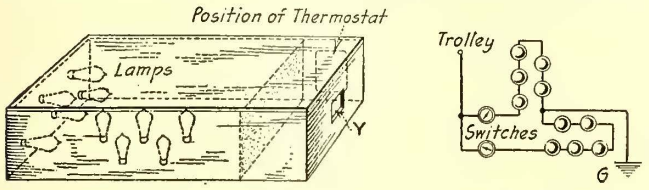
BY E. D. RANSOM, B.E.

It requires a long time to determine the temperature at which a car thermostat will operate if the whole car has to be heated for this purpose, since it takes about three hours to raise the car temperature to 60 deg. Fahr. when the outside temperature is 10 deg. It is unsatisfactory to apply heat directly to the thermostat if by doing so the rise in temperature is too sudden to permit accurate thermometer readings being taken.

To obviate these difficulties a heating box has been developed which is a great time-saver and gives accurate results. It consists of a wooden box, open at one end and heated by electric lamps which are connected in two circuits, each controlled by a separate switch as

shown in the diagram. The box is divided into two compartments, the larger section contains the lamps, and the smaller is placed over the thermostat by fastening the box to the side of the car. The two sections are separated by a strip of thin black cloth which shields the thermostat from the glare of the lamps and at the same time permits radiation of heat.

In testing a thermostat the box is fastened in place and a thermometer is inserted through a small hole in the end of the smaller section of the box. The bulb



BOX HEATED BY ELECTRIC LAMPS AND USED FOR THE CALIBRATION OF CAR THERMOSTATS

of the thermometer should touch the mercury column of the thermostat. The lamps in both circuits are then turned on, and the box is heated until nearly the required temperature is reached. The lamps are then turned off and the temperature in the box is allowed to become constant. The set of lamps in the end of the box is then used to raise the temperature slowly to the point at which the thermostat operates. The lamps at the end of the box are used for this purpose since they are more remote from the thermostat and will, therefore, raise the temperature more slowly. Results obtained by this method have checked within ½ deg. of the readings taken during normal heating of the car.

Creosoted Timber vs. Concrete Bridges and Trestles

A.R.E.A. Discussion at Chicago Brings Out Points Favoring the Cheaper Construction

At the recent meeting of the American Railway Engineering Association the discussion on the report of the committee on wooden bridges and trestles emphasized some of the economic features of the use of creosoted bridge timbers and trestles as compared with concrete structures. An abstract of the committee's report was printed in the issue of the ELECTRIC RAILWAY JOURNAL for March 24, page 549. The committee favored the former except when the cost of the concrete structure is less than one and one-half times that of a creosoted wood structure for the same location. One of the hazards of the timber structure which the committee pointed out was the danger from fire, and several men told of their experiences in this connection. None had had any trouble from fire caused from dropping coals and cinders. One railway man said he had more than 300,000 lineal feet of ballast-deck creosoted-timber structures on his line and had never in the history of the road had more than five burn out. Nevertheless this hazard was a possibility which the committee weighed heavily against the wood structure.

A consideration which was of importance to Southern railroads was the fact that the large amount of drainage work being done through the South was lowering the drainage level and making it possible partly to fill in a number of trestles which it had been previously necessary to keep entirely open. Thus it seemed not wholly advisable to spend $33 a foot for concrete or permanent trestle over drainage ways which might in the course of five or six years be safely filled in at least in part. With the temporary wood structure it was more likely that the creosoted stringers could be recovered than could the concrete slab of a permanent structure, and the loss would thereby be much less.

Another item in favor of the temporary structure in this district was the fact that many of the valleys are filling in with sand so that about every ten years it becomes necessary to lift the entire roadbed in order to keep it above the water level. The railway man citing this experience said that it would be distinctly a mistake to build permanent structures where conditions were changing in this manner, for with the concrete structure which could not be raised with the change in water level there would naturally be a greater risk of loss. Some of these sand fills, he said, appear very suddenly at times.

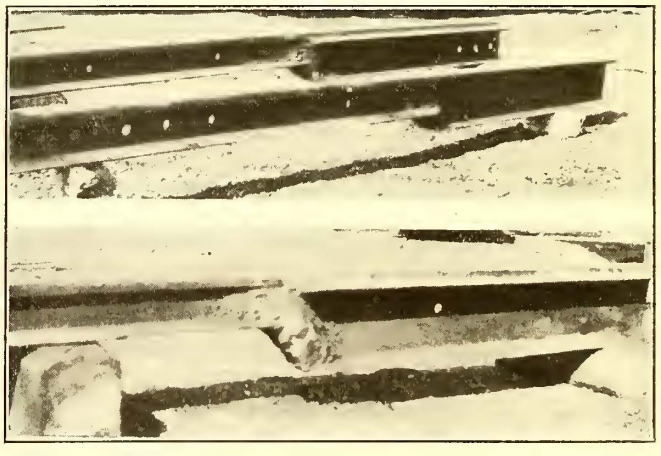
As against the wooden structure and favoring the permanent concrete structure, it was brought out that many things develop in connection with the creosoted timber which introduced a cost in taking care of it, such as cleaning out the vegetable growth beneath the structure, more frequent inspection, etc. These items the committee had apparently not included in their conclusions.

Inasmuch as the committee, in arriving at a definite ratio of economic advantage in the one type of construction over another, had assumed certain figures in the relative life of the two kinds of construction and had made other necessary assumptions which were not brought out in great detail in the report, the association voted to refer this recommendation back to the committee for further consideration.

Compromise Joints Improved by Arc Welding

BY JOSEPH McPHEE
Roadmaster Richmond Light & Railroad Company, New Brighton, N. Y.

There are a number of locations on our system where sections of T-rail join sections of girder rail. The occurrence of bad and broken joints at these places have been eliminated by making arc-welded compromise joints such as shown in the accompanying illustration. An Indianapolis welder is used, and care is taken to get a good body of welding steel where the rail ends



COMPROMISE TRACK JOINTS MADE BY ARC WELDING

are joined together. After the welding is completed the heads of the rails are ground to a smooth surface.

The cost of making a welded compromise joint between a Lorain T-rail section No. 47 and a Lorain girder rail section No. 84 is approximately $8, which includes the cost of the welding steel. Several of these joints have been in service for more than two years and are still satisfactory in every respect.

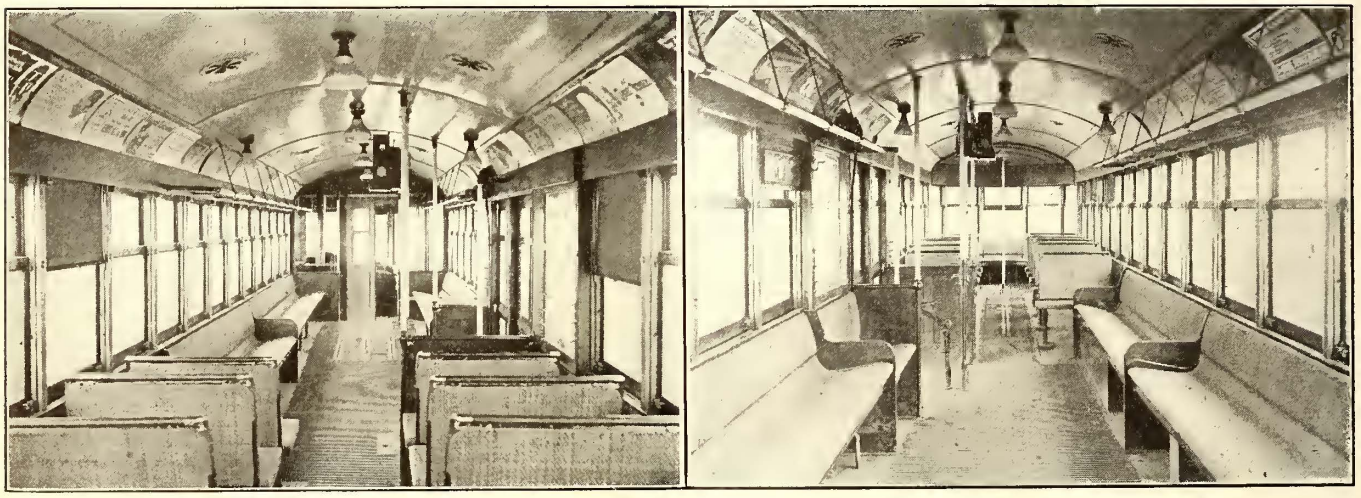
New Interior Views of Toledo Center-Exit Cars

The accompanying views of the interior of one of the sixty front-entrance, center-exit cars, which are giving excellent service in Toledo were recently taken for the ELECTRIC RAILWAY JOURNAL through the courtesy of H. H. Ross, chief engineer. As was explained in articles which appeared in the issue of this paper for Oct. 7, 1916, pages 723 and 738, the interesting feature of these cars is the provision for train control, this being the first attempt at multiple-unit operation with cars of the type designated by the inventor, Peter Witt, as the "Car Rider's Car."

The decision to operate these units was arrived at after experiments had been made with trains in handling crowds from the factories and from the downtown districts of the city during rush hours. Multiple-unit operation, however, was preferred to trailer operation because it was estimated, after studying the traffic, that out of a working day of sixteen hours there would be only about six hours during which two-car trains could be advantageously operated. With motor cars and trailers, therefore, half of the new cars would be idle for ten hours out of the sixteen. Also during this time the remaining new cars would be handicapped in weight and power consumption by the extra capacity of the motors required to haul trailers during the rush hour. With two-motor multiple-unit cars, however, all of the new cars could be kept in service during the entire day, working part of the time as two- or three-car trains and the remainder as single-motor cars. This arrangement, it is expected, will release from service during the non-rush hours a corresponding number of older and heavier cars which are more expensive to operate than the new ones and will thus effect material economies.

The new cars are designed for single-end operation and they are equipped with two Westinghouse 40-hp. field-control motors and light-weight HL control. Bus-line receptacles are employed and a train of two or three cars can thus be operated from a single trolley. The principal dimensions of the car provide for a 50-ft. over-all length, a width over side plates of 8 ft. 2 in. and a weight complete of 35,000 lb. The diameter of wheels is 26 in. The seating capacity is fifty-six.

The use of an indirect type of control was adopted not only because of the opportunity that it gave for multiple-unit operation, but also because it enabled all of the main circuits and circuit breaking devices to be located beneath the floor. In this particular instance the control has been supplemented by interlocking the control circuit through contact from the doors so that a car or a train cannot be started until all of the doors in the train are closed. The same arrangement is utilized also to operate a motorman's signal light which is used in place of the customary bell signal.



INTERIOR VIEWS OF THE FRONT-ENTRANCE, CENTER-EXIT CAR NOW IN USE IN TRAIN OPERATION IN TOLEDO, OHIO

Car Curtains Renovated and Dyed to Restore Appearance

Method Described and Chemical Formula Given Whereby Curtains May Be Cleaned for About Eighteen Cents

BY WILLIAM A. COLBURN
Master Painter, Auburn & Syracuse Electric Railroad, Auburn, N. Y.

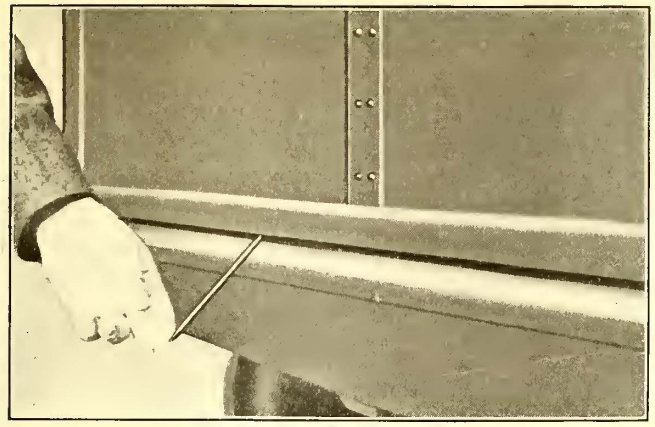
Very frequently car curtains, after being in use for some time, become soiled and faded, and often stained from water. The writer has successfully used a method of renovating curtains composed of fabric with leather ends.

The curtains are first removed and thoroughly whipped, after which they receive a gasoline bath. All water stains are then washed out with soap and water and the curtains are drawn through a vat containing the following mixture, sufficient for the curtains of one ordinary interurban car: 12½ lb. deep chrome green, or any other color desired, in oil; ¾ gal. turpentine; 1 pt. Japan dryer; 1 lb. drop black, in oil; and ¾ gal. raw linseed oil.

The vat is made of sheet iron, with a length 4 in. greater than the width of the curtain, a width of about 10 in., and a depth of about 4 in. The curtain is held by the two ends and the middle is drawn backward and forward through the solution.

After the curtain is thoroughly saturated it is held up edgeways for about two minutes to drain. It is then laid over a bench and brushed thoroughly while the fabric is still wet. This operation raises the nap of the cloth, as well as kills the effects of the linseed oil which would otherwise leave the cloth stiff. The curtain is then hung up with the roller end down for stretching and is allowed to dry for twenty-four hours to avoid the danger of spontaneous combustion. The cost of this process is about 18 cents per curtain.

Curtains made up of leather on one side and fabric on the other are not dipped, the paint being brushed into the fabric while it is laid flat on a bench. The cost of this process is about 13 cents per curtain.



SLOT FOR DRAINING SASH POCKETS

Drainage of Sash Pockets by Slot Above Side Sills

The Memphis (Tenn.) Street Railway has among its older types of cars fifteen of the straight side construction type with sash pockets that formerly had no bottom outlet.

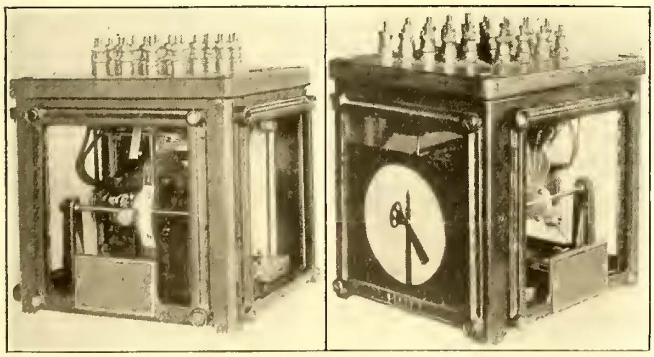
The accompanying illustration shows how drainage and ventilation have been provided at the bottom of the sides of this car by means of a special construction designed under the guidance of A. D. McWhorter, superintendent of equipment and overhead lines. A slot was first cut the full length the side of the car. The outside top corner of the sill was then chamfered off between the posts. After the wood had been thoroughly white-leaded it was shielded with sheet iron lapped over the outside of the sill and laid against the interior lining of the car. In this way this open slot leads directly to the window pockets, and any dirt or water immediately passes out of the slot.

This method of providing drainage and ventilation was installed only after the more simple method of boring holes had been found ineffective due to the stoppage of the holes with refuse.

New Types of Railway Signal Apparatus

The Union Switch & Signal Company, Swissvale, Pa., has developed several new types of relays which make use of their standard Model 15 vane construction.

One of these is the switch point indicating relay shown on the left side in the accompanying illustrations. In this instrument a pointer mounted on the shaft moves over a white enameled scale which is marked to designate the normal, reverse and de-energized positions of the relay. These positions correspond to the normal, reverse and intermediate positions of the switch points.



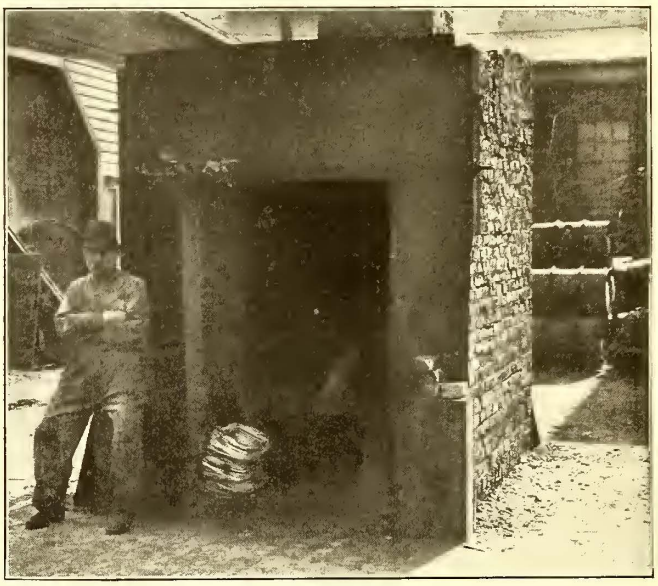
SWITCH POINT INDICATING RELAY AND TOWER-INDICATOR RELAY OF SEMAPHORE TYPE

Another type of the two-position Model 15 relay incorporates a tower-indicator attachment, thus providing a tower indicator with the functions and refinements of a standard relay. It can be furnished as a single or double element, line or track relay. The indicator can be of either the semaphore type which is shown on the right side of the illustrations or the disk type.

The same company has also developed an alternating current crossing warning bell of the electromagnet type. In size and general features it is identical with their direct current crossing bell, the operating mechanisms of the two being interchangeable. An adjustment is provided by which the frequency and the intensity of the strokes can be varied through a wide range.

Furnace for Burning Insulation from Copper Wire

The brick furnace shown in the accompanying illustration is used by the International Railway, Buffalo, N. Y., for burning the insulation from old wire. It consists of a brick chamber, lined with fire brick, about 4½ ft. deep x 5 ft. wide x 7 ft. high, inside dimensions. A brick chimney on the rear projecting about 8 ft. above the roof furnishes the necessary draft.



FURNACE FOR BURNING INSULATION FROM OLD WIRE

A grate is located about 18 in. above the floor, made up of sections of ordinary boiler grate resting upon iron bars attached to the side walls. A sheet-iron door is provided to cover the front opening from the top down to the grate level.

The furnace is charged with field coils, armature coils, line wire, etc., by inserting the grate in sections as required. This method of charging permits the wire to be handled readily. When the furnace is fully charged, its contents are covered with kerosene, the sheet-iron door is put into place and the charge is ignited. The copper is removed perfectly clean, almost as if dipped in an acid bath.

A furnace of this kind provides a convenient place for storing scrap copper wire while a charge is accumulating. It can be built in an out-of-the-way corner of any shop grounds at a very moderate cost.

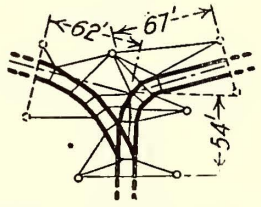
Cost of Erecting Overhead Work—VI

(From the records of a large Eastern company)

The following is the sixth group of a series of diagrams with figures to show the actual costs of erecting the various types of overhead construction described under conditions of light, ordinary and congested traffic. The preceding groups of this series were published in the issues for Jan. 20, page 127; Jan. 27, page 173; Feb. 10, page 260; Feb. 24, page 355; and March 10, page 447.

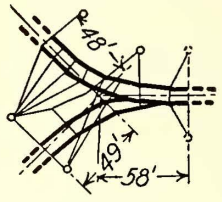
LABOR REQUIRED FOR CONSTRUCTING VARIOUS TYPES OF OVERHEAD TROLLEY SPECIAL WORK UNDER VARIOUS TRAFFIC CONDITIONS

Double track "Y" branch-off, angle 150 deg.



