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No. 13

THE MEANING OF LOW REPAIR COSTS

Although we have come to regard locomotive maintenance costs only as incidental to electrification problems, the record of the New York Central's equipment, published in last week's issue, possesses from one angle a very considerable degree of importance to those interested in the electrification of steam railroads. The units in question have been kept in repair during the past eight years at a figure that has remained consistently close to 3½ cents per locomotive-mile, and although this fact does not prove that all electric locomotives in the country will be maintained at the same rate of expense, it does show what can be done. The low cost is, obviously, the result of skilful management on the part of the New York Central's equipment-maintenance department, this being shown in the road's maintenance cost of some 1.9 cents per car-mile for its multiple-unit cars, but since good management certainly ought to be available on any line similar results can hardly be considered impossible of duplication elsewhere. Upon the assumption that this is the case, a somewhat surprising conclusion develops. An electric locomotive that costs 3½ cents for repairs saves just about 10 cents per mile over the repair cost of the steam locomotive that it displaces. This saving alone, even when based upon a low annual mileage of 36,000, will pay 8 per cent interest on the cost of the electric unit, and inasmuch as twice this mileage is possible, the high first cost of the electric locomotive ceases to be of import under high-grade supervision.

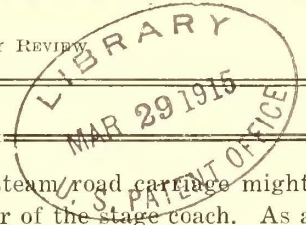
THE AUTO-BUS EIGHTY YEARS AGO

The present "jitney" bus agitation has undoubtedly brought to the minds of students of transportation history the fact that the automobile is about a century old and that more than eighty years ago it was, in England, a potentially formidable rival of the then well-established and profitable stage-coach lines. The condition of the roads in this country was not favorable to either mode of transportation at that time. The steam carriage was brought to a remarkable state of perfection for the time, and its operation was satisfactory to the passengers, as indicated by liberal patronage. London was the center of the new industry, and the London & Greenwich Steam Carriage Company had good equipment and an opportunity to build up an interurban, and possibly an urban, business. The only difficulty was to make any profits, the same difficulty which is confronting the "jitney" to-day, although the promoters are blinding themselves to the facts. If the rapid development of the steam railroad had not modi-

fied the situation, the steam road carriage might have become a real competitor of the stage coach. As a matter of fact, however, even the stage coach had to take to rails eventually and was restricted to the urban field by economic considerations. Transportation history has proved that the economical and safe wholesale movement of passengers and freight requires the use of rails, large vehicles and operators who are skilled in all the various branches of railroading, and history has a habit of repeating itself.

EXAMPLE OF ASSOCIATION ACTIVITY

The report of the committee on the operation of motor vehicles, published elsewhere in this issue, is a good example of the interim work which an association is capable of doing. Many people not familiar with the work done at the New York office of the association imagine that it is confined mostly to compiling the reports of the previous convention and preparing for the next; in other words, that to hold a convention is the chief purpose of the association. Actually, it is the expression only of the work, and in some respects of only a part of the work, done during the year. In this connection it is illuminating to compare the activities of the association now and ten years ago, when it was reorganized. At that time the convention was practically the only association event of the year, and in 1905 two volumes only were required to report the meeting of the association. Now there are six volumes, an engineering manual, a monthly magazine, bureaus of information, fare research and identification of claimants, and many other activities. Yet up to last October, when a slight increase was made, there had been no change in the dues since 1905. It is idle to say that the needs of the industry have not grown enormously during this period and now require a larger general staff to direct the united work which must be undertaken. Much of the work of an association cannot be planned a year in advance. Who could have foretold, for instance, last October, of the development of the "jitney" bus situation? Without a permanent organization little could have been done until next October, but with the present organization a group of prominent operating men have been brought together to study the situation and have been able to issue their conclusions with a statistical report on the subject prepared by the bureau of fare research. We believe that this work will be appreciated by the membership at large. It is also evidence to companies which are not now affiliated with the association of the value of membership.



LIGHT ON THE BUS SITUATION

In brief, the conclusion reached by the committee on motor vehicles in its report on the "jitney" bus is that a thorough illumination of the whole subject is the one vital necessity. No other solution of the problem is emphasized in the report, which is published elsewhere in this issue, and in view of the committee's strongly-expressed belief in the temporary character of most of the "jitney" bus competition, no more immediately satisfactory plan is apparent. By this time, of course, it is well established in the minds of electric railway operators that the motor-driven vehicle cannot handle traffic as cheaply as the surface car. And it is also well established that, notwithstanding the futility of regulated "jitney" operation, the unregulated "jitney" continues to operate and even can make money over sufficiently short, heavily-traveled routes, so that if it is encouraged by a community through neglect of legal restrictions the inevitable result will be the economic waste incident to the artificial maintenance of inefficiency.

Unfortunately, the public at large has not yet grasped this fact. The "jitney" bus offers high speed, and in some cases it offers, as well, the convenience of stopping at the doors of its patrons' homes. From the viewpoint of the individual, there are opposed to these definite advantages only the minor visible objections of discomfort and risk of accident, together with the nebulous assertion that the effect on the railway company of the continuance of the "jitney" will eventually be to drive the fare up or the service down throughout the outlying sections of the city. As the "jitney" patrons are, in general, limited to the residents of, say, a 2-mile zone about the business district, they are naturally inclined to let the other fellow do the worrying about what is going to happen in the suburbs.

Obviously, this does not alter the fact that the public at large has an immediate and very direct concern in the matter. The public at large will pay the bills in the end, and it is entitled to an unobscured view of the goal toward which the bus fallacy may lead it. There is certainly wide opportunity for the dissemination of information on the subject. This is exemplified by the situation in Chicago, where the suggestion in the City Council to use the city's 55 per cent share in the net receipts of the surface traction lines for establishing competitive buses has resulted in an investigation of the profits accruing from the proposed enterprise. The inquiry was conducted by the Commissioner of Public Service, and he has prepared a glowing report in favor of the project which will, no doubt, influence the minds of many of Chicago's citizens regardless of the fact that it is fairly reeking with errors.

To be specific: In the report a suggested route to Hegewisch, the suburb made famous by the real-estate ventures of one Battling Nelson, is among those selected for analysis. This calls for a 7-mile run for a thirty-passenger bus with an assumed load factor of 70. As the report does not contemplate that the buses will do a pickup business these premises correspond to an aver-

age of twenty-one passengers per trip or three passengers per bus-mile, producing gross receipts of 15 cents per mile, while the report admits the bus would cost 26 cents per mile to operate. The figure of three passengers per bus-mile is certainly a liberal allowance in view of the fact that the Fifth Avenue buses in New York, with their high average seating capacity of thirty-eight and with undoubtedly more short-haul traffic than on the line proposed in Chicago, carry only 3.86 passengers per bus-mile. Nevertheless, the Commissioner of Public Service, by a peculiar process of reasoning and seeming confusion of "seats per single trip" and "seats per round trip," finally reaches the conclusion that the twelve buses on the route in question would earn annual profits of more than \$17,000. On another page he states that a 14-mile north and south route across the city of Chicago is good for receipts that are equivalent to 6.2 passengers per bus-mile, although twenty-six-passenger buses are to be used.

Again, in the same report there is published a table of data on the 3-cent, crosstown bus line in the city of Detroit. In this the number of passengers per bus-mile is actually stated to be five, allowing 35 per cent of standees, while immediately following this is an item showing the direct cost of operation alone to be 27 cents per bus-mile. According to our method of calculation, five passengers at 5 cents each would bring in only 25 cents per bus-mile and would net nothing but a deficit. Yet the Detroit authorities are quoted as stating in all seriousness: "Were we to charge a 5-cent fare we would readily lay aside a nice sum annually!" If this is the material with which the citizens of Chicago and Detroit are fed by their local officials can they be blamed for believing that the "jitney" is a gold mine?

Would it not be well to begin by supplying city engineers, who may be in position to influence public opinion, with some of the elementary data and methods used in transportation problems? At the present time, a perfect flood of glaringly inaccurate reports on bus operation is submerging the fact, and electric railway men alone are equipped with the experience necessary to dam it.

As we have explained before, the only conditions under which automobile service for a 5-cent fare can be made economically successful are on very short runs with large traffic, but even here electric cars can carry passengers much more cheaply than the bus. If the latter is to be permitted, the only recourse for the railway companies, as pointed out in the report of the bureau of fare research, is to go to a zone system and beat the "jitney" out in its own field. However, a campaign of publicity which can be based upon such definite facts as exist in the case of the "jitney" can hardly fail to result in the application of restrictive measures so that such a drastic remedy may not be needed. Most of the "jitney's" freedom at present seems to be due to a belief that it is a highly valuable infant industry and needs pampering. If this belief is dissipated regula-

tion should follow at once as a matter of course, and, in general, the "jitney" is not able to survive regulation.

BUSINESS CONDITIONS AND REGULATION

The annual report of the American Telephone & Telegraph Company is usually a most interesting corporation document. This year, however, it surpasses all previous records by virtue of its being an index of general business conditions in the United States and an authoritative commentary upon the success and needs of public utility regulation.

Theodore N. Vail, president of the company, believes that the basic conditions of this country never were better for the restoration and continuance of normal conditions, and to his mind the correction is simple. Of the three principal creative divisions of industrial enterprises—producers from the earth, manufacturers, and transportation and intercommunicating companies—Mr. Vail looks upon the last as the most important in their creative effect. Upon these industries depend all interchange and movement; their relative economic importance is many times their relative capital, and any cause that disturbs them disturbs the two other classes as well, both industrially and financially. As a corrective measure, therefore, it is necessary to make the securities of such companies, particularly the transportation lines, so attractive that they can secure from investors the \$1,000,000,000 a year needed by the country as a "going" and a "growing" concern. If this were done, the normal conditions of employment, ability to purchase, production and prosperity would soon be restored.

Mr. Vail is a keen and experienced observer of American conditions, and his recognition of the importance of transportation prosperity is forceful. This point comes out, too, in connection with his remarks on regulation. To his mind, regulation and control by commissions and business courts have become a permanent feature of our economic life. Regulation must not be too drastic, however, or interfere too much with operation. During the last few years the disturbance, uncertainty and timidity about transportation caused by legislative requirements and increased wages without corresponding revenue increases have caused a jump in operating expenses which can no longer be met by a reduction in such expenses or by scientific methods. The fact is that the same ratio of progress that was brought about by the introduction and application of the principles of scientific management cannot be permanently maintained, and when this fact is coupled with increasingly onerous legislative and regulatory burdens, it is easy to see, as Mr. Vail says, that an irreducible minimum in unit expenses has just about been reached.

As we have before stated in these columns, there have been a few evidences in the last few months that some commissions are beginning to realize that bankrupt public service companies mean stunted communities and that utilities cannot expand and develop without additional capital. Funds for further investment, how-

ever, will not be proffered in the desired abundance until better returns are in sight than at present. Investors must be reassured against commission severity, and the best way to accomplish this is to bring the general public to a fuller realization that the problems which are before public service commissions are far more vital to our national prosperity than questions before even the highest courts.

MAILING COMMUNICATIONS WITH DIVIDENDS

With the quarterly or semi-annual distribution of dividends an electric railway company has an opportunity often overlooked to communicate to its stockholders information, advice or suggestions bearing upon the welfare of the property. There is no reason why such communications should so generally be confined to annual reports, and as the importance of taking an interest in the public relations of a utility becomes more generally realized by security holders, an increase may be expected in the practice of addressing stockholders and bondholders several times a year if need be, in connection with matters where public sentiment has much influence.

Thus the latest dividend checks of the Pennsylvania Railroad Company, mailed a few days ago, were accompanied by printed slips calling the attention of stockholders to the efforts the management is making to obtain the repeal of the so-called full crew laws of the states of Pennsylvania and New Jersey. The statements point out that the campaign is being made to uphold the interests of the stockholders, of railroad workers as a body and of the public, all of which are unfairly attacked by the full crew laws. The stockholder, it is urged, has a vital interest in the repeal of these laws, and the slips conclude with the request that each stockholder do all that he or she can to interest friends, community and state in securing the removal of this legislation from the statute books.

This practice can be applied in the electric railway field on occasions which will readily occur to executive officers. Among them might be cited forthcoming or pending rate proceedings before state commissions, applications for legislation freeing companies from various burdens of excessive taxation, such as severe requirements in connection with the replacement of highway structures after track construction is carried through, or the repeal of ordinances relating to paving, drainage and other matters of like import, so far as they affect local stockholders. In many of these cases a partial mailing list will be sufficient. Such procedure does not mean that the directors and executive officers of a company are not doing their full share of company management, but it may on occasion afford a useful means of stimulating public opinion along proper lines of action, and at much smaller cost than where circularization has to be independently conducted through the mails. Even the postage on a message to several thousand stockholders is worth saving, if it can be effected by a little foresight along the lines above indicated.

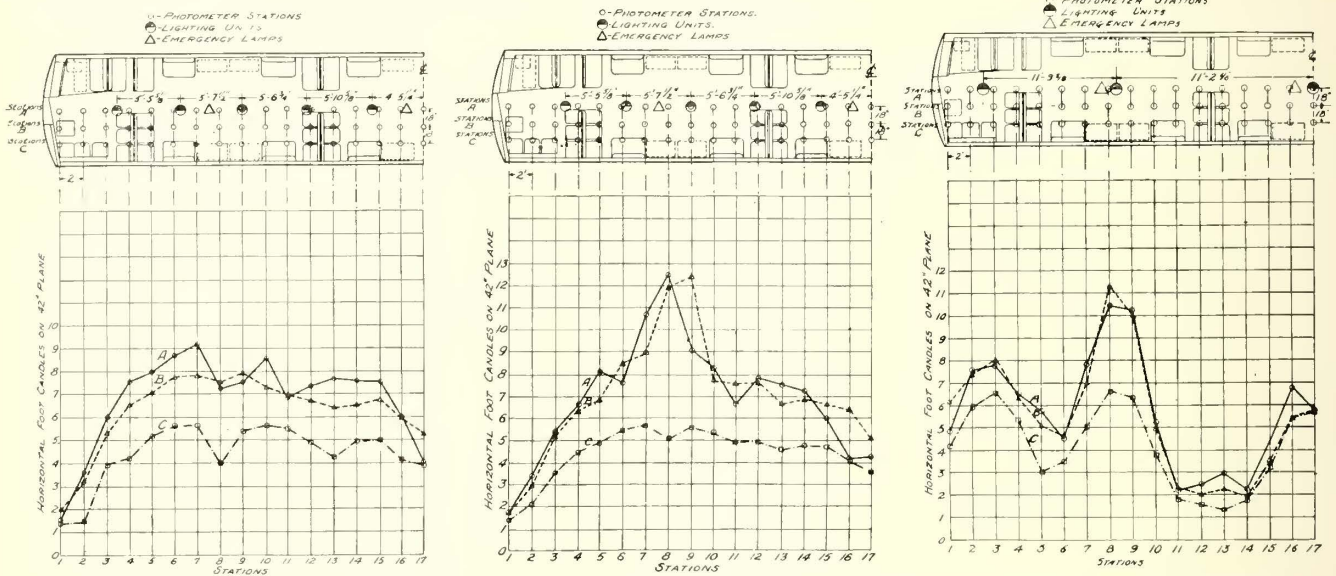
The New York Municipal Car—The Lighting*

Many Lighting Combinations Were Tried in a Full-Size Template Car, Resulting in the Choice of Fifteen 56-Watt Bowl Frosted Tungsten Lamps along the Car Center Line, Besides Emergency Lamps

BY W. G. GOVE, ENGINEER OF CAR EQUIPMENT NEW YORK MUNICIPAL RAILWAY CORPORATION, AND L. C. PORTER, EDISON LAMP WORKS, GENERAL ELECTRIC COMPANY, HARRISON, N. J.

Not the least of the advanced equipment of the New York Municipal car is its lighting. Many new problems had to be solved to meet satisfactorily the following desiderata: (1) Quantity of light; it is desirable to have an average intensity of not less than 3 foot-candles on a horizontal plane 42 in. above the floor, at 85 per cent normal voltage. (2) General effect and appearance of lighting system with lamps lighted or extinguished. (3) Lack of eyestrain for both seated and standing passengers, involving not only intensity and direction of light, but also glare and possible shadows thrown by standing passengers on the reading matter of seated passengers. (4) Efficiency. (5) Installation and main-

tenance expense. (6) Depreciation of equipment in service. (7) General effect and appearance of lighting system with lamps lighted or extinguished. (8) Lack of eyestrain for both seated and standing passengers, involving not only intensity and direction of light, but also glare and possible shadows thrown by standing passengers on the reading matter of seated passengers. (9) Efficiency. (10) Installation and main-



NEW YORK MUNICIPAL CAR—FIGS. 1, 2, AND 3—CHARTS SHOWING DISTRIBUTION OF LIGHT AND EFFECTIVE ILLUMINATION

Fig. 1 shows ten 56-watt, 120-volt tungsten filament lamps in glass reflectors, and four 10-watt, 115-volt tungsten emergency lamps with same reflector. Fig. 2 shows ten 56-watt, 120-volt tungsten lamps in prismatic reflectors and four 10-watt, 115-volt tungsten emergency lamps in prismatic reflectors. Fig. 3 shows five 94-watt, 120-volt tungsten lamps in prismatic reflectors and four 10-watt, 120-volt emergency lamps in prismatic reflectors.

tenance expense. (6) Depreciation of equipment in service.

To study these problems tests were conducted in a full-sized model car. This car was 67 ft. 3 in. over all, 9 ft. 10 in. wide and 12 ft. 3 in. high. The interior dimensions were 65 ft. long and 9 ft. wide. The interior finish was white enameled headlining and walls down to the window sills. Below the sills the walls were painted gray. The floor was concrete and the seats were upholstered in yellow rattan.

Photometer tests were taken to supplement such data as observation of the general appearance, installation and maintenance cost figures, etc. The photometric measurements were not made to compare the efficiency of any particular types of illuminating devices or accessories thereto, though the average intensities obtained were used in securing the relative utilization efficiencies.

In making the photometer tests stations were chosen 2 ft. apart in a horizontal plane 42 in. above the car

voltage. The same lamps, as far as practicable, were used in the various reflector equipments.

It was decided before the tests started that tungsten filament lamps would be used for illuminants, the question being what was the best method of applying the lamps. Three systems of illumination were tried out, namely, direct lighting, semi-indirect lighting and totally indirect lighting. To carry on the tests the interior construction of the car was altered when this was necessary.

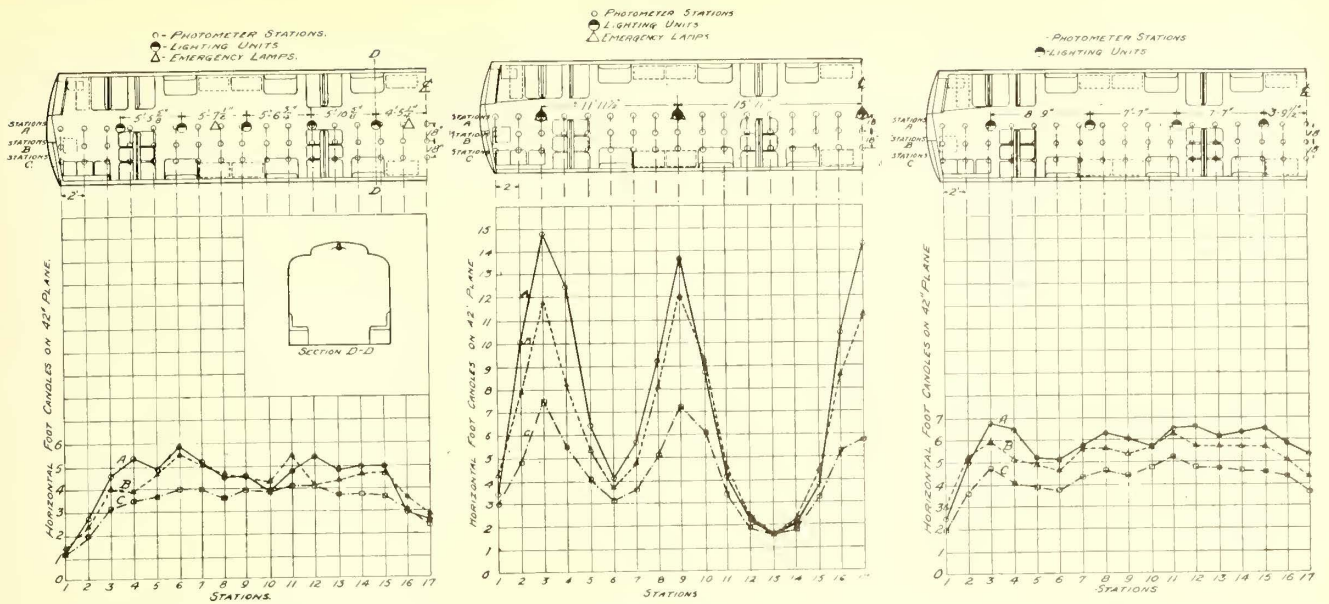
Photographs of the interior of the car were taken with the lamps burning. The exposures were timed to exactly two minutes. These photographs have no bearing on the photometric readings, except to indicate in a comparative way the high and low lighting throughout the car.

DIRECT LIGHTING TESTS

The direct lighting tests made were as follows:

No. 1.—The lighting units consisted of a single row of fourteen 6-in. opal glass reflectors (Fig. 9) mounted along the center line of the ceiling and spaced as shown

*Abstract of a paper entitled "A Practical Study of Car Lighting Problems," read at a meeting of the New York Section of the Illuminating Engineering Society, March 11, 1915.



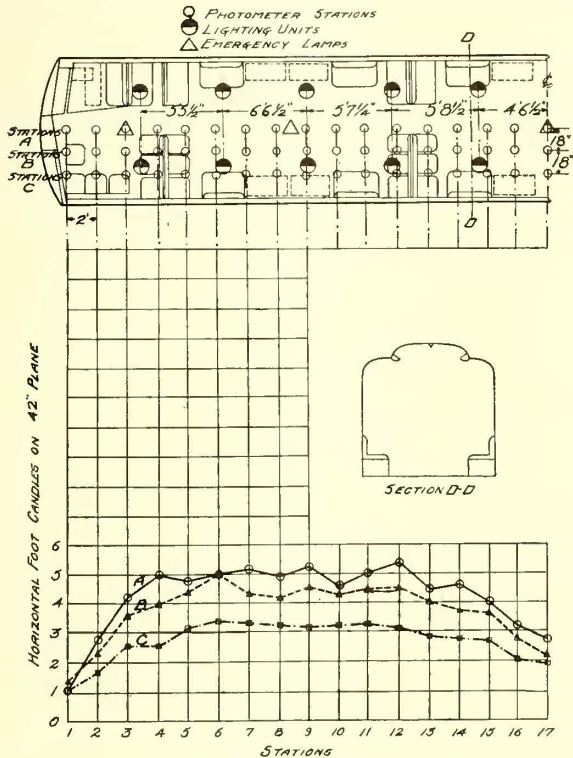
NEW YORK MUNICIPAL CAR—FIGS. 4, 5 AND 6—DISTRIBUTION OF LIGHT AND EFFECTIVE ILLUMINATION

Fig. 4 shows an installation of indirect reflectors set in coves, ten on each side of car, and five 10-watt frosted emergency lamps along center line of car, set in ceiling rosettes. Fig. 5 shows a semi-indirect installation of two 94-watt (horizontal) lamps and one 10-watt (vertical) lamp for each of five units. Fig. 6 shows an indirect installation comprising eight white enameled steel indirect reflectors with three 36-watt, 115-volt lamps per unit.

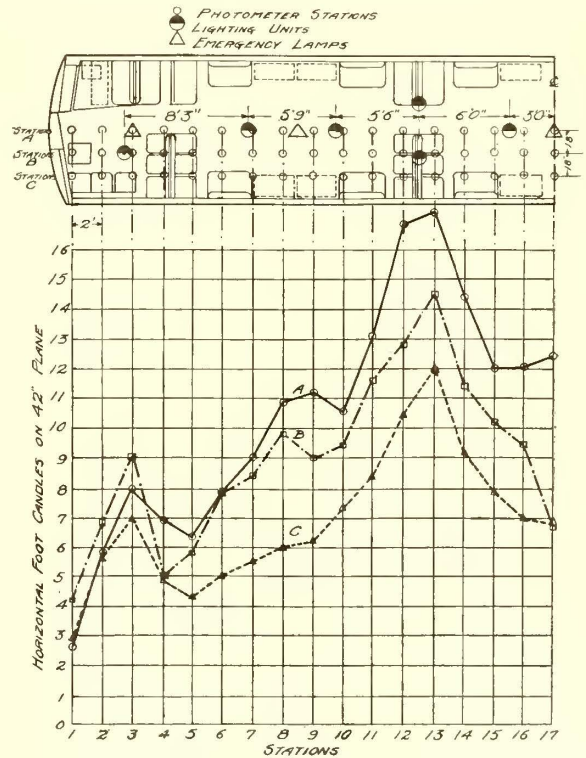
in Fig. 1. Ten reflectors were equipped with 56-watt clear bulb tungsten lamps and four with 10-watt clear bulb tungsten emergency lamps. The light distribution, Fig. 1, was good, though it had points of high intensity under the emergency lamps, due to the small lamp in the large reflector. No bare lamp filaments were visible along the normal line of vision. The efficiency of the

square foot. There were 5.54 effective lumens per watt and the effective utilization efficiency was 68.7 per cent. The utilization efficiency in an ordinary dark yellow car with similar equipment is about 30 per cent, showing the great advantage of the white enamel interior finish.

No. 2.—The second test, Fig. 2, was similar to the first, except that clear prismatic reflectors were used.



NEW YORK MUNICIPAL CAR—FIG. 7—CHART SHOWING DISTRIBUTION WITH COVE LIGHTING (SEE FIG. 17)



NEW YORK MUNICIPAL CAR—FIG. 8—CHART SHOWING DISTRIBUTION WITH LIGHTS ON GRAB RAILS (SEE FIG. 18)

system was high, installation costs—on account of the single row of large units—were low, and maintenance was good, the smooth surface of the reflectors facilitating rapid cleaning. The general appearance in the car was pleasing (Fig. 15) and the illumination good, averaging 5.7 foot-candles at normal and 3.2 at 85 per cent voltage, with an energy consumption of 1.03 watts per

The change of reflectors raised the average foot-candle intensity to 6.1 at normal and 3.4 at 85 per cent voltage. The effective lumens per watt were increased to 5.90 and the utilization efficiency to 73.2 per cent. Maintenance would be slightly higher, due to cleaning the prismatic glass. There was also a little more glare, though not an objectionable amount.



NEW YORK MUNICIPAL CAR—FIGS. 9, 10 AND 11—ARRANGEMENTS AND TYPE OF LIGHTS

Fig. 9 shows 56-watt tungsten lamps in white glass reflectors. Fig. 10 shows 56-watt lamps with reflector board below ceiling. Fig. 11 shows 80-watt turnip-shaped lamps.

No. 3.—In the third test five 94-watt clear tungsten filament lamps, equipped with clear prismatic reflectors, were located in a single row down the center line of the ceiling. Four 10-watt tungsten emergency lamps in clear prismatic reflectors were located between these. The resultant average intensity in the car body was good, but due to the relatively low hanging height and wide spacing of the units the distribution was very uneven (Fig. 3). The installation and maintenance of the system would be low, on account of the small number of large units to install and clean. The average foot-candles obtained were 5.0 at normal and 2.8 at 85 per cent voltage. The energy consumption was 0.87 watt per square foot; the effective lumens per watt were 5.75; and the effective utilization efficiency was 71.5 per cent.

SEMI-INDIRECT LIGHTING TESTS

No. 1.—A very interesting method of lighting was used in the first semi-indirect lighting test. Twelve special 80-watt 95-volt turnip-shaped tungsten lamps, opal-dipped over the tip half, were installed down the center line of the ceiling. Each lamp was suspended by an inverted white enameled cone, shown in Fig. 11. Three 10-watt tungsten emergency lamps were also used in small rosettes. The 80-watt lamps were connected six in series. All of the filament of the 80-watt lamps was located below the center of the bulb; hence, none of it was in the line of vision. The opal on the lower half of the bulb served to protect the passengers' eyes from the glare of the bare filament and to reflect the light up to the ceiling. This system eliminated reflectors, special holders and other accessory equipment, thus lowering both installation and maintenance costs. The aver-

age intensity was 7.7 foot-candles at normal and 5.1 at 85 per cent voltage. The energy consumption was 1.69 watts per square foot, the effective lumens per watt 4.65 and the utilization efficiency 58.4 per cent.

No. 2.—In the second semi-indirect lighting test a novel equipment was used (Fig. 10). Ten 56-watt clear tungsten lamps were located on the center line of the ceiling, supplemented by four 10-watt tungsten emergency lamps. At 6 in. below the ceiling, and extending the entire length of the car, was suspended a reflector consisting of a white enameled board 11 in. wide, convex on a 16-in. radius. The bowls of the 56-watt lamps extended through holes cut in this reflector. Under each hole was fastened a white glass dish to diffuse the glare of the bare filament. The plan was to utilize as much as possible of the direct light from the lamp, to illuminate the advertising signs; the indirect light to give even distribution and the direct light to brighten up the under side of the reflectors. The light distribution was good, but the intensity low, averaging 3.9 foot-candles at normal and 2.2 at 85 per cent voltage. The watts per square foot were 1.03, effective lumens per watt 3.81, and the effective utilization efficiency was 47.2 per cent. The illumination was pleasant, but the appearance of the lighting equipment was rather crude, suggesting a watering trough down the center of the car. While both sides of the reflector and the ceiling were painted alike, the under side of the reflector appeared gray, due to the lower intensity of light on it. Another test with the interior finish silver gray instead of white lowered the efficiency about 10 per cent.

The next semi-indirect equipment tested consisted of ten 94-watt tungsten lamps equipped with five 13-in. glass bowls, mounted down the center line of the ceiling.



NEW YORK MUNICIPAL CAR—FIGS. 12, 13 AND 14—ARRANGEMENTS AND TYPE OF LIGHTS

Fig. 12 shows an indirect fixture with three 36-watt tungsten lamps (see Fig. 6). Fig. 13 shows semi-indirect lighting with two 94-watt and one 10-watt lamp per bowl. Fig. 14 shows tungsten lamps and special curved white glass screens.



NEW YORK MUNICIPAL CAR—FIG. 15—LIGHTING EFFECT OF INSTALLATION SHOWN IN FIGS. 1 AND 9

There were two 94-watt lamps and one 10-watt emergency lamp in each bowl. The bowls were hinged to allow lowering for cleaning and lamp replacement. The bowls were suspended with their tops located 12 in. below the center of the ceiling. The illumination from this system was very uneven, being high directly under the units and low between them (Fig. 5). The average intensity was 5.7 and 3.2 foot-candles at normal and 85 per cent voltage respectively; watts per square foot 1.69, effective lumens per watt 3.36, and effective utilization efficiency 41.5 per cent.

To determine the effect of the shape of the ceiling on the light distribution, a special headlining consisting of a white enameled insert, having a 3-ft. span on an 18-in. radius, was inserted and the test repeated (Fig. 16). This raised the average foot-candles to 6.1 and 3.4 at normal and 85 per cent voltage respectively, effective lumens per watt to 3.62, and the utilization efficiency to 44.7 per cent.

The insert was then removed and the test repeated with a different spacing of the units. This resulted in a little improvement in distribution. The principal trouble was that the car headroom was not sufficient to allow the lighting units to be hung the proper distance below the ceiling.