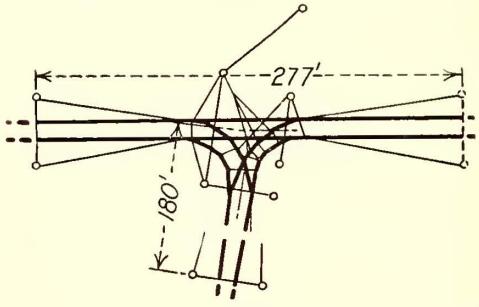
	Light		Ordinary		Congested	
No.	Labor	Trucking	Labor	Trucking	Labor	Trucking
40*	$45.38	$33.00	$54.45	$39.60	$63.53	$46.20

Double track "Y" branch-off, angle 90 deg.



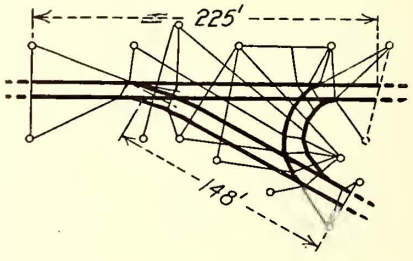
	Light		Ordinary		Congested	
No.	Labor	Trucking	Labor	Trucking	Labor	Trucking
41	$35.09	$14.52	$41.47	$17.16	$47.85	$19.80

Double track three-part "Y", angle 180 deg.



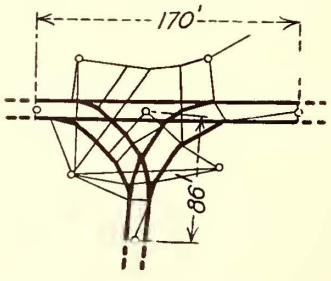
	Light		Ordinary		Congested	
No.	Labor	Trucking	Labor	Trucking	Labor	Trucking
42*	$54.45	$39.60	$63.53	$46.20	$72.60	$52.80

Double track right hand branch-off with double track connecting loop angle 30 deg.



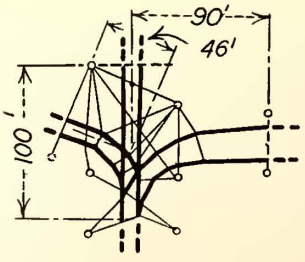
	Light		Ordinary		Congested	
No.	Labor	Trucking	Labor	Trucking	Labor	Trucking
43*	$54.45	$39.60	$63.53	$46.20	$72.60	$52.80

Double track three-part "Y"



	Light		Ordinary		Congested	
No.	Labor	Trucking	Labor	Trucking	Labor	Trucking
44*	$54.45	$39.60	$63.53	$46.20	$72.60	$52.80

Double track through "Y", angle 180 deg.

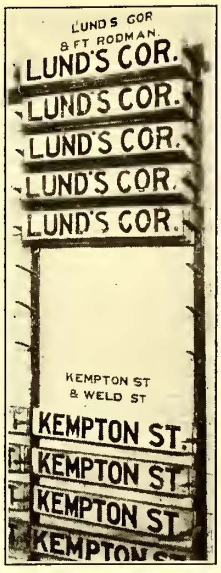


	Light		Ordinary		Congested	
No.	Labor	Trucking	Labor	Trucking	Labor	Trucking
45*	$54.45	$39.60	$63.53	$46.20	$72.60	$52.80

*Trucking includes cost of extra reel truck. None of the figures on this page includes cost of superintendence and engineering.

Compact Sign Rack at New Bedford

A simple but very compact sign rack is in use at the Weld Street carhouse of the Union Street Railway, New Bedford, Mass. As shown in the illustration, it consists of sections of strap iron and angles bolted to the carhouse wall, each pair of angles forming a skeleton shelf holding a half dozen signs. In a wall space of about 12 ft. x 7 ft. approximately 300 signs can be stored for immediate withdrawal for service. The uprights are of 1½-in. x ½-in. iron with sign supports 5 in. long, 1 in. wide and ¼ in. thick, spaced 6 in. apart. The brackets are slightly inclined from the horizontal, thereby holding the signs in place by gravity. Labels painted on the wall denote the different sections and also aid in the rapid selection of a sign.



INCLINED BRACKETS HOLD SIGNS BY GRAVITY

Reduction of Clinker Trouble

Selection of Suitable Furnace Lining, Good Quality of Coal and Proper Handling of Fire Are Essential

In a discussion on the causes and remedies of clinker trouble in boiler furnaces Albert A. Cary, consulting engineer, New York City, called attention to many interesting facts of which the following is an abstract. Clinkers are formed by the fusion of the ash and refuse which remains after the combustion of the coal in the furnace. Where shaking bars are used it is quite essential that the thickness of the ash bed should always be reduced before any attempt is made to break up the fire bed above, otherwise the ash will be thrown up into the bed of fuel and fused into clinker. Too thin fires, carried on the grates, should be avoided, especially with shaking grates, as every fire bed should be of sufficient thickness to allow a proper depth of ash to be carried on the bars to protect them from the intense heat of the burning fuel above them. Excepting these very thin fire beds, it may be said that the intensity of draft required to operate a furnace is, generally speaking, a measure of its clinker-making properties, which is another way of saying that the intensity of the draft required is a measure of the density of the fire bed.

The underfeed type of stoker, in its method of working, simply defies all theories for the reduction of clinker troubles. Very few grades of coal produce ash which will not become fused into more or less of a clinker under the conditions of treatment found in the underfeed stoker. It therefore becomes necessary, where this type of stoker is used, to select a coal which does not run too high in its percentage of ash, and the ash must have the highest fusing temperature possible. By the method of feeding used in this type of stoker, the coal is compactly forced into a more or less condensed mass of burning fuel, which demands the use of heavy forced blast fans, and in order to reduce the amount of clinkering which occurs the operator must use every possible means to keep his fuel bed open and porous. Otherwise the air for combustion will seek every easy passage for escape, and work its way through cracks and holes in the fuel bed, instead of being more uniformly distributed throughout the mass of hot fuel.

This form of stoker has permitted the feeding of more coal per unit of grate area than its predecessors, and this valuable feature largely offsets its clinkering troubles, as the demand of to-day is for a stoker that will burn coal, and lots of it when required, to carry the plant over its troublesome peak loads.

Side walls with this type of stoker should be kept free from accumulations of ash or clinker at very frequent intervals and before the clinker is allowed to cool and harden. By a careful selection of the coal and refractory lining for the furnace the worst effects of clinker trouble can be considerably reduced.

The selection of refractory material for lining furnaces is a matter which has received altogether too little attention by power-plant owners. The common practice of using the same quality of fire-brick for all parts of the furnace is certainly a mistake. The sidewall lining of a furnace should be selected with the use to which it is subjected kept in mind. It is true that these side walls are subjected to the effect of high temperatures, but if the most refractory bricks that can be bought are used for this position, it will be found that they will not stand the severe abrasion to which they are subjected, such as result from the use of the poker, the clinker bar, etc., to free them from the adhering clinker. It is most important to consider the fluxing effect on these bricks from the ash produced from the particular kind of coal used.

The fire-clay brick is now used in nearly all boiler settings, and it is probably the best brick adapted to sudden changes of temperatures, due to its more or less porous structure. The fine-ground, hard-burned brick usually gives the best linings for side walls, while the coarser and more open or porous bricks are better adapted for fire arches. Accumulation of ash or any incipient formation of clinkers on the side walls or bridge walls of the furnace must be promptly removed if destruction of the walls is to be avoided.

The other class of inclined grate stokers have their fuel fed from coal magazines placed in each side wall. At the bottom of the V, formed where the two sets of inclined grates from each side wall come together, there is provided a set of clinker bars which are supposed to remove the ash and clinker automatically as soon as they reach this position, but there is always an accumulation of incandescent ash, clinker and some small amount of fuel at the bottom of this trough. This builds up especially in the presence of large clinkers formed in the fire bed, and where this lower part of the fuel bed comes in contact with the end walls there is a tendency to build up clinker or erode.

In the chain-grate type of stokers with a very slow motion of the burning fuel on the grates, there is a tendency, with certain coals, for fusion of the ash to take place, and when this comes in contact with the side walls, due to the slow rate of travel, clinkering often occurs there. Such trouble is increased when the movement of the grate is stopped for considerable periods of time. Efforts have been made to reduce the destructive action to side walls in furnaces, where this type of stoker was used, by substituting metal faces in the furnace walls to replace the fire-brick lining, back of which faces a water circulation was maintained. Besides the clinker or erosive troubles in stokers of this type, there is added the abrasion caused by the constant rubbing of the fuel bed against the side walls. Notwithstanding the occurrence of such troubles in certain plants using this type of stoker, there are many hundreds in use where fire-brick linings are used in their furnaces, and it is claimed that the cost of repairs for these linings is not excessive, and that it is no higher than in other stokers doing similar service.

News of Electric Railways

Traffic and Transportation

Financial and Corporate | Personal Mention | Construction News

New Albany Storm Damage

Damage to Railway Lines Very Slight—Service Rendered Quickly by Them to the General Public

Comparatively little damage was suffered by the street railway system, in New Albany, Ind., by the tornado which skirted the northern and western extremities of the city on the afternoon of March 23. Altogether, according to W. L. Foreman, trainmaster of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, about 2 miles of overhead construction was destroyed. It chanced that this fell on two ends of the State and Vincennes Street line, which terminates at each end in the storm devastated area. A portion of the Vincennes Street carhouse was unroofed and a corner of the wall blown down. Between New Albany and Jeffersonville, the interurban line of the Louisville & Northern Railway & Lighting Company was put out of commission for a time by wire trouble, but this damage was speedily repaired and service continued. There was no interruption on the direct Louisville & Northern line to Louisville via the Kentucky & Indiana Bridge. No cars were damaged.

All Power Shut Off

Power was shut off from all lines immediately after the storm broke, so as to eliminate danger of damage from live wires. All wire systems in the storm area were twisted into tangled masses. Mr. Foreman immediately sent crews out to patrol the lines not seriously affected and to cut the wires on the line affected at Cherry Street on one end and Charter Street at the other. On the following morning full service was resumed, except over the 2 miles of line in the devastated area.

After ascertaining that there was no chance of further direct damage by the storm, the United Gas & Electric Company and the two companies mentioned previously gave their attention to the needs of their own employees and their families. Fourteen of the railway men had homes in the area affected. Some of them lost relatives in the total of thirty-seven deaths.

The repair forces of the companies served to take care of immediate requirements to the system. Some trolley wire was obtained from the Louisville Railway, but outside of that no aid was needed. Salvage of the wire system material will be slight. Permanent repairs will be made as soon as the members of the National Guard, who were rushed to service in the emergency, are removed and the storm district opened again.

The force of the storm was spent 1 mile from the river front where the principal improvements of the steam railroads are concentrated. The total property damage is estimated up to $1,500,000.

Across the river, service was interrupted on the Prospect line of the Louisville & Interurban line railway, but the damage to that property was slight.

Traffic Demand Great

An interesting feature for several days following the storm was the heavy demand on the Louisville & Northern and the Louisville & Southern Interurban lines, reaching from New Albany to Louisville. Sightseers and relief workers taxed the capacity of the company's lines from the outset and on the half holiday on Saturday, March 24, and on the Sunday following, people stormed the cars for accommodations. Every piece of rolling stock that the electric railways had available was pressed into service. Free carriage was provided for relief supplies from Louisville.

New Force in Washington

Company Rebuilding Its Car Personnel—Violence by Strike Sympathizers—Terms of Individual Contract

The drive being made by the Washington Railway & Electric Company, Washington, D. C., against its former employees and members of the Amalgamated Association now on strike is having a telling effect. An entirely new force carefully selected with a view to permanent employment by the company has been engaged and is fast becoming acquainted with the requirements of service in Washington.

The strikers and other sympathizers, realizing that the strike is lost, are resorting to desperate tactics, which indicate the collapse of whatever defense they may have had. Among the first of the threatened acts of reprisal on the company was the talk of boycott mentioned in the Electric Railway Journal for March 24. The company met this issue squarely by announcing that it proposed to appeal to the courts for protection of its rights.

In the last few days threats made previously of damage to the company's property were actually carried out. On March 27, after overpowering the crew of a car, the perpetrators of disorder turned on the current and the car ran wild on the public streets until derailed. This act was the logical sequence of inflammatory talk and speeches. It had the effect, however, of strengthening the determination of the company to have nothing to do with the Amalgamated Association. In fact, the company promptly offered a reward of $1,000 for information which would result in the arrest and conviction of the person or persons responsible for the attack on the crew and the destruction of the car.

The company is resting its case with the public on the basis of service offered, and within the last few days has gone directly to the public with announcements only in the matter of the reward offered for the apprehension of the perpetrators of the wreck previously mentioned, and where statements emanating from union headquarters have so grossly misrepresented the facts or the company's position that it felt the statements should not be allowed to go uncontradicted.

Contents of Individual Contracts

The individual agreement made between the company and each of its men contains eight clauses. The first specifies the rates of pay and provides that in addition all car service men shall be entitled to their share of any bonus or profit-sharing plan which the company may adopt. In the second the man agrees to abide by the rules of the company as they are now or may from time to time be established, that the business of the company shall be conducted on the open-shop principle, that the present practice in assigning runs will be continued and that the hours shall be as specified.

The third clause provides that any grievances will be taken up with the management on the second or fourth Tuesday of each month at the office of the superintendent, that a man may appeal from the decision of the superintendent to the president and that the Public Utilities Commission of the District shall be the final arbitrator. The fourth provision is to the effect that the commission may decide the conditions under which its decisions shall take effect and to whom they shall apply, that either party may apply for a modification or review of such decision and that the decision of the commission shall be in harmony with the express terms and provisions of the contract. Clause 5 provides for hearings in the same way for any man discharged, with final appeal to the Public Utilities Commission.

Under the sixth clause the men agree not to strike or to hamper or obstruct the company in the discharge of its duties as a common carrier, and if they wish to leave the service of the company they will do so peaceably, singly and without confederation, and the company agrees on its part that it will not declare a lockout or cease operation or to refuse to employ and keep in its employ a force of suitable and competent men who are willing to abide by the terms of the agreement and that it will not discharge men without cause.

The seventh clause provides that any presentation of agreements or arbitration under contracts shall proceed only in the name of and under the direct charge of the complaining employee or employees or committee thereof. Clause 8 provides that the contract shall be for three years.

The contract is about 1500 words in length, and space is provided in it for the signature of the trainman and for the signature of the president of the company.

Toledo Negotiations Resumed

Negotiations between the Street Railway Commission of Toledo, Ohio, and Henry L. Doherty of the Toledo Railways & Light Company, over the franchise, were resumed during the week ended March 24. Forfeiture clauses in the proposed community plan were first discussed in detail. Mr. Doherty declared two of them so drastic that he could under no circumstances accept them.

A number of details were agreed upon. The rate of cash fare was also discussed. Mr. Doherty holds that this should be 5 cents, since it is paid almost entirely by transients. He also objected to firemen and policemen riding free. It was finally agreed to leave this matter in the hands of the city.

On March 21 considerable time was spent in discussion of the proper manner of arriving at the value of the plant when the city is prepared to purchase the property. Commissioner Johnson Thurston insisted that it should be valued on the basis of actual cost, plus the cost of repairs and minus depreciation. Mr. Doherty, however, argued that the market value at the time should govern the price paid. He suggested that the other commissioners, who were absent, consider this point before further discussion of it.

On March 22 Mr. Doherty suggested that the people would be more willing to agree to a fair settlement if the fare was advanced now. He also expressed doubt as to the wisdom of the course that has been taken in endeavoring to compromise the franchise matter.

At a meeting with Councilmen and other city officials in Mayor Milroy's office on March 22, Mr. Doherty refused to bind the company to pave between its tracks on an unlimited number of streets, where the city wishes to make improvements, subject to the discretion of Council. He did, however, propose to pave this space on a list of streets submitted by Service Director Goodwillie, on a five-year basis, provided Council would agree not to order the removal of the company's tracks from Huron and other streets.

Agreement on Franchise

An agreement was reached on March 22 between Mayor Minshall of East Cleveland, Ohio, and the Cleveland Railway on the terms of a new franchise which will go into effect on the approval of the East Cleveland Council, unless a referendum vote is demanded. It is to cover a period of twenty-five years, and provides for a cash fare of 5 cents, with free transfers to any part of the city of Cleveland, and six tickets for 25 cents, with free transfers on crosstown lines in the suburb, and a cent charge for transfers on Cleveland crosstown lines. The company agrees to extend the Superior Avenue line from 123d Street to Euclid Avenue, and build a crosstown line in the suburb between Euclid Avenue and St. Clair Avenue, the route to be selected later. The agreement also provides for the kind of service which is to be furnished for East Cleveland patrons. Mayor Minshall insisted for some time upon a straight 3-cent fare for rides within the city of East Cleveland. Fielder Sanders, street railway commissioner of Cleveland, asserts that the company has been losing $250 or more a day on the East Cleveland business. Mr. Sanders will prepare a draft of the proposed franchise.

Dishonest Conductors Apprehended

Men Who Operated in Atlantic City and Other Places Under Indictment

Guy Brinsfield, under indictment for conspiracy to defraud the Atlantic City & Shore Railroad, Atlantic City, N. J., for which he worked as a conductor last summer, was caught in Maryland on March 25. Brinsfield was locked up in the county jail pending disposition of his case in the Quarter Sessions Court. Brinsfield and William G. Gilbert secured employment in Atlantic City last summer as conductors, representing themselves to be brothers and giving their names as George and William Maddox. In applying for work they gave as reference the names of Paul Osier and William J. Windsor. Letters about their standing, written to addresses furnished by the men, came back to the company containing high recommendations for the pair. Windsor, in one of the references, was represented to be cashier of a national bank in Oldgrove, Del., but subsequent inquiry revealed that there was no such institution there. Both Osier and Windsor were indicted with Brinsfield and Gilbert. The latter was arrested following the revelation that fares were being withheld from the company. He is under bonds for trial. Brinsfield was located in Bridgeport, Conn., but eluded arrest at the time, although Windsor was apprehended in the same city at the time as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 24, page 360.

Bus Extensions Recommended

Extension of motor-bus lines in New York City is recommended in a report submitted by the committee on franchises to the Board of Estimate on March 22. The report says that a comprehensive motor-bus system at the rates of fare now proposed will not injuriously affect the earnings of the existing or proposed transportation facilities, such as the dual subways in which the city is interested.

The committee has also considered bids submitted by the Fifth Avenue Coach Company and the New York Motor Bus Company, Inc., and has concluded that new offers should be requested from these companies upon routes which have to some extent been amended since the hearings. The report ends with the statement that the committee is about to ask for new offers from the companies, and will present another report to the Board of Estimate as soon as a satisfactory contract has been submitted.

New "Seven Sisters" Law

Governor Edge of New Jersey on March 29 signed two Senate bills amending the "Seven Sisters" anti-trust laws, passed during the administration of President Wilson as Governor of New Jersey, making them conform to the federal Clayton act. Under the amended laws New Jersey corporations may acquire stock in other corporations.

Suppressing Reckless Autoists

Trainmen of the Bay State Street Railway Are to Report Careless Automobilists

The Bay State Street Railway Company, Boston, Mass., has issued instructions to car service men to report to their division superintendents the license number of any automobile which passes a standing car in such a manner as to jeopardize the safety of the passengers. These numbers will be reported by the company to the Massachusetts Highway Commission, which has jurisdiction over all automobiles registered in the State, so that in the event of a report an admonition will be issued. More severe measures will be taken by the commission upon receipt of a second report on the same automobile. The Massachusetts statute provides that in approaching a standing street car which has been stopped to enable passengers to alight or to embark, the operator of every motor vehicle shall slow down and, if necessary for the safety of the public, bring the vehicle to a full stop. Through the co-operation of the board, the company hopes to reduce the number of accidents due to failure to observe the above regulation.

Brotherhood for Denver Tramway

Expansion of the Former Mutual Aid Association—Benefit Features for Its Members

It has been decided to enlarge the Tramway Mutual Aid Association of the Denver (Col.) Tramway employees by organizing a brotherhood known as The Tramway Brotherhood of Denver, Col. The principle underlying this organization is mutual co-operation among the employees and the officials and management of the Denver Tramway and affiliated companies. All the employees of the company, numbering about 1400, will constitute the membership of the brotherhood. According to the preamble of the organization, it is based on the belief on the part of the employees that they are capable of managing their own interests without affiliation with any outside organization. Its objects are: to provide death benefits and give relief to its members in case of disability, to promote good fellowship among the members and secure possible business benefits by co-operating with the company officials, and to aid in the education of the members in things concerning railway operation and thus make the business mutually advantageous to the brotherhood and to the company.

The management consists of a board of trustees of nine persons. The general manager of the Denver Tramway is president of the brotherhood and the auditor of the company is treasurer. The president and treasurer, together with seven members of the brotherhood, selected from the mechanical, engineering and power departments, and the four divisions of the transportation department, constitute the members of the board. The members are divided into three classes, according to their average monthly earnings, and the dues per month are 50 cents, 75 cents and $1 for the respective classes. The weekly indemnities in case of total disability are $5, $7.50 and $10 and the death benefits for the different classes are $500, $750 and $1,000.

The company pays from its own treasury all death benefits up to the amount required by the American experience table of mortality, expenses of management and for the litigation and adjustment of death claims, and also agrees to loan to the brotherhood without interest for a year any deficits which may occur in its funds.

Philadelphia Proposal Criticized

City Transit Director Urged That Construction Be Limited at Present—Fare Increase May Be Necessary

An analysis by W. S. Twining, transit director of the city of Philadelphia, of the proposal submitted to the city by the Philadelphia Rapid Transit Company for the lease and operation of the city-built high-speed lines was transmitted to the Council by the Mayor at a special session on March 29 called for its reception and also for action upon the ordinance providing for the construction of a subway in Chestnut Street. Mr. Twining said in a letter which prefaced his report that the study by his department of the company's proposal showed it to be wrong in principle, unfair and costly to the city and faulty in detail. He said that, shorn of technicalities, the proposal aimed not to lease the city's property to the company, but to lease the company's property to the city at a fixed rental of $1,500,000 a year, the company remaining in charge of operation without a proper degree of responsibility.

The objections of Mr. Twining to the company's proposal are summarized in twenty-three separate paragraphs. The director added to his objections and recommendations a summary of the transit situation in which he discussed at length the question of fares. He asserted it must be evident that the authorized and established rate of fare would not meet the demands of the present system and carry the city's construction as well. In conclusion he recommended that the program of immediate construction of rapid transit lines be cut as nearly as practicable to the amount of the appropriation; that the construction of such portions of the proposed lines as would not interfere with the value of the rapid transit system to be deferred until a period of lower prices; that such part as practicable of the abnormal increases of taxes on real estate caused by rapid transit development be devoted to the payment of fixed charges on the city's investment in rapid transit, and that if there should still remain a deficit in the payment of the city's interest and sinking fund charges on the cost of construction the fare should be increased in order to make the undertaking self-supporting; first, by a charge for transfers between high-speed and surface lines; or, second, if this were not sufficient, by charging 6 cents on the high-speed lines with a 5-cent fare on the surface lines, or by charging a uniform 6-cent fare on both the high-speed and the surface lines.

Electric Line to Open in May.—May 15 has been fixed tentatively as the date for the Southern Pacific Railway to begin electric train service from Whiteson, 42 miles to Corvallis, thus completing the electrification of the West Side line from Portland, Ore.

Car Purchase Referred to Committee.—At the regular meeting of the City Council of Cleveland, Ohio, on March 19, Councilman Reynolds' resolution authorizing the Cleveland Railway to purchase 100 new motor cars and 100 trail cars was referred to the committee on street railways.

Toledo Plant Guarded.—The Toledo Railways & Light Company, Toledo, Ohio, is flooding its river front plant with light every night and guards patrol the space about it as a precautionary measure to prevent any possible attempt at injury to the plant by sympathizers with any of the belligerents in the war.

Fire Destroys Hagerstown Carhouse.—Fire destroyed the carhouse of the Hagerstown & Frederick Railway recently, along with nine cars and a quantity of freight, entailing a loss of nearly $100,000. The loss was covered by insurance and steps will be taken immediately looking to the rebuilding of the structure.

Bill Legalizing Utility Bonds for Savings Bank Unlikely to Pass.—The efforts are regarded as very unlikely to succeed which have been made to secure the passage of a bill in the New York Assembly, legalizing for the investment of funds of savings banks in public utility bonds that meet certain requirements.

Tulsa Reaches 50,000.—Under the franchise granted by the city of Tulsa to the Tulsa Street Railway when Tulsa attains a population of 50,000 the company is to pay to the city 2 per cent of its gross revenue. Tulsa now claims a population of more than 50,000, and a special census has been asked of the government.

New Pay System.—The Louisville & Southern Indiana Traction Company, New Albany, Ind., has put into effect the plan of paying off through depositing wages in a bank to the credit of the employees. By this plan a great deal of labor is saved for the office force, the memorandum of amounts due being merely handed to the bank, which credits each employee accordingly.

Employees Refuse to Sign Wage Agreement.—On March 22 it was announced that employees of the local line of the Cincinnati, Dayton & Toledo Traction Company at Hamilton, Ohio, had refused to sign the new wage agreement, because of some further differences that have arisen. Split runs are causing trouble and there has been a misunderstanding in regard to pay for overtime.

Mutual Welfare Association for Employees.—The employees of the Manhattan & Queens Traction Corporation, New York, N. Y., have organized a mutual welfare association which affords its members sick benefits, death benefits to the extent of $500 and special hospital fees. An association physician is provided and any member who leaves the employ of the company may continue in good standing, receiving all benefits with the exception of the death benefit.

New Jersey Commissioners to Designate Train Crews.—By the signing of a bill repealing the full crew railroad law heretofore operative in New Jersey, by Governor Edge, the Board of Public Utility Commissioners, effective on July 1, will prescribe the necessary train crews for railroads in the State. It is intended that the board shall hold hearings

before taking action in the different classes of operation before rendering decisions as to the number of trainmen necessary to comprise respective train crews.

Cleveland Track Renewal Reduced.—At the meeting of the City Council of Cleveland, Ohio, on the evening of March 26, the Cleveland Railway was authorized to spend $517,000 in the renewal of tracks on twelve streets, instead of the $1,273,000, which the company had asked to spend. In addition, renewals can be made on nine other streets with funds that were to have been used last year, amounting to $458,000. Only a small part of the program arranged for last year was carried out. The renewals granted are for the most part on streets which are to be repaved.

Third-Tracking the New York "L."—The Interborough Rapid Transit Company, New York, N. Y., has issued "How a Twenty-Million Dollar Railroad Was Built in Mid-Air," a twenty-eight page booklet 6 in. x 8 in., describing and illustrating the third-tracking of the New York elevated lines. The contract for the third-tracking was let on Feb. 13, 1914, the work was begun thirty days later and was finished by Jan. 1, 1916, and on Jan. 17, 1916, the new express service was begun. The longest single interruption to traffic while the work was in progress was twenty minutes.

Increase in Wages on Missouri Short Line.—The Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., the Missouri Short Line, has announced a new wage scale, as a result of the response of the trainmen to programs of safety efficiency. Heretofore the scale has been as follows: first six months, 26 cents; second six months, 26½ cents; second year, 27 cents; third year and thereafter, 28 cents. The new scale is as follows: first six months, 26 cents; second six months, 27 cents; second year, 27½ cents; third year, 28½ cents; fourth year, 29 cents; fifth year, 29½ cents; sixth year and thereafter, 30 cents.

Paving Requirement to Be Imposed.—The City Commission of Dallas, Tex., has announced that it will order the repaving of Jefferson Avenue from Lancaster Avenue to the city limits, requiring the consolidated company that takes over the lines of all the companies in the city to pave between its tracks. It is estimated that the total cost of the paving will be about $500,000, and that the company will have to pay about $200,000 of this. This sum will be deducted from the amount required for improvements the first year under the service-at-cost franchise. The order will be issued as soon as the consolidation plan is worked out and this issue settled.

Technically Trained Men Urged for Public Positions.—D. A. Hegarty, president of the Texas Gas & Electric Company, Houston, Tex., in an address delivered recently before the engineering assembly of the Agricultural and Mechanical College at College Station, Tex., urged the employment of technically trained men for city, state or national positions of a technical nature. He cited examples of wastefulness in road, pavement and bridge construction supervised by men elected from other fields of endeavor, who were not capable of directing the work efficiently. Mr. Hegarty also said that sane regulation of privately owned enterprise meant the greatest efficiency and economy to the public.

Further Consideration of Norfolk Ordinances.—The proposed Virginia Railway & Power Company ordinances were discussed by the Aldermen of Norfolk, Va., on March 14, when the question of appropriating an additional $500 for the employment of an expert by the city came up. The Council had previously appropriated $600 for the purpose, but when it was found that an additional $500 would be required, the board reversed itself and declined to make the appropriation. It is stated now that the committee will take no further action until it has disposed of the resolution recently adopted instructing it to ask the Virginia Railway & Power Company if it is willing to submit or consider a proposition.

Increase for Youngstown Men.—Effective on April 1, the wages of the motormen and conductors employed by the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, will be automatically increased, according to the provisions of the wage scale agreed upon last year. Under the new scale the men will be paid as follows: 35 cents an hour for those in the service two years or longer; 32 cents an hour for those with the company one and two years; and 28 cents an hour for those employed less than one year. During the past year the men have worked under the following scale: 33½ cents an hour for those employed more than two years; 31 cents an hour for those working from one to two years, and 28 cents for the men employed less than one year.

Rhode Island Company Renews Its Plea.—Trustees of the Rhode Island Company, Providence, on March 22, in conference with Mayor Joseph H. Gainer, told him that there is a possibility of the company's holdings, most of which are leased, reverting back to the United Traction & Electric Company. Increasing operating costs and constantly advancing charges on the company's earnings by the city under the 1912 franchise, were cited as among the things that were gradually but steadily tending to embarrass the company. About a year ago the federal trustees appointed under the New Haven Railroad dissolution agreement appealed to the city for relief. Hearings were held on the matter, but no action has as yet been taken looking toward extending relief to the company.

Advertising Bill Opposed.—The International Railway, Buffalo, N. Y., through Porter Norton, of Norton, Penney, Spring & Moore, of counsel, is protesting against the enactment of the Marsh bill by the New York Legislature. The bill authorizes cities to tax billboards, signs and other public advertising mediums. At a hearing before the Assembly cities committee Mr. Norton declared that the company paid a tax to the city and to the State and that receipts from street car advertising entered into the gross revenues upon which the company was already taxed. He charged that the bill would mean a double tax and suggested that it be amended so that it would not apply to public service corporations subject to payment of a tax on special franchises or gross receipts.

New York Employees Return from Border.—T. P. Shonts, president of the Interborough Rapid Transit Company and the New York Railways, has announced that all the employees of the two companies who answered President Wilson's call last June, and who did National Guard duty on the Mexican border, have returned and resumed their former positions. While the men were away serving their country they were carried on full pay, and their places were kept open for them. The number of Interborough employees on duty varied from time to time, the greatest number at any one time being 149. The total amount in salaries or wages paid these men while in military service was $61,800. Seventy-six employees of the New York Railways did military duty on the border, and the total amount paid them by the company during their absence was $34,212.

Newport Ordinance Null and Void.—The initiated franchise ordinance, adopted by the voters of Newport, Ky., at the 1916 election, was held to be null and void by Circuit Judge Otto Wolff recently in overruling the demurrer to the petition filed recently by Attorney Frank V. Benton, representing W. L. Glazier, W. A. Paterson and John J. Fischer, Newport business men. Attorney Benton attacked the ordinance because, he alleged, it had not been properly advertised, that it conflicted with an ordinance adopted by the City Commissioners of Newport and with the rights of the Cincinnati, Newport & Covington Traction Company under a franchise for the crosstown line in 1906. Attorney Benton declared that sections of the ordinance conflicted with other franchises and that since the grant had been adopted under the initiative and referendum clause of Kentucky no one had power to change it except the voters. The arguments concluded, the court issued an order overruling the demurrer to the petition. Solicitor Spence declined to plead further and announced that the case would be carried to the Court of Appeals at once in order to get an early decision.

Program of Association Meeting

Iowa Electric Railway Association

The next meeting of the Iowa Electric Railway Association will be held at Des Moines, Ia., on May 24 and 25.

Financial and Corporate

Insurance Holdings Analyzed

Utility Bonds Increase Nearly $75,000,000, or 67 Per Cent, from 1904 to 1914—Stocks Fall Off $6,800,000, or 34 Per Cent

Orlow H. Boies, statistician Association of Life Insurance Presidents, has made an interesting analysis of life insurance investments during the decade 1904-1914. The data collected show that railroad and public utility bond holdings made a large gain in per cent during the ten years, but that the stock issues of such corporations showed a falling off. The detailed results of the study are presented in the accompanying table.

For 1904 an analysis was made of the investments of sixty-three insurance companies, these being 67.75 per cent of the number of companies then in existence but holding more than 99.5 per cent of the total admitted assets for that year. For the last year in the decade a study was made of the investment of 116 companies, or 46.5 per cent of the total, these representing, however, 97.9 per cent of the total admitted assets of all American companies.

The investments shown in the accompanying table are divided into fourteen classes, some of which need a word of explanation. Class 5 includes bonds of "railroads" so called and recorded by the Interstate Commerce Commission, while Class 7 includes the bonds of street railways and interurban electric railways. Class 7 also includes the bonds of all gas, electric light, power, water, telephone and telegraph and other companies generally included in the public utility group. Class 6 covers national and state bonds as well as bonds of every minor civil division, such as county, municipal, levee and drainage districts, school districts, etc. Class 9 includes stocks of companies of the same character as Class 5, while Class 10 covers the stocks of corporations in Class 7.

ANALYSIS OF SECURITY HOLDINGS OF INSURANCE COMPANIES FOR DECADE 1904-1914

Classes of Assets	Assets, Dec. 31, 1904	Per Cent of Total 1904	Per Cent of Total 1914	Assets, Dec. 31, 1914	Change in Investments in 1914, Compared with 1904 Amount	Change in Investments in 1914, Compared with 1904 Per Cent
1. Real estate	$178,425,828.15	7.17	3.40	$164,547,316.69	— $13,878,610.46	— 7.78
2. Mortgage loans	681,047,925.88	27.37	34.46	1,660,168 266.09	+ 979,119,342.21	+143.76
3. Collateral loans	42,332,616.87	1.70	0.39	18,984,766.48	— 23.347,850.39	— 55.15
4. Policy loans and premium notes	187,644,831.22	7.54	14.94	722,406,573.67	+ 534,761,740.45	+284.98
5. Railroad bonds	750,668,349.33	30.16	26.00	1,256,000.282.46	+ 505 331,933.13	+ 67.32
6. State, county and municipal bonds	163,194,690.20	6.57	11.06	534.607,399.84	+ 371,412,809.64	+227.59
7. Public service bonds	111,209 859.14	4.47	3.84	185,848,359.57	+ 74,638,500.43	+ 67.11
8. All other bonds	17,470,168.18	0.70	0.61	30,113.643.97	+ 12 643,475.79	+ 72.37
9. Railroad stocks	45,681,425.92	1.83	0.68	33,111,374.04	— 12,570,051.88	— 27.52
10. Public service stocks	19,779,115.45	0.79	0.26	12.925,933.36	— 6,853,182.09	— 34.64
11. Stock of banks, trust companies, etc	55,983,962.05	2.24	0.56	27,091,032.48	— 28,892 929.57	— 51.61
12. All other stocks	3.158,848.14	0.12	0.04	2,106,703.18	— 1.052,144.96	— 33.31
13. Non-ledger assets less non-admitted assets	130 641,641.21	5.24	1.80	87,308,951.86	— 43,332.690.35	— 33.17
14. Cash in bank	101,791,372.83	4.08	1.95	94,933,919.43	— 6.857,453.40	— 67.36
Total admitted assets	$2,489,030,634.57	100.00	100.00	$4,830,154,523.12	+$2,341,122,888.55	+ 94.05

The most notable group in the whole statement is Class 6 —state, county and municipal securities. This class showed the highest rate of increase of all investments over which the insurance companies have control, the securities therein having increased from $163,194,690 in 1904 to $534,607,399 in 1914, or 227.59 per cent. Only policy loans showed a more rapid rate of growth. As the amount of money invested by life insurance companies in national and state bonds is comparatively small, the great bulk of this increase was in municipal bonds. During the decade the insurance companies increased their investments in such bonds by nearly double the rate of increase in municipal indebtedness and took more than one-fifth of the total new securities of this character.

To consider now Class 5 or steam railroad bonds, it will be noted that these issues increased $505,331,933, or 67.32 per cent during the decade. This investment, however, fell short of keeping up with the increase in the total amount of railroad bonds in the country, which during the period amounted to 68.28 per cent. The proportion of the total bonded indebtedness of the railroads held by life insurance companies fell a trifle, as in 1904 they held 10.92 per cent of the total outstanding bonded debt, while in 1914 they held 10.86 per cent. Moreover, the proportion of admitted assets invested in railroad bonds decreased from 30.16 per cent in 1904 to 26 per cent in 1914.

During the decade the investment in public utility bonds increased $74,638,500, or 67.11 per cent. This percentage increase, it will be observed, was only a trifle lower than that for the steam railroad bond increase. No statistics were presented to show how the utility securities were divided according to the class of service rendered. For the whole group there was a reduction in the percentage of utility bonds to total assets from 4.47 per cent in 1904 to 3.84 per cent in 1914.

In contrast to the various classes of bond issues, the stock investments of insurance companies decreased about $50,000,000 in the decade. The largest reduction ($28,892,929, or 51.61 per cent), was in stocks of banks and other financial institutions, railroad stocks coming second and public utility stocks third. The railroad stocks showed a marked decline not only in relation to other investments but in amount. They decreased $12,570,051, or 27.52 per cent, during the decade, and were in 1914 only 0.68 per cent of the total assets as compared to 1.83 per cent in 1904. Public utility stocks showed a falling off of $6,853,182, or 34.64 per cent, the percentage to total assets dropping from 0.79 per cent to 0.26 per cent. All other stocks decreased 33.31 per cent and represented 0.04 per cent of the total assets in 1914.

Annual Report

Ottawa Traction Company, Ltd.