The next equipment tested required special reflecting devices. Ten 56-watt clear tungsten lamps were located in a single line down the center of the ceiling, with five 10-watt all-frosted emergency lamps in rosettes between them. Each 56-watt lamp was equipped with a screen

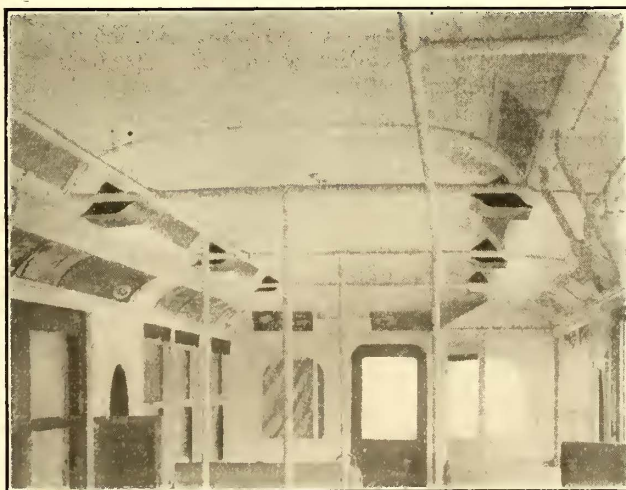


NEW YORK MUNICIPAL CAR—FIG. 16—SEMI-INDIRECT LIGHTING WITH SPECIAL CEILING INSERTS

made from a circular piece of glass bent over a cylinder (Fig. 14). This gave a screen 11 in. long x 8 in. wide x 3 in. deep. When these screens were hung beneath the lamps with their open ends toward the side of the car, it was possible to see the lamp filaments from any part of the passenger car body; at the same time the direct light from a considerable portion of the lamp fell on the ceiling and reached the reading plane with but one reflection, making the system fairly efficient. The distribution lengthwise of the car was even, though the outboard seats received considerably less light than the center aisle of the car. The average intensity was 4.8 and 2.7 foot-candles at normal and 85 per cent voltage, the energy consumption 1.04 watts per square foot, effective lumens per watt 4.63, and effective utilization 57.6 per cent. The chief advantage of this equipment was the ease with which the reflectors could be cleaned.

TOTALLY INDIRECT TESTS

No. 1.—The first totally indirect equipment tried consisted of eight special indirect fixtures, these being white porcelain enameled on steel, 15½ in. in diameter and 5½ in. deep. Each fixture contained three 36-watt tungsten lamps mounted vertically. The fixtures were hung in a single row down the center line of the ceiling, the tops of the reflectors being 13 in. below the ceiling. The spacing of the units is shown on Fig. 6. The resultant illumination was uniform and of fairly good intensity, averaging 5.1 and 3.2 foot-candles at normal and 85 per cent voltage, for an energy consumption of



NEW YORK MUNICIPAL CAR—FIG. 17—INDIRECT LIGHTING WITH REFLECTORS SET IN COVES, TEN ON EACH SIDE.



NEW YORK MUNICIPAL CAR—FIG. 18—INDIRECT LIGHTING FROM UNITS ON GRAB RAILS

1.47 watts per square foot. The effective lumens per watt were 3.43 and the effective utilization efficiency was 46.3 per cent. The chief drawback of these fixtures was their liability to catch and collect much dirt, thus materially reducing their efficiency; also to obtain good distribution it was necessary to hang them so low that they might be in the way of tall passengers.

No. 2.—To get away from a low fixture in the center line of the car, the next equipment tested consisted of twenty 36-watt tungsten lamps in indirect reflectors. These were mounted in two rows of ten each on the sides of the car, just above the deck sill between the ventilators, as shown in Fig. 17. Five 10-watt frosted lamps in rosettes were mounted on the ceiling for emergency lights. The 36-watt lamps were mounted horizontally with their centers 7 ft. 4 in. above the floor. The spacing of the lighting units and the distribution therefrom is shown in Fig. 7. The resultant illumination was of low intensity, averaging 3.5 and 2.2 foot-candles at normal and 85 per cent voltage. The wattage consumption was 1.32 per square foot, effective lumens per watt were 2.67, and effective utilization efficiency 36.3 per cent. The main objection was keeping the reflectors clean.



NEW YORK MUNICIPAL CAR—FIG. 19—LIGHTING ADOPTED

56-watt bowl-frosted lamps in white glass reflectors, and 10-watt all-frosted emergency lamps.

No. 3.—The last test was made on twelve 94-watt tungsten lamps in indirect reflectors and five 10-watt emergency lamps in rosettes, located down the center line of the ceiling. To get maximum headroom for these reflectors and still have them out of the way of passengers, special inverted cone-shaped containers for the reflectors were built into the stanchions along the center line of the car (Fig. 18). Unfortunately the construction of the car necessitated spacing the units rather far apart, so that uneven illumination resulted. In addition to the bowls, smaller inverted bowls were mounted on the horizontal grab rails, at points shown in Fig. 8. Each of these contained one 94-watt tungsten lamp, making a total of twelve 94-watt and five 10-watt lamps in the car. The average foot-candles were 8.5 and 4.7 at normal and 85 per cent voltage, watts per square foot 2.01, effective lumens per watt 4.21, and the utilization efficiency was 53.4 per cent. Much difficulty would be experienced in keeping this equipment clean.

CONSIDERATIONS WHICH FIXED THE CHOICE

General Effect and Appearance.—The general effect and appearance of each system under test were judged by comparison with present methods of car lighting for similar service, namely, with the use of tungsten lamps but without reflectors. Under this item was also con-

sidered the effect of the distribution of light on the various parts of the car.

Lack of Eyestrain.—The effect of the light on the eyes was particularly noted by a large number of observers.

Ease in Reading for Seated and Standing Passengers.—Particular attention was given to the possible shadows thrown on reading matter of seated passengers by passengers standing in a crowded car. In some cases it was found that passengers could obtain proper light in any position; in others it was necessary for them to move in their seats, often to uncomfortable positions, to obtain proper light.

Efficiency of System.—The efficiencies of the systems tested differed widely. In some cases this was largely due to the type of reflector used; in others to the position of the reflector, shape of the ceiling, etc. In several tests it was evident that improvement could be made by changes.

Maintenance.—The question of maintenance was serious. Some of the most desirable arrangements of reflectors and lights were handicapped by the dust problem. With a large number of small units this difficulty increases.

Energy Consumption.—To secure a reasonable operating cost, low energy consumption was one of the important factors. The indirect system of lighting required considerably more power than the direct, while the semi-indirect came between these two.

Depreciation.—The relative loss of reflecting power, due to accumulation of dust on the various types of reflectors, also received consideration.

Emergency Lighting.—It was decided that sufficient light would be obtained from the emergency lamps to permit clearly distinguishing people and various objects in the car with the main lamps extinguished.

A thorough study finally led to the adoption of a single line of fifteen 56-watt bowl-frosted tungsten lamps placed symmetrically down the center line of the ceiling, equipped with reflectors, as shown in Fig. 19, supplemented by six 10-watt all-frosted round-bulb tungsten emergency lamps. One big unit was placed on each end bulkhead of the car to bring up the illumination at these points. This system was chosen as the one containing the highest percentage of satisfactory illumination, low energy consumption, low maintenance and upkeep and pleasing appearance.

The emergency lamps were placed in rosettes, one being located on the side wall over each pair of doors. These lamps do not burn while there is power on the line, but the instant that fails they are automatically thrown onto a storage battery.

In the car as finally equipped the illumination averaged 5.94 foot-candles at normal and 3.85 at 85 per cent voltage, the energy consumption was 1.44 watts per square foot, effective lumens per watt 4.14, and the utilization efficiency 50.6 per cent. These data are not comparable with the other tests, due to the use of bowl frosted lamps (instead of clear), also a larger number and different arrangement of lighting units.

It was interesting to note that the low intensities of illumination, at stations 7 and 17, were opposite the entrance doors, which are dark green, in comparison to the white finish between doors. The curves were slightly high at stations 2, 3 and 4, due to the fact that the end lamps are located on the bulkheads considerably lower than the rest of the lamps in the car.

On the whole, the illumination is remarkably soft, even and pleasing. It is not possible to note any unevenness with the naked eye. The use of bowl-frosted lamps lowers the efficiency a little, but also eliminates glare, even when one looks directly at the lamp.

Report On Motor Vehicles

Committee on Operation of Motor Vehicles Presents Report on "Jitney" Bus Situation—Statement for the Press
—Cost Analysis by Bureau of Fare Research

A meeting of the committee on operation of motor vehicles of the American Electric Railway Association, held in New York on March 16, was mentioned briefly last week. The conclusions of the committee are summarized in a report printed below, submitted to President Allen of the association. The report is signed by the four members of the committee: Britton I. Budd, Chicago; Henry G. Bradlee, Boston; William A. House, Baltimore, and C. L. S. Tingley, Philadelphia.

REPORT TO PRESIDENT ALLEN

The special committee on the operation of motor vehicles, appointed by you to consider the "jitney" bus and its effect upon electric railway operation, begs leave to submit its report as follows:

Your committee has held two meetings, at which the information compiled by the secretary was carefully reviewed.

Consideration of the information in the hands of the committee has convinced it that the "jitney" bus, while at the present time a seeming menace to the interests of the railways, is in general the product of present business conditions and the present state of unemployment, is economically unsound and cannot for long continue to exist. It is, however, at present causing, and for some time to come may cause, a diminution in the revenues of those properties located in cities in which the "jitney" operates. A report prepared by the bureau of fare research bearing on the cost of service of the "jitney" bus is transmitted herewith.

Your committee desires to emphasize the distinction between regular motor bus service and the "jitney." The latter may in general be said to possess these characteristics:

It is the operation of the ordinary four to seven-passenger cars, usually second-hand and of the cheaper makes, by the owner or lessee, for the carriage of passengers for short distances. The service is without fixed schedule or route, and is operated only in such sections as afford a profitable haul.

Your committee is convinced that the evil effects of "jitney" bus operation may only be corrected by the public and not by the companies, and that the companies' part in the elimination of these evils must be confined to the fair and square presentation of the facts in connection with the case, as they affect the public.

In this connection, two elements of the situation stand out above all others:

First, that the ability of railway companies to furnish adequate and reliable service depends upon the patronage of the public, and that the curtailing of this patronage through the operation of the "jitney" must necessarily reduce the ability of the companies to give such service.

Second, that the loss to the community through diminution in taxes and other public charges paid by the railway companies, wear and tear on streets and highways, increased accidents, and ultimate deterioration in electric railway service will more than offset any gains to the community which may arise out of "jitney" operation.

With the idea in mind of affording assistance to the member companies of this association in their task of awakening their communities to the true situation, your committee appends to its report:

First, a statement designed for use in the press, in which has been assembled what the committee believes to be the salient points in the argument against the unrestricted operation of the "jitney." This statement the committee proposes to supplement from time to time, with such other publicity matter as it believes will be of service to member companies.

Second, a statement intended for general circulation, and for such use as the member companies may desire to make of it, which elaborates and puts in terms easily understood by the ordinary citizen, the reasons why this "jitney" competition is not to the best interests of the community.

Your committee has examined many regulatory measures which are in effect or under consideration, and for your information two typical forms are appended hereto. Copies of additional measures are on file in the office of the association and will be furnished to member companies or to public officials interested, upon request to the secretary.

On the matter of regulation, your committee believes it important that this fundamental idea be kept in mind: If the "jitney" is to enter the business of the common carrier, which is in fact what it is doing, then it should by the proper authorities be declared a common carrier and subject to all the duties and obligations placed upon common carriers.

Electric railways are operated under strict laws, ordinances and commission requirements, which have been instituted by the representatives of the people, in the interests of the public and for its protection. If equal protection to the public interest is to continue, it is obvious and equitable that the same requirements and obligations, or other requirements and obligations meeting the special conditions which have arisen, should be placed upon any form of local transportation which seeks to acquire the same rights and privileges upon the public highway.

FOR THE PRESS

The special committee of the American Electric Railway Association, consisting of Britton I. Budd, president Metropolitan West Side Elevated Railways Company of Chicago; H. G. Bradlee, president of the Stone & Webster Management Association of Boston; William A. House, president United Railways & Electric Company of Baltimore, and C. L. S. Tingley, vice-president the American Railways Company of Philadelphia, which has been investigating the subject of "jitney" buses, has submitted its report to the association.

The committee says:

"The 'jitney' is a product of unemployment and has sprung into existence primarily because the owner or lessee, being out of work, is for the time being content with such income as arises from the small difference between the fares collected and the cost of gasoline, tires and minor repairs.

"The committee's investigations have been such as to convince it that the operation of the 'jitney' is not profitable to its operators. This is shown conclusively by the constant change in the personnel of the operators of these machines in the cities where the 'jitney' has been established. The experience in all of these places is that few men stay in the business longer than a month or

two, and the conclusion is inevitable that such owners find the business unprofitable but that their places are supplied by others, who are led to take up the work because of the advertising that has been given to the 'jitney' proposition and to a certain extent because of the representations of automobile dealers, anxious to secure a market for their second-hand cars.

"In the meantime, however, it must be borne in mind by those communities which are encouraging 'jitney' operation that the revenue received by their proprietors is taken from the revenue of the electric railways, and that, because the ability of these railways to furnish adequate service depends entirely upon the moneys received in fares, such diminution in income lessens the ability of the companies to furnish the service demanded. Communities are apt to forget the benefits which are received from electric railway operation and which are not received from 'jitney' bus operation. Included in these are the payment of a very large amount in taxes and in other public charges, extensive contributions toward the cost of paving, the maintenance of unprofitable lines necessary to civic development, the maintenance of fixed routes and fixed schedules and service uninterrupted so far as possible by weather conditions, the investment of a large sum of money in the equipment necessary to take care of the demands during the time of extraordinary travel, the provision of comfortable and safe cars, properly lighted and suited to the varying conditions of the seasons, the system of transfers, whereby the revenues of the company are largely reduced, in order that transportation may be furnished to all parts of the city, its financial responsibility for the damages resulting from the accidents, its submission to the control of the regulatory bodies as to capitalization, rates and service, and, above all, the fact that a very heavy percentage of its income is returned to the community, in the shape of taxes, public charges, wages, payment for supplies and other items.

"Contrasted with the benefits to be derived from the operation of 'jitneys,' your committee believes that the advantage to the community is all with the electric railways, and that it is, therefore, for the communities to decide whether, in their own interest, the 'jitney,' being a common carrier and seeking the privileges granted to common carriers, should not be obliged to assume the obligations of a common carrier.

"In other words, it is for these communities to say whether, as a matter of protection to the public, the 'jitney' should be compelled to operate over fixed routes and upon fixed schedules, whether it should be placed under the jurisdiction of such regulatory bodies as exercise jurisdiction over railways, should contribute in taxes for general city purposes and for paving purposes a sum proportionate to that contributed by the railways, should be held to strict accountability for accidents, should be required to establish its responsibility for damages arising from such accidents, should be compelled to provide for the safety of its passengers, and should maintain the same standard of service required of electric railways.

"Every obligation placed upon the electric railway has been so placed by the representatives of the people in the interest of the people.

"It is now for the people, for whom this elaborate system of safeguards has been put into effect, to say whether an untried and evidently inefficient experiment in local transportation should, without restrictions, without the exaction of a return, with no responsibility and with no obligations, be given the use of the streets and highways, for which use the electric railways pay so high a price.

"This, the committee feels, is the question that squarely confronts every community which has per-

mitted the unrestricted operation of the 'jitney.' It is, moreover, a question which must be decided by the community and in the solution of which the part of the companies is simply to point out the undoubted facts."

REPORT OF BUREAU OF FARE RESEARCH

The report of the bureau of fare research will be published in pamphlet form by the association for distribution among the members. An abstract follows:

Such regulation as has been undertaken through city ordinances may be classified as to the intent of its provisions as follows:

(1) Requiring "jitney" operators to carry liability insurance or to execute a bond for \$10,000 or other substantial sum, for each car operated in order that the public may be assured of their financial reliability in the event of accident.

(2) Requiring and charging a fee for a license in order that (a) the "jitney" shall contribute to the common funds of the community, and (b) the casual and irresponsible operator may be eliminated.

(3) Providing for the regulation and licensing of drivers in the interests of safety.

(4) Providing for definite routes and schedules as affecting reliability of service.

(5) Providing standards (loading, lighting and heating) to promote the comfort and convenience of passengers.

(6) Providing definite rates of fare.

(7) Providing penalties for failure to comply with regulations (fines and revocation of license).

The following tabular representation of ordinance requirements is drawn from copies of ordinances either proposed or adopted. The table is incomplete and some of the requirements may be or may have been altered before adoption. Numbers correspond to numbered paragraphs above:

TABLE 1, SHOWING REQUIREMENTS IN "JITNEY" ORDINANCES

City	Requirements in Ordinance
Birmingham, Ala.	1
Fresno, Cal.	1 to 4, 6, 7
Long Beach, Cal.	1 to 4, 7
Los Angeles, Cal.	1 to 5, 7
Oakland, Cal.	1 to 4, 6, 7
Pasadena, Cal.	1, 2, 4, 7
San Francisco, Cal.	1 to 4
Boise, Idaho	1 to 3, 7
Oklahoma City, Okla.	1, 2, 4, 7
Fort Worth, Tex.	1 to 4, 7
Port Arthur, Tex.	1 to 4, 7
Seattle, Wash.	2 to 5
Spokane, Wash.	1, 2, 4

The city of Denver has passed an ordinance requiring each individual contemplating engaging in the passenger transportation business to obtain a franchise.

COST OF OPERATION

An examination of the various elements of the cost of operation of "jitney" buses may be conveniently made under the general groups of accounts in use by electric railways. Under the head of way and structures there will be normally little expense for the man who operates his own car. Companies, however, which maintain their own garages or own and maintain general office buildings will incur expenses properly listed as maintenance of buildings, fixtures and grounds, and as depreciation of structures. Inasmuch as the greater part of the operators of "jitneys" own their cars and keep them in sheds and stables not otherwise in use, no cost has been considered under this head. Individual "jitney" owners are under no necessity of counting as part of the cost of operation, taxes and interest on the investment in and the cost of maintenance of property otherwise idle. There have, however, been considered a part of such items under the caption of garage costs.

Under the heading of equipment some rather exten-

sive cost figures have been kept during the past year by a company which is a member of the American Electric Railway Association. This company operates several types of cars in different cities, and its records based on twenty Ford cars in service for eight months disclose an expense of 1.3 cents per mile for maintenance of chassis and body. Tires cost 1.2 cents per car-mile, and miscellaneous expenses for maintenance and replacement of parts amount to 0.3 cent per car-mile, or a total for the three items of 3.3 cents. These costs do not allow for depreciation and replacement of the car. Corresponding figures from two other reliable sources and covering other types of cars are respectively 7.71 cents per car-mile and 4.56 cents per car-mile.

Under the heading of power there must be included the cost of gasoline and oil, and engine maintenance. For the Ford cars above referred to, the cost for these items was slightly more than 2.5 cents per car-mile, while the amounts for the other two types of car were 4.43 cents per car-mile and 2.39 cents per car-mile respectively.

Under the heading of conducting transportation the major item is the wage of the driver. The figures which the bureau has been able to obtain for this show a wide variation. One "jitney" company pays 2 cents per mile; one 30 cents per hour; another pays \$8 per week to foreigners for this type of work. Still another company is reported as paying \$15 per week and one pays the driver 35 per cent of the gross receipts. Inasmuch as the possession of a license is necessary in many cities if one wishes to operate a car, it seems that the minimum wage which can be paid will not be greatly below \$2 per day and the man who drives his own car will probably consider his time worth at least \$2 per day. Less may be paid, however, in the case of men and boys who operate cars for three or four hours per day in addition to some other occupation.

There will usually be little to be considered under the heading of traffic. An occasional payment for advertising and solicitation may occur, but this in general may be neglected and may to a certain extent be offset by revenue from advertising.

Injuries and damages and insurance will be the most important items in the general charges, and in many instances these will be by far the largest expenses to be met by the owner-operator. In one of the Pacific Coast cities, each of the three local bonding companies has, since the advent of the "jitney" bus, refused to issue indemnity insurance for such vehicles, and in a somewhat smaller city the rates for such policies have been increased from an annual fee of \$50 to one of \$250.

However, the rates for insurance indemnifying automobile operators against loss through injury and damage suits are not as yet based upon sufficient experience to render them stable, and as "jitney" buses become numerous, they are being increased. At present the rate for a Ford car operated for hire in New York City is \$150 per year. To this sum should be added insurance against damage from fire, against damage from collision, against loss by theft, and against judgments obtained by employees. Probably these risks can be pooled through insurance for a sum ranging from \$200 to \$300 per year.

Garage expense, cleaning and inspection may be figured between \$12 and \$20 per week. This expense will be avoided by owner-operators of single cars, but is nevertheless a real outlay which must be taken into account where several "jitneys" are operated by employees.

TAXICAB OPERATING COSTS

The experience of taxicab companies is also of interest. The estimated figures shown in Table II were

prepared some months ago by Benedict Holden, former counsel of the Mason-Seamon Taxicab Company operating in New York City. They are presented without extended discussion as a contribution to the subject from one closely associated with the operation of automobiles for hire and in possession of pertinent information. The Ford town car is the one assumed in the following table, in which the figures are given in cents per mile:

TABLE II.—EXPENSES PER MILE FOR TAXICABS

1. Drivers' wages, clothing and gasoline.....	4.07
2. Lubricants	0.05
3. Tires	2.00
4. Washing, polishing and garage attendance.....	0.70
5. Repairs, labor	0.85
6. Repairs, material	0.33
7. Painting, upholstering, etc.....	0.17
8. Rent	0.56
9. Light, heat, power.....	0.14
10. Taximeters	0.20
11. Licenses	0.07
12. Injuries and damages.....	0.50
13. Office and supervising salaries.....	0.76
14. Advertising	1.11
Total.....	11.51

These figures were based on the assumption that 15,000 miles would be run annually per car. Items 4, 8, 9, 10, 11, 13 and 14 are nearly independent of the miles run, and if a car made 25,000 miles instead of 15,000 miles in a year, the cost per car-mile would become 10.1 cents instead of 11.5 cents. Eliminating advertising and rent of taximeters, expenses which the "jitney" operator will reduce to a minimum or avoid entirely, the total becomes 9.3 cents per car-mile. To this figure, however, there should be added at least 0.8 cent per car-mile for depreciation of the car, so that on the basis of these figures a car should earn at least 10 cents per mile to pay expenses. In Table III the above figures as well as the foregoing ones are summarized in classified form.

FIXED CHARGES

In addition to ordinary operating expenses, the items of depreciation and interest are essential parts of the cost of service. By far the largest number of "jitney" buses in service are Ford five-passenger touring cars, costing about \$500. The private user receives an allowance of \$200 on an old car turned in on the purchase of a new one, this being based on an estimated normal use of 5000 miles for one year. For two years' operation, or 10,000 miles, the minimum depreciation is about \$275.

TABLE III.—OPERATING EXPENSES OF SMALL AUTOMOBILES

	Company-Owned Automobiles		Estimate for Taxicabs	
	Cents per Car-Mile	Dollars per Year	Cents per Car-Mile	Dollars per Year
Way and structures equipment:				
Car body and chassis	2.1		1.35	...
Tires	1.2	7.71, 4.56	2.0	...
Power:				
Engine maintenance	2.5, 4.43, 2.39		1.5	...
Gasoline			0.95	...
Conducting transportation:				
Drivers	2.0	416—532	2.5	...
Garage expense..	...	...	...	105
Traffic .....	...	...	...	166
Advertising .....	...	...	...	...
General and miscellaneous:				
Supervision and office expenses..	...	...	...	219
Injuries and damages .....	...	75—130	...	75
Insurance .....	...	50—130	...	...

However, there seems little reason to doubt that, considering the excess of mileage over 5000 made yearly by the "jitney," the minimum depreciation will be \$200 whether new cars are secured each year or on alternate years. Similar figures furnished by individual owners of private cars range from \$160 to \$225.

Of course, the cheapness of second-hand cars may influence individual owner-operators to enter the "jitney" business, but it appears unlikely that such competition will be of as long duration or as serious as that of the

owners of new cars of recent design. Consequently, the annual cost of maintaining the investment in a Ford car may be taken as \$240.

The items of taxes and license fees may be considered together at a minimum of \$5. There is no uniformity of license fees and no estimate can be made as to the amount of the average fee.

Collecting the figures and putting most reliance on those coming from companies which keep cost data a tentative summary can be made. Looking at the matter from the point of view of those who drive their own "jitney" buses and who will be persistent but not serious competitors, the cost of operation is simply the expenditure for gasoline, oil, repairs and tires, and the difference between this amount and the fares collected represents profits. The lowest reliable figure for these items, reported in Table III, is 5.8 cents per mile. Assuming a 2.5-mile route (round trip 5 miles) and 75 miles as a day's run, \$4.35 represents the "out of pocket" cost. If four passengers are hauled on each trip the fares will amount to 40 cents per round trip, or \$6 per day, leaving a wage for the operator of \$1.65. A shorter haul or a higher number of passengers will increase the operator's wage but it is not likely that much more profitable conditions than those assumed can be found regularly.

In the case of the company which purchases machines for the service and treats the whole matter as a business proposition the costs varying with the mileage made may be placed at 5.8 cents per mile. Other operating expenses to be considered are insurance, amounting to \$200 per year; cleaning, inspection and housing, \$100 per year; wages of driver, \$700 per year; superintendence and management, \$195 per car per year, the latter figure being based on the expenses of supervision of a large taxicab company.

The above operating expenses may be summarized as 5.8 cents per car-mile plus \$1195 per year. To these must be added \$240 interest and depreciation, and for want of better information \$5 each for state registration, personal property tax and public vehicle license. The total then is \$1450 per year plus 5.8 cents per car-mile, including an 8 per cent return on investment. In other words, the expense is \$4.05 per day plus 5.8 cents per mile.

MAXIMUM PROFITABLE HAUL FOR "JITNEYS"

If we assume that 75 miles are run per day and that four passengers are handled on each half round trip and letting *S* represent the length of the route or one-half round trip, the number of passengers handled per day will be $75 \times 4 \div S$. At 5 cents per passenger the revenue in dollars will be $15 \div S$. This must equal the cost, which is $75 \times 0.058 + 4.05$, and if any interest on investment is earned the revenue must exceed the cost by the amount of the interest. The effect of interest, however, is negligible, because of the small investment.

On the basis of no return on investment, the relation between the number of passengers per half round trip and the maximum length of half round trip for various daily mileages is shown in Table IV.

Although the above figures will vary from place to place and from time to time, it is believed that they are substantially correct as representing average conditions, and it is to be concluded that competition from the "jitney" bus will be confined to the short-haul business. If the "jitney" service survives the experimental stage and finds, as it may, that after being put by laws and ordinances into its proper relation to the community, passengers can be carried from 1 mile to 2 miles for 5 cents, this short haul competition will constitute the necessity for, and furnish a valid argument for, a much more serious consideration of the zone system of fares on the part of the electric railways and regulatory bodies than

TABLE IV.—MAXIMUM LENGTH OF HALF ROUND TRIP FOR "JITNEY" SERVICE

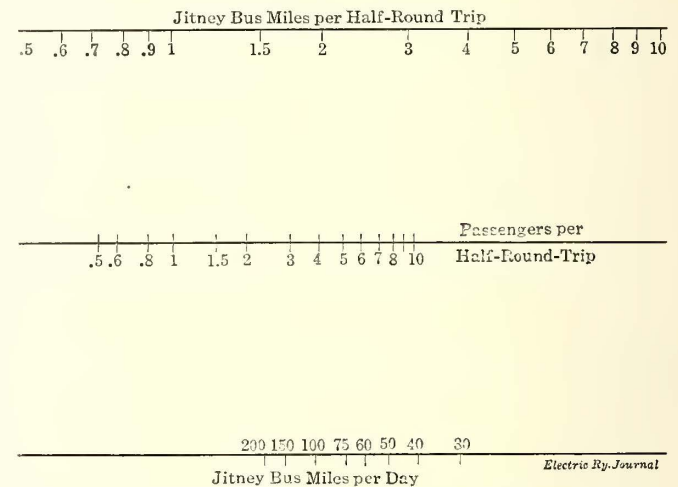
Number of Passengers per Half Round Trip	Length of Half Round Trip in Miles			
	75 Miles per Day	100 Miles per Day	150 Miles per Day	200 Miles per Day
1	0.45	0.51	0.58	0.63
2	0.89	1.02	1.17	1.27
3	1.34	1.52	1.76	1.91
4	1.79	2.04	2.34	2.55
5	2.24	2.54	2.93	3.18
6	2.68	3.05	3.52	3.82

it has received in the past. It is obvious that, to the extent that the street railways are deprived of the traffic that costs less than 5 cents per passenger to handle, they cannot continue to carry passengers for 5 cents where the cost is more than 5 cents.

Fig. 1 is a graphical representation of the relations expressed in the equation:

$$\frac{M}{S} \times N \times 5 = M \times 5.8 + 405$$

where *M* represents the daily mileage, *S* the length of a half round trip, *N* the number of passengers per trip, and 5 the fare in cents. The diagram is used by laying a straight edge across the points corresponding to the assumed figures for the bus-miles per day and for passengers per half round trip, the answer in maximum trip mileage being read on the upper scale. For exam-



"JITNEY" BUS—FIG. 1—DIAGRAM FOR DETERMINING MAXIMUM PROFITABLE HAUL

ple, a total daily mileage of 100 with three passengers per half round trip will permit a maximum haul of 1.5 miles.

RAILWAY AND "JITNEY" COMPARED

It is of considerable interest also to compare the costs of transportation by the small automobile with the costs on a typical electric street railway, and the following analysis, while admittedly not complete, is nevertheless, it is believed, detailed enough to indicate rather closely the relations between the factors which control the profitable length of haul on street railways. The operating expenses, depreciation, taxes and return on investment of a \$20,000,000 street railway plant, classifying the expenses according to the factor which presumably influences its variations, amount to \$0.106 per car-mile, plus \$0.985 per car-hour, plus \$14 per mile of track per day, plus \$0.0025 per passenger, plus \$980 per day or, since the assumed plant is operating 200 miles of track, \$4.90 per mile of track per day.