According to the annual report of the Ottawa (Ont.) Traction Company, Ltd., the gross receipts of the operating company, the Ottawa Electric Railway, for the twelve months ended Dec. 31, 1916, totaled $1,154,912, as compared to $1,041,100 for the preceding year, an increase of $113,812, or 10.9 per cent. The total expenses, including mileage payments, taxes and interest, were $776,587 for the last year, as compared with $742,123 for the year preceding, an increase of $34,464, or 4.5 per cent. As a result the net income for the last year at $378,324 represented an increase of $79,348, or 26.5 per cent. The net earnings after operating expenses and maintenance, increased $100,789, or 26.2 per cent. The percentage of operating expenses to receipts for 1916 was 58 per cent, as compared to 63.2 per cent in 1915.

The net result of the year was that the company paid the usual quarterly dividends of 3 per cent, and a bonus of 3 per cent, all totaling $281,535. It also paid as a war tax $21,143, wrote off $65,000 for depreciation, and placed $31,789 to the credit of profit and loss. The balance at the credit of the profit and loss account on Dec. 31 was $249,504.

During 1916 a total of 27,093,778 passengers was carried, as compared with 24,361,867 in 1915, an increase of 2,671,911. The only expenditure of importance in the way of new work or renewals carried out in 1916 was for reconstructing a section of track on Rideau Street, and replacing the old rail with heavy girder rail. No extensive renewal work is contemplated during 1917, but with traffic increasing in the present ratio, it is said, the company in the near future will be required to make a substantial increase in rolling stock equipment.

Electric Railway Statistics

Returns for the Year Ended Dec. 31, 1916, Compared with Those for 1915 and 1914, Indicate an Improvement Over 1915

A comparison of electric railway statistics for the twelve months ended Dec. 31, 1916, with figures for the corresponding period of 1915 and 1914, made by the information bureau of the American Electric Railway Association, indicate an improvement in the electric railway business of the United States over that done in 1915, together with some improvement over the year 1914. In the Eastern district the improvement over 1914 was greater than over 1915, while the reverse was true of the Southern district. Returns from the Western district indicate that 1916 was not so good a year as 1914 though an improvement over 1915. In all districts increasing expenses and taxes accompany the advance in net earnings and net income. Data for the twelve months representing 7910 miles of line of companies scattered throughout the country indicate an increase in operating revenues of 6.34 per cent over 1915 and of 4.49 per cent over 1914, in operating expenses of 6.86 and 4.86 per cent respectively and in net earnings of 5.78 and 3.88 per cent. Data representing 7497 miles of line indicate an increase in the amount of taxes paid of 7.94 per cent over 1915 and of 7.32 per cent over 1914, while the operating income increased 5.24 per cent over 1915 and 4.48 per cent over 1914.

Operating Ratio Increased

The operating ratio of the United States as a whole increased from 62.03 in 1914 to 62.25 in 1916. The experience of the past few months would seem to indicate, however, that in spite of all possible economies an increase is to be expected in the future. In the Western and Southern districts the operating ratio was somewhat higher during the year 1915 than during either 1914 or 1916, while the reverse was true of the Eastern district.

The number of revenue passengers carried by companies representing 5412 miles of line increased 9.71 per cent over 1915 and 5.20 per cent over 1914, while the number of transfer passengers increased 5.97 per cent over 1915 and 5.41 per

TABLE I

REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR TWELVE MONTHS ENDING DECEMBER 31, 1916. COMPILED FROM MONTHLY RETURNS OF ELECTRIC RAILWAYS TO THE AMERICAN ELECTRIC RAILWAY ASSOCIATION

ACCOUNT	United States			Eastern District			Southern District			Western District		
	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent
Operating revenues	$207,520	6.34	4.49	$148,162	6.26	7.02	$11,987	10.57	*0.33*	$47,371	5.56	*1.58*
Passenger revenues	196,738	6.18	4.50	139,234	6.01	7.17	11,472	10.99	*0.29*	46,032	5.55	*1.72*
Other railway operating revenues	10,782	9.32	4.31	8,928	10.32	4.76	515	2.03	*1.24*	1,339	5,78	3.55
Operating expenses	129,187	6.68	4.86	91,478	7.53	6.66	6,898	7.28	*2.07*	30,811	4.09	1.40
Net earnings	78,333	5.78	3.88	56,684	4.26	7.61	5,089	15.38	2.12	16,560	8.40	*6.69*
Operating ratio, per cent — 1916	62.25	.....	.....	61.74	.....	.....	57.55	.....	.....	65.04	.....	.....
Operating ratio, per cent — 1915	62.05	.....	.....	61.01	.....	.....	59.32	.....	.....	65.96	.....	.....
Operating ratio, per cent — 1914	62.03	.....	.....	61.95	.....	.....	58.57	.....	.....	63.13	.....	.....
Average number of miles of line represented	7,910	.....	.....	5,303	.....	.....	778	.....	.....	1,829	.....	.....
COMPANIES REPORTING TAXES												
Operating revenues	$201,100	6.26	4.87	$147,975	6.26	7.03	$9,103	9.46	*1.37*	$44,022	5.62	*0.55*
Operating expenses	125,158	6.60	4.82	91,397	7.54	6.66	5,066	5.77	*5.99*	28,694	3.88	1.32
Net earnings	75,942	5.69	4.95	56,578	4.25	7.62	4,037	14.46	5.11	15,328	9.05	*3.89*
Taxes	12,825	7.94	7.32	9,185	9.23	6.70	718	6.28	12.30	2,922	4.44	8.11
Operating income	63,117	5.24	4.48	47,393	3.33	7.80	3,319	16.40	3.68	12,406	10.20	*6.34*
Operating ratio, per cent — 1916	62.24	.....	.....	61.77	.....	.....	55.65	.....	.....	65.18	.....	.....
Operating ratio, per cent — 1915	62.03	.....	.....	61.03	.....	.....	57.59	.....	.....	66.28	.....	.....
Operating ratio, per cent — 1914	62.27	.....	.....	61.98	.....	.....	58.39	.....	.....	63.97	.....	.....
Average number of miles of line represented	7,497	.....	.....	5,250	.....	.....	571	.....	.....	1,676	.....	.....

NOTE.— Figures in *italics* indicate decrease.

TABLE II

DETAILS OF OPERATING EXPENSES OF ELECTRIC RAILWAYS FOR THE YEAR ENDING DECEMBER 31, 1916

ACCOUNT	United States			Eastern District			Southern District			Western District		
	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent
Operating expenses	$92,205	9.03	6.52	$54,496	12.28	10.92	$6,898	7.28	*2.07*	$30,811	4.09	1.40
Way and structures	10,531	8.84	0.75	6,203	14.01	5.66	840	13.08	*2.97*	3,488	*0.11*	*6.14*
Equipment	8,372	7.98	4.66	4,493	11.14	13.06	753	19.11	2.54	3,125	1.54	*5.02*
Total maintenance and renewal*	24,634	9.41	4.64	14,910	12.68	10.16	1,593	15.85	*0.44*	8,130	2.82	*3.29*
Power	14,492	10.31	8.02	8,504	13.94	10.07	861	4.22	*1.47*	5,127	5.77	6.46
Conducting transportation	38,995	9,01	8.26	23,275	11.89	12.51	3,259	4.82	*2.98*	12,461	5.05	4.09
Traffic	398	*5.48*	1.02	162	*21.57*	*16.27*	47	32.41	*0.31*	189	5.65	23.27
General and miscellaneous	13,731	7.61	4.10	7,645	11.91	9.37	1,138	4.97	*2.21*	4,948	2.13	*1.75*
Transportation for investment — Cr.	*45*	.....	.....	.....	.....	.....	.....	.....	.....	*44*	.....	.....
Average number of miles of line represented	7,208	.....	.....	4,601	.....	.....	778	.....	.....	1,829	.....	.....

* Contains an amount not apportioned between "Maintenance of Way and Structures" and "Maintenance of Equipment."

cent over 1914, the revenue car mileage 4.11 and 2.13 per cent and the revenue car-hours 3.40 and 0.20 per cent respectively.

In general there are apparent decreases in the number of express, freight, mail, etc., car-miles and car-hours run as well as in the number of free passengers carried. The average fare per revenue passenger decreased 0.40 per cent over 1914 and 0.60 per cent over 1915, while the average fare per passenger, including transfers, decreased 0.25 per cent over 1914. Both of these figures, however, are based upon the combined returns of both city and interurban electric railways.

The average number of revenue passengers per passenger car-mile increased 2.89 per cent over the year 1914 and 5.38 per cent over 1915. The returns from the city and interurban electric railway companies, as shown in detail in the appended tables, have all been classified according to the geographical grouping indicated in table V, viz.: Eastern District—east of the Mississippi River and north of the Ohio River. Southern District — south of the Ohio River and east of the Mississippi River. Western District—west of the Mississippi River.

What Table I Shows

Table I shows the revenues, expenses and net earnings of over 110 electric railways in the United States as well as the operating income of a slightly smaller number of companies reporting taxes. Difficulty in obtaining 1914 data, together with the limited time after the close of the calendar year 1916 available for tabulation, made it impossible to include a greater number of companies in this summary. It is believed, however, that data here given are fairly representative of conditions as a whole. Of the three groups shown on this table, returns for the Western indicate that it has as yet apparently failed to recover from the effects of the unregulated jitney competition of the past two to three years. Though net earnings for 1916 show some improvement over 1915, they were still 6.69 per cent below those of 1914. Returns for the Southern group show considerable improvement over 1915 and very slight improvement over 1914,

TABLE III

TRAFFIC STATISTICS OF ELECTRIC RAILWAYS FOR THE YEAR ENDING DECEMBER 31, 1916

ACCOUNT	United States			Eastern District			Southern District			Western District		
	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in thousands)	Increase over 1915, per cent	Increase over 1914, per cent
Car miles — total	$411,290	4.12	2.18	$215,042	4.26	1.66	$36,503	5.90	4.20	$159,744	3.54	2.43
Passenger car miles	404,165	4.20	2.22	210,733	4.32	1.59	35,960	6.05	4.54	157,472	3.65	2.58
Other revenue car miles	4,632	*3.07*	*5.12*	3,280	*3.81*	0.35	327	6.54	*19.77*	1,024	*3.43*	*15.04*
Non-revenue car miles	2,493	4.52	10.00	1,029	22.77	26.59	216	*14.88*	*3.64*	1,248	*3.50*	1.53
Car hours — total	44,228	3.23	0.18	23,019	3.61	*0.13*	4,126	5.28	1.67	17,083	2.25	0.25
Passenger car hours	43,466	3.45	0.42	22,589	3.79	0.10	4,049	5.86	2.34	16,828	2.46	0.40
Other revenue car hours	499	*5.75*	*15.54*	327	*7.57*	*13.87*	51	5.08	*18.37*	120	*4.80*	*18.60*
Non-revenue car hours	263	*12.55*	*3.63*	103	3.61	*0.14*	26	*43.07*	*34.28*	135	*13.88*	2.84
Passengers — total	2,948,359	8.85	4.81	1,559,216	11.59	10.61	199,248	17.68	3.79	1,189,895	4.20	*1.76*
Revenues passengers	2,295,434	9.71	5.20	1,275,051	11.84	10.85	162,172	17.87	3.53	858,212	5.37	*1.93*
Transfer passengers	624,589	5.97	5.41	270,451	10.85	14.55	32,433	17.26	5.26	321,704	1.24	*1.19*
Free passengers	28,336	5.33	*26.25*	13,714	4.61	*41.32*	4,643	14.09	2.90	9,979	2.65	*5.30*
Average fare per passenger												
Per revenue passenger	5.02¢	*0.60*	*0.40*	5.00¢	*0.20*	.....	4.98¢	*3.12*	*2.55*	5.07¢	*0.20*	*0.40*
Per passenger (including transfers)	3.95¢	0.25	*0.25*	4.12¢	*0.25*	*0.73*	4.15¢	*3.04*	*2.81*	3.68¢	0.54	*0.81*
Average number of revenue passengers per passenger car mile	5.68	5.38	2.89	6.05	7.27	8.81	4.50	10.83	*1.10*	5.45	1.67	*4.39*
Average number of miles of line represented	5,412	.....	.....	3,251	.....	.....	588	.....	.....	1,573	.....	.....

NOTE.— Figures in *italics* indicate decrease.

TABLE IV

OPERATING REVENUES AND EXPENSES OF ELECTRIC RAILWAYS PER REVENUE CAR MILE, YEAR ENDING DECEMBER 31, 1916

ACCOUNT	United States			Eastern District			Southern District			Western District		
	Amount, 1916 (in cents)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in cents)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in cents)	Increase over 1915, per cent	Increase over 1914, per cent	Amount, 1916 (in cents)	Increase over 1915, per cent	Increase over 1914, per cent
Per revenue car mile:												
Operating revenues	29.43	4.80	2.68	31.53	6.99	9.14	22.95	7.29	*3.21*	28.08	1.30	*4.72*
Operating expenses	17.66	2.97	2.55	17.91	5.48	6.73	13.69	3.01	*2.00*	18.22	*0.11*	*1.88*
Net earnings	11.77	7.68	2.88	13.62	9.05	12.47	9.26	14.32	*4.93*	9.86	*4.01*	*9.62*
Revenue car miles*	408,796	.....	.....	214,012	.....	.....	36,288	.....	.....	158,496	.....	.....
Average number of miles of line represented	5,412	.....	.....	3,251	.....	.....	588	.....	.....	1,573	.....	.....

OPERATING REVENUES AND EXPENSES OF ELECTRIC RAILWAYS PER REVENUE CAR HOUR, YEAR ENDING DECEMBER 31, 1916

	(In dollars)			(In dollars)			(In dollars)			(In dollars)		
Per revenue car hour:												
Operating revenues	2.73	5.79	4.59	2.94	7.30	10.94	2.03	7.41	*0.98*	2.63	2.73	*2.59*
Operating expenses	1.64	3.79	4.45	1.67	5.69	8.44	1.21	3.42	.....	1.70	0.59	.....
Net earnings	1.09	8.91	4.80	1.27	9.48	14.41	.82	13.89	*2.38*	92	4.55	*8.00*
Revenue car hours*	43,965	.....	.....	22,916	.....	.....	4.101	.....	.....	16,948	.....	.....
Average number of miles of line represented	5,412	.....	.....	3,251	.....	.....	588	.....	.....	1,573	.....	.....

* The last three figures are omitted.
NOTE.— Figures in *italics* indicate decrease.

the latter being probably due to rigid economy and the introduction of such money-saving devices as the one-man car. The Eastern district, where during 1914 there was considerable business stagnation and unemployment, shows an increase in the net earnings of 1916 over those of 1914 of 7.61 per cent. On the other hand for this section of the country 1915 was a better year than 1914 and therefore the net earnings of 1916 increased over those of 1915 but 4.26 per cent. All groups indicate an increase in the amount of taxes paid, the greatest percentage increase over 1914 occurring in the Southern district and over 1915 in the Eastern.

Table II shows the details of the operating expenses of companies represented by 7208 miles of line. An examination of this table indicates considerable increases in all items of expense except "traffic" both over 1914 and 1915. The Southern district, however, shows some decreases over 1914, and this is also in a measure true of the Western district.

Table III gives the traffic statistics of companies represented by 5412 miles of line. All groups indicate increases over 1915 in the number of passengers carried and car-miles and car-hours run. All but the Western show similar increases over 1914, the Western showing a decrease of 1.76 per cent in the number of passengers carried. The Southern district shows the greatest percentage increase over 1915 in the number of transfer passengers carried; the Western, the least. A large number of companies keep no record of free passengers, or "deadheads" as they are popularly known, and the records of free passengers as shown on the table are, therefore, somewhat smaller than the actual figures. Available data, however, indicate a considerable decrease in all but the Southern district, in the number of such passengers carried. The average fare per revenue passenger has decreased in all districts. This is also in part true of the average fare per passenger, including transfers. The average number of revenue passengers per passenger car-mile has increased in all districts as compared with 1915 and in the Eastern as compared with 1914. The increase for the United States as a whole is one of 5.38 per cent over 1915 and one of 2.89 per cent over 1914.

In Table IV there are shown the revenues, expenses and net earnings per revenue car-mile and per revenue car-hour, together with the per cent increase or decrease over the corresponding figures for 1915 and 1914. There are also given the number of revenue car-miles and revenue car-hours involved with the last three figures omitted. The net earnings per revenue car-mile increased 7.68 per cent over 1915 and 2.88 per cent over 1914, while there were similar increases per revenue car-hour of 8.91 and 4.80 per cent respectively. As compared with 1914, the Southern and Western groups show decreases in net earnings per revenue car-mile of 4.93 and 9.62 per cent respectively and similar decreases per revenue car-hour of 2.38 and 8 per cent respectively.

In Table V is given the monthly comparison for the month of December, 1916.

TABLE V—REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR DECEMBER 1916

	Companies Not Reporting Taxes		Companies Reporting Taxes	
*United States**	Amount	Per Cent Increase	Amount	Per Cent Increase
Operating revenues	$17,074,794	6.86	$15,980,564	6.59
Operating expenses	11,116,981	11.95	10,473,383	12.13
Net earnings	5,957,813	†1.50	5,507,181	†2.56
Taxes	.....	...	1,026,164	7.03
Operating income	.....	...	4,481,017	†4.52
Operating ratio, per cent:				
1916	65.11	...	65.54	...
1915	62.15	...	62.30	...
Miles of line represented	9,057	...	8,153	...
*Eastern District**				
Operating revenues	$11,036,964	6.03	$10,923,518	5.96
Operating expenses	7,519,094	17.24	7,464,572	17.34
Net earnings	3,517,870	†11.96	3,458,946	†12.38
Taxes	.....	...	694,995	16.08
Operating income	.....	...	2,763,951	†17.47
Operating ratio, per cent:				
1916	68.13	...	68.33	...
1915	61.61	...	61.71	...
Miles of line represented	5,644	...	5,440	...
*Southern District**				
Operating revenues	$1,405,785	8.79	$798,884	8.90
Operating expenses	769,051	7.81	403,918	4.55
Net earnings	636,734	10.01	394,966	13.73
Taxes	.....	...	66,033	†6.12
Operating income	.....	...	328,933	18.77
Operating ratio, per cent:				
1916	54.71	...	50.56	...
1915	55.21	...	52.66	...
Miles of line represented	1,002	...	534	...
*Western District**				
Operating revenues	$4,632,045	8.29	$4,258,162	7.81
Operating expenses	2,828,836	.91	2,604,893	.48
Net earnings	1,803,209	22.32	1,653,269	21.82
Taxes	.....	...	265,136	†8.48
Operating income	.....	...	1,388,133	30.05
Operating ratio, per cent:				
1916	61.07	...	61.17	...
1915	65.54	...	65.64	...
Miles of line represented	2,411	...	2,179	...

*Groupings are as follows: *Eastern District*—East of the Mississippi River and north of the Ohio River. *Southern District*—South of the Ohio River and east of the Mississippi River. *Western District*—West of the Mississippi River.
†Decrease.

American Cities Company, New York, N. Y.—New officers have been elected for the American Cities Company as follows: Francis T. Homer, New York, president; H. J. Pritchard, New York, secretary-treasurer; Hugh E. Vincent, New Orleans, assistant secretary-treasurer. Lee Benoist, New Orleans, and E. G. Connette, New York, were re-elected vice-presidents. The new directors of the company are Arsene Perrilliat and A. B. Wheeler, both of New Orleans. Walter J. Schwenk, heretofore with the American Cities Company, has been made assistant secretary of the New Orleans Gas Light Company. L. F. Barbier, former secretary and statistician of the American Cities Company, has been made statistician of both companies. H. J. Jumonville, auditor of the American Cities Company, retires on April 1.

Boston (Mass.) Elevated Railway.—In an order issued on March 24 the Massachusetts Public Service Commission authorized the West End Street Railway to issue 11,694 shares of common stock to pay for additions and improvements to its property made by the Boston Elevated Railway, the lessee. The West End Street Railway petitioned for authority to issue 18,000 shares, but the commission pointed out that there was in the company's treasury more than $33,000, representing excess on bonds issued under authority of previous orders. The commission found that there was due from the West End Street Railway to the Boston Elevated Railway on account of improvements to the former company's property the sum of $618,248. The sale of the 11,694 shares authorized by the order made on March 24, together with the excess now in the treasury of the West End Street Railway, will provide the amount required to liquidate the West End Company's indebtedness to the Boston Elevated Railway.

Central California Traction Company, San Francisco, Cal.—Bondholders of the Central California Traction Company have received from the company agreements which they are asked to sign binding themselves to relinquish a claim to 5 per cent interest on the $1,400,000 of first mortgage bonds and accept instead 2 per cent interest for the coming three years. The agreement also waives the sinking fund provision which is demanded by the deed of trust.

Chicago, Aurora & De Kalb Railroad, Aurora, Ill.—Claims to the amount of $70,000 against the Chicago, Aurora & De Kalb Railroad are reported to have been settled by six out of seven claimants accepting bonds for the full amount of their claims and by the other claimant being satisfied with cash. As a result the receivership has been lifted. A syndicate headed by H. H. Evans is said to be negotiating to take over the property.

Monongahela Valley Traction Company, Fairmont, W. Va.—The Kanawha Traction & Electric Company and Monongahela Valley Traction Company have concluded an arrangement whereby the Monongahela Valley Traction will take over the Kanawha Traction & Electric Company. The preferred and the common stocks of the Monongahela Valley Traction Company will be converted into stock of par value of $25. The Monongahela Valley Traction Company's 5 per cent preferred stock will be exchanged for 6 per cent preferred stock on the basis of eighty-four shares of new stock for 100 shares of the present 5 per cent stock. The Kanawha Traction & Electric Company will receive practically 44,000 shares of preferred and 44,000 shares of common stock, par value $25, which will be distributed by that company to the present stockholders.

Dividends Declared

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

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

Capital Traction Company, Washington, D. C., quarterly, 1¼ per cent.

Chicago (Ill.) City Railway, quarterly, 2 per cent.

Cities Service Company, New York, N. Y., monthly, one-half of 1 per cent, common and preferred; one-half of 1 per cent on common payable on stock.

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

Houghton County Traction Company, Houghton, Mich., 3 per cent, preferred.

Louisville & Northern Railway & Lighting Company, Louisville, Ky., quarterly, three-quarters of 1 per cent.

Louisville (Ky.) Traction Company, 2½ per cent, preferred; quarterly, 1 per cent, common.

Monongahela Valley Traction Company, Fairmont, W. Va., quarterly, 1¼ per cent, common.

New York State Railways, Rochester, N. Y., quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

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 & Western Railway, Upper Darby, Pa., quarterly, 62½ cents, preferred.

Porto Rico Railways, Ponce, P. R., quarterly, 1¾ per cent, preferred.

Republic Railway & Light Company, New York, N. Y., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.

Electric Railway Monthly Earnings

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

Period			Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan.,		'17	$107,049	*$75,444	$31,605	$32,660	†$1,055
1 "	"	'16	101,420	*63,311	38,109	28,855	9,254
12 "	"	'17	1,241,252	*835,578	405,674	360,129	45,545
12 "	"	'16	1,107,434	*730,834	376,600	357,268	19,332

CLEVELAND, PAINESVILLE & EASTERN RAILROAD, WILLOUGHBY, OHIO.

1m., Jan.,		'17	$36,436	*$22,134	$14,302	$11,436	$2,866
1 "	"	'16	30,900	*18,308	12,592	11,061	1,531

CITIES SERVICE COMPANY, NEW YORK, N. Y.

1m., Feb.,		'17	$1,681,868	$31,813	$1,650,055	$303	$1,649,752
1 "	"	'16	673,406	18,357	655,049	44,186	610,863
12 "	"	'17	12,309,710	256,359	12,053,351	172,408	11,880,943
12 "	"	'16	5,002,685	183,453	4,819,232	495,485	4,323,747

HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.

1m., Feb.,		'17	$497,800	*$231,327	$266,473	$216,203	$50,270
1 "	"	'16	472,259	*210,864	261,395	213,307	48,088
2 "	"	'17	1,039,095	*465,660	573,435	432,434	141,001
2 "	"	'16	967,818	*422,149	545,669	426,704	118,965

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY

1m., Feb.,		'17	$2,205,349	$1,274,258	$931,091	$813,678	$117,413
1 "	"	'16	2,036,166	1,150,743	885,423	816,738	68,685
8 "	"	'17	18,490,282	10,363,493	8,126,789	6,514,716	1,612,073
8 "	"	'16	16,607,058	9,311,215	7,295,843	6,529,309	766,534

PUGET SOUND TRACTION LIGHT & POWER COMPANY, SEATTLE, WASH.

1m., Jan.,		'17	$787,869	*$471,237	$316,632	$191,925	$124,707
1 "	"	'16	669,593	*431,271	238,322	182,651	55,671
12 "	"	'17	8,225,647	*5,160,961	3,064,686	2,222,257	842,429
12 "	"	'16	7,558,290	*4,764,384	2,793,906	2,184,496	609,410

REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO.

1m., Feb.,		'17	$357,645	*$251,654	$106,001	$78,685	‡$28,301
1 "	"	'16	310,459	*180,245	130,214	64,930	‡39,719
2 "	"	'17	737,428	*508,748	228,679	157,410	‡73,097
2 "	"	'16	628,774	*362,810	265,964	132,217	‡134,393

TWIN CITY RAPID TRANSIT COMPANY MINNEAPOLIS, MINN.

1m., Feb.,		'17	$827,373	$576,858	$250,515	$135,612	$114,903
1 "	"	'16	810,420	523,051	287,369	136,345	151,024
2 "	"	'17	1,725,306	1,189,020	536,286	284,975	251,311
2 "	"	'16	1,640,703	1,066,250	574,453	282,296	292,157

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

Traffic and Transportation

Hearing on One-Man Cars

Two Companies Apply to Massachusetts Commission for Privilege to Use One-Man Cars— Birney Design Favored

Petitions of the Boston Elevated Railway and the Brockton & Plymouth Street Railway, Plymouth, Mass., for authority to use one-man cars on certain lines were heard by the Massachusetts Public Service Commission at Boston on March 23. H. B. Potter, assistant to the president, appeared for the Boston Elevated Railway. He stated that the company had ordered one car of the Birney type seating thirty passengers for use on the Maverick Square-North Ferry Line in East Boston. The headway on this line was fifteen minutes, and the traffic was correspondingly light. Mr. Potter said that it appeared that two such one-man cars would give more frequent service and probably at a lower cost than a double-end car seating fifty-two passengers and operated by two men. The speaker declared that better service with no increase in cost was a necessity and the cost of the one-man cars was about $35 per seat less than a semi-convertible car of the latest type.

One-Man Cars on the Coast

A. Stuart Pratt, president of the Brockton & Plymouth Street Railway, said that an increased demand for one-man cars in the Puget Sound District was expected following a recent decision of the Supreme Court of the State of Washington, which, it was expected, would prove a death blow to the jitney. He spoke also of a meeting held recently at Fort Worth, Tex., which was attended by Stone & Webster car experts from all parts of the country with a view toward standardizing this type of rolling stock so far as practicable on the Stone & Webster properties, and thereby secure a reduction in cost of this equipment. The Brockton & Plymouth Company desired to operate two Birney cars on its line from Pilgrim Hotel, Plymouth, to Kingston in place of two single-truck cars of an old type. The details of fare collection in zones had not yet been worked out.

Mr. Pratt said that it was proposed to have the door of the permanent car design at each end at the right of the motorman. The same construction would be used for single-end cars, except, of course, in the matter of controllers, etc. If the commission authorized the use of these cars, they could be purchased at $4,000 each by the Brockton & Plymouth Company, but at least a 10 per cent higher price would apply to future purchases. Mr. Pratt said further that unprofitable lines had been greatly improved by the use of one-man cars.

P. J. Murphy, of the Boston division of the Amalgamated Association, opposed the use of one-man cars on the ground that none of the members of the association had experience in their operation. Chairman McLeod characterized this opposition as theoretical and stated that until the board had an opportunity to observe the operation of the cars, it was difficult to judge satisfactorily their fitness for the proposed service.

George H. Martin of the Westinghouse Traction Brake Company next described the emergency features of the door and brake control mechanism of one-man cars. He stated that standard air fittings were used and that the chances of failure were no greater than with other long-tried braking equipment. Other safety features of one-man cars were pointed out by John Lindall, superintendent of rolling stock and shops of the Boston Elevated Railway. He particularly emphasized the fact that easy access was a natural result of the reduced height.

M. A. Cavanaugh, general manager of the Norfolk & Bristol Street Railway, Foxboro, Mass., testified that safe operation is possible with one-man cars. The hearing was then closed.

Eliminating Foreign Cars

Mr. Dana Explains Policy of Boston Elevated in This Connection at the Hearing on Through Service at Boston

At a recent hearing before the Public Service Commission of Massachusetts upon the grant of a location to the Bay State Street Railway in Arlington to permit the operation of through car service from Winchester to Harvard Square subway station, Cambridge, Edward Dana, manager of surface transportation of the Boston Elevated Railway, discussed the policy of his company relative to the elimination of foreign cars from the system. Mr. Dana pointed out that within the last few years cars of foreign roads had in general been withdrawn from entry into Boston and passengers required to change at the boundaries of the Boston Elevated system. This policy had enabled a more uniform and better spaced service to be rendered within the Boston area, and had enabled the Boston Elevated Railway to make the most of existing station and track facilities through the use of co-ordinated rolling stock.

The demands made to the Boston Elevated Railway for the operation of through cars into such terminals as Harvard Square had come from residents of territory lying laterally with respect to the trunk lines, but the service as a whole had been bettered by confining through service as far as practicable to such trunk lines. The tendency was toward the use of two-car trains and ultimately three-car trains on surface lines radiating from important subway terminals. Mr. Dana said that in the Winchester case, the community virtually lay within the northern rapid transit zone tributary to Sullivan Square terminal, and that the deflection of traffic from Winchester through Arlington would impose additional burdens on Cambridge and Arlington trunk lines already hard pressed to handle the travel in these growing communities. The speaker held that it would be better to increase the present Boston Elevated Arlington-Harvard Square service than to operate the desired through foreign cars from Winchester.

Six-Cent Fare for Boston Elevated

President Brush Advocates Higher Unit Fare as Essential for Relief and Invites Public Investigation

That the 6-cent fare on the Boston (Mass.) Elevated Railway must come as the ultimate solution of its financial problem in relation to transportation development in the Boston metropolitan district was declared by President Matthew C. Brush at the final legislative hearing, March 20, on the company's economic status. Mr. Brush spoke briefly before the committee on metropolitan affairs, supplementing his previous testimony regarding the company's needs. Many places on the system, he stated, should be changed over at once to provide bodily transfer areas, especially where the cost of such a change is relatively small.

With reference to attacks on salaries, Mr. Brush pointed out that all the salaries of the officers are on file at the offices of the Public Service Commission, with all the contracts in force on Sept. 14, 1915, and those since entered into, as well as the list of stockholders. Every detail in the operation of the road, the speaker declared, is open to the public, and anyone seeking information is urged to call at his office.

Referring again to the transfer situation, Mr. Brush said that not another street railway in the world, except the Interborough Rapid Transit Company of New York, N. Y., issues 100,000,000 tickets annually, and this number of transfer checks, which is issued annually at Boston, is greater than the number of passenger tickets issued by the New Haven Railroad. The company received 85,000,000 paper transfers last year. The cost of making up a transfer case in the courts averages $300, and the work is beset with the utmost difficulties. It has been suggested that the company trace the transfer in the way a bank check is handled, but the cost of such a check would be prohibitive. Mr. Brush said that if the public would do less "knocking" and would co-operate more in the interests of safety, the results would be remarkable. The annual outlay for damages is now $800,000, an expenditure which, in the speaker's opinion, does no good to anyone.

Representative Ammidon intimated that the public interest was discouraged by the reception given to suggestions which were deemed impracticable by the management. Mr. Brush emphatically declared that there had been no such attitude since he came to the Boston company. He said he had entertained suggestions whether they came from railroad men or newsboys and that he would guarantee to put any suggestion into effect or prove that it was impracticable.

Mr. Brush said that he personally favored a single fare system in view of the class discrimination effected by the zone system. To permit a man to ride farther for his nickel than he is entitled to is unfair to the man who rides the usual distance for 5 cents.

In closing, Mr. Brush emphasized the fact that the relief sought is the improvement of transportation facilities at Boston, a consideration which weighed heavily in the message sent by Governor McCall to the Legislature when the Boston Elevated investigation was suggested.

City Upheld in Jitney Case

Supreme Court of New Jersey Confirms Authority of Atlantic City to Regulate Its Traffic

The power of the City Commissioners to regulate jitney bus traffic in Atlantic City, N. J., was confirmed in a decision handed down on March 23 by the Supreme Court in the case of William H. Irwin, who attacked the regulating ordinance passed by the commission on the ground that the State jitney law of 1916 had taken the regulation of jitneys out of the hands of municipal authority. In the opinion of the court this right was not taken away, and the city's right to regulate the use of its streets is concurrent with the State's power from the standpoint of public safety.

The points on which the appeal was based and which the court regarded to be without substance were: That the city had no authority over the jitney except in the matter of granting licenses and as provided in the act of 1916; that it was without the right to regulate jitney fares, to demand that a jitney furnish indemnity insurance, to fix a jitney route or to compel a jitney to display a route card; that it was without power to revoke a jitney license for failure to pay a judgment or tax lien, to compel a jitneur to carry policemen and firemen free of charge, or to impose a penalty for violation of such provisions.

Irwin was the only jitney operator who would not submit to the city authorities and cover the routes specified in the ordinance. He attempted twice previously to have the ordinance made inoperative pending results of the trial and also attempted to have forty other jitney men made parties to his action in order that they, too, might be relieved from compliance with the ordinance pending the decision.

Railway Advertises Mobile

The Mobile Light & Railroad Company, Mobile, Ala., is advertising in the leading trade journals of the country, representing those trades which it thinks would do well in Mobile by reason of the supply of raw material near at hand, and on account of the advantageous position of Mobile as a distributing center, not only for a large part of the United States, but also for Cuba, the West Indies, Central and South America. The company is advertising in the furniture journals because it believes Mobile would be a good place for the manufacture of furniture, refrigerators, caskets, and anything else made from oak, ash or gum timber. There is much of such timber adjacent to the river system which flows into the Gulf at Mobile. The company also thinks Mobile would be a good place for the building of motor boats, and even for a ship-building plant. In addition to advertising in a large number of trade journals, the company is also advertising in the dailies of the leading tourist headquarters of the South, calling attention of visitors to the South to the wonderful undeveloped resources of Mobile.

Interstate Fare Increase Allowed

In a recent decision issued by the Interstate Commerce Commission the Shore Line Electric Railway, Norwich, Conn., which controls the Norwich & Westerly Traction Company, operating in Connecticut and Rhode Island, and the Groton & Stonington Street Railway, operating in Connecticut, was granted certain increases in its interstate fares according to a proposed tariff filed with the commission to become effective on Nov. 1, 1915. This tariff, in part, provided as to intrastate traffic that school tickets should be sold in books of 300 tickets for $3, but proposed to cancel in respect of interstate traffic certain provisions pertaining also to commutation ticket books.

Complaints against the proposed changes were filed charging unreasonableness of fares between Westerly, R. I., and points on the Groton & Stonington line in Connecticut. The defendant companies asserted that the increases were compelled because of the insufficient return derived from their former rates and submitted financial statements in considerable detail.

Complaints were also filed at the same time with the Public Utilities Commission of Connecticut relative to the intrastate fare, and this commission, in its decision handed down on May 17, 1916, ruled that the returns afforded by the new schedule were not excessive. The Interstate Commerce Commission, after careful consideration, found that the increased interstate fares, being constructed upon a similar basis, were also reasonable, and the complaints were ordered dismissed.

Investigation of New Orleans Problems

The Commission Council of New Orleans, La., has adopted a resolution suggested by Commissioner Lafaye in a special report, to appoint a committee to investigate the traffic problems of the railways, as proposed by the New Orleans Railway & Light Company recently. The resolution of the Council reads in part as follows:

"Be it further Resolved, That said committee be requested and instructed to make a thorough investigation, and report with respect to transportation conditions in New Orleans, and advise and recommend the steps that should be taken to improve said conditions, whether it be by existing instrumentalities or the inauguration of auxiliary services, such as bus lines, jitneys, etc."

The committee is to report within ninety days to the Council. On the report will depend the final decision of the Council. In the meantime, the jitneys cannot operate unless they give a $5,000 indemnity bond; the proposition before Council has been to amend the jitney ordinance to allow the jitneys to operate under a $5,000 insurance bond which they can readily furnish.

Hearing Closed on Vestibules

Public Service Commission of New York Takes Matter of Inclosed Vestibules Under Advisement

At a hearing held on March 27 by the Public Service Commission of New York, First District, in regard to the establishment of an order requiring fully inclosed vestibules for surface cars, final arguments were presented by the attorneys of several of the interested railways, and at their conclusion Commissioner Whitney. who presided, declared the case closed. From the nature of the statements made by the railways' representatives there appeared to be no very vigorous objections to the promulgation of such an order.

On behalf of the New York Railways and the several other properties in Greater New York controlled by the Interborough-Consolidated Corporation it was stated that there was no intention to resist the proposed order, but that a period of three years would be required to complete the necessary alterations on the companies' cars, provided no change in the labor situation occurred.

The New York Railways was already proceeding with the installation of folding doors and steps, but not a control-interlock, on 439 cars. It was the company's understanding that its center-entrance storage-battery cars which already had entrance doors, but no control interlock, would be excepted from the terms of any such order because of the position of the conductor where he could oversee the door operation, and that 196 small single-truck cars would be excepted because they were obsolete and would be scrapped as soon as possible.

E. A. Maher, Jr., vice-president of the Third Avenue Railway, stated that all of his company's cars in New York City were already equipped with folding doors and steps and interlocked control.

On behalf of the Second Avenue Railroad it was argued that all of that company's cars were very old and that, since they were to be replaced as soon as capital for modern cars could be raised, their remodeling would not be desirable. It was said also that accidents on the Second Avenue's cars were few in number.

No argument was submitted by the Brooklyn Rapid Transit Company at this hearing.