Assuming a speed of 8½ m.p.h. and that the number of cars in service will be varied to correspond with the variations in traffic so that there is a fixed number of passengers carried on each half round trip, and that a degree of concentration of traffic exists such that if the number of car-miles run during the busiest hour is

multiplied by $10\frac{1}{2}$, the result will be the total number of car-miles of all cars per day, the following equation obtains:

$$P(R - .25) = L(3T + 22.2)$$

where P represents passengers per half round trip, R the fare in cents, L the length of half round trip, and T the minimum headway in minutes.*

Fig. 2 shows the relation between the four quantities which appear in the equation. In this diagram, the figures outside of the two lines should be considered together and the figures inside of these lines should be considered together. For example, assume that it is desired to find out how many passengers per half round trip must be carried to make profitable the operation of a line 3 miles long on which the fare is 5 cents, when the minimum headway during the rush hour is two minutes. Placing a straight edge on the figure connecting 3 miles in Column L and two minutes in column S ,

* This equation is derived as follows:
As L equals length of line, $2L$ will equal length of track and also the mileage per round trip of each car. Then

$$\frac{2L}{8.5} = \text{hours per round trip.}$$

If I equals minimum headway in minutes, then

$$\frac{2L}{8.5} \times \frac{60}{T} = \text{maximum number of cars in service (rush hour)}$$

$$\frac{14.1L}{T} \times 10.5 = \text{car-hours per day.}$$

$$\frac{14.1L}{T} \times 89.25 = \frac{1260L}{T} = \text{car-miles per day.}$$

$$\frac{1260L}{2TL} = \frac{630}{T} = \text{round trips per day.}$$

$$\frac{1260}{T} = \text{half round trips per day.}$$

If P equals passengers per half round trip, then

$$\frac{1260}{T} \times P = \text{passengers per day.}$$

And if R equals fare in cents, then

$$\frac{1260PR}{T} = \text{revenue per day in cents.}$$

Now if the costs of operation equal the revenues per day

$$2L(1400 + 490) + \frac{1260}{T} \times 10.6 + \frac{148L}{T} \times 98.5 + \frac{1260P}{T} \times 0.25 = \frac{1260PR}{T}$$

$$\text{Or } P(R - .25) = L(3T + 22.2).$$

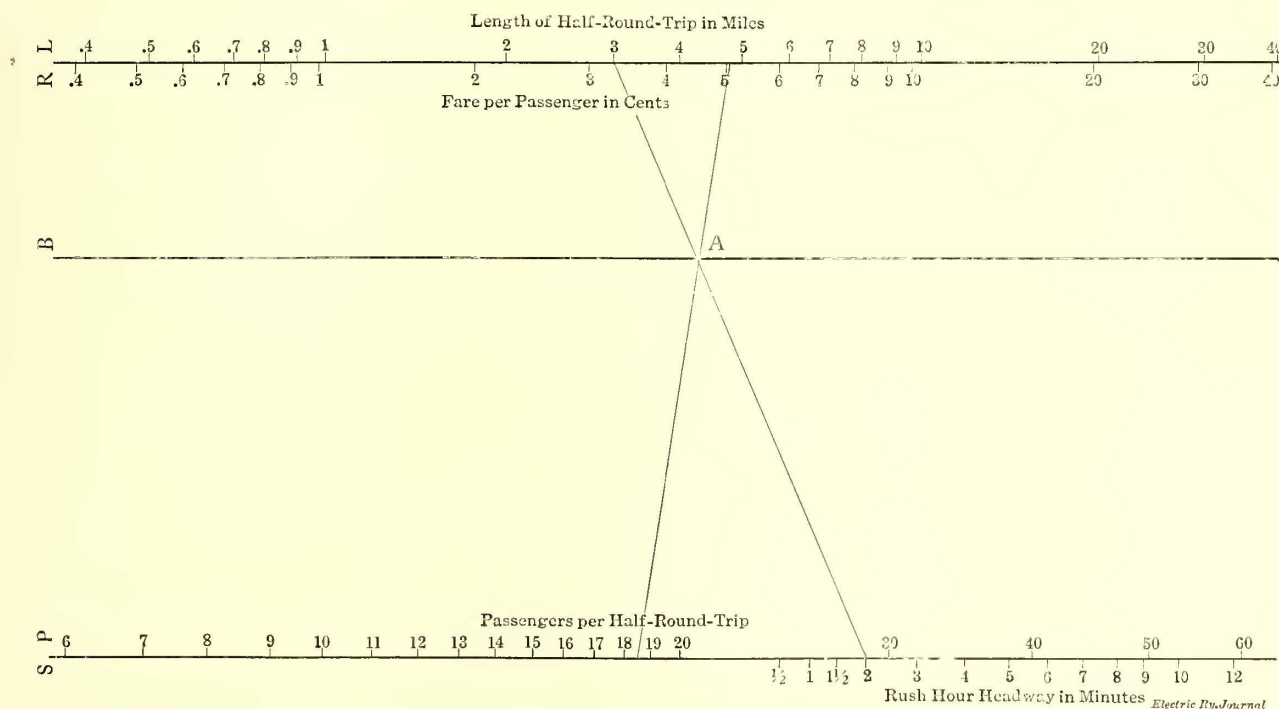
TABLE V.—SHOWING RECEIPTS ON COST BASIS AND FLAT-RATE

Length of Half Round Trip Miles	Number of Passengers		Receipts on Cost Basis		Receipts on Flat-Rate Basis	
	Half Round Trip	Total	Per Passenger in Cents	Total in Dollars	Per Passenger in Cents	Total in Dollars
2	30	3,000	2.25	67.50	5	150
3	30	3,000	3.10	93.00	5	150
5	30	3,000	5.00	150.00	5	150
10	30	3,000	10.00	300.00	5	150
Total		12,000	5.09	610.50	5	600
Total excluding 2-mile line		9,000	6.03	543.00	5	450
Total excluding 2- and 3-mile lines		6,000	7.50	450.00	5	300
Total excluding 2-, 3- and 5-mile lines		3,000	10.00	300.00	5	150

the point A on line B is determined. Connecting A and 5 cents in column R , the number 18 is read in column P as the number of passengers per half round trip. If it is desired to determine the number of passengers per day under these circumstances, it may be done by multiplying the number of trips during the rush hour, 30, by 2, to determine the number of half round trips, multiplying this product by $10\frac{1}{2}$ to determine the number of half round trips per day, and multiplying this again by 18 to determine the total number of passengers handled, or more briefly, divide the number of passengers per car by the headway in minutes and multiply by 630.

It is of interest to note in comparison with costs of "jitney" bus operation that with the length of haul of 2 miles, which is about all the "jitney" bus can do for a nickel (with an average of four passengers per half round trip), and with a rush-hour headway of one minute the electric railway would require about eleven passengers per half round trip to make operation profitable, at 5 cents per passenger. A car, however, seating twenty people can be run on such a route and schedule as this for a 3-cent fare. A passenger riding 10 miles, however, in a car which is carrying on the average of twenty people per half round trip would have to pay something over 12 cents per ride.

To show the effect of the "jitney" in taking away this short-haul traffic, assume, for example, four lines, 2 miles, 3 miles, 5 miles and 10 miles in length respectively, and assume that the fare on each one is 5 cents. Assume 3000 people ride on each line in 100 half round trips. A



"JITNEY" BUS—FIG. 2—DIAGRAM FOR DETERMINING VARIOUS FACTORS INVOLVED IN BUS OPERATION BASED ON ARBITRARY COST PER MILE

fare at cost on the previously-outlined basis would yield the railway \$610.50, while the flat-rate, 5-cent fare yields \$600, as indicated in Table V on page 623, the two figures in this case being in substantial agreement.

The elimination of the 2-mile trip would clearly require that 6 cents be made the flat rate for the remaining lines, and the elimination of the 3-mile and 5-mile lines would raise this flat rate first to 7.5 cents and then to 10 cents.

It must be evident then that the "jitney" bus can compete in the matter of the cost of operation only under very special conditions with the electric railway, and it should be borne in mind that each passenger now riding 2 miles on an electric car contributes something toward the cost of carrying the passenger who rides 10 miles. If the "jitney" bus, then, is permitted to compete with electric lines for this short-haul business, it is obviously but a step toward the zone system of fares.

Electrical Night at N. Y. R. R. Club

Recent Progress in Steam Road Electrifications Described before the New York Railroad Club

The eleventh annual electrical night of the New York Railroad Club was held Friday, March 19, with some 500 members present.

Following the opening remarks by William McClellan, chairman of the committee on electrical subjects, George Gibbs of Gibbs & Hill, consulting engineers, New York, was introduced.

MR. GIBBS' REMARKS

Mr. Gibbs first discussed, with the aid of slides, the electrification of the Norfolk & Western Railway. The superiority of electrification in this case, he said, was due largely to the presence of a long, continuous grade and the opportunity it afforded for the maximum utilization of equipment. If electrification should be extended, say for the entire division of 120 miles, the economies would be less because grades occurred in the middle of the adjoining sections.

Speaking about the equipment in hand, Mr. Gibbs said that twelve electric locomotives were replacing thirty-two steam locomotives. This was due in part to the fact that an electric train would have but two electric locomotives, header and pusher, as against three steam locomotives; and in part to the elimination of engine watering and coaling.

One characteristic of the new locomotives was their ability to exert full tractive effort for a considerable time, say five minutes, while standing. In starting trains it was difficult always to get synchronous action of the header and pusher. With regenerative control it had been found feasible to go down grade at 15 m.p.h. without the use of brakeshoes. As much as 8000 hp had been put into a train, an amount, he believed, never before reached in either steam or electric operation.

Mr. Gibbs then discussed the Paoli electrification of the Pennsylvania Railroad, also with the use of slides. In this case the reason for electrification was that it would reduce existing track congestion at less expense than would the acquirement of land for more track and terminal facilities. It was not, then, a question of securing a direct return on the investment. Among Mr. Gibbs' views were some of the newly-installed light signals which show rows of white lights in any one of three positions—horizontal, 45-deg. and vertical—to take the place of the usual movable semaphore arms.

MR. EATON'S REMARKS

The next speaker, G. M. Eaton, Westinghouse Electric & Manufacturing Company, presented a series of

slides which showed the progress of the Norfolk & Western locomotives from the receipt of the Baldwin chassis to their completion at the Westinghouse works. In discussing various details of the locomotives Mr. Eaton mentioned the liquid rheostat. This device has no moving plates. Instead of moving the plates to vary the resistance, a valve and pneumatic cylinder are provided for the converse act of raising the water.

PROFESSOR PENDER'S REMARKS

Harold Pender, professor of electrical engineering University of Pennsylvania, then discussed the use of electric motor trucks in large freight houses and stations. As in other kinds of electrification, density of traffic determined the question of economy. In one instance of freight moving with two-wheel hand trucks the cost was \$5.33 per ton-mile whereas electric trucks in one Chicago freight house had lowered the cost to 39 cents per ton-mile and in another Chicago house to 48 cents per ton-mile. These costs included labor, interest, depreciation, cost of energy, etc.

W. S. MURRAY'S REMARKS

W. S. Murray, of McHenry & Murray, consulting engineers, New Haven, in taking the floor first referred to his earlier New Haven progress reports before the American Institute of Electrical Engineers and to his more recent paper before the Franklin Institute (see *ELECTRIC RAILWAY JOURNAL* for Jan. 30). He referred to the maintenance costs of locomotives there given and said that these costs, within a few months, would be brought to 6 cents per locomotive-mile and possibly to less.

Operation of single-phase locomotives showed that even without regeneration a most remarkable absorption of starting peaks took place, although the New Haven electric zone is on practically level track. It was found that when 3000-ton electric trains were placed in operation, instead of the expected peaks in the power station load line during the period of acceleration, the load line was actually improved. The explanation of this phenomenon was that when a number of heavy trains are in translation on level track a train that is starting draws down the voltage of the line slightly, not enough to interfere with the schedules but yet far enough to leave the trains in translation at speeds which exceed those corresponding to the lower voltage.

Mr. Murray then discussed what he termed "the visualization of the kilowatt-hour." He said that the capacity of the Cos Cob station had been slightly taxed, but an opportunity had been offered to buy a 4500-kw supply at the eastern end of the line. The question was, what would this comparatively small addition mean? The power records of the New Haven Company had been kept and analyzed so carefully that it was known in advance that the additional 4500-kw could be applied to handle twelve 3000-ton freight trains. On the basis that 1 lb. of coal in the power house delivers as much energy as 2 lb. of coal in the locomotive, it was calculated that the substitution of electric for steam operation of twelve trains would save \$70,000. The reduction in engine repair costs with consequent increase in mileage and the saving in line losses, due to using the available energy nearer the points of supply, meant further economies. In fact, the total saving was about \$150,000.

He believed that electrical engineers had the tendency to drive trains too rapidly. The New Haven trains were geared for about 35 m.p.h. While that speed was justifiable on the New Haven, because of its heavy traffic, yet if the speed was 35 per cent less the in-

creased tractive effort obtained therefor would permit the operation of 4000-ton instead of 3000-ton trains. Therefore, in considering engines in the future it would be of great advantage to look to tractive effort as well as speed.

In conclusion, Mr. Murray spoke enthusiastically about the tests on the New Canaan branch with the mercury arc rectifier. It offered the best means to join the advantages of a.c. transmission and distribution to the advantages of d.c. propulsion. One practical result on the New Haven would be the possibility of increasing the tractive effort of the a.c.-d.c. locomotives by 50 per cent with all speed characteristics maintained.

MR. ARMSTRONG'S REMARKS

A. H. Armstrong, railway department, General Electric Company, was the next speaker. Referring to the economies of electrification, he said that the first cost of the Butte, Anaconda & Pacific Railway, including interest during construction, was \$1,200,000. For handling practically the same tonnage, the railway had saved \$240,000 in operating expenses compared with the last year of steam operation. The success of this electrification had led the Chicago, Milwaukee & St. Paul Railway to adopt 3000-volt d.c. electrification. The 113-mile section between Deer Lodge and Harlowton was well under way. In the entire 440 miles only fourteen substations were required, whereas the Norfolk & Western Railway had four substations in an 11,000-volt a.c. 30-mile electrification. The 3000-volt line was reinforced with but 500,000 circ. mils of feeder copper.

MR. TURNER'S REMARKS

W. B. Turner, Westinghouse Traction Brake Company, then described the advantages of actuating air brakes electrically to obtain simultaneous operation of the brakes throughout the train. As an example, a stop made in 580 ft. with the ordinary brake has been made in 330 ft. with electrically-operated brakes, from a running speed of 40 m.p.h. Not only could emergency stops be made in half the time but all other stops were made in less time, more agreeably and with less strain on the equipment.

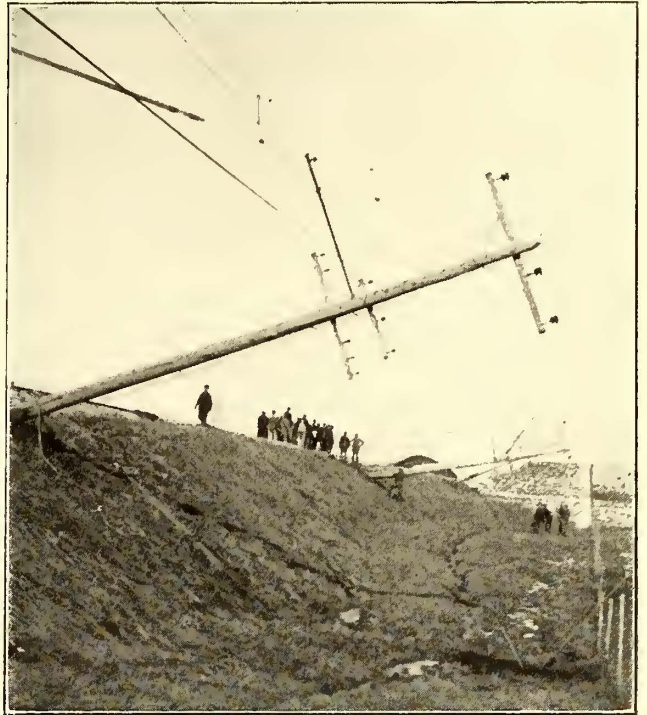
CHAIRMAN McCLELLAN'S REMARKS

Mr. McClellan in concluding the meeting, said that it marked his resignation as chairman after many years of service. He was pleased to see that even in hard times money was being spent on electrification. He ventured to prophesy that electricity if used to its fullest extent would abolish all physical limitations of railroads. Rivers and mountains would no longer be an obstacle. The possibilities of multiple-unit operation were as yet hardly realized. The day would come when single cars would be operated much more freely in trunk line service than to-day. The most startling possibility was in operation through distant control. He thought that the day might come when trains would be operated on automatic stops and signals only, and there would be no employee on the train except someone to look after the comfort of the passengers and telephone in case of emergencies. A still greater improvement that lay in the future was a wide-gage railroad from the Atlantic to the Pacific Ocean for freight only. He was willing to predict the possibility of universal electrification, but the only thing he was not willing to predict was what system would be used.

On the conclusion of the speaker's farewell remarks President Syze thanked Mr. McClellan in the name of the Railroad Club for the excellent work that he had performed as chairman of the committee on electrical subjects.

Storm Plays Havoc on Kansas Pole Lines

The accompanying halftone shows how many of the fifty-three poles between Liberty and Excelsior Springs on the Kansas City, Clay County & St. Joseph Railway were blown down by a storm on Feb. 22. In some instances the poles were on embankments higher than the track, while in others they were on a fill. Both the high-tension and low-tension lines were down at many places.



HIGH-TENSION POLES BLOWN DOWN ON THE KANSAS CITY, CLAY COUNTY & ST. JOSEPH RAILWAY

The section mentioned was out of service for four days. The only previous interruption on this railway was Feb. 22, 1914, when a section of the St. Joseph division was out two hours because of poles blown down in a similar storm. The telephone and telegraph companies lost many poles in eastern Kansas and western Missouri, but no serious damage was reported by interurban railroads other than that shown.

Brooms and Street Cars

A recent discussion of brooms appears in the current issue of *Trolley Topics*, the official organ of the Louisville (Ky.) Railway. It is written by G. B. Powell, superintendent of employment of the Louisville Railway. Mr. Powell says:

"Our present type of broom was invented more than a century ago and is quite an improvement over the 'turkey wing' which was in use at that time. There are many kinds of brooms and their uses are varied, and you will find them in all parts of the civilized world, including the rear platform of street cars. The street car broom has developed a one-sidedness from lack of exercise and from standing, straw-end down, in the same position for days at a time, which gives them the appearance of a run-over shoe. Now if you will give them vigorous exercise about once a trip by sweeping out your car, it will benefit the broom by improving its appearance, improve the looks of your car, cause favorable comment from passengers and prevent the inspector from reporting you to the office for allowing your cars to be dirty."

Meeting of Illinois Electric Railways Association

Economies in Power Consumption, Feeder-Tap Protection and Care of Commutators, and One-Man Cars Were the Topics of Discussion at This Meeting, Which Was Held at the New Morrison Hotel in Chicago on March 19

At the meeting of the Illinois Electric Railways Association, held on March 19 at the New Morrison Hotel, Chicago, sixty members were in attendance, President F. E. Fisher presiding. In the business session which preceded the regular program, it was decided to change the name of the association's signal committee to engineering committee, in order to broaden the scope of its future work. The subject assigned to this committee was economy in power consumption, subdivided under three headings, namely: distribution, handling cars, and return circuits.

G. T. Seely, assistant general manager Elevated Railroads of Chicago, in commenting on the importance of making a thorough study of the subject of economies in power consumption, stated that his company had a man who devoted his entire time to this work. Although this man had been thus employed only a short time, excellent results had already been obtained through close attention to the use of heaters, lamps and controllers. This inspector had found that the heaters and lamps, both in cars and buildings, were left in service when they were not required. Although the large demand for power during the winter months made it practically impossible to accomplish much by instructing motormen in the methods of coasting, the rise in temperature during the early spring permitted much to be done by instructing the men along this line.

Continuing Mr. Seely stated that during the remaining portion of the spring, the summer and the fall months, this schooling should result in a considerable saving. Coasting boards have been installed, and by temporarily placing coasting clocks and meters on cars the motormen were shown the effect of the improper use of controllers. Mr. Seely estimated that his company's power bill was approximately \$1,250,000 a year, so that a small per cent saved in energy consumption represented quite an item. Marshall E. Sampsell, president Central Illinois Public Service Company, in emphasizing Mr. Seely's remarks stated that, even though power was being sold, it was good policy to instruct the power purchaser how to reduce his energy consumption in addition to effecting economies within his organization.

President Fisher stated that the association had decided to inaugurate a question box, and in pursuance of that idea, he had sent out to the member companies the first list of questions. These, however, had been put in the mail too late to permit a full discussion at this meeting and were referred to the different committees. The president requested all companies to reply to such questions as they desired, mailing the answers to Secretary W. B. Griffin, secretary and treasurer of the Elevated Railroads of Chicago, who in turn would distribute the replies to the committees interested, for final disposition.

Chairman E. E. Soules, manager of the publicity department Illinois Traction System, reported for the publicity committee regarding progress in the preparation of the Illinois Electric Railways Association map. He stated that the area to be included in the map had been slightly enlarged in order to show the lines of all member companies. A preliminary draft of the map had been sent to all the member companies and cor-

rections had been received. The map was in the hands of an artist in the process of a final sketch, and as soon as it was completed it would again be sent to member companies for final check and approval.

Charles H. Smith, engineer executive department Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., was then called upon to deliver his paper, "Feeder-Tap Protection in D. C. Apparatus," following which J. M. Bosenbury, superintendent of motive power and equipment Illinois Traction System, Peoria, Ill., read a paper on "The One-Man Car." These papers are abstracted on the next page. The discussion which followed centered around the economies to be obtained by the adoption of the one-man car and details regarding its operation. It was brought out that after the motorman had become familiar with the operation of the one-man car, lengthening of the schedules was unnecessary, even though the single man was required to issue transfers and sell tickets. It was deemed advisable, however, to station flagmen at extremely busy steam-railroad crossings, the operation of the one-man cars making possible a saving which was much in excess of that necessary to pay for this extra crossing protection.

J. M. Strasser, vice-president Illinois Light & Traction Company, Streator, Ill., stated that at one point where one-man cars had been placed in service much opposition on the part of the employees had been experienced. This had been overcome, however, by obtaining other positions for the deposed conductors in addition to convincing the city that it would be possible to give better and safer service than could be afforded under the existing method of operation. Increased safety in operation was believed to be the best argument for the introduction of one-man cars in the smaller cities and towns. It was also considered good policy, should the resultant savings permit, to purchase new cars or at least thoroughly to overhaul the old ones.

At this point J. R. Blackhall, general manager Chicago & Joliet Electric Railway, Joliet, Ill., called attention to the present tendency to seek ways and means of reducing expenses rather than to consider seriously the possibility of obtaining an increased fare. While the one-man car offered a logical and satisfactory means of reducing expenses in the smaller cities and towns, Mr. Blackhall did not believe it a practical proposition for the larger cities. A campaign for increased fares appeared to be the most plausible and practical way to obtain relief. The weight of the argument for higher fares was on the side of street railway companies, because they could show that since their inception the crude horse car had been replaced by the modern electric street car, provided with comfortable seats, heating and lighting systems, while the rate of fare had remained the same. Superimposed upon this argument was the marked increase in the cost of materials, many of which cost 100 per cent more than they did ten or fifteen years ago.

At the close of this discussion the meeting adjourned to the regular association luncheon, during which the members and guests were entertained by songs and music furnished by a chorus and orchestra of employees of the Elevated Railroads of Chicago.

THE ONE-MAN CAR

BY J. M. BOSENBURY, SUPERINTENDENT OF MOTIVE POWER AND EQUIPMENT ILLINOIS TRACTION SYSTEM

If, through the use of the one-man car, it is proposed to place upon the motorman the responsibility for collecting fares and issuing transfers in addition to his other duties, it is manifest that some arrangement should be afforded to simplify and to make safe the method of operating the car. Concentration of the operating devices to which the motorman must give attention is an important requirement, and this may be effected by combining the air-brake valve with the door-operating and step-operating mechanism. Such a combination should provide for stopping the car in the ordinary way and at the same time should open the doors and lower the steps without requiring the motorman to remove his hand from the brake-valve handle. Furthermore, the operation of the air brakes or the operation of the doors and steps should be so controlled that either could be accomplished independently. It is also desirable to include with these functions the application of sand to the rails by means of the brake-valve handle during the progress of a stop and without interfering with any of the other operations.

All of the foregoing requisites have been observed in the one-man cars that are now used on several of the properties of the Illinois Traction System, and, in addition, as the air-brake equipment on these cars is provided with the emergency feature, automatic operation of the emergency valve is provided if the motorman's hand is removed from the controller handle when it is in running position. A rear or emergency door has been provided also, and this is so arranged that if an emergency application of the air brake is made both front and rear doors and steps are automatically thrown open, the release of the air brakes closing them. This is the only circumstance under which the rear door and steps are operated. When the brake valve handle is moved to emergency position by the motorman, sand is automatically applied to the rail.

The principal objections which have been advanced against one-man car operation are that it might retard the schedule by lengthening the time of stops, or by flagging at railroad crossings. The difficulty of attending to the trolley and (in some sections of the country) the race problem are also put forward from time to time as undesirable features. With regard to the effect on the schedule, it may be said that the handling of passengers is largely a question of car design and arrangement. Under the present system of two-men operation the number of unpaid fares on the platform when the car starts is primarily a question of the location of the conductor. But in any case it is highly desirable to have as many passengers seated as possible, or at least past the platform, when the signal to proceed is given, and herein the one-man car does not suffer by comparison.

With regard to the flagging of railroad crossings it is necessary, of course, for the motorman to leave the car and to investigate the safety of the crossing before he returns to his car to move it across. This applies only to crossings where traffic is infrequent, because wherever considerable traffic obtains a watchman is generally stationed at the intersection.

Attention to the trolley or other parts of the car under one-man operation is under about the same handicaps as it is with the fully-inclosed cars of two-man type. Furthermore, the question of the trolley coming off the wire is largely one of maintenance, and it has been found that this criticism has not been borne out in the case of cars with two men when both of them are stationed on the front platform.

In the sections of the country where the distinction in race is made some objection may be advanced against the entrance of negroes by the front door of the car, but this situation does not differ greatly from that which prevails under conditions where the whites enter at the rear, and are obliged to pass through a section reserved for negroes.

In general it has been observed where one-man car operation is practiced that the undivided responsibility has produced a degree of efficiency in operation not normally reached with two-men operation. Step accidents are unknown. Where a comparison has been made between the two methods of operation the results so favor the one-man car that in one instance a claim department has actually requested the use of more cars of this type. The net savings in operation has been variously estimated to be from 8 per cent to 14 per cent of the gross earnings and the cost of arranging a car for one-man operation is almost negligible in comparison.

The attitude of labor toward the introduction of the one-man car will probably be antagonistic, but if any considerable saving can be effected, it follows that the railway company will be in a position to provide better service for its patrons, and to reach this desirable condition the transportation companies must be met halfway by the public. With the possibility of more frequent service, combined with adequacy and at least an equal degree of comfort, it is fair to assume that once the proposition is thoroughly understood co-operation from the public will follow.

FEEDER-TAP PROTECTION AND CARE OF COMMUTATORS

BY CHARLES H. SMITH, ENGINEER EXECUTIVE DEPARTMENT WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

Under the title "Feeder-Tap Protection for D. C. Apparatus and a Few Suggestions Regarding the Care of Commutators" Mr. Smith explained how and why feeder-tap protection should be furnished, and stated the precautions necessary to secure good commutator operation. His paper was an extension of one published in the *Electric Journal* of January, 1915.

LOCATION OF FEEDER TAPS

By the location of feeder taps at proper distances from the power station or substation, the resistance or reactance of the feeders suffices to limit short-circuit currents to values which will not cause "bucking" or "flash-over." Mr. Smith quoted an official of a large system to the effect that his practice is to allow no taps to be made within 2000 ft. of stations. Recently, a tap located 1000 ft. from a station caused flash-overs and temporary shut-down. Removal of this tap to a distance of 2000 ft. stopped the trouble. In another case taps were found in front of substations in which flash-overs were serious. The cutting of these taps produced improvement, and the removal of the nearest taps to a distance of 4000 ft. entirely overcame flashing. Other illustrations cited by the speaker demonstrated the importance of furnishing proper feeder-tap protection, from 75 per cent to 90 per cent of the trouble from flashing being due to lack of such protection.

No general rule can be laid down for determining the proper tap distances. So many variables enter that the problem in each case can best be solved by moving the "close-in" taps until the resistance of the circuit becomes great enough to cushion and protect the machines. The variables which enter in determining tap distances are as follows:

(1) Capacity behind the generating unit. With a rotary converter the greater the capacity at the source of generation the greater will be the damage in case of trouble, and the more nearly equal the capacities of rotary and a.c. generator the less serious will be the damage. Motor-generator sets are better protected through the cushioning effect of the windings, including the transformer windings, as are also engine-driven d.c. generators. In the latter, there is the cushioning effect of the engines in addition to that of the windings.

(2) Capacity of the rotary or generator. The larger the unit the less subject is it to flash-overs.

(3) System voltage. The lower the voltage the nearer to the machines may the taps be placed.

(4) Sizes of feeders and rails. The larger the feeders and rails the greater must be the tap distances from the machines.

(5) Disposition of feeders. The distribution of feeders should be such that each will carry a reasonable proportion of the station output. Trouble on a feeder carrying more than its share is frequently responsible for flash-overs.

(6) Bonding. Broken bonds and poor ground connections have occasionally been known to produce flash-overs.

(7) Sizes of cars. With a given size of substation unit the heavier the car equipment and the higher the motor rating the greater will be the "drag" upon the substation equipment.

In general, experience has shown that on a 600-volt system the first tap should not be less than 2500 ft. from the machines, and on a 1200-volt system, 5000 ft. The line losses due to these distances are of no consequence compared with the energy lost through flash-overs and the expense involved in repairing damaged apparatus. Furthermore, with long feeders the car equipment is benefited by being worked at a more uniform voltage.

KINDS OF FLASHING

Mr. Smith analyzed the different varieties of flashing under these heads: Quick "squealing" or "kicking" flash; flash-over or buck-over; pedestal flash, and flash to the V-rings. The first shoots from under the brushes but does not carry across. It rarely results in much damage. Flash-overs are those which reach from positive to negative brush-holders. They may or may not prove destructive, but after one occurs the machine should be shut down and the commutator and brush-holders cleaned. Flashes to the bearing pedestal are invariably destructive and, in addition to blistering and burning the commutator and the brush rigging, burn the pedestals. They are largely traceable to the practice of grounding the frames of machines of which the negatives are grounded. Flashes to V-rings are not as common as formerly, as the rings are now insulated.

With rare exceptions, flashing is due to troubles originating outside the station, that is, line and car troubles in combination with "close-in" taps. The general impression that motor-driven d.c. generators, engine-driven d.c. generators, twenty-five-cycle rotaries and sixty-cycle rotaries, are equally suitable for all d.c. service, regardless of conditions, is not correct. These machines are temperamentally different, although there is no d.c. service to which they are not equally applicable provided they are properly installed and protected.

COMMUTATOR TROUBLES

The ideal commutator is a smooth one, and if it were possible to find brushes which would carry current at the high density now required and at the same time be sufficiently abrasive to keep the mica down,

the practice of slotting would soon lose favor. Undercutting is objectionable because the slots must be cleaned, the bars must be bevelled, and the copper must be removed from the slots after turning. A revolving stone gives satisfactory results in the surfacing of commutators.

The rate at which slots are bridged over is governed by the hardness of the bar copper, the width of the bars, the speed, the angle at which the brushes are set, the direction of rotation and the brush characteristics. In addition, lubricants have to be more intelligently applied with undercutting than without.

The "seasoning" of the commutators at the manufacturer's shops to render them permanently tight in service is difficult. Bars loosen due to the expansion and contraction of the copper and the V-rings, and to the results of the heating of the mica. Tightening of the V-rings while the commutators are hot usually cures the trouble, especially if bolts are tightened at opposite ends of diameters. Loose commutators are likely to cause flashing on slight provocation. Proper care of brushes is also an element in satisfactory operation.

In conclusion Mr. Smith makes the inquiry, "Is it not worth while to protect service, apparatus and men against the damaging effects of flashing and 'buck-overs' when the method is so fundamentally simple and the cost so small?"

Gear and Pinion Operation

In the current issue of the *General Electric Review*, A. A. Ross contends that operating conditions have much to do with gear life. He states that the involute tooth is best suited for railway motor work on account of the greater thickness at the root, and because the distance between pinion and gear centers can be slightly increased without seriously affecting the mesh. He recommends the "standard" rather than the "stub" tooth wherever it can be used, for "railway motor gearing is bad enough at the best."

Under operating conditions affecting wear Mr. Ross emphasizes four, as follows: (1) Grit, which accumulates in the gear pan. While practically every master mechanic will disclaim its presence it is there and has been found in quantity up to 24 per cent. It usually enters between gear hub and gear pan in the form of street dust, brakeshoe dust and wheel wash. Carelessness during inspection is also a cause of gritty grease. (2) Excessive lining wear, which produces improper mesh. This also produces noisy chattering affecting commutation. (3) Consistency of lubricant. This should be of such consistency and used in such quantity as to permit the teeth to dip frequently. (4) Number of stops in schedule, motormen's methods of accelerating and braking, etc.

The practice of driving pinions home with the sledge is bad. After fitting, the pinion should be heated throughout in boiling water and lightly tapped into place. In dismounting a puller which grips all of the teeth is safest. On account of "fatigue" of the metal pinions should be scrapped on a safe mileage basis, regardless of wear. Gears and pinions should be of the same hardness. In mounting solid gears without keys a pressure of 20 to 30 tons is sufficient for city cars and 50 tons for interurbans, as it takes a higher torsional pressure to twist a gear than to mount it.