Jitneys File Rates

Nearly 400 passenger autobus lines in California have filed tariffs with the Railroad Commission of that State, in accordance with the ruling recently established by the Supreme Court placing jitneys under the commission's jurisdiction. Fifteen hundred blank forms were sent out by the commission, and only 400 replies have been received. This is partly because some of the former jitneys have ceased to operate and because associations have filed one tariff for all its members. About 150 notices have been returned unclaimed by the post-office department, and fifty replies came from buses that do a "for hire" business only. The commission's investigation shows that jitneys are operating in every section of California and range in size from the individual operator of one small machine to the corporation with fifty expensive cars, each carrying from twenty to forty people. Passenger rates vary from 2½ to 4 cents a mile in level sections, where competition with electric and steam roads exists, to 8 to 15 cents a mile in mountainous sections where roads are poor and there is little or no competition.

More One-Man Cars for Seattle.—The Puget Sound Traction, Light & Power Company has requested authority of the Council of Seattle, Wash., to use on other lines twenty-five one-man cars similar to those now in use on the Bellevue-Summit line.

Rochester Fare Case Started.—Action has been brought in the equity term of the Supreme Court of the State of New York by a stockholder of the Rochester Electric Railway in appeal from the decision of the Court of Appeals denying an increase in fares to the New York State Railways between the Rochester city line and Charlotte territory. The city and the two companies are made defendants. The trial was started on March 20 and was continued during the day, at the close of which adjournment was taken until March 27.

Extension of City Fare Zone Refused.—The Harrisburg (Pa.) Railways have filed with the Public Service Commission an answer to the complaint of T. H. Bogar and others who want the city 5-cent fare zone extended. The company contends that the 5-cent zone runs from Market Square to more than half a mile beyond the city limits, or a distance of 3.28 miles, while the whole Rockville Division is but 5.82 miles long. It is pointed out by the company that persons living on that division have extensive transfer privileges and also that, though the cost of operation has materially advanced, the 15-cent round-trip tickets to Rockville are still maintained.

Employees to Cultivate Right-of-Way.—Officials of the Alton, Granite & St. Louis Traction Company, Alton, Ill., and the East St. Louis & Suburban Railway, East St. Louis, Ill., have announced a plan whereby their employees may plant gardens on the right-of-way. The two systems own about 60 acres of surplus right-of-way, some of which is very fertile. The acreage has been divided and the oldest employee will be given first choice of the sections. The employees are under no obligations. They will plant what they desire and will retain full ownership of the crop. During the summer the gardens will be inspected by disinterested persons, and in the fall five prizes, totaling $200, will be awarded. The employee with the best garden will receive $100.

Trainmen Rewarded for Safe Operation.—The Texas Electric Railway, Dallas, Tex, has inaugurated a plan whereby trainmen will be rewarded for extra care in avoiding accidents. Announcement of the plan was made at a recent meeting of the Texas Traction Company Employees' Benefit Association. There will be five teams of ten men each on the interurban lines, and the team causing the smallest amount of money to be paid out in claims will receive a cash bonus of $150 at the end of the year. The second team will receive $100. For the teams on city lines there will be a first prize of $75 and a second prize of $50. The city-line teams will be six in number, each composed of five men. An individual cash prize of $5 will be given to each trainman who has been responsible for no accident during the year. The plan goes into effect on April 1.

"Calf Clubs" to Increase Freight Traffic.—Three "calf clubs," as a means of increasing freight business, have been organized at Dearborn, Ferrelview and Camden Point, Mo., along the line of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., by J. F. Holman, general freight agent of the company, in co-operation with E. K. Slater of the educational department of the Blue Valley Creamery Company, who is manager of the cream territory. Local bankers were induced to buy calves which will be sold to boys of the district, who give 6 per cent interest-bearing notes indorsed by their parents. In the fall the calves will be sold at auction, the bankers receiving the amounts advanced with interest and the boys receiving the increment. It is expected that many of the calves will remain on the farms where they were cared for during the summer, and that in this way the cream production for transportation from the territory will be increased. The first consignment of sixty dairy calves was received at Dearborn on March 19.

Grade Crossing Auto Accidents Considered.—In the discussion of the report of the committee on signs, fences and crossings at the meeting of the American Railway Engineering Association in Chicago, Ill., during the week commencing March 19, it was brought out that during a recent month on one of the railroads there had been twenty-three cases where automobiles had actually run into trains at grade crossings. One case was also cited which had caused the death of the engineer and fireman, after which the company had brought suit against the automobile owner. Great stress was laid on the importance of this subject and the committee was urged to give special consideration to the possibility of providing special signs and means of preventing this form of accident, which, outside of injury claims, was a great menace to the railways. It was also brought out that the Railroad Commission of California was at the present time engaged in a study of the conditions as to why automobiles failed to observe the crossing signs and that some interesting data would probably be made public on the completion of their investigations.

Improvements Suggested in Transit Service.—In reply to notices posted in the subway and elevated trains of the Interborough Rapid Transit Company, New York, N. Y., inviting suggestions for improvements in the service, the committee on city traffic of the Merchants' Association has forwarded to Theodore P. Shonts, president of the company, a number of suggestions received from various sources. The abolition of dead-end elevated terminals at South Ferry is suggested and the substitution of loop tracks for a continuous interchange between the east and west side elevated trains. This, it is said, would make trains more frequent by eliminating switching delays and would provide better distribution of traffic by passengers not being directed to the subway at some points. Stairways and entrances to elevated stations of greater capacity than at present are recommended and also sliding or folding instead of swinging gates for the elevated cars. It is pointed out that the existing over-congestion at the Grand Central subway station is due largely to the interchange of express and local passengers at this point and that the elimination of the stops of local trains during the rush hours would relieve the situation. The carrying of large packages, especially in the subway cars, causes much delay and discomfort to passengers, and it is suggested that some other means of transportation might be provided for baggage in excess of a certain size, which in some cases at present is essentially merchandise.

Personal Mention

H. J. Pritchard has been appointed secretary-treasurer of the American Cities Company, New York, N. Y.

Charles Hoopes, secretary and auditor of the Oklahoma Railway, Oklahoma City, Okla., has been appointed assistant general manager of the company.

C. M. White, dispatcher on the Chicago, South Bend & Northern Indiana Railway, has been appointed chief dispatcher with headquarters at South Bend, Ind.

B. T. Gifford has terminated his connection with Kelsey, Brewer & Company of Grand Rapids, Mich., to become associatd with S. W. Cheney as consulting engineers in that city.

L. F. Barbier, former secretary and statistician of the American Cities Company, New Orleans, La., has been made statistician of that company and the New Orleans Gas Light Company.

Herman Pappert has been promoted to the position of track foreman on one of the lines of the Wheeling (W. Va.) Traction Company to succeed George E. White, who resigned from railway service.

E. R. Kelsey, manager of publicity of the Toledo Railways & Light Company, Toledo, Ohio, was elected district governor of the Rotarians at the convention held at Wheeling, W. Va., on March 23.

J. C. Schott, chief clerk of the claim department of the Public Service Railway, Newark, N. J., has resigned, after ten years of service with the company, to enter the automobile business in Newark.

H. J. Childs, engineer of power and lines of the United Traction Company, Albany, N. Y., has resigned. Mr. Childs was presented with a gold watch by the employees with whom he has been associated.

N. I. Garrison, formerly auditor and assistant manager of the Fort Smith Light & Traction Company, Fort Smith, Ark., has been appointed manager of the El Reno Gas & Electric Company, El Reno, Okla.

Edward Dana, manager of surface transportation of the Boston (Mass.) Elevated Railway, was a candidate for the office of Selectman of Belmont, Mass., in a recent election. He was defeated by only thirty-four votes.

Henry C. Hall, a member of the Interstate Commerce Commission, has been elected chairman of the commission for the ensuing year, according to the custom of selecting the chairman by rotation in the order of seniority.

George R. Sheldon, formerly vice-president and treasurer of the North American Company, New York, N. Y., has been appointed chairman of the board of directors. Mr. Sheldon has been succeeded as vice-president by Henry H. Pierce, but will retain his position as treasurer.

C. G. Reed, chief dispatcher of the Chicago, South Bend & Northern Indiana Railway, located at South Bend, Ind., has been transferred to Elkhart, Ind., where he will have charge of the city lines of Elkhart and Goshen as well as the interurban traffic between those cities.

Walter Coakley, formerly plant superintendent of the Toledo Railways & Light Company, Toledo, Ohio, and recently on temporary detail at the Niagara Light, Heat & Power Company, Tonawanda, N. Y., has been appointed general superintendent of the Knoxville (Tenn.) Gas Company.

Clifford Thorne, formerly chairman of the State Railroad Commission of Iowa and president of the National Association of Railway Commissioners, has resumed the practice of law involving rates, cost analyses and appraisal of railroads and public utilities, with offices in Chicago.

William Kambs, an interurban conductor for the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., has been promoted to the position of superintendent of the city lines of Michigan City and Laporte and the interurban service between those cities, succeeding John Cash, who has been transferred to South Bend.

L. K. Langdon, Lebanon, Ohio, has resigned as a member of the Public Utilities Commission of Ohio. Mr. Langdon was counsel for the commission a few months before his appointment as a member of the commission in 1915. His term expired on Feb. 1, but he has remained on the commission since that time at the request of Governor Cox.

S. W. Cheney, who recently resigned his position with Kelsey, Brewer & Company of Grand Rapids, Mich., is a member of a firm of consulting engineers just organized in Grand Rapids. Mr. Cheney was graduated from the University of Wisconsin in 1904 and was identified with public utilities until 1913, when he was appointed assistant engineer of Kelsey, Brewer & Company.

N. G. Day, formerly electrician for the Massachusetts Northeastern Street Railway, Haverhill, Mass., and the Dover, Somersworth & Rochester Street Railway, Dover, N. H., was recently presented with a fine mahogany chair by the employees with whom he has been associated. Mr. Day has accepted a position as commercial manager with the Rockingham Light & Power Company, Portsmouth, N. H.

G. C. Estill, chief engineer of the Cumberland County Power & Light Company, Portland, Me., and the York County Power Company, has in addition been appointed chief engineer of the Lewiston, Augusta & Waterville Street Railway and the Westbrook Electric Company, which are controlled by the Cumberland County Power & Light Company. In a previous report of his appointment Mr. Estill's name was incorrectly spelled.

Frank H. Warren, formerly assistant claim adjuster for the Union Traction Company of Indiana, Anderson, Ind., has been appointed to succeed James Harmon of Indianapolis, who is transferred to a position with the bureau of safety of the Middle West Utilities Company, with headquarters in Chicago. Mr. Harmon was safety agent for the Interstate Public Service Company, Indianapolis, Ind., and other subsidiary properties of the Middle West Utilities Company.

William Clayton, vice-president and managing director of the San Diego (Cal.) Electric Railway, who was shot and seriously wounded March 12 by an Italian, was reported as being practically out of danger on March 20. According to the railway company's records, Lorenzo Bellomo, the assailant, was injured on July 11, 1914, when he jumped from a moving car. Witnesses asserted that the company was in no way to blame for the accident, but the company paid his hospital bills and gave him $50 when he left the hospital. Later he was employed by the company, but was discharged because he was unsatisfactory as a workman.

H. C. Hoagland, general manager of the Muskogee Gas & Electric Company, Muskogee, Okla., has resigned to accept the position of president and general manager of the Central Oklahoma Light & Power Company, with headquarters in Oklahoma City. Mr. Hoagland formerly was manager of the Fort Smith Light & Traction Company, Fort Smith, Ark., for three years, and was succeeded a few months ago by D. C. Green. Mr. Hoagland has been general manager of the Muskogee plant for seven years, holding that position while residing in Fort Smith and serving as manager of the Fort Smith Light & Traction Company.

John G. Sullivan, president-elect of the American Railway Engineering Association, was born in 1863 at Bushnells Basin, N. Y. He was graduated from Cornell University with the class of 1888 and began railroad work as a rodman on the Great Northern, later becoming assistant engineer. Since 1900 Mr. Sullivan has been connected in various capacities with the Canadian Pacific Railroad with the exception of two years, which he spent in Panama after accepting the position of assistant chief engineer for the Isthmian Canal Commission in 1905. He was advanced to the position of chief engineer of the Canadian Pacific, Lines West, in 1911, the position he now holds. Mr. Sullivan is the builder of the Connaught Tunnel, the longest railway tunnel of the western continent.

E. W. Holst, mechanical engineer of the Bay State Street Railway, Boston, Mass., has resigned from that position to take effect on April 1 and will open an office as a consulting engineer in Boston. Mr. Holst's service with the Bay State Street Railway and its predecessors date from 1904 when he joined the staff as superintendent of car repairs. He had received part of his early technical training with the General Electric Company and part in Norway, the country of his birth. In 1907 he was appointed superintendent of equipment of the Bay State system, and on May 4 of last year to his present position as mechanical engineer of the company. A biographical sketch of Mr. Holst with portrait appeared in the Electric Railway Journal of March 18, 1916, page 584.

E. Burt Fenton, who for two years has been publicity manager of W. S. Barstow & Company, Inc., has resigned. The first Barstow property with which he became connected was the Sandusky Gas & Electric Company, Sandusky, Ohio, for which he did publicity work during two municipal ownership campaigns, and he also prepared some good-will advertising articles at that time. Mr. Fenton was for several years editor of the Sandusky *Star-Journal* and has also been connected with newspapers in Pittsburgh, Pa., and Columbus, Toledo and Zanesville, Ohio. He wrote "Snuggling Up to John Smith," a paper on public relations, and "The Missing Link," dealing with the question of municipal ownership. Both papers were read at annual conventions of the Ohio Electric Light Association and have attracted much favorable comment from public utility operators.

P. D. Kline, general manager of the Ogden, Logan & Idaho Railway, Ogden, Utah, has resigned, effective April 1. Mr. Kline was at one time connected with the contracting department of the Allis-Chalmers Company and for four years was superintendent of transportation of the Sheboygan Light, Power & Railway Company, Sheboygan, Wis. He then became general superintendent of the Falkenau Electrical Construction Company, Chicago, Ill., in charge of all field construction. He supervised the installation of several large railway and lighting systems and a number of power stations for that company, after which he became general superintendent of the Ogden (Utah) Rapid Transit Company in 1913. Four months later he was appointed general manager for this company and retained this position with its successor, the Ogden, Logan & Idaho Railway until the present time.

L. W. Jacques, who recently was appointed master mechanic of the East St. Louis & Suburban Railway, East St. Louis, Ill., began his railroad career with the Baltimore & Ohio Railroad, which he served fourteen years, finally becoming roundhouse foreman at South Chicago, Ill. He next became foreman of the Thirty-first Street shops of the Twin City Rapid Transit Company, Minneapolis, Minn., where he remained for three years, after which he was for about five years master mechanic of the Fort Wayne & Wabash Valley Traction Company. This company was absorbed by the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., and in June, 1911, Mr. Jacques resigned to become master mechanic of the Rockford & Interurban Railway, Rockford, Ill., which he served until 1914. He has since been associated with M. E. Cooley, consulting engineer, Ann Arbor, Mich., working on valuations of street and interurban railway properties.

Obituary

Charles S. Braddock, Jr., formerly chief medical adviser to the government of Siam and later medical examiner for the Interborough Rapid Transit Company, New York, N. Y., died at his home in Haddonfield, N. J., on March 23 from the effects of paralysis, with which he was stricken last November. Dr. Braddock was known throughout the medical world as a writer on medical subjects and a leading expert on cholera and smallpox. He began his work in Siam in 1901, and a year later was appointed chief medical inspector. He led the fight against diseases which were depopulating the country, succeeded in stamping out the plague and received a diamond-studded medal for his services. In 1907, still suffering from the effects of tropical fevers, he returned to the United States after having written the health and sanitation laws now in effect in Siam. Dr. Braddock was formerly an officer in the New Jersey National Guard, later a lieutenant in the United States Navy and took an active part in the naval battle of Santiago in 1898.

Construction News

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

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

RECENT INCORPORATIONS

Milwaukee (Wis.) Western Railway.—Incorporated in Delaware as a holding company to take over the control of the Milwaukee Western Electric Railway, which proposes to construct a line from Milwaukee to Fox Lake, via Hustisford, Juneau and Beaver Dam, with a branch from Sussex south to Waukesha, via Pewaukee, about 74 miles. Capital stock, $2,750,000. The directors include A. P. Keltzsch, W. O. Vilter, and H. C. Kelling, Milwaukee; J. E. Steel, Olderly; A. F. Ryder, Juneau; G. Meissner, Oconomowoc; and J. H. Bach, Chicago. [Jan. 27, '17.]

FRANCHISES

Hartford, Conn.—The Connecticut Company has asked the Board of Street Commissioners for permission to construct additional tracks on Charter Oak and Huyshope Avenues and double tracks on Albany and Blue Hills Avenues, Hartford.

Springfield, Ill.—The Springfield Consolidated Railway has filed a petition with the Railroad Commission of California asking that the commission issue a certificate of convenience and necessity authorizing the company to extend its line from Fourteenth and Germania streets into Bunn Park.

Jamestown, N. Y.—The Panama Traction Company has asked the City Council for a franchise to construct a line in Jamestown. D. L. Davis, Jamestown, general manager. [March 3, '17.]

Columbus, Ohio.—The City Council has, as a committee of the whole, approved the proposed franchise granting the Columbus Railway, Power & Light Company the right to build a line connecting the Chittenden and Eleventh Avenue lines, on the payment of $5,000 to the city.

Youngstown, Ohio.—The franchises for extensions of the Mahoning Avenue, Poland Avenue and Steel Street lines of the Mahoning & Shenango Railway & Light Company, after lengthy discussion at a recent Council meeting, were referred back to the legal department to be rewritten. New drafts will also include a number of suggestions made by members. One of them is that the Poland Avenue and Steel Street extensions be double-tracked.

Juniata, Pa.—The Altoona & Logan Valley Electric Railway has received a franchise from the Borough Council to construct an extension on Fourth Avenue to East Altoona and through the Juniata Park district to the silk mill. The franchise will be submitted to the Public Service Commission of Pennsylvania for its approval.

Pennsburg, Pa.—The Norristown Traction Company has asked the City Councils of Pennsburg, East Greenville and Red Hill for franchises granting the company right-of-way through these towns. The proposed line will extend from East Greenville to Lederach, where it will connect with the Norristown-Harleysville line.

Olympia, Wash.—The Thurston County Commissioners at Olympia recently granted the Tacoma Railway & Power Company a franchise to construct power lines from the Pierce County line to the A. L. Brown farm, near Nisqually, and to extend its lines along county highways near Nisqually, to serve farmers in that district. As a result of the franchise, it is expected that the company will extend its lines still further in Thurston County in the future. While it is unofficially reported the company plans the extension of an electric interurban line from Tacoma to Olympia, nothing definite has been announced, the primary purpose of obtaining the franchise for lighting and power being to supply current to a large farming district near Nisqually.

TRACK AND ROADWAY

Visalia Electric Railroad, Exeter, Cal.—Preliminary surveys are being made by the Visalia Electric Railroad for further extensions of its lines into the foothills east of Porterville, to connect with the Porterville Northeastern Railroad at Adobe station. If built, the line will serve three magnesite mines, and two granite quarries, all under operation at the present time.

Municipal Railways of San Francisco, San Francisco, Cal.—A contract for the connection of the Market Street and Van Ness Avenue section with the Sixteenth and Church Streets section has been let to the Western Motor Draying Company, San Francisco, by the Board of Public Works, for $74,431.