March 11 was known as safety day among the employees of the Brooklyn (N. Y.) Rapid Transit Company. It was celebrated in the evening at the main clubhouse of the company at Jamaica and Alabama Avenues, with an entertainment under the auspices of the Brooklyn Rapid Transit Employees Benefit Association.

A. R. E. A. Convention Proceedings

An Account of the Action Taken by This Association on the Various Committee Reports

The discussion of the committee reports at the annual convention of the American Railway Engineering Association, held in Chicago, March 16-18, 1915, abstracts of which were contained in the issue of the *ELECTRIC RAILWAY JOURNAL* for March 20, brought out additional facts of interest to electric railways. President W. B. Storey, Jr., vice-president Atchison, Topeka & Santa Fé Railway, reviewed briefly the year's events of interest to railroad engineers, discussing topics relating particularly to the association's work.

ACTION ON COMMITTEE REPORTS

The report of the committee on signs, fences and crossings was presented by W. F. Strouse, chairman, and after some discussion the specifications for galvanized wire fencing, gates for right-of-way fences and concrete fence posts were adopted by the association. This committee's recommendation for track construction and flangeways in paved street crossings and in paved streets was revised so that the 141-lb. 9-in. girder rail was not recommended unless conditions required. For street crossings it was revised and provides for standard track construction with such modification as may be required to suit the situation. Upon motion it was finally decided to refer the question of track construction back to the committee for further consideration.

That part of the roadway committee's report setting forth a classification of soils was referred back for further consideration, while the specifications for sodding were adopted for inclusion in the manual. The formula recommended by the committee on ties to provide an economic comparison of railroad ties with different materials, was also approved and adopted for the same purpose. The information on metal, composite and concrete ties was received as such.

The recommendations of the committee on rail, i.e., that the sections weighing 100 lb., 110 lb. and 120 lb. per yard be approved as standard, that the A. R. A. section A also be adopted as standard for 90-lb. rail, that for sections below 90 lb. it was inadvisable to recommend any changes and that these conclusions be presented to the A. R. A. for its adoption, were approved. The specifications for high carbon steel joint bars and for heat-treated, oil-quenched steel joint bars were adopted for publication in the manual. In the discussion of the rail committee's investigation of transverse fissures, Dr. P. H. Dudley, New York Central Railroad, stated that one phase of this investigation had led him to believe that the shape of wheel treads was not as it should be. He found that the coning of the tread materially reduced the tread bearing. He believed that the uniform bearing over the entire head of the rail would produce much better results both as regards rail and wheel wear.

That part of the track committee's report containing tentative plans and specifications for manganese frogs and crossings was received as information. In a similar manner the report of the committee on buildings, portions of which were submitted as information and the other parts containing recommendations for changes in the manual, were approved.

The report of the committee on electricity was largely one of progress, but contained two recommendations, namely, a clearance diagram for equipment and permanent way structures adjacent to third-rail, which was approved by the association for publication in the manual. The second recommendation relating to speci-

fications for crossings of wires and cables over steam railroad rights-of-way was also approved. A recommendation containing certain revisions and modifications in the existing specifications for overhead crossings of electric light and power lines was approved, but on the suggestion of the committee was not recommended for publication in the manual.

The recommendation of the wood preservation committee, namely, that the use of coal tar in creosote be permitted, was approved. In addition to this a specification for creosote-coal tar solution was adopted for insertion in the manual, as well as four rules relating to the water allowance in creosote. In support of the recommendation of the committee on the grading of lumber, the present rules for white and Norway pine and hemlock were rescinded and the suggested rules for grading Southern pine lumber were received as tentative rules.

The report of the committee on ballast brought out more lively discussion than any other submitted at this convention, particularly that part of the report containing a proposed ballast section for single track on tangents. It developed that there was no necessity for banking ballast against the ends of the ties as proposed in the recommended section, since this was believed to be detrimental to the track. In substantiating this the opinion was advanced that the ballast at the ends of the tie becomes clogged, both by powdered ballast and dust, and thereby prevents good drainage. An actual test also had demonstrated that excessive tamping aided in clogging ballast. Banking of gravel at the ends of the ties also made more difficult the maintenance of track circuits when block signals were used, while a change to the drainage section, namely, by exposing the ends of the ties, eliminated this difficulty. Furthermore, it was found that the usual objection to the drainage ballast section did not obtain in practice, namely, that it was difficult to keep the track in line.

Regarding the kind of tile to be used for track drainage purposes, one member stated that in the past too high a value had been placed upon the qualities of ordinary farm tile. Experience had shown that it crushed out of line and filled with silt after a time, becoming valueless for drainage purposes. Vitrified bell and spigot tile was recommended, since it has a higher compressive strength and the bell tends to reduce the amount of silt carried into the tile by water. Following this discussion the track section was referred back to the committee for further consideration, awaiting such time as the report of the other committees investigating questions closely related to this one had made a report.

ANNUAL DINNER

The annual dinner was held in the Gold Room of the Congress Hotel on the evening of March 18, with President W. B. Storey acting as toastmaster. The list of speakers included Charles S. Gleed, president Missouri & Kansas Telephone Company; Sir George Foster, minister of foreign trade and commerce, Dominion of Canada; Frank L. Mulholland, president International Association of Rotary Clubs, and Benjamin Baum, chief engineer maintenance of way Maumee Valley Railroad.

The following officers were elected for the ensuing year: President, Robert Trimble, chief engineer maintenance of way Northwest System Pennsylvania Lines, West Pittsburgh, Pa.; first vice-president, A. S. Baldwin, chief engineer Illinois Central Railroad, Chicago; second vice-president, John G. Sullivan, chief engineer Western Lines Canadian Pacific Railroad, Winnipeg; treasurer, George H. Bremner, assistant district engineer division of valuation Interstate Commerce Commission, Chicago, and secretary, E. H. Fritch, Chicago.

ANNUAL CONVENTION
SAN FRANCISCO
OCTOBER 4 TO 8, 1915

American Association News

ANNUAL CONVENTION
SAN FRANCISCO
OCTOBER 4 TO 8, 1915

Committee Meetings Held This Week Included Accountants' Educational, Engineering Lightning Protection, and T. & T. Training of Transportation Employees—Transportation Committees Active Also

CONVENTION TRANSPORTATION MATTERS

Secretary Burritt's office is sending advance information to local transportation committee chairmen regarding the trains to and from the convention. A train will go over the N. Y. Central, northern route, and another over the Pennsylvania via Denver and Salt Lake City. Leaving San Francisco these trains will stop at Yosemite National Park, the San Diego Exposition and other Southern California points, as well as the Grand Canyon of Arizona. The details of these trips have not yet been definitely settled, but they will be round trips of the all-expenses-paid variety. A "special" will also be made up in Chicago and another one-way New York train is contemplated, leaving as late as Oct. 1, arriving in San Francisco on Oct. 4.

ACCOUNTANTS' EDUCATIONAL COMMITTEE

A meeting of the committee on education of the A. E. R. A. A. was held in New York on March 22. The committee members present were George G. Whitney, Washington, D. C., chairman, and F. L. Pryor, Philadelphia, Pa.; E. B. Burritt and H. C. Clark, of the American Association; J. L. Conover, Jr., Newark, N. J., and H. H. Norris, *ELECTRIC RAILWAY JOURNAL*, were present by invitation. The status of the correspondence course was discussed and a number of suggestions for improvement in details were referred to the chairman for conference with the instructor, Professor John R. Wildman of New York University. The desirability of adding an introductory course for accounting and other clerks and for individuals not familiar with accounting practice was considered.

PROGRESS ON THE ACCOUNTANTS' CORRESPONDENCE COURSE

Reports which have been received by the chairman of the educational committee of the Accountants' Association show that about one-half of the individuals enrolled in the correspondence course are now submitting papers for examination by the instructor. This is a very gratifying proportion and shows that an intelligent interest is being taken in the topics covered by the instruction papers. Many of those enrolled subscribed for the course to secure the information for reference purposes, and these also are being benefited although they do not file reports.

As was clearly explained in the prospectus of the present course, it was designed to give a scientific foundation for accounting work to those familiar with the practical details. Classification of accounts is not being considered because there is not yet sufficient unanimity regarding classification to warrant its incorporation in a regular course. Those in charge felt that there are certain fundamental principles of accountancy which permeate all lines of work so that the experience gained in other fields is available in electric railway accounting. The illustrations have, therefore, been drawn from different lines and the students have been left to apply the principles to their own work. As the course proceeds the illustrations will be drawn more and more from electric railway practice.

In view of the somewhat restricted field, the enroll-

ment of a class of more than 300 was an excellent indication of the desire of young electric railway accountants to prepare themselves for doing their work better and thus for promotion. If the result of the year's work is the establishment of a course or set of courses which will be permanent except for their adaptation to changing conditions in the industry, the achievement will redound to the credit of the association and to those who have fostered the movement. It devolves largely upon those who are now following the course to get the most possible out of it, realizing that they are thus assisting in laying the foundation for the future of the course as well as for their own progress.

COMMITTEE ON TRAINING OF TRANSPORTATION EMPLOYEES

A two-day session of this committee was held in Boston on March 25 and 26, Chairman C. S. Ching, Boston Elevated Railway, presiding. The members present were E. E. Strong, Rochester, N. Y.; F. I. Hardy, South Bend, Ind.; W. J. Harvie, Syracuse, N. Y.; H. H. Hanson, R. B. Currie, and Edward Dana, Boston. The committee is making a study of the laws relating to employment and is planning a systematic program for the improvement of courtesy. These will be covered at length in the report to be presented at the 1915 convention.

NEW ENGLAND TRANSPORTATION COMMITTEE

This committee held its first meeting on March 16, those present being H. E. Reynolds, Boston, chairman; C. C. Wood, Springfield, Mass.; A. A. Hale, Boston; J. E. Johnson, Boston, and R. M. Sparks, Boston, secretary. It was decided that the plans as outlined by the director of transportation will be followed by the New England section and it is expected that a large number of local members will make the trip. A notice for presentation at the annual banquet of the New England Street Railway Club on March 25 was prepared. This called attention to the inducements and conveniences which will characterize the trip and gave the names of the New England committee members so that inquiries can be made of those conveniently located.

COMMITTEE ON LIGHTNING PROTECTION

A meeting of the Engineering Association committee on lightning protection was held in Pittsburgh on March 24 with all of the members present, as follows: D. E. Crouse, Annapolis, Md., chairman; F. R. Phillips, Pittsburgh, Pa.; E. J. Blair, Chicago, Ill., and J. Leisenring, Springfield, Ohio. C. G. Hecker, Pittsburgh, also attended part of the meeting. The following assignments were made, the individuals named to prepare sections of the report after correspondence with other members of the committee: Mr. Phillips, material of cores, location and size of car lightning arrester choke coils, also location, available types, and suitable methods of inspection of car lightning arresters; Mr. Crouse, car wiring with reference to the prevention of electrostatic and electromagnetic induction, and lightning arrester grounding, including size of ground wire, proximity of

other wires, and effect of steel cars on methods of grounding; Mr. Leisenring, available types of line lightning arresters and recommendations as to the desirable number per mile; and Mr. Blair, line lightning arrester ground connections, with regard to earth or rail connection or both. These topics were thoroughly discussed by the committee with a view to a logical development of the subject in preparation for the convention report.

DENVER TRAMWAY SECTION

The regular monthly meeting of Company Section No. 3 was held on March 18, with an attendance of 125. H. P. Fligg, chief of the coasting department, read the principal paper on the subject of "Coasting." This provoked a lively discussion.

PUBLIC SERVICE RAILWAY SECTION

On account of lack of space last week the March meeting of Company Section No. 2 was merely mentioned. The meeting was attended by more than 300 men, and talks were given by R. E. Danforth, general manager; Alfred Green, Galena Signal Oil Company, and H. H. Norris, *ELECTRIC RAILWAY JOURNAL*.

Mr. Danforth reviewed his own experiences in Buffalo and Rochester, calling attention to the fact that in the latter city seven new sets of motor equipment were required in ten years, owing to the rapid development of the railway motor between 1890 and 1900. He showed how this development work imposed heavy financial burdens on the electric railways of the country and intimated that the cost of this development is a proper capital charge. From the experience of the Public Service Railway he showed how, during seven years past, maintenance costs, even of old motors, had been reduced by such devices as impregnating windings with insulating varnish, slotting commutators, etc. He also gave figures comparing maintenance costs of different types of motors used in Rochester some years ago, indicating how rapid was the progress in perfecting mechanical details in motor construction. Mr. Danforth quoted a number of prices paid for repair parts of early motors and for complete motors, showing that not only were motors expensive, but the cost of the repair parts was excessive, due to the inexperience of the manufacturers.

Mr. Green's talk was an intimate personal account of troubles with early motors with particular reference to gears and controllers. He gave amusing details of the construction of gears with wooden centers and cast-iron rims, the wooden centers being necessary for insulating purposes. Steel rims were later shrunk on the wooden centers with great reduction in cost. His talk gave a vivid impression of the difficulties of keeping cars in motion in the early days, which difficulties are apt not to be appreciated by the rising generation. He closed by emphasizing the fact that troubles with equipment were farreaching in preventing regular operation and dissatisfaction to patrons.

Mr. Norris confined his attention to calculations of the energy required to bring cars to speed from rest on level track, grades and curves and to maintain speed, for the purpose of showing the relation of accelerating power to the necessary size of motors. The speaker and the audience worked the problems out together, using motor curves which were printed on the regular Public Service data-book leaves. The calculations were based on equipment used in Newark, so as to permit the results to be checked from the experience of the men present. The A. I. E. E. motor rating was explained and the relation of this rating to the all-day load of the motor was illustrated from the calculations.

New England Street Railway Banquet

Large Attendance at the Annual Meeting in Boston on Thursday—New Officers Elected

Between 600 and 700 members and guests of the New England Street Railway Club gathered at the Copley-Plaza Hotel, Boston, Mass., on the evening of March 25 for the fifteenth annual banquet of the organization.

As usual, the banquet was preceded by the annual meeting in the afternoon, at which Clarence E. Learned, of Boston, was elected president, succeeding John T. Conway, of Brockton, Mass. Other officers elected were: vice-presidents: Massachusetts, C. V. Wood, Springfield; Maine, A. H. Ford, Portland; New Hampshire, J. Brodie Smith, Manchester; Vermont, Frank C. Wilkinson, St. Albans; Rhode Island, A. E. Potter, Providence; Connecticut, R. W. Perkins, Norwich. H. A. Faulkner, of Boston, and E. P. Shaw, Jr., of Framingham, Mass., were re-elected secretary and treasurer, respectively. The executive committee consists of J. T. Conway, Brockton, Mass.; Harry B. Ivers, Boston; E. F. Flynn, Boston; C. S. Ching, Boston; J. E. Dozier, Lynn, Mass.; J. W. Belling, Boston, and A. A. Hale, Boston, the finance committee consisting of C. E. Learned, H. B. Potter and A. P. Emmons, all of Boston. A biographical sketch of the new president is printed on another page of this issue. At the close of the business meeting an informal reception was enjoyed in the corridors and lobby of the hotel.

At the banquet in the evening "safety first" was featured in the menu, which abounded in clever cartoons and quips sponsored by Secretary Faulkner. The outside cover bore a red, white and green shield—the original "safety first" appliance of primitive man, handsomely decorated with trolley cars rampant and other appropriate emblems. Inside the folder were a set of "safety first" banquet rules wittily paraphrased. Among these were the following:

"Avoid hasty movements. Watch out. Be sure of your seat before sitting."

"Be careful. When in doubt pick the fork on the outside and work toward the plate. Watch the man on the other track."

"Don't leave the hall while the speakers are in motion. Face the front."

"Safety first pays. Remember the names of the men you are introducing—or cough at the meeting points."

An attractive musical program was provided during the evening. A decided hit was made by the appearance of an East Indian crystal gazer whose "revelations" of the future contained many appropriate references to prominent members and their activities.

ADDRESSES OF THE EVENING

Mayor James M. Curley of Boston paid a high tribute to the safety work of the Boston Elevated Railway and to the personnel of the club. He emphasized the present serious situation in the transportation field with respect to the need of increased revenue and pointed out that the public fails to realize the rising cost of living to the railroads. The speaker recognized the need of higher fares, contrasting the difficulties of securing adequate income with the facility with which municipal and state taxes can be increased. "Safety first," said the Mayor, "should be extended to the stockholder's interests as well as to the life and pocket of the public." Closing, he said that he believed the railroad men of New England were competent to work out a solution of the present difficulties, including the invasion of the "jitney" bus, and voiced his purpose to see that so far as lies within his power, justice shall be accorded the railways.

The next address was delivered by Judge Thomas Duncan, chairman of the Indiana Public Service Commission. The speaker traced the legal development of the power of states to regulate common carriers from the early regulations of ferrymen, wagoners and common carriers by parliament to the present mode of regulation by states through their public service commissions. "The exercise of the right to regulate rates, and to require adequate service through the instrumentality of state control, is but a change of the form, and not a change in the character of regulation," he said, and "the order of a commission in fixing rates has the same force as a legislative act. Continuing, he said:

"The courts go very far to sustain an order of the commission. It has frequently been determined by the highest courts of the land, that the orders of the commission are final unless, (1) beyond the power which it could constitutionally exercise; or (2) beyond its statutory power; or (3) based upon a mistake of law. But questions of fact may be involved in the determination of questions of law, so that an order regular on its face may be set aside if it appears that (4) the rate is so low as to be confiscatory and in violation of the constitutional prohibition against taking property without due process of law; or (5) if the commission acted so arbitrarily and unjustly as to fix rates contrary to evidence or without evidence to support it; or (6) if the authority therein involved has been exercised in such an unreasonable manner as to cause it to be within the elementary rule that the substance, and not the shadow, determines the validity of the exercise of the power."

The speaker then quoted figures from the reports of the Interstate Commerce Commission showing the growth of the railroad business and investments therein, and then said:

"The present depression in the transportation business is not permanent, nor in my judgment is it due to governmental regulation. It is not confined to business regulated by the state. It prevails generally with varying degrees of violence. The people and the public service corporations are not enemies but friends. Our citizens know these splendid properties cannot be permitted to die of starvation without injury to all. It is the mighty task of the leaders of thought of this age to show the people a more excellent way. When the broadest publicity discloses a reasonable necessity for increased revenues the people will respond with a just—nay, even with a generous hand. But deception is dangerous.

"It is the duty of public service corporations to assist in restoring harmonious relations between the carriers and those they serve. He who engenders strife is an enemy to the prosperity of his business. With the coming of peace in the world prosperity may confidently be expected and the development of the country will have the opportunity to proceed along efficient lines."

The next address was by Chairman Fred J. McLeod of the Massachusetts Public Service Commission who referred to the Middlesex & Boston case as a declaration of policy on the part of the board. He predicted that within the next two years many more applications for increased rates will be presented to the commission and said that, generally speaking, these are likely to be granted. Mr. McLeod said in part:

"The troubles of the railways are not due to state or federal regulation. This has in the main been constructive. The commission is not responsible for the adequacy of rates. That rests with the companies. In general, my conclusion is that the rates now charged by Massachusetts street railways are insufficient to enable the companies to give the kind of service the public has the right to demand, to adequately conserve the property and to provide for depreciation. The commission

is not in an enviable position, but the differences between the interests of the railways and of the public are largely superficial. The companies are run honestly and it would be to the highest degree imprudent to let the street railways of Massachusetts get into the unfortunate position of the Boston & Maine (steam) Railroad."

General William A. Bancroft, the next speaker, contrasted the difference between private income opportunities and the restrictions placed on public service corporation revenue and declared that unless responsibility for income is recognized as a necessary function of governmental regulation, then the latter becomes a failure. Capital furnishes equipment; labor operates it, and income should support both, as well as provide for maintenance, depreciation, obsolescence, attracting and supporting new capital. The requirements of good service and adequate wages are generally conceded, but the element of income needs more consideration. Government now determines the income and, with it, should assume the same responsibility formerly borne by those who fixed the revenue. The investor is entitled to as much consideration as are labor and the public. Said the speaker: "Government, to use the language of the President of the United States, must play the whole game and play it according to the rules. It cannot leave out any part. It must provide for capital, both for new and for old, as well as for service and for labor. It must raise rates if necessary, just as managers did before their power to do so was taken away."

General Bancroft emphasized the Middlesex & Boston decision as one which completely recognized the principle that income must be adequate to meet the conditions which it is its function to support. In conclusion he said: "In the expressive phrase of the day, it is 'up to' the governments of our respective states and to the government of the United States to provide for income. If government control fails to provide for income, then government control is a failure."

President C. Loomis Allen of the American Electric Railway Association, the next speaker, said that the survival of the industry, extensions into new territory, and increased facilities require a change in the public's attitude. A greater confidence must be inspired in the purchase of electric railway securities to enable the necessary expansion to be made. Self-education as to the problems of the industry and the education of employees are essential. "Tell your employees in language that will be understood how much money you take in and how these revenues are disposed of," said the speaker. He advocated giving employees a correct understanding of the profits that are earned on each nickel received. Many employees beside the public at large believe that these profits are very great. Financial facts should be set forth in plain and terse language, avoiding technicalities and accounting terms. The public wants to know about the expenditures from revenue. It wants to know the amounts paid in salaries, labor, and for the purchase of material and supplies; the amounts paid out in the settlement of injuries and damage claims, and the expenses connected therewith; the amounts of legal fees, of various forms of taxation, and to what extent the municipalities are benefited by these sums. The companies are interested in letting the public know the outlays in interest on funded and unfunded loans, the payments in dividends, who the stockholders are and the amount of stock each holds. A great service can be done the industry by furnishing employees with the details of operation, requesting them to tell the story to their neighbors, fellow-workers and friends. No expenditure and but little time is required to give such information in simple form. Misunderstanding has arisen in the past on the

part of the public through failure to make proper use of employees as avenues of truth distribution.

Frank J. Hedley, vice-president and general manager of the Interborough Rapid Transit Company of New York, was the last speaker. He touched upon the magnitude of the electric passenger transportation problem in New York City. About \$300,000,000 is now being expended in the construction of new rapid transit lines. When these improvements are completed, the maximum ride on a 5-cent fare will go up from 17 to over 26 miles. Mr. Hedley referred to the great benefits of the open shop method of operation and emphasized the efforts of the company to insure the satisfaction of employees and equal opportunities of advancement to all men of ability. Closing, he deprecated misuse of opportunities of the press and advocated a square deal in newspaper columns for railways.

C. S. Clark, Boston, and Harry B. Ivers, Boston, were, respectively, chairmen of the reception and general banquet committees.

COMMUNICATION

Meters and Men

SANGAMO ELECTRIC COMPANY

CHICAGO, ILL., March 18, 1915.

To the Editors:

In the editorial "Meters and Men," in the Feb. 27 issue of the *ELECTRIC RAILWAY JOURNAL*, the editor, after cautioning against the use of average consumption per car-mile records for determining motormen's relative performance in car operation without first carefully analyzing and subdividing the different service conditions, suggests the development of some sort of stop-recording device for simplifying the work.

It is the writer's opinion that the adoption of a device of this nature on any system would tend to defeat the real purpose of the car meters, the attainment of economy of operation, by putting a premium on the number of stops made by the motormen. Where the number of stops are considered in the motorman's average consumption rate, there would be an incentive for all the men, no matter whether they had a low or high consumption, to make the maximum number of stops, or even more if possible, thus reconciling their consumption to an unnecessarily extra number of stops.

The argument in favor of a stop-recording device must support the contention that the average car-energy consumption per mile is proportional to the number of stops per mile. This means that there must be a fair uniformity of energy consumption per stop, or rather between stops, over the test period. Yet, on a city system it is evident that the average consumption per stop per mile for a car crawling along behind wagons and slowly moving traffic will be far less than the average for a heavily-loaded car that makes from ten to twelve stops per mile at evenly divided intervals. Therefore, for fairness, it is either necessary to know the exact kind of stops, namely, to classify the stops according to the amount of energy used in accelerating and running between stops, or to take the test over a comprehensive period, to eliminate such variables, and to enable all men to make nearly an equal number of similar stops. To eliminate the variable representing the number of stops would be in fact eliminating the necessity of a stop-recording device.

There will be a difference in average consumption per stop per mile on different lines with the same type of car over a reliable test period, depending on conditions of local traffic, schedule, etc., just as there will be a difference in average consumption per mile for the same reasons, thus necessitating the separate classification of

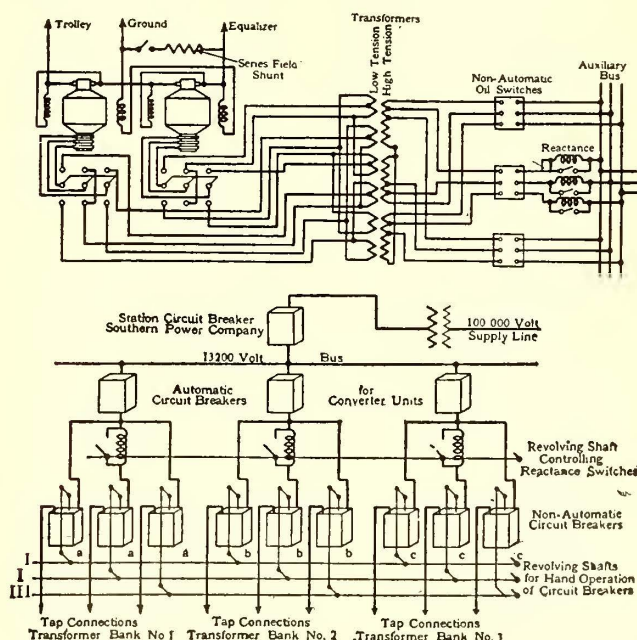
the results of the different service conditions, with either system. So that while the stop-recording device might apparently be of advantage in showing the total number of stops that any motorman has made with a given consumption, still the far more important variable representing energy used between stops has to be eliminated by the law of averages and the separate classification of service conditions.

It is true that a word of caution is due with regard to the use of meter records for comparisons of motormen. The different types of cars must be divided into car classes and the different service conditions divided into service classes, and the results in each car-service class should be figured separately in average consumption terms. Then each man's results in the different classes can be combined by percentage figures. It is not difficult properly to classify the different service conditions, and in this regard it is advisable to over-subdivide rather than otherwise, as later on similar averages of service classes can be combined and the total number of car-service classes reduced appreciably. Above all, no figures should be accepted until it is certain that they are reliable and have all variables but the ones of relative performance of motormen eliminated by having been taken over a sufficiently long period. Because a ball player has a batting average of 1.000 for two games is no sign that he is a great batsman, and similarly the record of an extra man on a tripper or special, over the rush hours of the day, is no criterion of his ability.

C. H. KOEHLER.

Sixty-Cycle Rotary Converters in Series in 1500-Volt Service

In the April issue of the *Electric Journal* Nicholas Stahl gives operating details of the rotary converter equipment of the Piedmont & Northern Railway, installed last year. Both motor-generator sets and rotary converters are used in the substations, but in the Spartanburg substation each unit consists of two sixty-cycle rotary converters connected in series on the d.c. side and mounted on a single bedplate. As the voltage on the substation was liable to considerable variation due to



SPARTANBURG SUBSTATION—A.C. AND D.C. CIRCUIT DIAGRAMS SHOWING TRANSFORMER SECONDARY MULTI-TAP CONNECTIONS

(The lower is a straight-line diagram)

the length of the transmission system and the varying load demand upon it, special provision was made for adjusting the secondary voltage of the transformers. The arrangements for connecting different taps in the 13,200-volt transformer primaries to the auxiliary bus-bars are shown in the diagrams which appear on page 633.

The transmission voltage to the substation is 100,000 and it is reduced to 13,200 in outdoor transformers. Inside the substation are nine transformers, each of 167-kva capacity, arranged in three banks, with star-connected primaries and delta-connected secondaries. These reduce the voltage to about 460 for the rotaries. There are three primary taps on each transformer, each made through an oil switch, the center or normal tap being provided with a preventive coil and a disconnecting switch. This arrangement provides for shifting the taps in service, the "disconnect" being open while two of the switches are closed in the process of transferring taps. The taps provide for voltage 90, 100 and 110 per cent of normal. The secondaries of these transformers are double, the two windings supplying respectively one phase of each of the two rotaries forming a pair.

The a.c. circuit breaker for controlling a transformer bank is provided with a low-voltage release and pallet switch. On failure of the alternating voltage the circuit breaker will trip out and the pallet switch, being connected to a non-voltage or shunt trip coil on the d.c. circuit breaker, will trip out the d.c. end of the rotary, completely isolating it. This prevents damage due to a.c. power coming back when the machine is out of phase and nearly at rest. As the substation is also liable to receive power over the d.c. trolley, d.c. reverse-current relays are installed on the machine panels to operate when the rotaries tend to reverse themselves. These short-circuit low-voltage coils on the a.c. circuit breakers and cut out the sets. Additional circuit breakers are placed on the negative side of the d.c. circuit to protect the "low side" machine in case of a short-circuit around the "high" machine. These circuit breakers, with the equalizer switches, are mounted on inclosed panels placed between the machine and feeder panels.

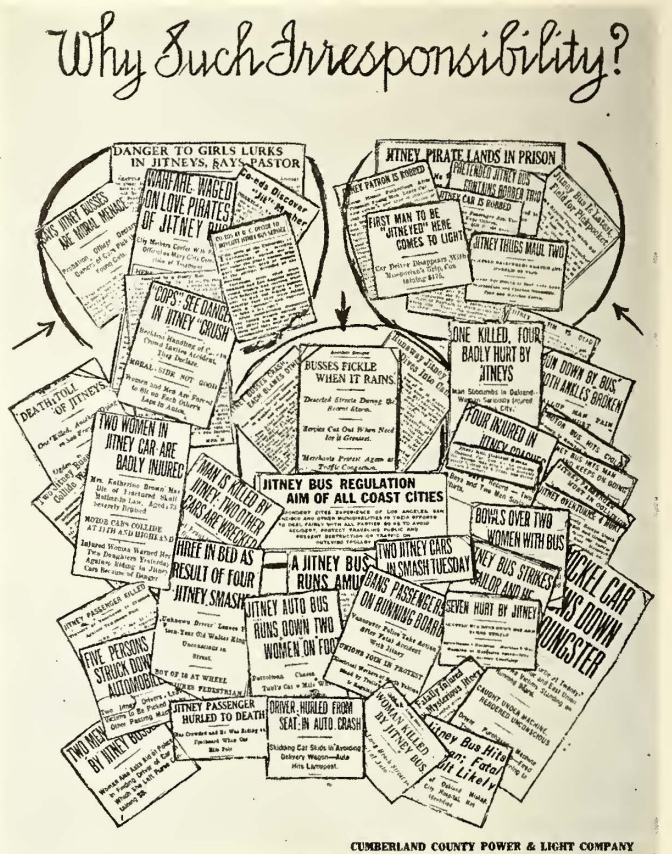
To protect the substation the feeders are not tied directly to the trolleys at the substation but are carried about a mile down the line. Flash-overs have been extremely rare and then of no serious consequence, and no trouble has been experienced through reversal of polarity of d.c. generators elsewhere on the system, which might have been caused by rise of voltage on the d.c. side of the rotary converters when a rise occurred on the a.c. side.

Ammunition in the "Jitney" War

The accompanying illustration shows an advertisement entitled "Why Such Irresponsibility?" originally inserted in the daily papers of Portland, Ore., by the Portland Railway, Light & Power Company and later, through the courtesy of that company, published in some of the daily papers of Portland, Maine, by the Cumberland County Light & Power Company.

As the other side of any question is interesting, however, an advertisement of a Chicago dealer in automobile supplies is reproduced also. The advertiser in this case is obviously a frank soul, for his plea to the casual reader to spend a few hundred dollars and earn \$100 per week sounds enticing. The statement of profit would, of course, be more convincing if the dealer had taken advantage of the opportunity himself, but as a

possible insight into one of the causes of the remarkable growth of the "jitney" craze the advertisement is enlightening. Incidentally, it might be added that in the many statements which have been received at the office of the ELECTRIC RAILWAY JOURNAL in regard to the profits of "jitney" bus drivers, none has ever claimed



"JITNEY" WAR AMMUNITION—NEWSPAPER HEADINGS ON "JITNEY" MENACE

Be the First to Operate a
"JITNEY"
BUS LINE

Why work for \$25 a week when on an investment of a FEW HUNDRED DOLLARS you can start in business and make \$100 a week?
New and used autos at prices never before offered. You can convert any of our cars we sell into a "Jitney" bus. Consult us—we will show you how to do it.
Limousine, coupe and up-to-date fore-door touring bodies at your own price.