Chicago & Joliet Electric Railway, Joliet, Ill.—This company reports that it expects to renew considerable track work during the coming season on account of paving to be done by the City of Joliet. The company has sufficient materials on hand for this work.

Quincy (Ill.) Railway.—New improvements planned by the Quincy Railway for this year include the building of loops at the ends of several lines, including the Soldiers' Home, Tenth Street, Broadway and the Depot Lines. The company will also lay new ties, repair tracks generally, lay new pavement and make improvements to the roadbed.

***Fruitdale, Ind.**—The construction of an electric railway from Fruitdale to Brownstown, via Nashville, is contemplated. W. J. Davis, chief engineer of the Tipton-Frankfort Traction Company, Tipton, is reported interested.

Orleans-Kenner Electric Railway, New Orleans, La.—Construction will soon be begun by the Orleans-Kenner Electric Railway of its proposed extension from Kenner to Rost, about 6 miles.

Bay State Street Railway, Boston, Mass.—As the result of a conference between Mayor Benson, City Solicitor Chapple of Salem, and James F. Jackson, counsel for the Bay State Street Railway, it was announced that the bill providing for a two years' extension of time in which the Bay State Street Railway must put certain of its wires under ground in Salem has been withdrawn by the company. The city officials have agreed, through the Mayor, to allow the road another year in which to comply with the law requiring them to remove their overhead wires in the business district of the city. In return for this concession, the company will remove its tracks from Charter and Federal Streets within a reasonable time. The City Council has endorsed the action of the Mayor.

Worcester (Mass.) Consolidated Street Railway.—This company will extend its tracks in Shrewsbury and Albany Streets, Worcester.

Kansas City (Mo.) Railways.—Bids will soon be asked by the Kansas City Railways for extensions as follows: Troost Avenue, from Forty-eighth to Fifty-fifth Streets, the estimate on which is $77,000; Thirty-ninth Street, the estimate on which is $64,000; Indiana Street, the estimate on which is $63,000; Twenty-seventh Street, the estimate on which is $25,000. The company has completed excavating on Thirteenth Street, Kansas City, Kan., and Littlefield, Fry & McGovern have begun work under their contract for the extension on Twenty-fifth Street, from Grand to Troost Street.

Southwest Missouri Railway, Webb City, Mo.—This company is now constructing an extension from Galena to Baxter, about 9 miles.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has recently awarded an order for special work to the Ramapo Iron Works, New York, consisting of frogs and switches to be used on the elevated portions of the Pelham Park extension of the Lexington Avenue subway. The contract price was $41,801. The commission has also under consideration, awaiting award, three bids on another portion of special work for use in the Eastern Parkway subway, in Brooklyn, on which the lowest bidder is the Bethlehem Steel Products Company, New York, whose figure was $34,136.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—This company will relocate its track to conform to the proposed improvement of Hamilton Pike, a part of the Dixie Highway.

Oklahoma & Northern Traction Company, Bartlesville, Okla.—The W. K. Palmer Company, Kansas City, Mo., engineers for the Oklahoma & Northern Traction Company, reports that arrangements are substantially completed for the north division of this system, consisting of lines from Miami, Okla., to Columbus, Kan., with a branch to Baxter Springs, Kan., which will probably be continued to Galena and into the city of Joplin. The south division consists of a line west from Miami to Bartlesville, Okla. Engineering locations and surveys are completed. Plans and specifications and estimates are ready and arrangements for the construction funds have been made for the north division. It is expected that contracts will be let shortly. [Feb. 24, '17.]

Sand Springs Railway, Tulsa, Okla.—This company, which operates a part steam and part electric railway between Tulsa and Sand Springs, will soon let contracts for an extension from Sand Springs to Hominy, and thence to a point on a proposed extension of the Atchison, Topeka & Santa Fe Railway. The grading, bridging and concrete work will be let by contracts, but track laying and other work preparatory to operation will be done by the company's own forces.

St. Thomas (Ont.) Street Railway.—The City Council of St. Thomas plans to construct an extension of the street railway line to Queen and Center Streets.

Southern Pacific Company, Portland, Ore.—It is reported that this company proposes to construct a new steel bridge at Oregon City, at a cost of about $14,000.

Altoona & Logan Valley Electric Railway, Altoona, Pa.—A report from this company states that it expects to construct a 1½-mile extension during the summer.

***Derry, Pa.**—Surveys have been made and work will soon be begun on the construction of an electric railway from Derry to Blairsville, via Millwood, Hillside and Ridgeview Park. It is stated that the line will connect with the Indiana County Street Railway at Saints Rest. Robert Doty, Derry, is interested.

Shamokin & Mount Carmel Transit Company, Mount Carmel, Pa.—It is reported that this company contemplates the construction of an extension from Centralia to Ringtown and thence to Shenandoah, about 14 miles.

Philadelphia, Pa.—Work on the Frankford elevated line of the city's new high-speed transit system has been resumed. The superstructure is completed to Ontario Street, and work has been begun there. Work was stopped in December last because weather conditions would not permit the laying of concrete bases on which the supporting columns of the L structure rest. This concrete work, for which Vare Brothers have contracts, will be begun at once, and the McClintic-Marshall Company, contractors for the structural steelwork, have notified Director Twining of the City Transit Department that they will resume the erection of steel column supports by April 2.

Rhode Island Company, Providence, R. I.—This company will double-track its line on Chalkstone Avenue, from Smith Street to Lisbon Street, this spring.

***Ship Channel Transportation Company, Houston, Tex.**—This company has been organized with a capital stock of $60,000 to construct an interurban line from Houston to Goose Creek. Ed Kennedy, Houston, and L. B. Mitchell, Chicago, are reported interested.

Virginia Railway & Power Company, Richmond, Va.—In connection with its rerouting at Richmond, the Virginia Railway & Power Company is building 2 miles of additional track, chiefly in double-tracking. As part of existing track is being removed, the net increase is only 1 mile. The company is also reconstructing 6000 ft. of single track. The rail for these jobs consists of new 116-lb., 7-in. Lorain section 434, or reused 107-lb., 9-in. Pennsylvania section. All work is on white oak in crushed-stone ballast and concrete paving.

Seattle (Wash.) Municipal Railway.—The Council of the city of Seattle has under consideration the construction of an extension of the Seattle Municipal Railway from Nickerson Street and Thirteenth Avenue to the north city limits in Ballard and the acquirement of common-user rights on Fourth Avenue between Stewart Street and Jefferson Street.

Capital Interurban Company, Milwaukee, Wis.—The Wisconsin Railroad Commission has dismissed the petition of the Capital Interurban Company for a permit to construct a line from Blooming Grove to Janesville. Gustav Pickhardt, Milwaukee, president. [July 29, '16.]

SHOPS AND BUILDINGS

Connecticut Company, New Haven, Conn.—Work will be begun within a month by this company on the construction of its new carhouse at Waterbury. The structure will be of the latest and most approved type of carhouse, and the present buildings will be razed to make way for the construction. The layout of the tracks in front of the building will be changed so as to eliminate all exterior switching. The switching, with the completion of the carhouse, will be done on the inside.

Pekin City (Ill.) Municipal Railway.—Work will soon be begun by the Pekin City Municipal Railway on the construction of an addition to its carhouse.

Hagerstown & Frederick Railway, Hagerstown, Md.—The carhouse of the Hagerstown & Frederick Railway at Virginia Avenue and Howard Street, Hagerstown, containing nine cars, was recently destroyed by fire. The loss is estimated at $50,000.

Interborough Rapid Transit Company, New York, N. Y.—Plans have been prepared by the Interborough Rapid Transit Company for the construction of a new carhouse to be erected in the Long Island Railroad yards, a short distance from the terminal of the Queensboro tunnel at Hunterspoint Avenue. The carhouse will be used for cars operated in the subway between the Grand Central Terminal, Manhattan, and the elevated lines in Long Island City.

POWER HOUSES AND SUBSTATIONS

Birmingham Railway, Light & Power Company, Birmingham, Ala.—Within the next few months this company plans to install three new 1000-kw. rotary converters, the output of which will be sold to the Birmingham, Ensley & Bessemer interurban lines.

Capital Traction Company, Washington, D. C.—An order has been placed by the Capital Traction Company with the Electric Storage Battery Company for a sixty-four-cell chloride accumulator to furnish exciter current at its Georgetown power plant. It has also ordered two small substation batteries from the U. S. Light & Heating Company.

Athens Railway & Electric Company, Athens, Ga.—This company reports that it is installing a 2000-kw. turbine.

Chicago, Ottawa & Peoria Railway, Ottawa, Ill.—This company is overhauling and reequipping its power plant at La Salle at a cost of $200,000. The plant is being enlarged and new machinery is being installed. This plant will be used as an auxiliary whenever the power fails at Marseilles because of high water or clogging of the gates with anchor ice. Both the La Salle and Ottawa plants are held in reserve to answer emergency purposes.

Ottumwa Railway & Light Company, Ottumwa, Iowa.—Preparations are being made for improvements to the power plant of the Ottumwa Railway & Light Company, including the installation of a 1250-kw. turbo-generator and auxiliaries.

Eastern Wisconsin Electric Company, Grand Rapids, Mich.—This company has purchased a 7500-hp. steam turbine and auxiliary equipment at a cost of about $150,000.

Columbus Railway, Light & Power Company, Columbus, Miss.—This company has recently overhauled both its gas and electric light plants, having installed modern machinery and equipment.

Butte (Mont.) Electric Railway.—This company reports that it expects to build two substations of 500 kw. and 1500 kw. capacity.

Manufactures and Markets

Discussions of Industrial Conditions
A Department for the Manufacturer, Salesman and Purchasing Agent

Rolling Stock Purchases | Business Announcements | Trade Literature

Purchasing Problems Discussed

Government to Become a Big Factor in Material Market—Embargoes Paralyze Construction Work—Contracts for Material Broken on Account of Car Shortage

By FRANK J. PETURA
Purchasing Engineer, Henry L. Doherty Company

The purchasing problems of the large utility companies are becoming more and more difficult each day with no immediate relief in sight. The possibility of war does not brighten the situation any for the reason that the government which so far has been comparatively a small buyer will now be in the market for enormous quantities of materials. Although the orders for the Allies, many of which were very large, are now about completed, the amount of material needed by this government will be far in excess of that required for shipment to the Allies. If these materials cannot be obtained in the open market, the only course left open to the government would be to requisition whatever is required. Corporations would still continue to operate their plants, but the government would requisition all of the products until further notice. This, of course, would make the situation in regard to raw materials more acute than at present. It is not now a question of price in obtaining materials but one of deliveries.

Prices generally are just about all that the traffic will bear, and in some cases a little bit more. For instance, this company purchases annually 400,000 tons of coal. Before the war this coal, which is usually run-of-mine, or No. 1 slack, was obtained for about $1 a ton at the mine with fairly prompt delivery. However, it is now about $3.50 a ton, and the large coal companies in the Central West are not particular at all whether they make contracts for their output or not. In a number of cases contracts have been canceled by the coal operators on account of the car shortage. If a certain contract calls for 20,000 tons of coal per month, the coal company after delivering 10,000 tons of coal has been known to notify the purchaser that on account of embargoes, car shortage, etc., no further deliveries could be made on contract, but that perhaps half the remaining amount would be sold to the purchaser at the current prevailing price which would be considerably in excess of the contract price. Unless the purchaser wanted to take the matter into the courts or to shut down his plants, he had no other recourse than to buy the coal outright at the higher rate. Again, it is almost impossible to make contracts for coal to be delivered at a future date. This company has in the process of construction additions which, when completed, will increase the amount of coal used about 100,000 tons, and this makes the fuel supply problem all the more difficult.

EMBARGOES HOLD UP CONSTRUCTION WORK

That construction work is being paralyzed by the embargoes recently placed into effect on many of the railroad lines is shown by the following illustration. All the railroads entering Warren, Ohio, recently had an embargo placed on them. In order to complete a boiler installation it was necessary for this company to use two carloads of firebrick which were en route from a nearby point in Kentucky. As the terminal lines refused to accept these cars the work had to be shut down until other arrangements could be made to get the firebrick delivered, and the completion of the power plant was delayed considerably. In addition to furnishing the railway load in Toledo, Ohio, energy is also furnished to the Overland automobile factory. The Overland people, however, are unable to ship the completed machines in standard cars, and if they were unable to get flat cars, production would probably be curtailed and the power company's load would fall off.

At the present time any kind of electrical equipment is in great demand, and about twenty months' delivery is the best that can be had on turbines of more than 2000 kw. For the smaller units, the General Electric and Westinghouse are quoting about fourteen or fifteen months, while the Allis-Chalmers is able to make delivery in eight or nine months. As it takes three months to build a turbine of this small size, it is evident that the companies are merely taking orders and perhaps do not commence actual work on the turbine for nearly a year after they have received the order. Formerly boilers ordered from Babcock & Wilcox Company, the Connelly Company, or from the Bigelow-Hornsby people could be obtained in ninety days, but six to seven months is the best that can be expected at the present time, on account of the scarcity of the seamless tubing and plates used in making the water tubes. These products have increased 150 per cent in value, and are not available even at that price except for long deliveries. Tubing of this kind is used in making shells and the munitions people have had their orders placed well in advance of the other lines.

It is generally believed that the manufacturers are making enormous profits off of some of their products, but the truth is that they are not making nearly as much as the prices would indicate. The raw material manufacturers, producers and middlemen are making the enormous profits.

CONDITIONS AFTER THE WAR

Anything that can be said regarding the conditions after the war is merely a guess. I believe, however, that there will be a big reaction and that labor conditions will be very unsettled. Our present trade without competition will have plenty of competition after the war. For instance, pig iron at the present time is selling for $38 a ton. With the mines working at an over-load capacity in Europe they will easily be able to cut this price in two. This may not only cut off the exports from this country, but cause a decrease in our domestic trade. Again, the foreign governments have power to fix prices, and this will tend to make American manufacturers sell their products at much less than they are now being sold in order to compete with the foreign market.

Loose-Leaf Literature vs. the Big Catalog

By ALLEN BOND
Advertising Manager Ohio Brass Company

I have read with considerable interest the article on uniform catalog size on page 372 of your issue of Feb. 24, and the comments on page 467 of the issue of March 10. There is no doubt but that a standard size catalog is to be desired for several reasons, both on the part of the buyer and the seller. However, it is doubtful if one size of catalog can be selected as suitable for all the different classes of products that are used in the industry. If two or three sizes are adopted as standard, any manufacturer will be able to adapt his publications to one of these sizes.

The loose-leaf catalog is fine in theory, but it does not work out satisfactorily in practice. Among the recipients of manufacturer's catalogs, a considerable percentage has no office organization that makes it a practice to properly file loose-leaf material as it is received from the manufacturer and as a consequence much loose-leaf material sent out fails to reach the proper file and is lost.

Better a solidly-bound catalog that is known to be six months or a year old than a loose-leaf affair whose up-to-dateness is unknown to either the owner or the manufacturer that supplied it.

International Commercial Outlook

According to O. P. Austin, Statistician of the National City Bank, international trade after the war will be about the same as before the war. There seems little reason to believe that nations now at war with each other will prolong the struggle after peace has been declared into an industrial war. Statistics show that after all great struggles trade between the warring nations was greater than before the struggle. Furthermore, there is no good reason to believe that European buyers are going to buy anywhere but in the most favorable markets. It is evident, therefore, that there is little occasion for American manufacturers to believe that after the war German markets will be closed to English and French goods and that English, French and Russian markets will be closed to German and Austrian goods.

Furthermore, statistics show that so far as labor is concerned Europe is in a better position to-day, and will be after the war, to make progress industrially than before the war. The net increase in male population of the countries now at war is greater than the number of males killed or maimed to an extent to be unfit for industrialism.

There is little likelihood that the destruction of vessels will in any way curtail foreign trade after the war is over, for according to the latest estimate, only about 10 per cent of the world's tonnage has been destroyed so far, while the production of new ships in the meantime has been fully half as much as the tonnage of those destroyed, so that the net loss it may be assumed is not more than 5 per cent. With this loss distributed all over the world, it is not likely to prove of much account in post-war trade.

A Disturbing Factor in Car Building

Prominent Car Builder Points Out That Pullman Company's Bids for Car Building Are Made on a Non-Commercial Basis

The acceptance by the Interborough Rapid Transit Company, New York, of the Pullman Company's bid for 377 motor car and 140 trail car bodies (noted on page 529 of the March 17 issue of the ELECTRIC RAILWAY JOURNAL) naturally has aroused considerable comment in electric railway circles. The fact that the Pullman Company could underbid electric railway car builders by margins ranging from $295 to $1,125 was a cause of astonishment to those unfamiliar with the conditions. The following comment from a leading car builder on the situation should prove of interest in this connetcion.

The Pullman Company, he points out, is organized primarily to operate cars built in its own shops. When its facilities are not drawn upon heavily for its own work, it seeks miscellaneous business in the steam field and large orders in the electric field. Its facilities for manufacturing economically are no better than those of most electric car builders. Furthermore, the Interborough contract was taken subject to contingencies in the delivery of material which proves that the Pullman Company also had to figure on buying material at current market prices.

The only reason, then, why the Pullman Company can underbid the electric car builders is that it makes no perceptible allowance for profit or overhead. Its price covers little more than labor and material. A careful audit of the Pullman books would probably show that the company makes no money from manufacture, whereas it does make large profits from operation. In other words, the benefits that accrue to a Pullman client here and there come out of a charge on the general public.

While the individual electric railway can hardly be censured for buying in the cheapest market, there is no question that competition of this kind is highly demoralizing. In the present state of the electric car business, the division among four or five builders of an order like the Interborough's would have proved a splendid stabilizer for the industry. By giving such orders to an outsider who insists upon an all or none policy, the legitimate car builder is not only deprived of business, but placed in a false position as to price when soliciting smaller orders from railways which the Pullman Company does not care for.

Metal Tickets for Several Properties

A Saving in Ticket Cost Is Gained and Complete Registration Is Easily Possible

The use of metal street-car tickets is not new, but at this time their popularity seems to be growing rapidly. The Johnson Fare Box Company of Chicago has on hand a number of orders for such tickets. They are in use in Evansville, Ind.; Mobile, Ala., and Racine, Wis., and the United Railways of St. Louis recently ordered 200,000 of them. By the use of metal in place of paper, it is possible to give a registration and a bell for every fare received. Transfers are rung on a separate register.

The metal tickets used in the cities mentioned are being used in connection with the Johnson fare box, but the standard size 5-cent metal ticket is suitable for registration in any fare box. Some of the properties in addition to the 5-cent fare, have special-size metal tickets for passes, for low-rate fares and for school tickets. In Mobile the boxes separately register four classes of fares, each class having its own totalizing indicator.

The metal tickets are made of German silver, are hard, and will last for years. They are engraved with a geometrical design, and by means of dies a large identification letter is silhouetted in the center of each ticket. The metal used for the tickets is so hard that a cutting die is said to last for but 50,000 impressions. These tickets can be resold many times, and thus the final cost is much lower than that of paper tickets.