AUTO SUPPLIES—TIRES

Accessories and radiators for all cars at 50 cents on the dollar.
Our No. 7 Price Wrecker covers every automobile want. Send or call for it. Save money.

WORLD'S LARGEST DEALERS
TIMES SQUARE AUTO COMPANY
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"JITNEY" WAR AMMUNITION—ADVERTISEMENT IN CHICAGO PAPERS

the gross profits of \$100 per week. The most extravagant claim of net receipts among them up to this time has been limited to about \$30 per week in cases where the driver neglected all expenses except those for gasoline and tires.

Equipment and Its Maintenance

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

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

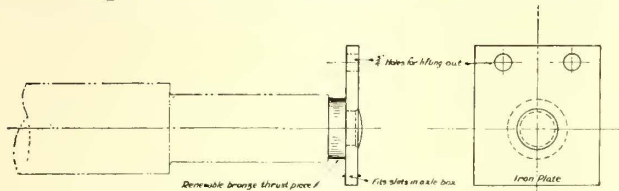
Thrust Plate for Worn Car Axles

BY "VULCAN," A.M.I.C.E., A.M.I.E.E., ENGLAND

A. R. Johnson's article on "Case-Hardened Collar and Welding Reclaim Worn Button-End Axles," on page 294 in the issue of Feb. 6, raises a subject of considerable interest, inasmuch as all who have had charge of the maintenance of rolling stock have at some time or another encountered the trouble referred to.

Mr. Johnson refers to the excessive wear as having taken place after his company had commenced to use check (or keep) plates made of hard bronze, but I should imagine that even when the plates were made of a softer metal the axle wear in the check grooves was more than that which occurred at other parts of the axles. In England I have come across scores of cases where an otherwise sound axle has been cast aside as useless, simply because the sides of the check grooves have worn to a bad shape; the plates are generally of fairly hard bronze, but soft metal is still quite common.

Considering the great pressures which are impressed on the sides of the axle grooves when a car takes a curve, at the high speeds so common nowadays, and remembering at the same time that the whole load is



RENEWABLE BRONZE THRUST PIECE FOR AXLE

spread over only about one-half of the full circle, it is not reasonable to expect such thrust faces to keep their normal shape for very long. Although there are two check plates per axle it can practically be assumed that the total side pressure is at any instant carried on one plate only per axle.

Take a common English case, namely, a double-deck car weighing 13 tons, on a four-wheel truck, traveling round a curve of 50-ft. radius at say 10 m.p.h. (14.6 ft. per second). Since the street track, as a rule, has no super-elevation, the centrifugal force causing pressure against the check plates will be:

$$F = \frac{W \times V^2}{g \times R} = \frac{13 \times 2240 \times 14.6 \times 14.6}{32.2 \times 50} = 3860 \text{ lb.}$$

where F = centrifugal force in pounds.

W = weight of car in pounds.

V = velocity of car in feet per second.

g = gravity acceleration = 32.2 ft.p.s.p.s.

R = radius of curve in feet.

This force is imposed on two check plates, one on each axle, and as the side-bearing area per plate is usually about 1.95 sq. in. the pressure intensity is

$$\frac{3860}{2 \times 1.95} = 990 \text{ lb. per square inch.}$$

This figure is, of course, very high indeed for the class of bearing under notice, but even this amount will be considerably exceeded when the car takes a sudden change of direction, as when taking switches and crossings and when nosing occurs at high speeds.

The case-hardened collar described by Mr. Johnson will undoubtedly effect a very considerable improvement. However, I think that the arrangement which I devised and used on two large systems having between them more than 600 cars, goes one better still.

The arrangement eliminated altogether the horseshoe type of check plate. In place of this we adopted a thrust plate which rubs against the end of the axle. To allow existing axle boxes to be used, the old axles with worn grooves were cut off in the lathe, level with the inside groove face, so that when in position there was just the necessary space available to allow the insertion of a plain solid bronze plate abutting on the axle end.

The check plates are reversible. For a 3-in. axle end they have a thrust-bearing area of nearly 7 sq. in. as compared with less than 2 sq. in. for the old arrangement. As can be expected, the wear on both axle and plate is very small indeed. They have been used on both single and bogie trucks (in the latter case for both driving and trailer axles), and in every case they have proved their superiority over the old pattern.

A later improvement greatly reduces the amount of bronze, which metal somehow or other seems to disappear very quickly when not in actual use on the cars. The accompanying sketch fully illustrates the revised check plate, and since all particulars are given thereon no further description is necessary.

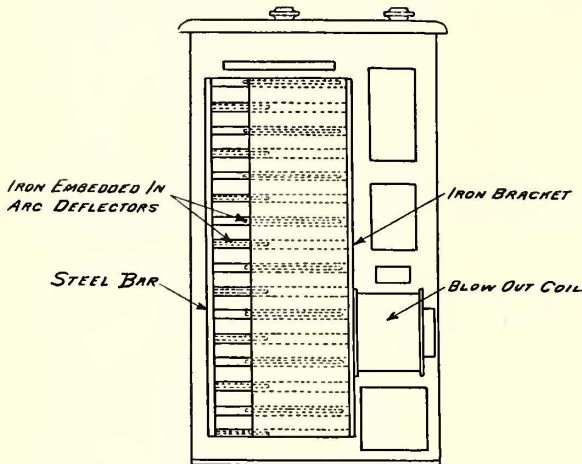
Equipment Defects—Controller Blow-Out Coils—II

BY C. W. SQUIER, E. E.

Directed Flux Blow-Out.—In order to direct the magnetic field so that the lines of force would pass across the contacts in a direction parallel to the shaft and so blow the arc away from the drum instead of against the arc deflectors, the Westinghouse Electric & Manufacturing Company developed what may be called the "directed flux blow-out." An accompanying illustration shows this arrangement as applied to the No. 210 controller. A cast-iron bracket runs down the blow-out coil side of the arc shield, and a facing is provided for this bracket to make contact with the core of the blow-out coil. The arc shield is fastened to this bracket and swings with it. The individual arc deflectors are made of pressed asbestos or Ambroin, and pieces of sheet iron are imbedded in them. These deflectors and iron plates are so arranged that every alternate one has the iron projecting backward to the bracket on the blow-out coil side, while the iron in the remaining arc deflectors consists of short pieces projecting down to a steel bar which runs down the front and on the lower edge of the arc shield. The magnetic circuit is then as follows: From the core of the blow-out coil lines of force enter the bracket at the back and pass to the iron plates in the arc deflectors and to one side of the contact fingers. Then the lines cross over the intervening space across the contacts to the short pieces of iron in the adjacent arc deflectors and from these short plates down to the steel bar running in front of the arc shield and to the controller frame, and so back to the blow-out coil core. In passing from one arc deflector

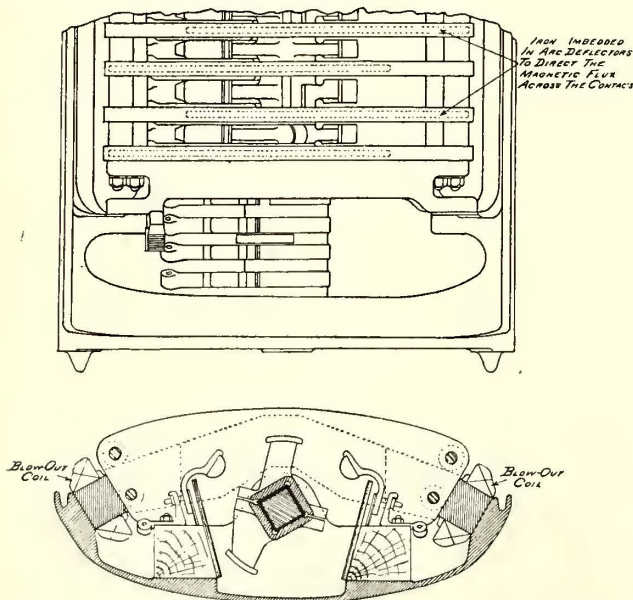
to the adjacent ones the lines of force cross the fingers and contacts in a direction parallel to the controller shaft, so that any arc formed by the opening of the controller circuit is lifted away from the drum. This type of blow-out overcame the disadvantage of having the arc blow against the arc deflectors, but as some contacts were a greater distance from the blow-out coil than others these had a less efficient blow-out.

Field Type of Blow-Out.—A further development of the directed flux blow-out overcame the disadvantage of



WESTINGHOUSE NO. 210 CONTROLLER WITH DIRECTED FLUX BLOW-OUT

a less effective blow-out for the contacts most distant from the blow-out coil. This was brought about by using two blow-out coils, one on either side of the controller, running the entire length of the contacts. It is known as the "field type blow-out" on account of its resemblance to the field of a two-pole motor. An accompanying illustration shows the arrangement of the coils, which are so wound that the faces of the pole



WESTINGHOUSE T-1 CONTROLLER WITH FIELD-TYPE BLOW-OUT

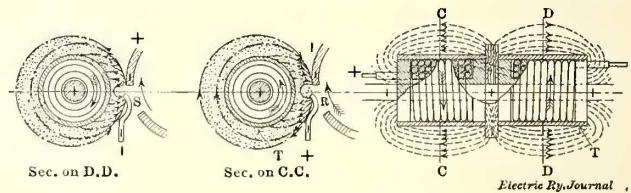
pieces are of opposite polarity. In the arc deflectors are imbedded iron plates which extend about three-quarters of the distance from one pole piece to the other. Each succeeding arc deflector is reversed so that the iron plates in adjacent arc deflectors overlap through the center of the controller, and the contact

fingers are placed in this space. The path of the magnetic flux is from one blow-out coil core through the iron plates which rest against this face to one side of the contact fingers, then across to the plates in the adjacent arc deflectors and through these to the blow-out coil core on the opposite side of the controller. By using coils which extend the entire length of the contact portion of the drum an absolutely uniform field is produced at the various contacts to produce a correspondingly uniform blow-out. The location of the coils at the side of the controller at a distance from the points at which arcing occurs leaves them safe from injury and gives an uninterrupted view of the contacts, which is desirable for inspection purposes.

Another desirable feature of this type of arc shield is that it permits the elimination of all screws in the deflector plates. Such screws promoted splitting of the plates and proved a constant source of trouble in all the previous types of blow-outs discussed. The deflector plates of this type are bolted together with iron rods and separated by fiber spacing blocks so that they are held firmly together with no tendency to split, the whole forming a very substantial construction. In a later design the holes for the rods are slotted so that any single arc deflector can be removed and replaced without disturbing the remaining ones.

THE METALLIC SHIELD TYPE OF BLOW-OUT

A somewhat unique but efficient type of blow-out is used in the controllers manufactured by Dick, Kerr &



DICK-KERR METALLIC SHIELD BLOW-OUT

Company, Ltd., England. This is shown in an accompanying illustration and is called the "metallic shield" blow-out. It consists of an iron core running the entire length of the controller drum on the side where the contact fingers are located. Several different coils of wire are wound about this core and arranged so that there are in alternation a series of positive and negative poles along the length of the iron core. These poles are at such locations that the direction of the magnetic flux across the contacts will draw the arc toward the coil. A copper metallic shield surrounds the blow-out coils so that, when the arc is broken, it is drawn around the circumference of this shield until a point is reached where it is broken without damaging results.

This feature of blowing the arc against copper shields or tips which the arc can follow along until it is spread out and then disrupted without damaging the contacts has been used very extensively in multiple-unit controllers by applying arcing horns to the unit switch contacts.

An important safety feature of the metallic shield blow-out is that the circuit to the blow-out coil and controller fingers is broken whenever the arc shield is swung back for inspection purposes. The danger of an accident due to a repairman leaving the circuit breaker in while inspecting the controllers on a car is thus reduced.

INDIVIDUAL BLOW-OUT COILS

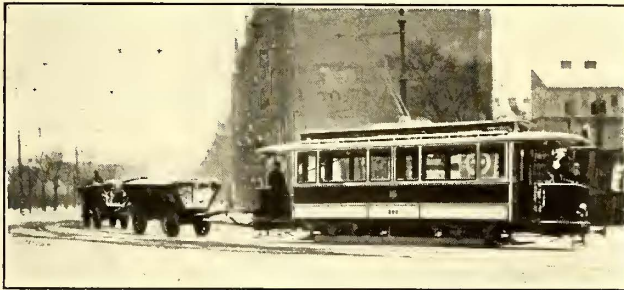
The latest General Electric controllers have individual blow-out coils and arc chutes for each finger or group

of fingers instead of a single blow-out coil for the entire controller, as was formerly used. These coils have steel cores, and the steel flanges which are riveted to these cores are in turn fastened to the finger bases. Steel plates are also imbedded in the arc deflectors so that they direct the lines of force through the arc chutes in a direction parallel to the shaft. This insures a very efficient blow-out and minimizes burning and the consequent repairs to contacts and fingers.

Motor Cars Supplant Horses in Vienna for Drayage

BY LUDWIG SPÄNGLER, DIRECTOR VIENNA MUNICIPAL TRAMWAYS

Owing to the war most of Vienna's heavy automobile trucks, horses and vehicle operators have been drawn upon for military duty, thereby making difficult the



WAR-TIME TRANSPORT IN VIENNA—PULLING COAL WAGONS ON A CURVE

cheap and skilful transportation of freight throughout the city. We are therefore adapting our electric railways for that purpose so far as possible. The same condition holds true also throughout Austria-Hungary.

A most important new field for the electric railway is the hauling of coal and coke from the steam railroad warehouses and gas plants to large city depots and retail dealers. In Vienna the direct use of the electric railway for this purpose is often impracticable because the coal is delivered to several widely-scattered terminals and the coke also must be taken from two different



WAR-TIME TRANSPORT IN VIENNA—ATTACHING AN EMPTY COAL WAGON

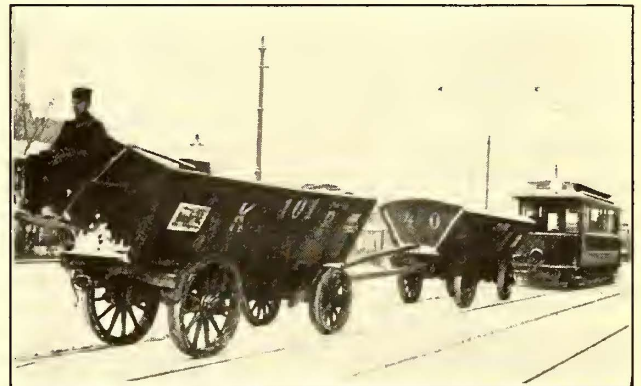
gas plants. Most of these sources of fuel supply are not accessible directly to the electric railway tracks. To build sidings and special fuel cars, including weighing facilities, would have called for a prohibitive expense, aside from which the retail fuel supplies in Vienna would have been exhausted long before new equipment could be furnished and installed.

To meet the emergency created by the war the writer suggested that the coal and coke be carried in the same wagons as before, but that motor-car haulage be substituted for horses on reaching the car tracks. The great reduction in horse mileage thus obtained would make it possible, of course, to get along with very few animals.

Following the writer's suggestion, the wagons are loaded and weighed at the supply points, whereupon they are drawn by horses to the nearest street railway. There the horses are unhitched and reharnessed to take back the empties. In the meantime the motor cars draw the loaded wagons to the desired distributing centers. In some localities the horses draw the wagons to the coupling place in the daytime, where they are left for the night drayage by the cars.

The short wagon hauls to the tracks are usually in level territory, whereas in an extended trip through Vienna it would be impossible to avoid quite a number of grades.

The coal wagons are attached to the standard draft rigging of the motor car by means of a coupling rod extended from the underside of the wagon axle. A second coal wagon may be attached to the first. Vienna coal wagons are usually of a slightly narrower gage than our tracks. On tangents, therefore, only the wheels of one side run on a rail, while the other two



WAR-TIME TRANSPORT IN VIENNA—PULLING COAL WAGONS ON A TANGENT

wheels run on the paving, but this causes no harm. If the service was to be continued for any length of time it would, of course, be natural to use wagons with the same gage as our tracks. However, we find that a motor car and wagon will run very well even on our shortest curves. The only precaution necessary is so to regulate the coupling rod that the wagon does not swing too far to one side.

The permissible speed of a train is about 3.7 m.p.h., which is about twice that of a horse-driven wagon. The wagons make the extra speed without damage or excessive noise. Of course, even this rate of speed is far below that of our passenger cars, which average about 8 m.p.h. Consequently, they cannot be interpolated with the short headway service of the day, so that all of this work has to be done at night.

The motor cars are furnished with extra heavy resistors to permit slow-speed operation. They make several trips a night, hauling an average load of 9 tons of coal per trip. In view of the short period for which this kind of transportation was devised, the cost of operation is very reasonable indeed and with no addition at all for new equipment. Our experience in this connection, and in the handling of freight generally during war times, proves the adaptability of the electric railway for new and important duties.

Points on the Installation and Removal of Pinions—I

BY R. H. PARSONS, ELECTRICAL FOREMAN

The correct installation and removal of pinions is a part of maintenance work which does not always receive the attention that it deserves. The old-time combination of a heavy sledge and a husky man is still in force in too many shops. In such places the pinion is usually placed on the shaft and then driven home by one man, who hammers against an iron block (or another pinion) held against the pinion by a second man. If the men fail to start the pinion straight they force it along anyhow, often dragging the surface of the shaft and destroying all possibility of a tight pinion.

After the pinion is driven as far as it will go the nuts are placed on the shaft and tightened again, with brute force acting on the end of a long wrench. The wonder is that more pinions are not broken and more threads stripped, especially if the workman stands upon the wrench and jumps on it until the nut will move no more. That ten minutes of such strenuous effort will not prevent the pinion from working loose seems incredible to the sledge wielder. Neither is it the least bit probable that he will detect cracks in the metal caused by his strength and ignorance. He would be astonished to learn that the pinion may drag enough of the metal of the shaft to shim itself tight temporarily but that it will loosen quickly in operation.

Conditions are even worse when a pinion is to be removed. Granting that the pinion has been in service for a year and that it was properly installed at the time, it need not be assumed that it is on tight and will require some force to remove it. Removal often causes serious damage, not only to the pinion itself but to the other parts of the motor, bringing such results as bent or broken armature shafts, broken frame heads and broken bearings. Sometimes, even, it is necessary to cut the pinion before it can be removed.

One of the difficulties encountered in devising an efficient pinion puller is due to the condition that the designers of many of the later type motors intentionally or otherwise did not pay particular attention to the fact that pinions do have to be removed. This is indicated by the fact that they did not leave space enough between the pinion and bearing or housing to apply the jaws of a pinion puller of sufficient strength.

Pinion pullers have been adapted for such motors by making them with jaws which have teeth to grip the side of the pinion. These jaws would do the work if the pinion is of soft material and not too tight on the shaft, but the newer pinions of high-grade surface-hardened steel do not allow the teeth to make an impression. As there is not room behind the pinion for a substantial jaw, the question arises: How are we to pull this pinion without damage to the motor and save the pinion if it is not worn beyond the limit? Furthermore, even if the pinion could be pulled with this outfit it might be cut so badly by the teeth that its further use would be out of the question.

Again, where the design of the motor does permit the use of a pinion puller which will clutch behind the pinion, the next points to be determined are: How much force must be exerted on the puller; how is this force conveyed to the pinion, and will the puller or the pinion give way first? Did you ever see four or five men tugging at the bar and turning the screw of a pinion puller, with one man using gentle persuasion on the pinion in the form of a heavy sledge?

Some pullers are constructed with a screw placed against the end of the armature shaft and operated with a long lever. Others have a screw and eccentric

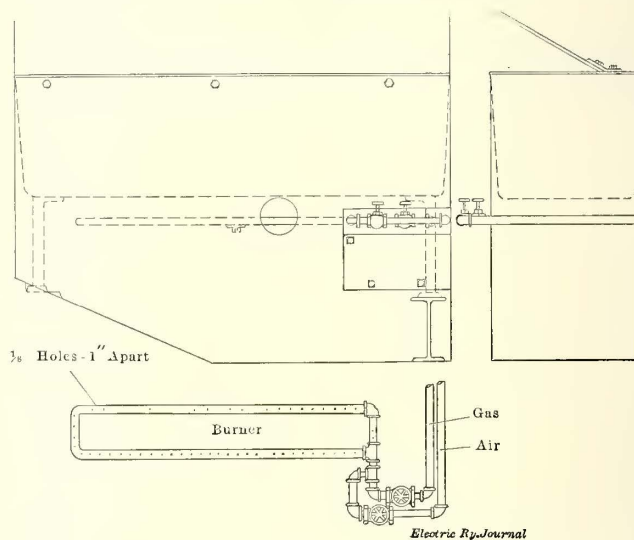
so arranged that the screw will take up the slack. The movement of the eccentric is intended to remove the pinion. Still others use the same principle but are operated as hydraulic jacks. In most instances 40-tons or 50-tons steady pressure would be required to remove a pinion. Yet I have seen a hydraulic pinion puller rated to exert a force of 100 tons give out trying to pull a pinion.

Lightness and portability are other problems that the designer of a good pinion puller must face because pinion work should be the duty of one man, not of half the force. The pinion puller should be brought to the motor, instead of transporting the armature or motor to the pinion puller.

Some day may see a pinion puller which will fill all requirements—one that will pull the pinions without damage to shaft, bearings or pinion. In the meantime, however, we must remove and replace our pinions when necessary. The following paragraphs may be found to embody a few helpful hints taken from every-day practice.

HEAT FOR MUSCLE IN PINION INSTALLATION

As a modern pinion properly installed will give long service and as the modern motor itself will give a very



WATER TANK FOR HEATING PINIONS WITH GAS AND AIR MIXTURE

high mileage before overhauling, every endeavor should be made to get from the pinion a mileage between overhauls equal to that of the motor. We cannot afford to bring a car into the shop just to replace a pinion. Therefore the installation of pinions by brute strength should be abandoned in favor of more scientific methods.

The heating of the pinion to a moderate degree before placing it on the shaft is approved by the best authorities because the contraction of the metal when it cools is sufficient to make the pinion tighter on the shaft than is possible by driving.

The recommended practice is to place the pinion for one hour in water kept at its boiling point, 212 deg. Fahr. In this bath the metal will expand uniformly to a size which will allow the pinion to be placed on the shaft as far as the design requires. The increase in the inside diameter of a pinion for a 65-hp motor when placed in boiling water for one hour is approximately 0.0045 in.

Immediately after removal from the water the pinion is placed on the cold armature shaft, pushed as far as it will go by hand and then driven home by striking its wooden block facing with a light hammer. Next, the

nuts are screwed to the shaft and tightened. The pinion guard is then struck a few more easy blows with a light hammer before the nut is tightened again. A short wrench with a handle 3 ft. or 4 ft. long is the only tool that is necessary, and this can be handled by one man. Neither the pinion nor the motor has been subjected to heavy blows or damage of any kind. The pinion shrinks back to its normal size, and when cool it is tight.

The cut on page 637 represents a tank heated by a combination of gas and air. This tank is very convenient for heating pinions. The one shown was an old cast-iron watering trough for horses. It was part of the equipment used in the maintenance of horse cars, but was readily adapted for electric car maintenance. It is about 3 ft. long, 2 ft. wide, and 1.5 ft. deep. It is mounted on an iron frame and fitted with an air and gas burner, as shown on the same sketch. Covering is provided in front and on the sides to protect the workman's clothing from the flame, and an iron top is used to confine the heat. Of course, pinions may also be heated by steam or electric ovens, but the water bath has been found to answer the purpose best. In the second article the removal of pinions will be discussed.

Headlight Test at St. Louis

An instructive comparison between arc headlights and incandescent headlights was recently made by the United Railways of St. Louis. The constantly increasing installations of high-efficiency incandescent headlights to replace arc lights suggested a competitive test between the railway's present equipment and the "Golden Glow" incandescent headlights. Some months earlier the latter lamps had been installed before the advent of concentrated filament tungsten bulbs. With the perfection of tungsten bulbs it was decided to try both the interurban and city type "Golden Glow" headlights on a car also equipped with the regular semaphore lens incandescent headlight and the 4½-amp arc. The test was conducted by M. O'Brien, master mechanic, the electrical engineer and the district superintendents of the railway, and Frank O. Grayson of the Esterline Company.

As reported by the company, the first run was made on the Hodiament line. This is the old "Suburban Line" which runs about 8 miles from one end of the city to the other. The greater part is on poorly-lighted right-of-way. In fact, there are no lights except at street crossings. On this line the 4½-amp arc headlight has been used regularly.

The test was made on a rainy, misty night. The first headlight tried was the T-128 interurban lamp with 94-watt bulb. This lamp gave far greater illumination than was desired. Hence the No. 95 headlight with 46-watt bulb was put in place. This lamp gave a better penetration than the 4½-amp arc, and yet reduced the power consumption from 2.7 kw to 46 watts.

Then followed this interesting experiment: The arc lamp was lighted and when the "Golden Glow" headlight rays were thrown on top of the arc lamp rays the illumination of the latter lamp was lost almost entirely.

After a general conference it was decided to recommend the SM-95 headlight with 46-watt bulb for the Hodiament line, burning in series with two circuits of 23-watt bulbs within the car, and the same style, but with a 23-watt bulb, on the purely city lines. As a result of this test the railway placed an order for 100 headlights for immediate delivery.

New safety-first signs to be placed in the yards, offices, carhouses and shops are being considered by the safety-first committee of the United Railways.

Tests of a 500-Hp Diesel Engine at Auburn, N. Y.

The McIntosh & Seymour Corporation, Auburn, N. Y., announces that on Jan. 11 it made five tests upon one of its 500-hp Diesel type engines. According to these tests the fuel oil consumption of the engine per brake-hp-hr. was 0.407 lb. at full load, and this was very little exceeded at four-fifths load. The consumption at one-half load was equal to that generally reckoned by the average engineer when estimating for full load conditions. These results naturally are considered to be exceptionally fine. Abstracts of the engine test and fuel analysis follow:

REPORT OF TEST MADE JAN. 11, 1915

Type of Engine, 4-A-38; Number, 1542; B.H.P. 500; R.P.M., 165; Cyl. Diam., 18¾ in.; Stroke, 28.347 in.; Kind of Fuel, Fuel oil.					
Test number.....	1	2	3	4	5
Load per cent of rating.....	113.4	100.4	79.4	52.4	25.2
Number of r.p.m.....	171	165	172	174	170
Brake-hp = $\frac{W \times N}{K}$	567	502	397	262	126
Test began.....	8:15 a.m.	1:20 p.m.	3 p.m.	4:30 p.m.	5:24 p.m.
Test ended.....	8:45 a.m.	2:20 p.m.	4 p.m.	5 p.m.	5:54 p.m.
Fuel consumption during test, lb.	115.0	204.7	163.8	68.9	41.1
Fuel consumption per b.hp hour, lb.	0.405	0.407	0.412	0.449	0.652
Injection pressure, lb.	925	925	815	785	775
Exhaust gas appearance.....	Clear	Clear	Clear	Clear	Clear
Inlet temperature of cooling water, deg. Fahr.	56	56	56	56	56
Outlet temperature of cooling water, deg. Fahr.	145	147	145	147	150
Temperature in testing room, deg. Fahr.....	62	62	62	62	62

ANALYSIS OF FUEL OIL FROM INDIAN REFINING COMPANY

Gravity.....	.60 deg. Fahr.	0.8550 per cent
Flashing point.....	190 deg. Fahr.	
Burning point.....	246 deg. Fahr.	
Tar test.....		Negative
Water.....		0.051 per cent
Sulphur.....		0.187 per cent
Carbonization.....		6.4 per cent
Acidity.....		Trace
Heat value.....		19,266 B.t.u. per gallon
		137,463 B.t.u. per gallon

Transformer Blower of 40,000 Cu. Ft. Capacity per Minute

The Buffalo Forge Company, New York, has recently installed an unusually large fan for cooling air-blast transformers at the Blue Island power station of the Public Service Company of Northern Illinois. The installation was made under the direction of Sargent & Lundy, engineers. It consists of a direct-connected blower handling continuously 40,000 cu. ft. of air per minute at 70 deg. Fahr. and 29.92-in. barometer, with a static increase in pressure of 2.6 in. water gage. The blower is direct connected to a 30-hp, twenty-five-cycle, three-phase, 470 r.p.m. GE motor. Aside from the size of the unit, the interesting feature is the operating speed. Most transformer cooling units are 20,000 cu. ft. per minute capacity or below, and although direct connection is desirable, it has heretofore involved prohibitive expense for the slow-speed motors necessary on larger units. The blower in this case is a turbo Conoidal high-speed type, such as the Buffalo company has been using in connection with motor and steam turbine-driven forced-draft units for underfeed stoker work. Although the air pressures required for cooling air-blast transformers are much less than for stoker work, the speed of this fan is high enough to permit the use of a motor at a price which is not excessive. The fan is of the multiblade type with compact housing. It has a static efficiency of 60 per cent, and requires 27 brake-hp.

Impregnation Saves Copper and Repairs

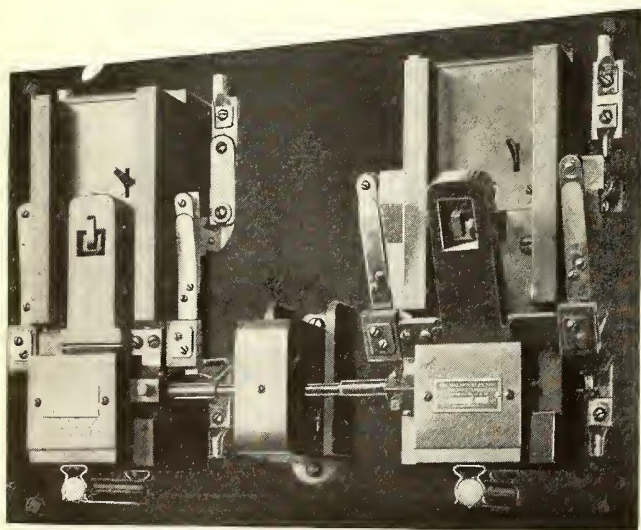
The Metropolitan West Side Elevated Railroad several years ago used approximately 3000 lb. of copper wire a year in rewinding the field coils of air compressors. Shortly after the vacuum impregnating process was introduced, this company tested several impregnated field coils to determine the relative merits of the impregnated and the ordinary untreated coils. The impregnated coils were placed in the same service as the untreated ones. Within a year the compressors containing these test coils came in for repairs, and examination showed that the coils which were in perfect condition were the impregnated ones, and they were adopted as standard.

Since the company began to use the impregnated coils, approximately five years ago, no copper has been required for repair work on compressor field coils. In the case of large motor field coils, where high temperatures would shrink the insulation on the field, resulting in a loose field coil which required rewinding, the conditions are similar. The average cost of rewinding and replacing large field coils was approximately \$50 per motor. With impregnated coils the field winding is tightened without rewinding, effecting a saving of approximately two-thirds of the former cost, to say nothing of the elimination of many "shorted" field coils.

Emergency Lighting Magnet Switches

A recent development in automatic switches for use when two sources of current potential are available in subways and other places, where the exigencies of the service are such that an interruption of lighting service might produce serious results, is shown herewith.