CURRENT PRICES FOR MATERIALS

Quoted Wednesday, March 29

Copper (electrolytic)	New York, 35½ cents per pound
Rubber-covered wire (base)	New York, 42 cents per pound
No. 0000 feeder cable (bare)	New York, 42 cents per pound
No. 0000 feeder cable (stranded)	New York, 39¾ cents per pound
No. 6 copper wire (insulated)	New York, 39½ cents per pound
No. 6 copper wire (bare)	New York, 42 cents per pound
Tin (straits)	New York, 55⅞ cents per pound
Lead	New York, 9½ cents per pound
Spelter	New York, 10¾ cents per pound
Rails, A. S. C. E., O. H.	Mill, $40 per gross ton
Rails, A. S. C. E., Bess	Mill, $38 per gross ton
Wire nails	Pittsburgh, $3.20 per 100 pounds
Railroad spikes, 9/16 in. and larger	Pittsburgh, 3.65 cents per pound
Steel (bars)	Pittsburgh, 3¾ cents per pound
Sheet iron (black, 24 gage)	Pittsburgh, 4.85 cents per pound
Sheet iron (galv., 24 gage)	Pittsburgh, 6.55 cents per pound
I-beams over 15 in.	Pittsburgh, 10 cents per pound
½-in. galv. extra high strength steel wire	New York, $7.04 per 100 ft.
⅜-in. galv. high strength steel wire	New York, $3.52 per 100 ft.
⅜-in. galv. Siemens-Martin wire	New York, $2.60 per 100 ft.
5/16-in. galv. Siemens-Martin wire	New York, $2.00 per 100 ft.
Galvanized barb wire and staples	Pittsburgh, 4.05 cents per pound
Galvanized wire (ordinary)	Pittsburgh, 3.85 cents per pound
Cement (carload lots) with rebate for sacks,	New York, $2.02 per barrel
Cement (carload lots)	Chicago, $2.06 per barrel
Cement (carload lots)	Seattle, $2.60 per barrel
Sand in large lots	New York, 50 cents per ton
Waste, No. 1 white	New York, 14 cents per pound
Linseed oil (raw, 5-bbl. lots)	New York, $1.01 per gallon
Linseed oil (boiled, 5-bbl. lots)	New York, $1.02 per gallon
White lead (100-lb. keg)	New York, 10¼ cents per pound
Turpentine (bbl. lots)	New York, 45 cents per gallon

OLD METAL PRICES

Copper (heavy)	New York, 29 cents per pound
Copper (light)	New York, 24¾ cents per pound
Red brass	New York, 20 cents per pound
Yellow brass	New York, 19 cents per pound
Lead	New York, 8 cents per pound
Zinc	8 cents per pound
Steel car axles	Chicago, $38 per net ton
Iron car wheels	Chicago, $22 per gross ton
Steel rail (scrap)	Chicago, $27.50 per gross ton
Steel rail (relaying)	Chicago, $34 per gross ton
Machine shop turnings	Chicago, $9.50 per net ton

Signals for Illinois Traction

The Illinois Traction System is planning the installation this summer of 20 miles of track-circuit controlled automatic block signals, using the Union Switch & Signal Company's style B mechanism, and the Illinois Traction standard control circuits. With this 20-mile additional protection, the Illinois Traction System will have approximately 200 miles of track under block-signal control. The material for this installation, which will be located near Edwardsville, Ill., has been on order for some time. The work of installation will be under the charge of John Leisenring, superintendent of signals and overhead, Illinois Traction System, Springfield, Ill.

Branding Treated Lumber

One of the features of the annual convention of the American Wood-Preservers' Association, which was held recently in New York, was the manner in which the association took up the problem of branding treated lumber. Companies treating lumber were urged to brand their creosoted or otherwise treated timber and then to advertise their brand extensively. This is part of a national movement for the branding of products in order that the consumer may secure a guaranteed quality. The cypress manufacturers have already started branding their lumber, only members of the association being authorized to use the brand, thus placing the entire association back of the quality of lumber sold by members. The only difficulty in the way of making this a universal practice has been to secure an effective machine to brand each end of every piece of timber manufactured.

ROLLING STOCK

Columbus (Ohio) Railway & Light Company are reported to be in the market for ten city cars.

Hagerstown & Frederick Railway, Frederick, Md., is reported to have lost nine cars in a fire which caused a total damage of about $50,000.

Oklahoma Union Traction Company, Tulsa, Okla., are preparing specifications for seven one-man and three interurban cars.

Carbon Transit Company, Mauch Chunk, Pa., lost five summer cars in a fire which recently destroyed its carhouse in Upper Mauch Chunk.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has ordered twenty Peter Witt cars from the G. C. Kuhlman Company.

Stone & Webster Management Association, Boston, Mass., noted in last week's issue as being in the market for twenty-four double-end, one-man cars for its Bellingham and Tacoma properties, has placed the order with the American Car Company.

Illinois Traction System, Peoria, Ill., has on order with the St. Louis Car Company forty-four city cars to be distributed as follows: Fifteen to Wichita, three to Atchison, six to Oskaloosa, two to Ottawa, and eighteen to Peoria. In addition, one interurban car was ordered for the main line of the system.

Wilmington & Philadelphia Traction Company, Wilmington, Del., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 24 as reported to have purchased ten cars from the J. G. Brill Company, have specified the following details for this equipment:

Number of cars ordered.....15	Rail to trolley base...11 ft. 4 in.
Date of order.....Feb. 27, 1917	Body.....All steel
Date of delivery.....July, 1917	Roof, arch or monitor.....Arch
Builder of car body.....Brill	Air brakes.....General Electric
Type of car....Semi-convertible	Control type.....K
Seating capacity 44	Door operating mechanism..Brill
Weight (total).....30,600 lb.	Motors.....4 G.E.-258
Bolster centers, length, 17 ft. 6 in.	Motors .....Inside hung
Length over bumpers.....41 ft.	Seats, style.....Brill reversible
Length over vestibule.....40 ft.	Seating material.....Rattan
Width over all.....8 ft. 4 in.	Trucks, type..Baldwin Arch Bar
	Wheels.....26-in. cast iron

Wheeling (W. Va.) Traction Company, noted in the ELECTRIC RAILWAY JOURNAL of Feb. 17 as ordering fourteen prepayment car bodies from the Jewett Car Company, has specified the following details for this equipment:

Type...Low floor—end entrance	Designation signs.....Hunter
Seating capacity.....52	Door mechanism.Nat'l pneumatic
Weight (total).....38,000 lb.	Fare boxes....International R-5
Bolster centers, length.22 ft. 0 in.	Fenders.....H.B. life guards
Length over bumpers.49 ft. 0 in.	Gears and pinions.....Nuttall
Length over body.....34 ft. 0 in.	Hand brakes.....Peacock
Width over all.....8 ft. 10 in.	Heaters .....Truss Plank
Rail to trolley base...10 ft. 9 in.	Headlights.....Crouse Hinds
Body.....All steel	Journal boxes.....Symington
Interior trim.....Cherry	Lightning arresters .....West.
Headlining .....Agasote	Motors.....4 West. No. 532
Roof, arch or monitor.....Arch	Motors.....Inside hung
Air brakes.....Westinghouse	Seats..Hale & Kilburn, No. 300
Axles .....Heat treated	Seating material.....Rattan
Bumpers.....Rico anti-climber	Step treads .....Feralun
Control, type .....K	Trolley retrievers.....Knutson
Couplers...Tomlinson automatic	Trolley base.....U. S. 14
Curtain fixtures.....Fabrikoid	Trucks, type...Baldwin, Type K
Curtain material....Ring fixture	Ventilators.Jewett Car Company
	Wheels.....Davis 26 in

Montreal Tramways, Montreal (Que.), Canada, noted in the ELECTRIC RAILWAY JOURNAL of March 10 as being in the market for fifty cars, has placed this order with the J. G. Brill Company.

Cleveland Southwestern & Columbus Railway, Cleveland, Ohio, noted in the ELECTRIC RAILWAY JOURNAL of Dec. 23, 1916, as ordering six interurban cars from the G. C. Kuhlman Car Company, has specified the following details for these cars:

Type of car..Single-end, steel frame, smoking and pass. interurban cars	Designation signs..Ry. standard
Seating capacity 78	Door mechanism.Nat'l pneumatic
Weight (total).....52,150 lb.	Fenders .....Providence
Bolster centers, length.36 ft. 0 in.	Gears and pinions.Westinghouse
Length over bumpers.61 ft. 6 in.	Hand brakes.....Kuhlman
Length over vestibule.60 ft. 6 in.	Heaters.....Peter Smith
Width over all.....8 ft. 6 in.	Headlights .....Crouse-Hinds
Rail to trolley base..12 ft. 6½ in.	Luminous-Arc
Body.....All steel	Journal boxes.....Brill MCB
Interior trim...Statuary bronze	Lightning arresters.....West.
Headlining .....Agasote	Motors.....West. 548-C.
Roof, arch or monitor....Arch	Motors.....Outside hung
Air brakes .....Westinghouse	Paint .....Sherwin-Williams
Axles .....Brill	Registers..Ohmer Fare Register
Bumpers .....Kuhlman	Sanders .....Nichols-Lintern
Car trimmings.....Kuhlman	Sash fixtures....Brill Renitent
Conduits and junction boxes, West. steel conduit junction boxes.	Seats, style..Brill pressed steel
	Seating material..Green Chase "X" plush (pass.), black Pantasote (smokers)
Control type.Westinghouse H-L.	Springs .....Brill
Curtain fixtures..Curtain supply	Step treads.Mason or Universal
Curtain material.....Pantasote	Trucks, type..Brill 27-MCB-3-X
	Ventilators.American Automatic
	Wheels .....37-in. rolled steel

International Railway, Buffalo, N. Y., noted in the ELECTRIC RAILWAY JOURNAL of Jan. 27 as being in the market for fifty cars, has specified the following details for this equipment:

Number 50	Fenders or wheelguards....HB
Date of order.....Feb. 15, 1917	Gears....Columbia Machine Co.
Date of delivery....Aug. 1, 1917	Handbrakes ..Peacock-National
Builder .....Kuhlman	Heaters .....Peter Smith
Type .....Peter Witt	Headlights .....Golden Glow
Seating capacity.....56	Journal boxes.....Brill
Weight (total).....36,000 lb.	Lightning arresters, Shaw insulator
Bolster centers, length.24 ft. 6 in.	Motors.....2 GE 57-2 turn
Length over bumpers.50 ft. ¼ in.	Motors.....Outside hung
Length over vestibule.49 ft. ¼ in.	Paint.....Acme white lead
Width over all.....8 ft. 2 in.	Varnish.....Kay & Ess
Rail to trolley base...11 ft. 2 in.	Sanders.....West. Type C
Body .....Steel	Sash fixtures .....Kuhlman
Interior trim....Natural cherry	Seats, style .....Brill
Headlining .....Nevasplit	Seating material.....Cane
Roof .....Arch	Springs .....Brill
Air brakes.....Westinghouse	Step treads.....Feralun
Axles...4¾ in. AERA Standard	Trolley catchers or retrievers.QP
Bumpers.....Rico anti-climber	Trolley base.....U. S. No. 14
Car trimmings.....Kuhlman	Trucks, type.....Brill 39-E-2
Control.....K-11 not pneumatic	Ventilators .....Nichols-Lintern
Couplers .....Brill	Wheels..33 in. and 22 in. American Car & Foundry
Curtain fixtures.Curtain Supply	Special devices, etc.Nichols-Lintern selector switches for lighting
Curtain material.....Pantasote	
Designation signs....Hunter Ill.	
Door mechanism.Nat'l pneumatic	

TRADE NOTES

Ohio Brass Company, Mansfield, Ohio, announces that it has received an order from the Boston Elevated Railway for 4800 trolley ears.

Gold Car Heating & Lighting Company, New York, N. Y., has received an order for fifty thermostatic control and electric heater equipments from the Public Service Railway, Newark, N. J., to be used on the fifty cars being built by the Cincinnati Car Company. This makes a total of 180 equipments in use by this company.

Edwin G. Hatch, consulting engineer, New York City, is arranging to have a large quantity of nickel-steel turbine buckets manufactured in this country for the South African plant of the Victoria Falls & Transvaal Power Company, Ltd. These buckets were originally supplied by the Allgemeine Elektricitäts Gesellschaft of Germany.

Vanadium-Alloys Steel Company, Pittsburgh, Pa., announces that arrangements have been completed whereby the following firms will represent the company in the sale of its high-speed and alloy and carbon tool steels: E. T. Ward's Sons, 44 Farnsworth Street, Boston; Geo. Nash Company, 304 Hudson Street. New York; Field & Company, Inc., 721 Arch Street, Philadelphia, and Geo. Nash Company, 646 Washington Boulevard, Chicago.

Edison Lamp Works of the General Electric Company, Trenton, N. J., has under construction a four-story reinforced-concrete addition to its plant on Sussex Street, 135 x 193 ft., estimated to cost $300,000. The company also

has had plans prepared for a three-story addition, 93 x 152 ft., to its plant in the vicinity of Ampere, N. J., to cost about $100,000.

Willis M. Deming has resigned from the General Electric Company and will spend some time on the Pacific Coast in rest and recreation, for which he has long felt the need. He has been in the service of the General Electric Company for the last twenty-eight years, having entered the employ of the Thomson-Houston Company at West Lynn in 1888. On the evenings of March 8 and 13 he was tendered farewell dinners by his associates of the General Electric Company and other friends in Schenectady.

Holden & White, Inc., Chicago, Ill., announce that they have been incorporated under the Illinois State law and have changed their name from the partnership firm name of Holden & White to that of Holden & White, Inc. They will continue as general sales agents to handle car equipment specialties, such as Perry-Hartman side and center bearings, Anderson slack adjusters, Garland ventilators, Wasson trolley bases, Watson car-lighting regulators and Reliance air sanders. They will also act as Chicago representative for the Drew Electric & Manufacturing Company, Columbia Machine Works & Malleable Iron Company, the Lincoln Bonding Company and the Miller Trolley Shoe Company.

Julian Beggs Signal Company, Terre Haute, Ind., has closed a contract with the Chautauqua Traction Company to equip that company's line between Lowe Avenue at Lakewood and Westfield, an approximate distance of 25 miles, with the Julian Beggs cab signal and train control system. It is expected that the system will be in operation some time during the coming summer. Under the auspices of the Beggs Company, officials of the Chautauqua Traction Company were in attendance at a test made of the train control system at Cincinnati on March 12. The system is installed on 20 miles of the Queen & Crescent Railroad between Erlanger and Christy, Ky., and consists of twenty blocks. The demonstration train consisted of a locomotive equipped with cab signals and three passenger cars.

ADVERTISING LITERATURE

Wayne Oil Tank & Pump Company, Fort Wayne, Ind., has prepared an illustrated leaflet descriptive of its oil tanks and pumps.

Standard Scale & Supply Company, Pittsburgh, Pa., has issued catalog Y-125 on its standard low-charging concrete mixers.

National X-Ray Reflector Company, Chicago, Ill., has issued a bulletin announcing its nationwide campaign for x-ray lighting.

Electric Storage Battery Company, Philadelphia, Pa., is distributing bulletin No. 164, descriptive of its storage batteries for stationary and semi-portable types for railway signal service.

Wendell & MacDuffie Company, New York, N. Y., is distributing in bulletin form a series of reprints, "Better Public Relations," showing how these conditions are brought about by the use of HB. lifeguards and Providence fenders.

Sprague Electric Works of the General Electric Company, New York, N. Y., has issued bulletin No. 41,514 on its type BSS single-phase motors. This is a varying speed motor and is made in sizes up to 7½ hp.

Protective Signal Manufacturing Company, Denver, Col., will shortly move to its new factory which will afford greatly increased manufacturing capacity now demanded by this company's growing business in highway crossing signals and other forms of protective apparatus.

Doehler Die Casting Company, Brooklyn, N. Y., is distributing a carefully prepared and well-illustrated book, the title of which is "Creating an Industry." This book reviews the history of casting metals from the early Egyptian periods up to the present time.

Hess & Son, Philadelphia, Pa., have issued a bulletin on "Epicasitt" for tin, lead or zinc coatings. This new material is a metal powder mixed with a liquid carrier and is applied with a brush. It is used for protecting iron, steel, copper, brass, etc., against rust, corrosion or oxidation.

New Publications

Crane Construction and Safe Practices. National Safety Council Safe Practices Leaflets, No. 4. Council headquarters, Chicago, Ill. Fourteen pages. Price 10 cents.

This leaflet is one of the series mentioned in the issue of the Electric Railway Journal for Feb. 10, 1917, page 278.

Preliminary Mathematics. By F. E. Austin, professor of electrical engineering, Dartmouth College, Hanover, N. H., published by the author. 172 pages. Cloth, $1.20.

In this little manual Professor Austin has endeavored to explain the principles of elementary algebra in a practical way. There are numerous problems, many of which are solved and in other cases the answers are given.

Alternating Currents. By H. R. Kempe. D. Appleton & Company, New York, N. Y. Seventy-nine pages. Cloth

In this book the elements of alternating currents are explained without the use of hyperbolic functions. It is written for students, and deals principally with the development and application of formulas. Numerous diagrammatic illustrations are given. A large portion of the book is devoted to telephonic transmission problems.

The Co-operative System of Education. By Clyde W. Park, University of Cincinnati. Government Printing Office, Washington, D. C., Bureau of Education, Department of the Interior, bulletin, 1916, No. 37. Forty-eight pages. Paper. Twenty cents per copy.

This is a comprehensive, illustrated description of the co-operative system of education as developed in the College of Engineering of the University of Cincinnati, under the direction of Dean Herman Schneider. Appended to it is a complete bibliography of the co-operative system.

English and Engineering, a Volume of Essays for English Classes in Engineering Schools. By Frank Aydelotte, Professor of English in the Massachusetts Institute of Technology. McGraw-Hill Book Company, Inc., New York. 390 page. Price $1.50.

Under this title Professor Aydelotte has collected twenty-seven essays by prominent writers and has grouped these essays under six heads, namely: writing and thinking, the engineering professor, aims in engineering education, pure science and applied, science and literature, literature and life. Wordsworth, Ruskin, Carlyle, Bennett and Lounsbury are among those quoted. The purpose of this collection is primarily to help technical students to express themselves better in writing and speaking and to broaden their outlook on life. The book is indicative of the greater attention which is being paid to the study of English in our technical schools. While one cannot learn to write simply by reading, reading encourages thinking, and thought is the necessary precedent to interesting writing. The essays seem well selected to give every engineer, old or young, a broader idea of his profession, and to encourage him to impart his ideas to others in clear, concise language.

Engineering of Power Plants.. By Robert H. Fernald, Ph. D.; Whitney Professor of Dynamical Engineering, University of Pennsylvania, and George A. Orrok, M. E., Consulting Engineer, New York, N. Y. McGraw-Hill Book Company, Inc., New York, N. Y. 569 pages. Cloth, $4 net.

The scope of this book is broader than its title indicates. It deals with the transformation and uses of energy, an interesting subject for students and engineers in all branches of the profession. The topics are presented with comparisons and applications from a practical point of view. Cost figures have been given to introduce the commercial side of engineering, a field not emphasized in most engineering courses. The book gives information on the following subjects: Comparative values of fuels; construction, equipment and operation of steam power plants; chimneys; smoke and its prevention; electric generators and power transmission; cost of power; variable load economy; heating systems; gas producers; oil and gas engines; efficiencies and operating costs of different types of power installations; air compressors; refrigerating machinery, and hydraulic power. The book is well illustrated and gives actual operating data in diagrammatic and tabular forms.