This device consists of two magnet-operated switches with a mechanical interlock that prevents the closing of both switches at the same time, and the magnetic feature includes an automatic device that causes the opening of one switch and the closing of the other on a potential drop of predetermined value. The switch



DOUBLE-THROW MAGNET SWITCHES

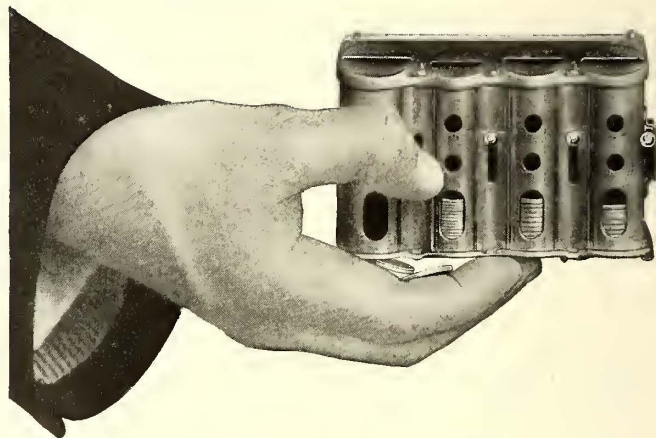
is normally closed to a preferred source of energy; the auxiliary system is thrown in upon the failure of the preferred source and the normal connection re-established upon the return of full potential to the line. If both circuits are dead, the switch automatically closes to the one first available.

This switch will handle 600-volt railway circuits successfully, and transfers the lighting load from the regular to the auxiliary source of potential so rapidly that

the momentary outage in the lighting system is not noticeable. The switch is made by the Palmer Electric & Manufacturing Company, Boston, Mass.

Improved Change Carrier

A conductor's change carrier improved by the addition of thumb levers which eject coins from each of the four compartments, has just been put on the market by the McGill Ticket Punch Company, Chicago. This device is made of brass throughout, the standard outfit containing four compartments, two for nickels and one each for dimes and quarters. It will also be made with



ONE FORM OF IMPROVED CHANGE CARRIER

compartments for pennies or for Canadian coins. One of these improved change carriers is shown in the accompanying illustration. Its advantage lies in the fact that simply by pressing down one of the thumb levers with which each compartment is fitted, coins are ejected one at a time and as rapidly as desired. The ejectors have been so placed that the hand naturally assumes the proper position for receiving the ejected coins. Also the rapid, easy ejection of coins, one at a time, permits the operation of this change carrier with gloved fingers and the receipt of a coin with each operation.

Auto-Bus for Houston

The J. G. Brill Company has lately built for the White Company the auto-bus shown in the accompanying illustration. The bus body was built at Philadelphia but was mounted on a White T. A. D. 3-ton chassis of 16-ft. 2-in. wheelbase in the Kuhlman works.

The body is 18 ft. 2 in. long and 22 ft. 2 in. over the



SINGLE-DECK AUTO-BUS FOR HOUSTON, TEX.

rear platform. The rear wheels are of 40-in. diameter, making the successive risers 15½ in., 13½ in. and 11 9/16 in. from pavement to platform to bus floor. The front exit is by way of a glass-paneled folding door and folding step. The width over the posts is 7 ft. 6 in. and the height from the floor to the center of the headlining 6 ft. 6 in. The cane seats are of cross-seat type, one two-passenger seat on each side of a 17½-in. aisle. The seating capacity is twenty-six.

News of Electric Railways

COMMISSIONERS REPLY TO CHARGES

Governor Whitman of New York Hears Commissioners for the First District on Charges Against Them

The dénouement that attended the hearing on March 23 before Governor Whitman of New York, at which Chairman McCall, and Commissioners Cram, Wood and Williams of the Public Service Commission of the First District answered the charges against them resulted in the Governor adjourning the hearing for two weeks. All the commissioners save Mr. Williams had been heard. As he concluded his prepared brief, Mr. Williams turned to memoranda and began urging on the Governor the meaning of removal from office and apparently bracketed the Governor with the "cruel piratical politicians." The Governor promptly ordered him to withdraw the insinuations under pain of immediate removal. Mr. Williams apologized, saying that he had been laboring recently under mental and physical strain.

Chairman McCall was the first to face the Governor as the hearing opened at noon. He had prepared a pamphlet answering in full the eight charges preferred against him. He called attention to his own unwillingness to leave the bench for the commission and to the sacrifice which he made to do so. Having shown that he was not with the commission at the time mentioned in the charge with reference to the Lexington Avenue subway, the chairman recited the difficulty of deciding the course of the subway. As for the charges based on the method of the commission in dealing with informal complaints Mr. McCall pointed out that the allegation that he neglected them rested solely on the evidence of the chief clerk, who could not possibly know what the chairman did concerning them in consultation with the secretary and the other commissioners. The chairman then explained how the committee had been misled concerning the way these complaints which were styled "informal" were handled. One trouble had been that the legislative investigating committee never had any conception of the real work of the commission or how difficult it was to attend to all its details. The chairman then called attention to the fact that the committee in raising this point about informal complaints had never mentioned the work of the commission in increasing transfer privileges in Brooklyn and thereby removing perhaps the greatest source of complaints. A commissioner could not attend to petty details and do the more important constructive work necessitated by his office.

Taking up the charge that he had permitted the railroad companies to violate the orders of the commission Mr. McCall first pointed out that since he had been chairman the subway had carried 720,000,000 passengers with less than forty complaints. As he passed on to consider the charge founded on the delay in ordering more cars by the Brooklyn Rapid Transit Company, the chairman said that the committee when it made its charge must have known that cars would be in use on the Fourth Avenue Subway in May. The fourth charge dealt with delay in insisting on the improvement of the Brooklyn service. Mr. McCall said in this connection that the commission was bound by law to grant a hearing.

The chairman next turned to the two charges against him of malfeasance in office. The first was founded on the fact that he had practiced law while he was in the commission. He owned frankly that he had gone into the commission with the belief that he could do so. The entire time that he gave to private practice since he went to the commission has been thirteen days. On not one of these days had he failed to be at his desk. Not a meeting had been held when he had been in town, that he had not first gone over the calendar carefully, and more often he had been kept away by the business of the commission than by his private practice. During his two years in office he had never taken a vacation. As for the use of the commission's automobile the chairman explained that it was necessary for him to go on business of the commission to all parts of the city at all hours of the day. His own car had been used

more frequently in the public service than the commission's automobile.

In the course of his general plea the chairman said:

"Governor, I have been a Democrat and I shall be a Democrat as long as my principles will permit me. I found in the commission an organization left by my Republican predecessor and it is there to-day. No one under me has dared to ask a man what his politics are. I would rather cut off my arm than remove a man for his political beliefs. Millions of dollars have been spent by the commission but not a single charge of favoritism has ever been brought against it. Our engineering expenses have been cut down to less than 6 per cent of the capital expended and I defy you to make it less. I care no more for place than a child for a broken toy. I hold office at financial loss. But there is something dearer to me than money. Here I stand before you in this town where I was born and where everybody knows me. Here I say to you, I am tenacious of my honor, and for that I protest against these scandalous charges."

Commissioner Wood confined himself to reading his printed brief. He pointed out particularly that he had been in office only eight months, and in going over the specific charges covered much the same ground as the chairman. He pointed out how much he had done for the Bronx and stated that he had made particular inquiries as to the informal complaints that came to the commission from that borough.

Commissioner Cram asserted that the method of handling informal complaints adopted by the commission was in his judgment one of the best things ever done, while the charge that there had been neglect in keeping the subway up to the proper service was absurd, considering it was the most remarkable service in the world. Then he spoke of his achievements in connection with the rehabilitation of the public utilities in Richmond, in moving for the abolition of the wooden cars in the subway and in promoting the abolition of grade crossings on Long Island.

CLEVELAND CONSTRUCTION MATTERS

Twenty-five owners of property on Euclid Avenue, between East Twenty-second and East Fortieth Streets, Cleveland, Ohio, filed a petition in common pleas court on March 22, asking for an injunction to prevent the Cleveland Railway from constructing a double track over that section of street, commonly known as "Millionaires' Row." Judge A. J. Pearson denied the order, when Attorney Harry J. Crawford, representing the company, gave his personal pledge that work would not be started on the tracks until a similar suit involving another section of street, pending in Judge Vickery's court, has been decided.

The charter adopted by the city of Cleveland some time ago provides that consents of owners of abutting property are not necessary to construct a line on the street. The plaintiffs in this suit insist that consents are necessary in spite of the charter provisions and also that legal permission from the City Council had not been obtained for the construction of the line. Director of Law Stockwell asserted that a temporary injunction was not necessary, as the Council resolution permitting the construction of tracks will not become effective until April 10.

Recently the Brookside Sausage Company brought suit to prevent the company from laying tracks for a loop on Archwood Avenue, S. W., near the entrance of Brookside Park. The allegations are similar to those made in the Euclid Avenue petition. The case will be heard soon and on the decision in this action will depend the result of the later attempt to keep street cars from operating over the heretofore prohibited section of Euclid Avenue.

At a public meeting on March 22 the proposed new franchise for Lakewood was discussed by citizens. Objections were made to the provision for a straight 5-cent fare between Cleveland and Lakewood and several leading men argued that the old rate of eleven tickets for 50 cents between the city and Lakewood and within Lakewood would

be better than the proposal made, by which the fare within Lakewood will be 3 cents. Mayor Tyler threatened to veto any grant made by Council along the lines suggested. Another meeting will be held and in the meantime the Council committee will confer with the company officials and Peter Witt, street railway commissioner.

The subject of a new franchise was discussed in the East Cleveland Council on the same evening. The East Cleveland Chamber of Commerce insists that the length of the franchise be submitted to a vote, while Council stands for a twenty-five-year grant. It is contended by some that the proposed grant will bind the city to a 5-cent fare in case it is annexed to Cleveland and many object to an increase over the city rate.

Councilman Woods submitted a resolution to the City Council on March 22, directing an expenditure of \$15,000 for the extension of the Payne Avenue line to an intersection with the East 105th Street line. Mr. Witt opposed the measure on the ground that the extension does not justify the expenditure. At present passengers must walk up or down a hill to make transfers from one line to the other, and people in that vicinity are insisting on the extension.

TRAFFIC IN SAN FRANCISCO

How the Exposition Crowds Are Being Handled at San Francisco

In referring to the successful manner in which the crowds were handled on the opening day of the Panama-Pacific International Exposition an official of the Oakland, Antioch & Eastern Railway said that "the transportation world ought to feel pretty good over what has been accomplished." Since the attendance at the grounds on that day was 246,738, the opinion prevails that with the improvements in the service which both the Municipal Railways and the United Railroads have under way, there will be no delays or inconvenience in handling the traffic even on the busiest days during the exposition. The total number of admissions to the grounds in the first fourteen days was 1,036,349, or an average of 74,025 per day.

The Board of Supervisors of San Francisco, recognizing the able manner in which the railways were operated, adopted the following resolution:

"Whereas, On Feb. 20, the opening day of the Panama-Pacific International Exposition, the Municipal Railways of San Francisco transported 265,000 persons without accident or discomfort, and conveyed them to their destinations without delay; therefore, be it

"Resolved, That the Mayor and the Board of Supervisors hereby extend congratulations and commendation to the superintendent and employees of the Municipal Railways for the splendid service given the public on the said opening day of the exposition, and that there is hereby expressed public appreciation of the courteous and expeditious transportation of the people of this city and visitors who had occasion to use the Municipal Railway service."

A. M. Mortensen, traffic manager for the exposition, expressed the opinion that the facilities for bringing visitors to the exposition grounds were already equal to any requirements likely to be imposed, and recalled that at the Chicago exposition the opening day crowd, though much smaller than at San Francisco, caused great congestion and delay. He pointed out that the location of the exposition grounds at San Francisco was so convenient to the residential portion of the city that many of the opening day visitors would have walked if any inconvenience had attended their using the cars. Although many thousands joined in the parade on Feb. 20, it is estimated that a total of 220,000 people rode directly to the exposition gates. This traffic, it is estimated, was divided as follows:

Municipal Street Railways.....	80,000
United Railroads (Polk and Fillmore).....	50,000
Key Route Ferry (direct).....	35,000
California cable road.....	25,000
"Jitneys" and buses.....	25,000
Sausalito Ferry (direct).....	5,000
Total	220,000

The United Railroads has at present capacity for transporting 28,000 passengers an hour to the exposition gates.

Three lines from different parts of the city whose capacity totals 20,000 an hour when operating on forty-five-second headway terminate in a loop at the Van Ness entrance. The Fillmore Street lines can bring 12,000 an hour to the terminus at the top of the hill, whence the seven blocks to the Fillmore entrance are covered by an extension operated as a funicular line for two blocks. This extension has a capacity of 6000 an hour at the present time, but will shortly be improved by putting on closed pay-as-you-enter cars so as to be operated in two-car trains over the funicular part of the line, and the capacity will then become 8000 an hour. These trains are to be operated on less than a two-minute headway over a maximum grade of 25.5 per cent.

The "jitney" buses on the opening day inaugurated a 10-cent fare from the ferries to the exposition grounds, and about 1000 automobiles, including the larger buses, were in operation. The Key Route Ferry maintained a twenty-minute service from its Oakland pier direct to the exposition ferry slip and, in addition to much local traffic from Oakland, carried all the passengers brought in on the excursion trains of the Oakland, Antioch & Eastern Railway, which terminate on the Key Route mole. Altogether about 172,000 passengers were brought over from transbay points, and this number was handled so easily that J. D. Brennan, superintendent at the Oakland pier, where the heaviest traffic centered, said that he knew from this experience that the companies could carry 500,000 people or more into San Francisco in the course of a day.

The total receipts of the Municipal Railways on Feb. 20 were \$13,421.20, which represented the cash taken in on 150 of the large new cars and twenty-seven of the small open cars used on the Union Street line. Besides these, eighteen of the large cars were held in reserve. Only one minor accident was reported on the Municipal Railway system, although ninety new crews of platform men had to be broken in during the twenty days preceding the opening date. The receipts on this system on the three days following Feb. 20 were \$6,825.75, \$8,046.40 and \$5,707.70 respectively, and it is now estimated that the probable gross receipts on the system during the exposition will be \$3,000,000.

Branches of the Municipal Railways reach all five of the main exposition entrances, and cars are looped on double tracks past three of these. That is, cars arrive at an entrance from opposite directions on each track of the double loop, and by serving one entrance with both pairs of looped tracks the maximum number of cars direct to or from the city pass each main entrance. With this arrangement the minimum effective headway is so satisfactory that it has not been thought necessary to install turnstiles except at the Laguna Street entrance. At this point the only access to the cars is through the exposition exits, so that turnstile collection involved no special inclosure.

WORKMEN'S COMPENSATION AMENDMENT

The Senate of the State of New York on March 19 passed the amendment to the workmen's compensation bill providing for permissive direct settlement between employee and employer. The Senate also passed unanimously the bill appropriating \$445,000 for current expenses of the commission. Both bills are now before Governor Whitman for his signature. The amended bill provides that the employer and the employee may enter into a tentative agreement on settlement. Where they do not choose to enter into such a direct settlement, the matter devolves upon the commission. The bill also does away with the actual payment of awards by the commission and provides that payments may be made direct by the employer to the employee. Just before adjournment on March 19 a resolution was passed by the Senate calling for an investigation of the charges that corrupt and sinister influences forced the passage of the amendment providing for direct settlement.

The ways and means committee of the Assembly, which has in its custody the concurrent resolution calling for an investigation which was passed in the Senate, met on March 24, but took no action on that measure, and it is presumed that the resolution will be permitted to die in committee.

THE CINCINNATI INVENTORY

On March 17 the city solicitor of Cincinnati sent a communication to the Cincinnati Traction Company in which he insisted on the right to an immediate examination of the company's books. The company had informed Mr. Schoenle that its books were constantly in use and suggested that the report of the Public Service Commission would contain all the information that he would need. The street railway committee of the City Council now has under consideration the request of Mr. Schoenle for authority to bring proceedings against the company to compel it to allow him to make an examination of its books at once.

On March 22 W. Kesley Schoepf, president of the Cincinnati Traction Company, wrote to City Solicitor Schoenle about the company's policy with regard to his inspection of its books. Mr. Schoepf said in short that the company had nothing to conceal. Its books were frequently examined by city, state and federal authorities. The annual audit was being made when Mr. Schoenle's request was made and at the same time the Public Utilities Commission was engaged at the request of Council on an inventory of the property. He understood that Mr. Schoenle was willing to join with the company in requesting the early completion of the work of the commission. In view of this and the fact that the books were no longer in demand for the audit and by the commission the books were now at Mr. Schoenle's disposal. On the same day Walter M. Draper, vice-president of the company, denied before the street railway committee of the City Council that he had refused Mr. Schoenle permission to examine the books. Mr. Schoenle said that since Mr. Schoepf had consented to allow him access to the books there would be no need of further proceedings. Council had already denied him permission to bring proceedings of any kind to secure the books at this time.

LEGISLATION IN PENNSYLVANIA

The House has passed the bill empowering cities of the second class to tax railroad switches, etc., and has also passed the bill authorizing the merger of street railways in Pennsylvania with street railways outside of the State. Since March 11 bills have been introduced in the Senate to authorize cities to regulate and license certain motor vehicles, etc., and seven measures have been introduced affecting workmen's compensation. Among the bills introduced in the House since March 11 are the following: authorizing cities of the second class to locate, construct, etc., subways or galleries and to require public service companies to use the same under certain conditions; giving certain jurisdiction to the Public Service Commission in the matter of furnishing quotations of stock exchange; making it compulsory on the part of street railways to do an express and freight business; authorizing street railways to lease or operate motor omnibuses, etc.

HYDRO-RADIAL RAILWAYS

At a meeting of representatives of Windsor, Walkerville and Sandwich, held on March 19 in Windsor, Ont., it was decided to memorialize the provincial government in favor of a system of hydro-radial railways. A deputation will be sent from the City Council of Windsor to Toronto on March 26 to meet representatives of the government, when an effort will be made to have engineers from the Hydro-Electric Power Commission detailed to report upon the proposed plan for municipal railway lines to connect the three municipalities.

The second annual meeting of the Niagara District Hydro-Radial Union, comprising the Counties of Welland, Lincoln and Haldimand, was held at Welland on March 19. T. J. Hannigan, Guelph, Ont., secretary of the Provincial Hydro-Radial Association, announced that arrangements had been made with Premier Hearst to receive a deputation from the municipalities of Ontario on March 26, when the government will be asked to adopt the policy of subsidies to hydro-radial railways at the rate of \$3,200 a mile. The annual report of the Niagara District Association showed that of the forty-five municipalities in the three counties thirty-five had asked for surveys and that a number of these had been completed by the engineers.

ELECTRIFICATION IN IOWA

The Charles City (Ia.) Western Railway, which operates between Charles City and Marble Rock, Ia., a distance of 18½ miles, announces that it has contracted for the electrification of its line now operated by steam locomotives and gasoline motor cars. In addition to the electrification of the existing line, a 7½-mile extension will be constructed. The overhead construction will be of the mast-arm direct-suspension type and energy will be supplied at 1200 volts d.c. from a central station in Charles City.

Rolling stock for this electrification has been purchased from the McGuire-Cummings Manufacturing Company, Chicago, Ill., and includes two single-truck, all-steel city cars, one all-steel interurban car and one 35-ton electric locomotive. The three cars are to be equipped with General Electric apparatus, the single-truck cars with two GE 270, 50-hp motors each, and the interurban car with four motors of the same type. The electric locomotive, which will be used largely for handling freight between Charles City and Marble Rock, where the line connects with the Rock Island Railroad, will be equipped with four GE 205, 80-hp motors and type M control. According to the present plan of E. R. Ernsberger, general manager, the existing line, which includes 18½ miles of track along with a 2½-mile extension, will be completed and in service by July 1, 1915.

TOLEDO FRANCHISE PROSPECTS

Henry L. Doherty, chairman of the board of directors of the Toledo Railways & Light Company, was in Toledo on March 18. Mr. Doherty said he had nothing new or different in the way of a franchise to offer or suggest and that he was not ready to renew negotiations just at this time. He expects to return to Toledo soon for a conference with the city officials.

The Thurstin ordinance, providing for an issue of \$4,000,000 of bonds, the proceeds to be used for the purchase of the tracks and cars of the local company, was considered by the railway and telegraph committee of the City Council on March 17 and was referred back to the city solicitor for additional details as to how it is to be put into operation. Councilman Dotson said that no bids could be secured on bonds until a valuation had been completed of the property upon which the bonds will be a lien.

Municipal Ownership Inquiry Bill.—Assemblyman A. F. Shartel has introduced into the Legislature of California a concurrent resolution directing the State Highway Commission to investigate all interurban electric railways with a view to their ultimate purchase by the State. Mr. Shartel's resolution provides that the commission shall report back to the Governor the result of the proposed inquiry by Jan. 1, 1916.

New Haven Indictment Pleas.—Judge Hunt has postponed in the Federal District Court until March 29 the entering of pleas to the second or superseding indictment returned against twenty-one of the directors of the New York, New Haven & Hartford Railroad. This was done because the government had interposed demurrers to the special pleas made by two of the indicted directors. By March 29 it is expected that argument on these demurrers will have been heard.

Federal Trade Committee.—The board of directors of the Chamber of Commerce of the United States in Washington, an organization representing the federated chambers of commerce of the different cities in this country, has appointed a committee on federal trade to co-operate with the new Federal Trade Commission. It is composed of nine members, one of whom is Guy E. Tripp, chairman of the board, Westinghouse Electric & Manufacturing Company.

Municipal Ownership Bill Defeated.—The Massachusetts House has rejected a bill to provide that the people may vote in any year on the question of public ownership of the electric railways in that State. Mr. Robinson, Boston, characterized the bill as a half-baked proposition. He pointed out that it would absolutely commit the State to the policy of public ownership with a single affirmative vote at a single election, and that this might happen without any public discussion.

Des Moines Franchise Negotiations.—Negotiations between the Des Moines (Ia.) City Railway and the City Council for a new franchise for the company are being continued through the medium of a committee representing the commercial organizations of the city and a new franchise is being drawn up for approval by the city and company. The grant then will be submitted to a vote of the people, probably early in June. Members of the mediation committee included newspaper editors and others of prominence. Emil G. Schmidt, president of the company, is present at the meetings of the committee.

Subway Car Order Accepted.—The Interborough Rapid Transit Company has notified the Public Service Commission for the First District of New York that it will accept the order of the commission, adopted on Jan. 12, 1915, requiring the removal of the 478 composite cars from operation in the subway and the substitution of all-steel cars therefor. The work of removal is to begin May 1 and to be completed by Dec. 1, 1915. These composite cars are a part of the original equipment of the subway. They have steel underframes and wooden sides, sheathed with copper. With the removal of the composite cars, all cars in the subway will be of all-steel construction.

Toronto Report Suit.—John Mackay & Company, Toronto, Ont., have entered action at Osgoode Hall against the city of Toronto, Ont., to recover \$42,546.50, alleged to be due for services rendered and for disbursement made in connection therewith. It is alleged that Mr. Mackay was retained by Mayor Hocken to make a report. When his retainer was questioned Mr. Hocken is said to have announced that he would pay the bill himself. This he failed to do. The report for which payment is sought was rendered in connection with the negotiations of the city for the purchase of the property of the Toronto Railway, Toronto Electric Light Company and Toronto & York Radial Railway.

Pittsburgh Subway Bill Objections.—The committee on subway legislation of the Chamber of Commerce of Pittsburgh, Pa., has made a report disapproving the Senate subway bill, already passed by the Pennsylvania Legislature. The chief objections found in the Senate bill by the Chamber committee were that it does not specifically permit the building of a subway confined wholly to the congested area of the city; that it puts no limit on the lease the city may grant to the subway corporation and under its terms a lease might be perpetual and exclusive, and that it gives to the city the right of charging a sum not in excess of 2 cents per passenger for the use of the proposed subway in addition to the charge made by the operating or leasing company.

Subway Construction Contracts in New York.—March 19 was the second anniversary of the signing of the dual system rapid transit contracts. In the two years which have elapsed the Public Service Commission for the First District of New York has awarded thirty-eight construction contracts, which, with those previously awarded, make sixty-four of the eighty-four sections of the city-owned lines already under contract. The commission hopes to let contracts for the remaining twenty sections within the next six months. The total of all city contracts now outstanding is about \$142,000,000. The greater part of the work to be done and paid for by the Interborough Rapid Transit Company and the New York Municipal Railway Corporation in the third-tracking and extension of existing elevated lines is also under way.

Separate Chicago Commission.—The Illinois Legislature through its public utilities committee, has undertaken to learn through public hearings the demand for a separate public utilities commission for Chicago. Mayor Harrison, William Hale Thompson, Republican nominee for Mayor, and Robert M. Sweitzer, Democratic nominee, along with aldermen and members of Chicago commercial organizations interested in what is termed "the home rule of public utilities," have appeared before this committee. Two bills are pending before the public utilities committee of the Legislature, one amending the present utilities law by providing for the establishment of a separate commission to be appointed by the Mayor of Chicago, and the other authorizing the City Council of Chicago to appoint a commission to regulate its public utilities.

Financial and Corporate

PASSENGER CAR ORDERS

Electric Railways Surpass Steam Carriers in Large Orders and in Total Cars Ordered

A comparison of the purchasing activity of steam and electric roads, a subject of timely interest in view of the large order this week by the Interborough Rapid Transit Company for 478 car bodies, shows the number of large passenger car orders and of total passenger cars ordered from year to year to be decidedly greater on electric than on steam railways.

In regard to the number of "star orders," electric railways easily surpass steam railroads. Since 1908, inclusive, the largest electric passenger car orders, graded according to size, have been as follows: (1) The Philadelphia Rapid Transit Company, with 1000 cars ordered in 1912; (2) the Chicago Railways, with 700 cars ordered in 1908; and (3) the Philadelphia Rapid Transit Company again with 500 cars ordered in 1913. The Interborough Rapid Transit Company's recent order ranks next, according to the number of car bodies ordered, although owing to the omission of truck equipment in the order, it might rank somewhat lower in amount of expenditure. The greatest number of passenger cars ordered per year by any steam railroad in the last two years, before which time individual figures are not readily available, was only 342 in 1913 for the Pennsylvania Railroad, including the Pennsylvania Lines West. In general, during 1913 and 1914, there were thirteen electric as compared to eleven steam orders for more than 100 passenger cars.

Electric railways also rank first as regards consistent ordering of passenger cars. During the last eight years orders of electric railways for this type of equipment exceeded those of steam railroads for every separate year except 1909, making a total of 31,811 for electric as compared to only 22,951 for steam lines. In view of the great difference between these two figures, which would be much greater if the large number of mail, baggage and milk cars, classed as passenger cars under the latter figure, were omitted, it seems safe to infer that the electric car industry, despite the shorter average length and the less costly character of car body, offers to the manufacturer a field whose relative importance has not always been fully appreciated.

REPORTS ON BUSINESS OPTIMISM

Composite Opinion of Representative Business Men Is Inclined Toward Optimism

A digest recently compiled by Harris, Winthrop & Company, New York, contains the opinions of many representative business men on the commercial and financial outlook of this country. This digest is worthy of note, for it indicates that the scattered advices as to the rising tide of business confidence and activity are in accordance with the conclusions drawn by many business men from the present trend.

According to the composite opinion of more than 700 representative business men, as shown by letters answering specific questions, the stock of goods on hand is low and will need replenishing, thereby increasing future demand. The accumulation of savings is interpreted to be a reassurance as to the future of the investment market and business credit. The unemployment reported is large, but of late is decreasing. It is generally believed that no appreciable burden will be placed on domestic commerce by the higher freight rates. Economy is general, but is in many cases a matter of choice.

When asked for an expression of opinion on these points, 60 per cent of the respondents stated that present conditions made the outlook encouraging. Moreover, 17 per cent stated that there was no abnormal business depression in sight. Confidence and hope are only mental attitudes, but it is interesting to note this expression of optimism on the part of business men themselves.

ANNUAL REPORTS

Milwaukee Electric Railway & Light Company

The comparative statement of income, profit and loss of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., for the fiscal years ended Dec. 31, 1913 and 1914, follows:

	1914	1913
Operating revenues	\$6,005,495	\$6,016,916
Operating expenses:		
Current ordinary operating expenses.....	\$3,095,606	\$3,167,365
Depreciation (reserve credit).....	698,516	633,359
Contingencies (reserve credit).....	1,601	15,042
Taxes (reserve credit).....	436,701	390,669
Total	\$4,232,424	\$4,206,435
Net operating revenues.....	\$1,773,071	\$1,810,481
Non-operating revenues.....	65,807	45,178
Gross income	\$1,838,878	\$1,855,659
Interest charges	823,375	733,322
Net income	\$1,015,503	\$1,122,337
Dividends on preferred stock.....	270,000	270,000
Dividends on common stock.....	763,375	788,000
Surplus	*\$17,872	\$64,337

*Deficit.

The comparative statement of income, profit and loss of the railway department for these two fiscal years is as follows:

	1914	1913
Operating revenues:		
Passenger revenues	\$4,075,213	\$4,184,135
Other revenues	35,505	37,175
Total	\$4,110,718	\$4,221,310
Operating expenses:		
Way and structures.....	\$135,697	\$156,162
Equipment	232,647	295,717
Traffic-power-transportation	1,514,176	1,472,919
General	153,849	111,764
Undistributed	328,427	385,718
Depreciation (reserve credit).....	514,488	457,532
Contingencies (reserve credit).....	1,097	10,553
Taxes (reserve credit).....	299,342	273,935
Total	\$3,179,723	\$3,164,299
Net operating revenues.....	\$930,995	\$1,057,011
Non-operating revenues.....	14,633	11,926
Gross income	\$945,628	\$1,068,937
Interest charges	559,895	498,659
Net income	\$385,733	\$570,278

The total operating revenues of the company for 1914 showed a decrease of \$11,421 as compared with the figures for the previous year. This decrease was caused by a reduction in the operating revenues of the railway department of \$110,593, in large part offset by an increase of \$99,172 in the light and power department. It is stated that the street railway in Milwaukee, in common with those in other cities, is suffering from an absence of growth of revenues and an increase of expenses over which the owners have no control, and the continuation of present conditions in respect to railway net earnings will necessarily affect the ability to expand. During the first seven months of the year the revenues of the railway department decreased 0.7 per cent on account of the then prevailing business depression. The decrease since that time was exaggerated by the disturbances resulting from the European war, making the decrease for the year 2.6 per cent.

The total net income of the company decreased 9.5 per cent, resulting from a decrease in gross income of \$16,782 and an increase in interest charges of \$90,052. While the gross income of the light and power department increased \$106,527, the gross income of the railway department decreased \$123,310. This decrease was caused in part by the smaller revenues before referred to and in part by the higher operating expenses brought about by increased car service to comply with prescribed commission standards.

Before arriving at net operating revenues, there were deducted for maintenance and depreciation of physical property amounts equivalent to the following percentages of the operating revenues: railway department, 22.25 per cent; light and power department, 16.25 per cent, and steam heating department, 6.63 per cent. The balances remaining after providing for maintenance in ordinary operating expenses were carried to the credit of the depreciation reserves. The property accounts increased \$391,309 during the year, the largest items covering extensions to the over-

head and underground electric distribution systems. The amount of construction work was kept at a minimum during the year, the capital expenditures being smaller than those for any year since 1898. A total of 9.4473 miles of track was reconstructed.

The amount of fire insurance protection carried has gradually increased from \$2,200,000 for 1911 to \$3,633,970 for 1915, while the annual premiums paid have been reduced from \$22,000 to \$13,082, equivalent to rates of \$1 and 36 cents per \$100 of valuation. During 1914 loans made to members of the newly formed employees' mutual savings, building and loan association totaled \$56,950. At the end of the year the employees' mutual benefit association had 2690 members, \$40,926 cash and investments on hand and 526 outstanding life insurance policies, covering \$276,500 of insurance. The reserve created against coupons issued with city commutation tickets amounts to \$183,549.

Miscellaneous comparative statistical data of the railway department of the company for 1913 and 1914 follow:

	1914	1913
Miles of track owned.....	165.02	164.87
Miles of track leased.....	27.51	27.51
Miles of track operated	177.72	177.14
Receipts per mile of track operated.....	\$23,130.30	\$23,830.36
Revenue passengers carried.....	97,874,919	100,073,659
Transfer passengers carried.....	38,814,573	36,963,958
Receipts per revenue passenger.....	\$0.0416	\$0.0418
Revenue car hours operated.....	1,712,079	1,685,014
Receipts per revenue car hour.....	\$2.40	\$2.51
Revenue car miles operated.....	14,688,176	14,596,686
Receipts per revenue car mile.....	\$0.2799	\$0.2892
Number of passenger cars owned.....	537	537
Maximum number of cars operated.....	471	462

Chicago City Railway

The gross earnings, expenses and distribution of residue receipts of the Chicago (Ill.) Surface Lines for the year ended Jan. 31, 1915, were as follows:

Gross earnings	\$31,966,048
Expenses:	
Maintenance	\$2,464,564
Renewals	2,557,284
Operation of power plants.....	2,781,907
Operation of cars.....	8,786,523
General expenses—including board of supervising engineers	1,945,924
Taxes	1,353,073
Total expenses of operation.....	\$19,889,275
Residue receipts	\$12,076,773
Divided:	
Chicago Railways, 59 per cent.....	\$7,125,296
South Side lines, 41 per cent.....	4,951,477

The gross earnings of the Chicago Surface Lines amounted to \$31,966,048, and expenses to \$19,889,275, or 62.22 per cent of the gross, leaving residue receipts of \$12,076,773. These were divisible 59 per cent, or \$7,125,296, to the Chicago Railways, and 41 per cent, or \$4,951,477, to the South Side lines, namely: the Chicago City Railway, the Southern Street Railway and the Calumet & South Chicago Railway. The income statement of the Chicago City Railway for the year ended Jan. 31, 1915, follows:

41 per cent of the residue receipts of Chicago Surface Lines.....	\$4,951,477
Deduct:	
Joint account expenses, interest on capital investment of the Chicago City Railway and the Calumet & South Chicago Railway, and net earnings of the Southern Street Railway.....	3,612,889
Net earnings of Chicago City Railway.....	\$1,338,588
City's proportion, 55 per cent as per ordinance.....	736,223
Company's proportion, 45 per cent, as per ordinance....	\$602,365
Add:	
Interest on capital, as certified by Board of Supervising Engineers.....	2,416,913
Income from operation.....	\$3,019,278
Other income, net.....	279,548
Interest on bonds outstanding.....	\$3,298,826
Net income	1,529,409
Dividends, 9 per cent.....	\$1,769,417
Surplus	1,620,000
Total	\$149,417

The Chicago City Railway produced a net income after the payment of all operating expenses and bond interest of \$1,769,417, from which four quarterly dividends were paid, aggregating a total of 9 per cent upon the \$18,000,000 of capital stock of the company. The dividend rate shows a

decrease from 10½ per cent last year, largely owing to the decrease in gross receipts during the last half of the fiscal year. The beginning of the European war, Aug. 1, 1914, was followed by the closing of, or by a material reduction in the operating forces of, a large number of manufacturing plants in the city. This immediately affected the receipts adversely, and during the last six months of the year the gross receipts of the Chicago Surface Lines were \$608,085 less than the receipts for the same period in the preceding year.

During the year the company built 7.04 miles of single track. The total mileage of single track now owned is 312.75 miles. During the year the company purchased and put in service 226 double truck passenger cars, and twelve cars are now under construction and being delivered. The company bought real estate and erected thereon substation buildings of 8000-kw capacity each at Forty-fourth Street and Kedzie Avenue and at Eighty-second and Halsted Streets and installed machinery and apparatus to the extent of 12,000 kw.

CONDITION OF PHILADELPHIA COMPANY

Mason B. Starring Issues Statement Showing Financial State of Philadelphia Company and Subsidiaries

Mason B. Starring, president United Railways Investment Company, which controls through stock ownership the Philadelphia Company, Pittsburgh, Pa., has issued the following statement on the affairs of the Philadelphia Company:

"Owing to the controversy between the preferred stockholders of the United Traction Company and the management of the Pittsburgh Railways, as to the desirability of the latter corporation applying earnings of United Traction to improvements and betterments instead of paying them out in preferred dividends, a good deal of discussion of Philadelphia Company and United Railway Investment Company securities has resulted, with some selling by holders who do not understand the situation.

"The thing that interests me most is to keep the security holders from sacrificing their securities because of some fear of the condition of the Philadelphia Company or its subsidiary corporations. The net income of the Philadelphia Company for the year ended March 31, 1915, will be more than \$5,600,000, available for payment of interest. The interest on all classes of funded debts amounts to \$1,913,639, so that there will be left for the payment of dividends and for improvements to the property about \$3,700,000, and probably more.

"All interest and rentals of the companies leased or owned by the Pittsburgh Railways have been earned and will be paid. At the outbreak of the war the companies were in the midst of their usual summer work, and it was considered safer to issue script to the common stock for dividends than to borrow money on short time to make these payments, on account of high rates of interest and uncertainties of the money market. The condition of all the companies was never better than it is now."

In connection with the controversy mentioned by Mr. Starring, it may be noted that the protective committee for the stockholders of the United Traction Company has received word that the board of directors of the Pittsburgh Railways has passed a resolution to give the United Traction Company notice of the cancellation of the operating agreement between the companies. A committee from Pittsburgh was expected to confer with the protective committee on March 25 to suggest some plan for the future operation of the United Traction Company. Previous references to this dispute were made in the *ELECTRIC RAILWAY JOURNAL* of Jan. 9 and 16, and Feb. 13 and 20.

Chicago (Ill.) City Railway.—A quarterly dividend of 2 per cent has been declared on the \$18,000,000 capital stock of the Chicago City Railway, payable on March 30 to holders of record of March 26. This dividend compares with payments of 2½ per cent quarterly from March, 1910, to September, 1914 (besides extra payments) and 1½ per cent in December, 1914.

Gary, Hobart & Eastern Traction Company, Hobart, Ind.—A certificate was recently filed at Indianapolis covering the

reduction of the common stock of the Gary, Hobart & Eastern Traction Company from \$125,000 to \$100,000, and the creation of \$25,000 of preferred stock.

Holyoke (Mass.) Street Railway.—Lee, Higginson & Company, Boston, are offering at 105 and interest \$850,000 of first mortgage 5 per cent gold bonds of the Holyoke Street Railway. These bonds are dated April 1, 1915, and are due on April 1, 1935, but are callable at 107 and interest on and after April 1, 1920. The proceeds will be used to retire \$250,000 of 5 per cent debentures due on April 1, 1915, and to pay off floating indebtedness incurred for construction and equipment of the railway. The Massachusetts Public Service Commission has expressed its formal approval of this issue. It has also ordered rescinded 2081 shares of capital stock, part of an issue of 4765 shares authorized by the Massachusetts Railroad Commission on June 24, 1913, and not now to be used.

Kansas City Railway & Light Company, Kansas City, Mo.—The holders of the certificates of deposit representing the first lien refunding 5 per cent gold bonds of the Kansas City Railway & Light Company have been notified that the protective committee under the agreement of April 3, 1913, has extended until April 3, 1915, the period within which to receive new securities or cash, pursuant to a sale or a plan for reorganization, or to obtain the deposited bonds.

Los Angeles (Cal.) Railway.—Vice-President Dunn states that no new application will be made by The Los Angeles Railway to the California Railroad Commission for permission to issue bonds, and that no modification of the application which was denied on March 5 is contemplated at least for this year. The commission recently refused to allow the Los Angeles Railway Corporation and the City Railway of Los Angeles to transfer their property to The Los Angeles Railway, as noted in the *ELECTRIC RAILWAY JOURNAL* of March 13. According to Mr. Dunn, whatever extensions will be made will have to be paid for from the earnings above fixed expenses, and with the "jitney" bus continually cutting into the company's business, these are now or nearly nil.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—Holders of more than 75 per cent of the outstanding securities of the Oakland, Antioch & Eastern Railway and affiliated roads recently heard the report of the committee of seven appointed to study the affairs of the road. The committee heartily indorsed the policy of the present management and expressed approval of the existing plan for refinancing the system. Concerning foreclosure it declared its opposition in no uncertain terms. Since both the bonds and the stocks are owned by practically the same persons, the committee thought that a receivership would be of no special benefit, whereas by the bondholders waiving their interest for three years and the stockholders advancing \$3, the roads would have a chance to work out their own salvation. The report was unanimously accepted by the stockholders, and the committee of seven was re-elected and made a permanent body, one additional member being named. At the request of counsel for the Oakland, Antioch & Eastern Railway, the California Railroad Commission has rescinded its authorization for the railway to mortgage certain real estate at Sacramento and to issue two notes amounting to \$58,000 secured by such mortgage. It was stated that the authorization to issue the notes is not now desired or required by the company. Previous references to the notes were made in the *ELECTRIC RAILWAY JOURNAL* of Jan. 20 and Feb. 6.

Rockford & Interurban Railway & Rockford City Traction Company, Rockford, Ill.—The Illinois Public Utilities Commission has authorized the Rockford & Interurban Railway & Rockford Street Traction Company to issue bonds amounting to \$86,000.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The question of the value of Key Route properties was debated before the California Railroad Commission on March 16, when an attempt was made to reconcile the conflicting estimates made by the commission and the company's engineers. The total value placed by the commission's staff varied from the companies own figures by \$12,969,382. The testimony of George K. Weeks, presi-

dent, established the fact that the different values were based on different areas as well as on different ratings. He stated that the company's own estimate of the total value of the system to-day was \$36,492,710, composed of operative property, \$25,040,824, and non-operative property, \$11,451,886. It was decided that the engineers for both sides should get together and endeavor to straighten out the appraisals in the light of new data from the company. The Key Route is asking the commission for permission to issue \$10,000,000 of additional bonds, but the commission asserts that with such an increase the ratio of bonded indebtedness to actual value will be 130 per cent as compared to 108 per cent at present. The corporation expects to show that the present ratio is 47 per cent.

Springfield Railway & Light Company, Springfield, Mo.—An initial quarterly dividend of 1¾ per cent, payable on April 1, has been declared on the \$750,000 of 7 per cent cumulative preferred stock of the Springfield Railway & Light Company.

Third Avenue Railway, New York, N. Y.—At a meeting of the board of directors of the Third Avenue Railway on March 23 F. W. Whitridge, president, issued a statement showing that all the surplus of \$518,111 earned in the eight months ended Feb. 28 had been expended for additions and betterments, together with an additional \$100,000, bringing the total so expended up to about \$624,000. Mr. Whitridge said that if anyone should spell a dividend for the company out of these figures he failed to see it. He presented a statement of the budget for 1915, showing that the actual necessary outlays for improvement of the property would require \$1,159,400. The directors appointed a committee of James N. Wallace, Adrian Iselin, Harry Bronner, L. F. Strauss and Emlen Roosevelt to consider the future policy of the company as regards both dividends and the outlays for improvements. Mr. Whitridge stated that he took particular pains to have on the committee Messrs. Strauss and Roosevelt, two members of the committee who recently advocated the payment of dividends. The company has issued a circular to holders of the adjustment mortgage 5 per cent income bonds, outlining the conditions under which they may vote at the meetings of the company and urging them to avail themselves of this privilege.

Tri-State Railway & Electric Company, East Liverpool, Ohio.—Edwin Drake, special master, will offer for sale at the county court house in Cleveland, Ohio, on March 30, between 12 and 1 o'clock, the following property of the Tri-State Railway & Electric Company: The street railway in Steubenville, Ohio, formerly owned by the Steubenville & Wellsburg Traction Company, together with its property and franchise rights; 12,995 shares of the capital stock of the Steubenville, Wellsburg & Weirton Railway; 6995 shares of the capital stock of the Beaver County Light Company; 45 shares of the capital stock of the Midland Electric Light & Power Company; 995 shares of the capital stock of the Wellsburg Electric Light, Heat & Power Company, and 115 shares of the capital stock of the Hancock County Electric Company. The railway in Steubenville, with its rights and franchises, constitutes one parcel and bids will be received separately for it in its entirety. All bidders must deposit \$5,000 either in cash or certified check. The stocks named are all included in the second parcel and a deposit of \$50,000 must be made. In either case, however, first-mortgage bonds will be accepted in lieu of cash or check, when properly assigned. The appointment of the receivers of this company and their preliminary report were noted in the *ELECTRIC RAILWAY JOURNAL* of March 22 and June 7, 1913.

Urbana & Champaign Railway, Gas & Electric Company, Urbana, Ill.—The Urbana & Champaign Railway, Gas & Electric Company has received permission from the Illinois Public Utilities Commission to issue \$95,000 of 5 per cent bonds.

West End Street Railway, Boston, Mass.—The Massachusetts Public Service Commission has authorized the West End Street Railway to issue 8700 additional shares of common stock, amounting to \$435,000 par value. These shares will be offered by R. L. Day & Company on April 1 at public auction to the highest bidder at not less than par. The proceeds are to be used to provide for additions.

DIVIDENDS DECLARED

- Athens Railway & Electric Company, Athens, Ga., quarterly, 1¼ per cent, preferred.
- Bangor Railway & Electric Company, Bangor, Maine, quarterly, 1¾ per cent, preferred.
- Chicago (Ill.) City Railway, quarterly, 2 per cent.
- Cincinnati & Hamilton Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.
- Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.
- Columbia Railway, Gas & Electric Company, Columbia, S. C., quarterly, 1½ per cent, preferred.
- Elmira Water, Light & Railroad Company, Elmira, N. Y., quarterly 1¼ per cent, second preferred; quarterly, 1 per cent, common.
- Halifax (N. S.) Electric Tramway, Ltd., quarterly, 2 per cent.
- Houghton County Traction Company, Houghton, Mich., 3 per cent, preferred.
- Illinois Traction System, Peoria, Ill., quarterly, 1½ per cent, preferred.
- New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent, preferred; 50 cents, common.
- Omaha & Council Bluffs Street Railway, Omaha, Neb., quarterly, 1¼ per cent, preferred and common.
- Porto Rico Railways, Ltd., Toronto, Ont., quarterly, 1¼ per cent, preferred.
- Puget Sound Traction, Light & Power Company, Seattle, Wash., quarterly, 1½ per cent, preferred.
- Republic Railway & Light Company, New York, N. Y., quarterly, 1½ per cent, preferred.
- Springfield Railway & Light Company, Springfield, Mo., quarterly, 1¾ per cent, preferred.
- Toronto (Ont.) Railway, quarterly, 2 per cent.
- Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md., quarterly, 1½ per cent, preferred.
- Washington Water Power Company, Spokane, Wash., quarterly, 1½ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Jan., '15	\$29,054	*\$17,782	\$11,272	\$6,722	\$4,550
1 " " '14	29,798	*18,563	11,235	6,437	4,798
12 " " '15	349,149	*210,338	138,811	77,863	60,948
12 " " '14	378,915	*210,756	168,159	73,527	94,632

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE

1m., Jan., '15	\$194,212	*\$120,141	\$74,071	\$62,568	\$11,503
1 " " '14	184,509	*119,731	64,778	63,576	1,202
12 " " '15	2,523,323	*1,457,429	1,065,894	757,851	308,043
12 " " '14	2,366,719	*1,330,999	1,035,720	721,117	314,603

THE EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

1m., Jan., '15	\$206,162	*\$123,679	\$82,483	\$63,285	\$19,198
1 " " '14	231,944	*150,275	81,669	48,102	33,567
12 " " '15	2,598,045	*1,589,618	1,008,427	717,133	291,294
12 " " '14	2,719,696	*1,632,180	1,087,516	588,880	498,636

GRAND RAPIDS (MICH.) RAILWAY

1m., Jan., '15	\$104,728	*\$67,014	\$37,714	\$13,740	\$23,974
1 " " '14	102,585	*65,142	37,443	13,615	23,828
12 " " '15	1,288,710	*831,507	457,203	161,904	295,299
12 " " '14	1,299,426	*808,819	490,607	165,512	325,095

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE

1m., Jan., '15	\$49,527	*\$38,608	\$10,919	\$15,578	†\$4,659
1 " " '14	45,299	*39,359	5,940	15,338	†9,398
12 " " '15	681,150	*467,057	214,093	186,658	†27,435
12 " " '14	675,901	*433,983	241,918	180,436	†61,482

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1m., Jan., '15	\$395,065	*\$336,803	\$58,263	\$118,232	††\$32,764
1 " " '14	404,062	*350,635	53,427	109,389	††28,864
7 " " '15	3,183,083	*2,375,283	807,799	827,339	†45,676
7 " " '14	3,237,732	*2,372,088	865,644	747,857	†206,501

WESTCHESTER (N. Y.) STREET RAILROAD

1m., Jan., '15	\$17,394	*\$22,025	\$4,630	\$1,349	††\$5,971
1 " " '14	17,513	*21,226	3,713	1,164	††4,862
7 " " '15	159,199	*160,586	1,387	8,886	††10,191
7 " " '14	154,522	*149,692	4,830	7,580	††2,589

*Includes taxes. †Deficit. ††Includes other income.

Traffic and Transportation

THE "JITNEY" BUS

Information Summarized from Fourteen Cities—Accidents Attracting Attention—De Luxe Service Proposed

An unusual amount of information in regard to the "jitney" is available this week, but the information does not lend itself any more readily to being given direction than the "jitney" itself. Concerned with something without organization the material itself is more or less disorganized in that it defied being knit into a connected narrative. While for this reason the account which follows necessarily is choppy, it shows beyond question that the hallelujah chorus with which the "jitney" was ushered in has given way throughout the country to a dirge with a staccato accompaniment from the public at large demanding adequate regulation and proper protection for the safety of patrons and pedestrians. Information is summarized from fourteen cities.

The first "jitney" in San Francisco was placed in operation during December, but the number of machines was very limited up to about Jan. 1. Probably the maximum number in operation at any one time has been in the neighborhood of 700. On March 17 it was estimated that 600 "jitneys" were then running in San Francisco. One-half of all the cars are five-passenger Ford automobiles. The remainder are cars of other makes, ranging from five to seven-passenger touring cars. Up to March 17 no regulations have been passed by the city, but an ordinance is now being considered. Thus far the operations of the "jitneys" in San Francisco have been confined to the streets over which the electric railways are operating and to the short-haul travel.

There have never been any "jitney" buses in operation in Denver. The situation was explained to those in authority along the lines contained in the pamphlet, "The Landlord," published by the Denver City Tramway, and the city commissioners passed an ordinance by a vote of four to one which makes it necessary that a franchise shall be obtained before "jitney" service is established. The pamphlet, "The Landlord," was referred to in the *ELECTRIC RAILWAY JOURNAL* of Feb. 6, and the terms of the regulatory ordinance were published in the issue of Feb. 13.

In Portland, Ore., the first "jitney" was started on Jan. 5. The maximum number of cars in service on March 17 was 350, divided as follows: 307 autos carrying five to seven passengers; four trucks carrying twelve to sixteen passengers; three trucks carrying sixteen to twenty-eight passengers, and thirty-six trucks carrying thirty to thirty-two passengers. Up to March 17 no restrictive legislation had been passed in Portland, but the City Council was at that time considering the matter. The terms of the ordinance at Portland were reviewed in the *ELECTRIC RAILWAY JOURNAL* of March 13, page 531, but the measure has since been revised. The opinion prevails that the number of passengers to be carried in the "jitneys" in Portland will be limited by the ordinance to the seating capacity of the car, but doubt is expressed as to the courage of the City Council to include in the ordinance a suitable provision for indemnity bonds. It seems likely now that the whole "jitney" matter will eventually go before the voters of the city at the coming June election in the form of an initiative or referendum petition.

In Oklahoma City "jitney" service was commenced on Jan. 24 with two cars, one a seven or eight-passenger and the other carrying five passengers. Six or possibly eight cars is the largest number that has been in operation in Oklahoma City at any one time. No "jitneys" are operating there now. Restrictive legislation has been passed by the City Commission, as referred to in previous issues of the *ELECTRIC RAILWAY JOURNAL*. To what extent the legislation has worked to diminish the number of "jitneys" it would be difficult to estimate, but the Oklahoma City ordinance was a drastic one, providing many regulations tending to diminish the running of the "jitneys." After the ordinance went into effect several of the "jitneys" abandoned their regular routes and carried a sign reading, "Auto livery, East Side," "North Side," etc. The plan was

to carry passengers to any point within a specified distance for a "jitney." This did not last long, and although the weather has been favorable for automobile operation there were no "jitneys" in Oklahoma City on March 16. The Oklahoma Railway received assurances from hundreds of people of the city that its service and its treatment of them were satisfactory and that they would not patronize the "jitneys" under any circumstances.

The "jitney" made its appearance in St. Louis on Feb. 11. A few independent second-hand cars of small type had, however, been running in desultory fashion for a few days before that time. On March 16 there were 216 cars in operation, the maximum number in use at any one time. Practically all of the cars are of the five and seven-passenger variety. Two buses are employed from time to time. As stated in the *ELECTRIC RAILWAY JOURNAL* of March 20, the Commissioner of Streets and the president of the police board have drawn up a set of tentative rules which the police intend to enforce until an ordinance has been passed by the Municipal Assembly. Up to March 13 seventy-six "jitney" drivers had taken the examination prescribed by the police and only two failed. It is expected, however, that the regulations will tend to curb the reckless driving which had characterized the "jitney" in St. Louis in the past.

The "jitney" in Houston, Tex., dates from Nov. 28. The approximate maximum number of buses in operation at any one time was 750, which was the number in operation on March 16. All of them are of the five and seven-passenger type. Up to March 16 no restrictive legislation had been passed, but the City Council was at that time considering an ordinance which contained a provision for an indemnity bond but none against overcrowding. The indemnity bond is one inuring to the benefit of the injured party, whether passenger or pedestrian, the maximum amount to any one individual being \$2,500 and for a single accident \$5,000. The ordinance provides that a personal bond for the above amount may be accepted. The "jitney" operators state that they are unable to find any bonding company that will write this bond and they are opposing the passage of the ordinance.

The first "jitney" in Buffalo was placed in operation about three weeks ago. Up to March 13 there had not been more than three cars in operation and none were running at that time. The buses which were used in service in that city were ordinary five and seven-passenger touring cars. The municipal authorities are considering the matter of regulatory legislation.

The invasion of Atlanta by the "jitney" was incited and encouraged actively by the Atlanta *Georgian*, a Hearst newspaper, and on Jan. 28 the first "jitney" was placed in operation in that city. Thirteen cars has been the approximate maximum number of "jitneys" in operation in Atlanta at any one time. Three "jitney" bus concerns have applied for State charters as incorporated businesses. Two of the thirteen cars in operation on March 15 were seven-passenger cars, the remainder being five-passenger cars. No restrictive legislation has been passed in Atlanta, but, as stated in the *ELECTRIC RAILWAY JOURNAL* of March 20, legislation introduced by Councilman Lee is pending before a committee of the City Council. This ordinance would require a bond to the city in the sum of \$10,000 for two cars or less under the control of one operator and \$20,000 for more than two cars. It contains no provision against overcrowding.

Advertisements by the Georgia Railway & Power Company showing, first, why "jitney" buses must be regulated and then explaining term by term the provision of the ordinance have had a twofold effect: they have precipitated an issue that would have arisen some time later and called public attention to the "jitneys" themselves, and they have made it difficult for promoters to secure stock subscriptions. Furthermore, they have put the real interests behind the innovation, the automobile agents, dealers and branch managers, on the defensive in the public prints. In a five-column display advertisement in the papers of March 11 signed by six well-known automobile dealers and ten obscure names connected seemingly with the automobile trade, there appeared these phrases:

"We claim that the owner of an automobile has a right

to make a living by the use of his car if he wants to and to sell your ride for a nickel or a dollar—just what you and he agree upon. He has a right to barter and trade and ride you for a nickel if he wants to.

"But he should not be made a common carrier.

"If they make him that, he must ride anybody who wants to ride and for whom there is room.

"He can't separate the races.

"Can you see what the trolley company is aiming at?

"Every man is entitled to work and earn his living. The man who owns an automobile and wants to ride passengers for a nickel should not be singled out and crushed. Make him a common carrier and he must serve the whites and the blacks. He is through before he starts."

The first "jitney" in Louisville was placed in operation on Feb. 8. The maximum number in operation has been about forty-five. It was reported on March 15 that eleven machines had been withdrawn, but about as many more had replaced these. The cars used have been six seven-passenger cars, three buses with a seating capacity of eleven each and the balance five-passenger cars. Restrictive legislation is pending before the City Council.

The number of buses in operation in Peoria, Ill., is from five to twenty-five. The service is very irregular and fluctuates with the weather, the maximum number of cars being in operation only during more favorable days and the rush hours. The first bus in Peoria was operated on Feb. 6. The capacity of the automobiles in this service is about evenly divided between five and seven-passenger touring cars, there being a larger percentage of five-passenger Fords than any other make of car. No restrictive legislation had been passed in Peoria up to March 17.

The Des Moines (Ia.) City Railway, in spite of the so-called competition of the "jitney," which appeared in Des Moines early in the year, has found traffic increased to such an extent that additional service is now required on two important lines. About fifty "jitneys" are in operation in Des Moines. Their drivers report average receipts of about \$10 a day. The correspondent of this paper in Des Moines says that most of the "jitneys" in use in that city are old cars already headed for the junk pile.

The situation at Toledo is somewhat different from that of most other cities. The Toledo Railways & Light Company operates at a 3-cent fare during the rush hours and the "jitneys" charging a 5-cent fare are necessarily at a disadvantage. The "jitneys" have been operating in Toledo for about two months and on March 20 there were approximately twenty cars in operation. Three or four of these carry eight to twelve passengers, but the rest are but four-passenger machines. Already several have gone out of business. The operators bought second-hand machines and the cost of upkeep soon made serious inroads on their capital. Many of the "jitneys" in Toledo run on crosstown streets where no cars are operated. Legislation has been introduced in the Council to bond drivers in order to protect the people from injury, and the Council is sending to other cities for information as to what the legislative bodies there have done.

Labor organizations and the Building Trades Council in Kansas City are opposing the proposed ordinance for the regulation of "jitney" traffic. The measure is considered by the opponents to be too drastic, especially in its requirement for bonds, license fees, and in demanding a seat for every passenger. The regulation of "jitney" traffic in Kansas City, in so far as the element of competition with the street railway service is concerned, offers the paradoxical feature that the city is in effect a partner of the street railway company and under the new franchise will share even more largely in its earnings. In fact, under the receivership the city has practically an equal voice with the company in the management so far as service and traffic are concerned. Any action detrimental to the street railway would be equally detrimental to the city treasury.

Lieutenant Butler, the traffic expert of the police department of Los Angeles, reports that out of the 1800 licenses issued in Los Angeles prior to Jan. 1, only 600 permits have been renewed since the first of the year. More than 300 operators have retired from the field since Jan. 1 and there are only 700 "jitneys" in operation in the city at this time. A short time ago there were about 1200 "jitneys" operated in the city daily.

The committee on mercantile affairs of the Massachusetts Legislature has reported a bill regulating the "jitney" bus business. The bill is an amended draft of that introduced on petition of the Massachusetts Street Railway Association, and differs from the latter in not requiring "jitney" bus owners or operators to form incorporated companies, and in placing the entire regulation of these interests in the hands of boards of aldermen or selectmen, instead of giving regulative authority to the Public Service Commission. The bus owner or operator is required to file a bond of at least \$2,000 for each motor vehicle operated to cover damages in case of injury to any person resulting from the operation of such vehicle, and the widest latitude is conferred upon the municipal authorities in granting permits and establishing rules under which such buses shall be run.

The introduction of "jitney" service in Philadelphia has caused the Board of Trades' committee on municipal affairs to recommend to Councils and the Department of Public Safety that legislation be enacted at once to control the service there.

Another bill aimed at the "jitney," which would enable traction companies to compete with the new transportation concerns, has been introduced into the Pennsylvania Legislature. The proposed measure would enable street railways to enter into direct competition with the bus lines by operating automobiles in conjunction with their cars. The bill reads: "That every street passenger railway company incorporated under the laws of this commonwealth and every motor power or other company lawfully operating a line or lines of street passenger railway, shall have power and authority to own, lease and operate lines of self-propelled omnibuses in connection with the lines or systems of street passenger railways so owned, but only after obtaining consent of the local authorities."

A. L. Kempster, general manager of the Puget Sound Traction, Light & Power Company, Seattle, Wash., is quoted in part as follows in regard to the bus situation in that city:

"I understand that the 'jitney' bus people are arranging to attack the validity of the emergency clause in the law passed by the Legislature over the Governor's veto. This would open the law to the referendum and leave the situation as it has been since the beginning of the 'jitney' bus in Seattle. Should such be the case, my company will be unable to temporize further, and the reductions in service already put into effect will be as nothing compared to those we shall be compelled to make unless some relief is given. The Puget Sound Traction, Light & Power Company has retained scores of employees on its payrolls and has continued service where patronage did not exist, in the hope that the situation would clear without the public being greatly discommoded. We shall endeavor in the future to do all in our power for the convenience of the public, but it stands to reason that we cannot operate as many cars and cover the same territory that we have been covering if our short-haul business is to be taken from us indefinitely. We have borrowed millions of dollars to construct lines in territory that has never yielded a profit, and in so doing have mortgaged the profits of the paying lines. Now we find ourselves confronted with the possibility of indefinite continuance of a situation which has brought about enormous losses and we cannot do other than retrench immediately. I do not know that the efforts of the 'jitney' people will be successful in the present instance, but I do know what our course will be if the effort succeeds."

Second in importance to the question of adequate regulation is unquestionably the matter of accidents. From all parts of the country reports are increasing of the carelessness of the operators of the "jitney" and of the increasing hazard which attends riding in cars in competition with the railways and with each other for business. How the casualty men regard the matter has been referred to previously in this paper. Even in cities where regulatory ordinances have not yet been enacted, temporary measures have been adopted in the interest of safety. Among these cities are St. Louis, Pueblo and Fort Worth, in all of which the local authorities have invoked such powers for safety as attach to the policing authority. In Los Angeles, where the "jitney" idea originated, street accidents have increased 22 per cent since the introduction of the "jitney." In

short, accidents averaged 14.9 per day in October, and 23.3 per day in the last two weeks of November, with "jitneys" involved in 26 per cent of the total. In the first eight days of December there were eight accidents per day traceable entirely to "jitneys." In Akron, Ohio, a city of 69,067 population, where the "jitney" has been in operation only three or four weeks, one man has been killed, two others dangerously hurt, one or two horses killed and a score of vehicles damaged. The hazard of suits at law in connection with the "jitney" was stated strikingly at the recent "jitney" ordinance hearing at Los Angeles. E. B. Drake, an attorney whose practice includes personal injury suits, was quoted as follows:

"I am not against the "jitney" bus. I am in favor of it. The more "jitneys," the more business for me, but there is no use suing some one and getting a judgment unless you can collect. I have here the papers in the case of a client, a lad who was mutilated for life. I was given a judgment against a "jitney" bus driver who admitted in his deposition that his own negligence had caused the injury. He can neither speak nor write English, has not paid for his machine yet and has no property that can be attached. Five thousand dollars is not enough for a bond. If there are ten passengers injured that \$5,000 would not buy peanuts all around, let alone the attorney's contingent fee. The bond should be at least \$10,000."

A 10-cent auto bus line has applied to the City Council for a franchise to operate between the high-class residential districts north and south of the Chicago business district. Montague Ferry, the commissioner of public service, has presented to the Council a measure providing for the operation of 10-cent auto bus lines in the city of Chicago. The provisions of this measure are that the fare shall not be in excess of 10 cents for one way; that the company shall file with the city a published schedule every three months; that no auto bus shall be filled beyond its seating capacity; that its equipment be kept in safe, clean and sanitary condition; that no baggage or packages be carried in the aisles which would obstruct the movement of passengers, and that each bus carry signs designating its route. The proposed ordinance also contains the following specifications to govern the over-all dimensions and the weight of buses: height, 11 ft.; length, 23 ft.; width, 7 ft., and weight 16,000 lb. It is also proposed that the companies shall protect the city against all claims for damages.

NATIONAL "JITNEY" CONVENTION

Meeting of Automobile Men Scheduled to Be Held in Kansas City in May

The men who organized and developed the "jitney" transportation service in Kansas City are taking the necessary preliminary steps to effect a country-wide organization, and a meeting of "jitney" interests will be held in Kansas City on May 4, 5 and 6. The call for the national convention was sent out from the office of the Kansas City "Jitney" Transportation Company, 1133 Grand Avenue, a small upstairs executive office of the Kansas City "Jitney" Association. Downstairs is the operating department, where assistants plan schedules and the "jitney" drivers report. The call for the nation-wide meeting is on the letterhead of the Kansas City "Jitney" Livery Company, of which W. H. Miller is manager and E. K. Carnes traffic manager.

The Kansas City Jitney Association is composed of all drivers and owners who have cars in the "jitney" service. There are 215 touring cars registered and twenty-five buses registered. The members of the association are not under any specific and binding obligation to anybody, but are amenable to suggestions from the officers and managers and strive to conform to the general ideas of service as promulgated by the management. Every member of the association is supposed to pay \$1 a week. The Kansas City "Jitney" Transportation Company is a slightly more concrete body, the members of which sign a contract to observe the schedules to which they are assigned and to obey the rules of the association. The Kansas City "Jitney" Livery Company is composed of owners and drivers who are on special service, particularly available for night calls. The dues in the association for the transportation company are \$1 a week, each member keeping all he makes.

So many inquiries have come to the managers of the Kansas City association in regard to the operation of cars, the making of schedules, organization work, etc., that a mass meeting of "jitney" people for general discussion of these subjects seemed advisable. E. K. Carnes, therefore, is sending to about 200 cities letters announcing the meeting in Kansas City on May 4, 5 and 6. The letter follows:

"We believe that you are aware of the fact that Kansas City is the third largest automobile market in the world (New York and Chicago alone leading us). More cars are owned per capita in Kansas City territory than in any other. We are the second largest railroad center, consequently easy of access from all parts of the country, and this city is famed for its fine parks, boulevards and drives, as well as entertainment facilities.

"The success of the 'jitney' interests throughout the country is dependent entirely upon their ability to combat successfully the adverse, unfair and piratical legislation proposed at all points, instigated and financed by special interest monopolies and their allied 'invisible government.' Let us take concerted action on the big problems that are confronting us daily.

"No man can say at this time what the near future will develop, but we feel sure this is a pioneer movement destined to revolutionize the transportation problem and the carrying of people in our cities and suburbs. The people flocking to us by the thousands to avail themselves of the quick, pleasant mode of transportation we are offering is conclusive evidence of the above fact.

"We are receiving so many letters daily from all parts of the country that we are calling, in this city, on May 4, 5 and 6, a national convention of 'jitney' people for an interchange of views bearing upon vital points, such as legislation, insurance, safety in operation, licensing of drivers, style of equipment best adapted to the different classes of service under different conditions, etc., and at the same time lay the foundation for a strong nation-wide organization. We feel that such a move will strengthen us in every way, give the public more confidence in the stability of the service, and bring to our aid the manufacturers throughout the whole country with their valuable suggestions and advice, and in every way advance the general movement in all sections.

"We invite your co-operation at this convention and would be pleased to hear from you at an early date as to the number of delegates you expect to send."

Many of these letters are being sent out on the mere chance that there is a "jitney" association, and others on the assumption that the local automobile agents will find it to their advantage to organize one.

It is said that manufacturers and dealers in Kansas City, who have to do with both passenger and truck cars, excepting only the electric vehicle companies, have been more or less sympathetic with the movement. In fact, the local Motor Car Dealers' Association, of which E. E. Peake is secretary, has given substantial aid to the "jitneys," particularly through the participation of its attorney in the fight of the "jitney" association to secure a favorable regulating ordinance.

In Kansas City the recognized "jitney" association has two stands, where its cars are scheduled. The other associations have stands elsewhere in the business district; and one has recently organized to promote package as well as passenger delivery. The Kansas City association is trying to work out a plan of inter-insurance among "jitney" owners for public liability; and it reports that several stock companies are figuring on rates for "jitney" insurance. The "jitney" associations include small and large passenger cars of all vintages; makeshift buses on truck or passenger car chassis, and large buses substantially built for the "jitney" service. There are varying schedules of charges, most of the morning and evening traffic being by passenger cars and buses between specified points at a fare of 5 cents. The association also includes, however, the drivers who ply between the union station and hotels or downtown points and charge 10 cents a trip per passenger, and the cars in special service for which the schedule of prices is based on \$1.50 an hour for a five-passenger car. A garage, built with private capital, is being encouraged by the association, where 100 cars may be stored, preference being given to association members.

FINDING IN LAWRENCE TRANSFER CASE

The Massachusetts Public Service Commission has issued an order refusing to grant the petition of the Lawrence Chamber of Commerce for the general establishment of free transfer privileges in Lawrence to all passengers traveling between Haverhill and Lawrence on the Bay State Street Railway. The petitioners based their claim upon the ground that similar transfers are given to and from any part of Haverhill and contended that this constituted an unjust discrimination against the city of Lawrence.

In dealing with the question the board examined existing rates of transportation in and between other large centers. The distance between the cities of Lawrence and Haverhill is 10 miles, which is approximately the distance between Lawrence and Lowell. The fare between Lawrence and Haverhill is 10 cents, while that between Lawrence and Lowell is 15 cents. A transfer to and from all parts of Lowell and of Lawrence is given with the payment of this 15-cent fare. Persons traveling between Lowell and Nashua, N. H., approximately 15 miles, paying 20 cents, are given free transfers in Nashua but no transfers in Lowell. Passengers between Lawrence and Salem, about 21 miles, pay 25 cents, without transfer at either end. The distance between Lowell and Reading is about 15 miles, and the fare is 15 cents, without transfer at either end.

The commission states that the situation presented by the people of Lawrence is not uncommon, and points out that "the establishment of a 10-cent fare for a distance of 10 miles between two municipalities, with free transfers at both ends, would be an extension of fares that would create rather than remove discrimination." A comparison of fares in and about Lawrence with charges for transportation in other cities and their suburbs shows that the people of Lawrence are generally favored with low cost of transportation, and this is instanced in the fact that in Lawrence transfer limits are generally outside the city boundaries, while in Lowell transfers are confined largely to city limits.

The board further points out that inequalities in fare that exist to-day in different communities are in part the result of the willingness of those who originally promoted street railways to trade in fares and the disposition on the part of some local boards to take advantage of that willingness. That the practice in Haverhill in this respect differed from that in Lawrence appeared in the evidence, but was not controlling in its importance. The board says that "any change in fares which would work a substantial diminution in revenue, under present conditions, can only be approved when it is shown that such change is necessary to remove an unjust discrimination." On account of the fact that the aggregate mileage in interurban travel by the Berkeley Street and Prospect Hill branch lines in Lawrence between Lawrence and Haverhill is less than via the main line alone the board feels that transfer facilities should be inaugurated on these lines only, and so orders, but the company is sustained in its objections to granting free transfers elsewhere in Lawrence in connection with the Haverhill service.

NEW COMPANY PUBLICATION

The Portland Railway, Light & Power Company, Portland, Ore., has begun the publication of a pamphlet which it plans to distribute each week to patrons of all of its city and interurban lines. The first issue was dated March 10, and contained an outline of the scope of the publication. The issue is to be 50,000 copies. The chief endeavor of the company will be to create a better feeling toward the company among its patrons and the public in general by commenting in a good-natured spirit upon the numerous problems involving service in all its phases. Included in the publication each week will be one page or paragraph entirely informative or educational in character, dealing with investments, interest, taxes, operation, and in a general way with what the company has done and is doing in the way of maintaining reliable service. It is planned to discuss frankly some of the problems which through misunderstanding have aroused criticism and prejudice. The publication is 4 in. x 7 in. It will be issued under the supervision of W. P. Strandborg, publicity agent of the company, who was formerly connected with the staff of the Evening *Telegram* of Portland.

GROUP INSURANCE PLAN

Policy Is Being Written to Cover the Employees of Missouri Interurban System

A group insurance policy providing \$500 death benefits is being written in the Equitable Life Assurance Society on the 121 employees of the Kansas City, Clay County & St. Joseph Railway, including J. R. Harrigan, general manager, and all other employees, all of whom are now members of the mutual benefit association of the railway. R. J. Lyddane, general agent in Missouri for the Equitable company, explained to the members that because of the character of the policy, including all the members of a group exceeding 100, the exceedingly low rate, which figures about \$10 a thousand, was possible.

The mutual benefit association provides not only occasional social meetings for the men, but picnics for their families and many other features which have resulted in holding high the standard of their conduct and living. The association has been receiving dues at the rate of 10 cents a week from each member, the company duplicating the amounts paid in. The members have received weekly indemnities for accident and health incapacitation, and there has been life insurance of \$100 for each. The association has accumulated a fund of \$1,200 since its organization. Under the group insurance policy the Equitable Company, which does not write accident and health insurance, insures merely for death, the indemnity payable being \$500, or \$400 more than was provided in the association's plan. The company's part of the fund received, which will continue to be an amount equal to the 10 cents a week contributed by the members, will be paid to the Equitable Company, and the members' dues will be applied by the association to weekly indemnities on accident and health claims.

An assessment of \$1 a member was made previously upon the death of any member. This assessment will no longer be required under the arrangement with the Equitable Life Assurance Society. The benefits received by members of the mutual organization of the street railway company employees in case of injury or sickness will continue to be \$6 a week, the general fund being sufficient to carry the "risk" for some time even without the weekly payments of 10 cents apiece by each member.

Fare Increase Asked.—The Berkshire Street Railway, Pittsfield, Mass., has filed a petition with the Public Service Commission asking authority to increase fares.

Prizes for Traffic Suggestions.—The Municipal Art Society of New York has announced an offer of prizes of \$300, \$200 and \$100 for the best three plans for engineering changes to facilitate traffic at such congested street intersections as Forty-second Street and Fifth Avenue in New York City.

Suit to Recover Mail Pay.—Attorneys for several Eastern railroads on March 18 filed a brief in the Supreme Court in support of their contention that the government has illegally retained some \$35,000,000 due to the railroads for transportation of mails. The brief is in a test case to be argued orally on April 5.

Cup for Ball Players.—H. P. Waugh, of the Interborough Rapid Transit Company, New York, N. Y., announces in the *Interborough Bulletin* for March, 1915, that Harry N. Hempstead, president of the Giants, had presented a silver cup to be competed for yearly by members of the Interborough League, composed of employees of the Interborough Rapid Transit Company recruited from various departments.

Car Capacity Order Extended.—Acting upon the observations made by his inspectors Health Commissioner Goldwater has issued orders to the Brooklyn (N. Y.) Rapid Transit Company to keep the loading of its Flatbush-Seventh Avenue and Third Avenue lines down to the limit that he prescribed for the Graham Avenue cars. That is, not more than half as many standing as seated passengers are to be permitted on the cars.

New Brooklyn Cars in Operation.—Two all-steel subway cars of the type which will be used throughout the dual subway system when completed have been placed in oper-

ation on the Sea Beach line of the Brooklyn (N. Y.) Rapid Transit System between Eighty-sixth Street and New Utrecht Avenue in place of the shuttle service surface cars formerly operated between these two points. The design of these cars was described in the *ELECTRIC RAILWAY JOURNAL* of June 6, June 13 and Dec. 26, 1914, and the electrical equipment in the issue of March 13, 1915.

Hitching Sleds to One-Man Cars.—The item headed "Hitching Sleds to One-Man Cars," which was published in the *ELECTRIC RAILWAY JOURNAL* of Feb. 13, page 355, was in error in that Regina, Saskatchewan, instead of Brandon, Manitoba, was referred to as a city in which instructions had been issued to the police force to take vigorous measures to suppress the practice indulged in by youths of the city of tying their sleds to the cars of the municipal railway. The railway act of the province of Saskatchewan does not permit the Regina Municipal Railway to operate one-man cars.

New Fare System Satisfactory.—The Union Traction Company of Indiana, Indianapolis, Ind., has included in the pamphlet report of the company for the year ended Dec. 31, 1914, a review of the new system of fares put into effect on Jan. 1 with the approval of the Indiana Public Utility Commission. The company says that experience indicates that the new system is not objectionable because of the difficulty of making change, and that its fairness commends it to the public. References to the change to the "copper zone" system were contained in the *ELECTRIC RAILWAY JOURNAL* of Nov. 28, 1914, page 1221, and Dec. 19, 1914, page 1366.

Interchangeable Coupon Tickets.—The Auburn & Syracuse Electric Railway, the Buffalo, Lockport & Rochester Railway, the Empire United Railways and the New York State Railways have changed their rules and regulations governing the sale and use of interchangeable coupon ticket books (price \$10 per book) by eliminating from the list of carriers over whose lines such books will be honored for passage the Cortland County Traction Company, the Elmira & Seneca Lake Traction Company and the Fonda, Johnstown & Gloversville Railroad, effective on April 1, 1915. Such ticket books sold prior to April 1, 1915, will be accepted for passage over the lines of carriers eliminated, subject to terms of contract under which sold.

Service Stripes in Manila.—The Manila Electric Railway & Light Company, Manila, P. I., is to issue service stripes and insignia for excellent service to its inspectors, graduate conductors and motormen, of the transportation department, and certificates of excellent service to its employees of other departments. Vice-President and General Manager C. Nesbitt Duffy said recently: "The company decided to issue service stripes, insignia and certificates for excellent service to those employees who are deserving of same, as a mark of special recognition because of the excellent service rendered the company and the public in the performance of their duties as employees. The years of service of the employees range from one to ten years. Many transportation department employees will display the double stripe, indicating five years of service, more than 100 will be entitled to wear the metal diamond shaped insignia denoting 'excellent service,' some having earned five or more."

New Signals for St. Louis Cars.—A new method of signaling the motorman to stop and start the car will soon be put into use on the Grand Avenue line of the United Railways, St. Louis, Mo. Briefly, this system consists of an electric circuit in which the rear door, in closing, makes a contact which lights a miniature colored lamp directly in front of the motorman. When the lamp is lighted the motorman knows that the door is closed, and when the lamp is not lighted he knows that it is open. In operation the conductor closes the door when all passengers have boarded the car. The closing of the door automatically gives the signal to the motorman by lighting the miniature lamp. The motorman then starts the car without further signal. When a trail car is in use the signal is not given until the doors of both cars are closed. For stopping the car the present buzzer for passenger use will be removed to the motorman's cab. The motorman will stop the car at the next stop on passengers' signals without further signal from the conductor. The present bell and bell cord will be retained for emergency use.

Personal Mention

Mr. J. V. Collins has been appointed electrical engineer of the Charles City (Ia.) Western Railway.

Mr. C. L. Proctor, for the last six years general superintendent and purchasing agent for the Athens Railway & Electric Company, Athens, Ga., has resigned to accept a position with the Empire District Electric Company at Joplin, Mo.

Sir Albert Stanley, general manager of the Underground Electric Railways, Ltd., London, England, is to present a paper at the International Engineering Congress, at San Francisco, next September, on the subject of "Traffic in London."

Mr. Eliot Wadsworth, of the firm of Stone & Webster, Boston, Mass., sailed for Europe on March 20 on the American Line S.S. *St. Louis*, to prepare at Berlin for executive duties in connection with Polish relief work under the auspices of the Rockefeller Foundation, New York.

Mr. W. Leon Pepperman, assistant to the president of the Interborough Rapid Transit Company, New York, N. Y., formerly chief of office of administration of the Second Isthmian Canal Commission, is the author of "Who Built the Panama Canal?" published recently. The book deals largely with the work done by Mr. Theodore P. Shonts, president of the Interborough Rapid Transit Company, in formulating the plans for the canal during the time that he was at the head of the Isthmian Canal Commission from the spring of 1905 to February, 1907.

Prof. Albert S. Richey, author of the "Electric Railway Handbook," which has just been published, was graduated from Purdue University in 1894 with a B.M.E. degree and



PROF. A. S. RICHEY

took the E.E. degree at Purdue in 1908. After leaving school in 1894 Professor Richey was electrician, chief electrician, electrical engineer and chief engineer successively, first with the Citizens' Street Railway at Muncie, Ind., and later with the Marion (Ind.) City Railway and the Indiana Union Traction Company and other companies which are now included in the system of the Union Traction Company of Indiana. Professor Richey was in active charge of the electrical work during the building of all these various

interurban lines. While connected with these companies he also did considerable engineering work for other interurban electric railways in Indiana and Illinois. In 1905 he was appointed assistant professor of electric railway engineering at Worcester Polytechnic Institute, Worcester, Mass., and was made professor of electric railway engineering in 1907. While he has been connected with the Worcester Polytechnic Institute, Professor Richey has done an increasing amount of consulting engineering work, principally with the electric railways in New England, although to some extent in New York, New Jersey, Pennsylvania and Indiana. He has also been a member of the power distribution committee of the American Electric Railway Engineering Association for several years and is at present chairman of that committee. For the last three years he has been chairman of the committee on electrolysis of the American Electric Railway Engineering Association and is at present also a member of the committee on standards of the American Electric Railway Engineering Association. He was one of the representatives of the American Electric Railway Engineering Association on the national joint committee on overhead and underground line construction and is a representative of the American Electric Railway Association on the national joint committee on electrolysis. He is also a member of the railway committee of the American Institute of Electrical Engineers.

Mr. M. H. Bronsdon, chief engineer of power and lines of the Rhode Island Company, Providence, R. I., has been appointed to the newly created office of deputy commissioner of public works of the city of Providence, in which capacity he will succeed Mr. Otis F. Clapp as city engineer. Mr. Bronsdon was chief engineer of the Rhode Island Company from March, 1907, until August, 1912. He then engaged in general engineering work in San Francisco, but returned to the Rhode Island Company as chief engineer in December, 1914. The appointment of Mr. W. N. Cargill to the position of chief engineer of power and lines of the Rhode Island Company to succeed Mr. Bronsdon was noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 20, 1915.

Mr. Clarence E. Learned, the newly-elected president of the New England Street Railway Club, is the fifteenth chief executive of the organization, which now has some 800 members affiliated with all branches of the electric railway and many allied industries. Mr. Learned was born in South Boston, Mass., on March 5, 1858. He was educated in the South Boston and South End grammar schools, and in 1876 entered the employ of the banking house of Richardson, Hill & Company, Boston, where he remained two years. He then accepted the post of bookkeeper with Oscar Foote & Company, Boston, fertilizer and grain dealers. Mr. Learned's father was killed in a railroad accident in 1878, following which the new president took charge of his father's business for about two years, later returning to the organization of William H. Dow & Company, Boston, successors of the Foote concern. Mr. Learned traveled in New England for this house until 1886. After serving for a year as traveling passenger agent of the Boston & Hingham Steamboat Company and for a time engaging in newspaper work on the Boston *Herald* he was asked to join the forces of the West End Street Railway, Boston, by Mr. Henry M. Whitney, in 1888, as chief inspector, later becoming superintendent of the inspection department of the Boston Elevated Railway, the successor to the West End road. Mr. Learned is a Mason, belonging to the Boston Commandery. He is a Shriner, is affiliated with the Elks and is a member of the Boston City Club. He has been second vice-president of the American Electric Railway Transportation & Traffic Association, and has served on the committee on the training of employees of that association and is at present a member of the committee on fares and transportation. He was married at West Somerville, Mass., in 1882, and resides with his wife and one daughter at Wakefield, Mass.



C. E. LEARNED

OBITUARY

Frederick Winslow Taylor, author of "The Principles of Scientific Management" and "Shop Management," and well known as an efficiency engineer, died at Philadelphia, Pa., on March 21. Mr. Taylor was fifty-nine years old. He was graduated from Stevens Institute in 1883 and began his business career with the Midvale Steel Company at Philadelphia in 1878. He was president of the American Society of Mechanical Engineers in 1905 and 1906.

Charles Francis Adams, an original member and for seven years chairman of the Massachusetts Railroad Commission, died at his winter residence in Washington, D. C., on March 20. Mr. Adams was born in Boston in 1835; was a great grandson of President John Adams and a grandson of President John Quincy Adams. He was a son of Charles Francis Adams, minister to Great Britain during the Civil War, and had a distinguished career in military, historical, legal and railroad fields. He served on the Massachusetts commission from 1869 to 1879 and was at one time president of the Union Pacific Railroad. In 1897 he investigated the relations between street railways and municipalities in this country and Europe.

Construction News

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

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

RECENT INCORPORATIONS

***Lordship Company, Bridgeport, Conn.**—Chartered in Connecticut to operate the 3-mile electric line now being constructed by the Wilkenda Land Company on Hollister Avenue between Stratford Avenue and Lordship Manor, in Bridgeport. Contracts for the system, including a concrete carhouse, have been awarded the F. T. Ley Company, Springfield. Power will be bought of the Connecticut Company, but otherwise the lines of one will have no connection with those of the other company. Capital stock, \$500,000. Walter B. Lasher, Frederick A. Bartlett and John T. Kenworthy are among those interested.

FRANCHISES

Fresno, Cal.—The Fresno Traction Company has received a franchise from the Council for an extension from the Wishon Avenue line to the Normal School grounds in Fresno.

New Britain, Conn.—The Hartford, New Britain & Meriden Railway has asked the Council for a franchise to extend its lines by a different route to New Britain. [Jan. 2, '15.]

New Britain, Conn.—The New Britain, Kensington & Meriden Railway has asked the Council for an extension of time on its franchise in which to complete the construction of its line between Meriden and New Britain. E. A. Moore, New Britain, president. [May 16, '14.]

Louisville, Ky.—The Louisville Railway Company was the only bidder present at the public sale by the city of the franchise providing for a double-track electric railway extending north from the terminus of the company's Chestnut Street line to Madison and thence west to Shawnee Park, in Louisville. This means construction of approximately 2 miles of double track. Work is to be begun as soon as the weather permits.

Ludlow, Ky.—The Council of Ludlow has granted the South Covington & Cincinnati Street Railway a twenty-year franchise. The company is to pay the city \$250 and contribute \$10,000 toward the construction of a permanent viaduct across Elm Street, between the railroad and Locust Street. A twelve-minute schedule will be maintained through the day, with a five-minute service during the rush hours, morning and evening.

Boston, Mass.—The Boston & Eastern Electric Railway has asked the Council for an extension of time on its franchises to April 1, 1917, in which to build its proposed line. The project entails a tunnel between Boston and East Boston and routes connecting Lynn, Peabody and other towns and cities east and north of Boston.

East Chester, N. Y.—The Westchester Electric Railway has received a franchise from the Council for the extension of its North Pelham-Mount Vernon line from the North Pelham village line to Union Corners, East Chester. The extension will open up two new sections, Chester Heights and Chester Park, and connect them with the New York, Westchester & Boston Railroad. Before the new line can be placed in operation it will be necessary to reconstruct a bridge over the Hutchinson River, near North Pelham.

Patchogue, N. Y.—The Suffolk Traction Company has received from the Council a three-year renewal of its franchise within the incorporate limits of Patchogue.

Cleveland, Ohio.—The Cleveland Short Line has received a franchise from the Council for several short extension of its tracks in Cleveland.

Findlay, Ohio.—The Toledo, Bowling Green & Southern Traction Company has notified the Council that the company will accept the twenty-year franchise recently granted by the Council.

TRACK AND ROADWAY

Lethbridge (Alta.) Municipal Railway.—The City Council of Lethbridge has been asked to undertake the extension of this municipal railway to Hardieville.

British Columbia Electric Railway, Vancouver, B. C.—Plans are being made by this company to begin work soon on a new line on the south side of Front Street in New Westminster.

***Sacramento, Cal.**—A system of State owned and operated electric railway lines extending along the state highways, now being built under the \$18,000,000 bond issue, is urged in a resolution submitted to the Assembly recently by Mr. Shartell of Alturas. This is a separate and distinct movement from the proposed State purchase of the Western Pacific Railway. It is stated that California in building the extensive highway system has a right-of-way with grades suitable for electric lines.

San Francisco (Cal.) Municipal Railway.—Bids are being awarded for the construction of the Beach terminal loop for the Geary Street municipal line in San Francisco.

Connecticut Company, New Britain, Conn.—Surveys are being made to extend the double tracks from the Electric Field to a point near the Trumbull Electric Company's plant in Plainville this summer. This will complete a double track line from New Britain to Plainville. Extensive plans are being made by this company for strengthening all its bridges about New Haven over which heavy electric railway traffic is operated.

Washington Railway & Electric Company, Washington, D. C.—This company has been authorized by the Public Utilities Commission to issue \$353,000 of general improvement 6 per cent debenture bonds to defray the expenses of work largely carried out.

Capital Traction Company, Washington, D. C.—This company has asked the Public Utilities Commission for permission to extend its lines along Seventeenth Street and I Street northwest in Washington. The route would begin at Seventeenth and U Streets; extend south on Seventeenth to I Street; thence easterly on I Street to Thirteenth Street; southerly on Thirteenth Street to H Street, and easterly on H Street to Seventh Street, connecting with the company's present lines at that point.

Miami (Fla.) Traction Company.—Plans are being made by this company to build a line on the Southside in Miami. B. B. Tatum, Miami, president. [Feb. 6, '15.]

Lewiston-Clarkston Transit Company, Lewiston, Idaho.—Work has been begun laying track and overhead work is well under way by this company on its 18-mile line between Lewiston, Idaho, and Clarkston, Wash. H. C. Hartung, Lewiston, general manager. [Feb. 27, '15.]

Danville Street Railway & Light Company, Danville, Ill.—Residents of Oaklawn, a Danville addition, have petitioned this company to construct a line from Junction Avenue, east along Wellington Street to Illinois Street to intersect the line on that street, a distance of several blocks.

Illinois Northern Utilities Company, Dixon, Ill.—Contracts have been awarded by this company to build 1½ miles of new track in Dixon.

Southern Illinois & St. Louis Railway, Harrisburg, Ill.—Preliminary details for the construction of the electric line to connect Benton, West Frankfort, Herrin, Marion and Johnston City have been completed and work will be begun within a few weeks on the roadbed. W. H. Schott, president. [March 6, '15.]

Chicago & Joliet Electric Railway, Joliet, Ill.—An extension of the Hickory Street line in Joliet from its present terminal at Smith Street to Theilers Park is being planned by this company.

Murphysboro & Southern Railway, Murphysboro, Ill.—During the next few weeks this company will award contracts to build 7 miles of new track in Murphysboro. The company will also build one 17-ft. steel span bridge and one 60-ft. steel viaduct.

St. Joseph Valley Railway, Elkhart, Ind.—Application will be filed at once by this company with the Secretary of State of Ohio for a supplementary charter to build an interurban railway to connect Angola, Ind., and Toledo, Ohio.

Arkansas Valley Interurban Railway, Wichita, Kan.—At a special adjourned meeting March 4 the City Commissioners passed an ordinance providing for an election to vote on a \$30,000 issue of terminal aid bonds for this company, which is ready to begin construction on the extension from Halstead as soon as the bonds are voted. The election was set for March 29. Charles D. Bell is local manager for the company at Hutchinson.

Duluth (Minn.) Street Railway.—Construction this year of a double track extension from West Duluth to New Duluth has been ordered by the Council in Duluth. This company is to have its new line in operation by Dec. 1.

Minneapolis & Central Minnesota Railway, Minneapolis, Minn.—About 20 miles of grading has been completed by this company on its proposed electric line to connect Minneapolis, St. Cloud and Little Falls. Capital stock, authorized, \$1,000,000. E. G. Potter, 433 Andrews Building, Minneapolis, president. [Feb. 20, '15.]

Metropolitan Street Railway, Kansas City, Mo.—Arrangements are being made by this company to begin immediately the reconstruction of its tracks on Walnut Street from Seventh Street to Twelfth Street in Kansas City, preliminary to the paving of that street, which carries the heaviest street railway traffic of any part of the Metropolitan's lines.

Moberly, Huntsville & Randolph Springs Railway, Moberly, Mo.—Work has been resumed by this company on its line in Randolph. This 12-mile line will connect Randolph Springs, Moberly and Huntsville. Charles H. Dameron, Huntsville, president. [Jan. 23, '15.]

City Light & Traction Company, Sedalia, Mo.—During the next few weeks this company expects to rebuild its track and repave some of its lines in Sedalia.

Missouri Interurban Railroad, Sedalia, Mo.—This company reports that no definite plans have yet been decided upon when construction will be begun on its proposed 40-mile line to connect Sedalia, Prairie Home, Smithton, Otterville and Bunceton. B. H. Colby, Security Building, St. Louis, chief engineer. [Jan. 24, '14.]

Trenton & Mercer County Traction Corporation, Trenton, N. J.—Plans are being made by this company for an extension of its North Olden Avenue division from East State Street to North Clinton Avenue in Trenton.

Manhattan Bridge Three-Cent Line, Brooklyn, N. Y.—An issue of \$140,332 corporate stock has been authorized by the Board of Estimate to provide terminal facilities for this company on both sides of the bridge structure. These terminal facilities are estimated to cost \$240,000. Under the revised plans the terminal of the company will be ultimately located on an embankment, which is to be erected at the corner of the Bowery and Bayard Street, on the Manhattan side of the bridge structure.

Brooklyn, N. Y.—The Public Service Commission, First District, will shortly advertise for bids for the construction of Section No. 2 of Route No. 12, the Eastern Parkway subway in Brooklyn, to be operated by the Interborough Rapid Transit Company, bids to be opened April 20 next. The Eastern Parkway subway is an extension of the existing subway, and runs from its terminus at Atlantic and Flatbush avenues, Brooklyn, out Flatbush Avenue to Eastern Parkway and out Eastern Parkway to Buffalo Avenue as a four-track line, with a three-track elevated extension from that point out East Ninety-eighth Street and Livonia Avenue to New Lots Avenue, and a two-track subway branch down Nostrand Avenue to Flatbush Avenue. It is already under construction in Flatbush Avenue west of Prospect Park Plaza. Section No. 2 covers that portion of the line extending from Prospect Park Plaza under Eastern Parkway to a point east of Nostrand Avenue. The subway will be built on the double-deck plan, devised for the purpose of saving the trees in Eastern Parkway.

International Railway, Buffalo, N. Y.—An extension of its line down South Park Avenue to the south city line in Buffalo is being planned by this company.

New York, N. Y.—The Public Service Commission, First District, has approved the form of contract submitted by the Interborough Rapid Transit Company for the construction of a portion of the West Farms subway connection.

This section, which is authorized by the dual system contracts, leaves the Third Avenue elevated line at about 134 ft. north of the center line of East 143d Street, and runs through Willis and Bergen Avenues to a point near 149th Street, and thence to a connection with the Lenox Avenue branch of the existing subway. It is authorized under the certificate covering the rights for elevated railroad extensions, and as such is to be built by the company at its own expense. The only condition attached to the approval of the contract is that the company must get bids from at least six responsible bidders and submit the bids to the commission for its approval.

Black River Traction Company, Watertown, N. Y.—During the next few months this company plans to spend \$15,000 on improvements of its lines in Watertown.

Alamance, Durham & Orange Railway & Electric Company, Burlington, N. C.—Preliminary arrangements are being made by this company to build its electric line between Ossipee and Durham via Altamaha, Glencoe, Carolina, Hope-dale, Burlington, Graham, River Falls and Chapel Hill. John M. Cook is among those interested. [March 13, '15.]

Cleveland, Alliance & Mahoning Valley Railroad, Alliance, Ohio.—This company announces that it will place in operation its line between Newton Falls and Levittsburgh on April 1. Work will continue on the section of the line from Ravenna to Cleveland during the coming summer. The line to connect Alliance and Akron is well under way and will be in operation as far as Marlboro within the next few months.

Chardon, Jefferson & Meadville Interurban Railroad, Cleveland, Ohio.—Work will soon be begun by this company on its line to connect Chardon, Hampton, Rock Creek and Jefferson, a distance of about 30 miles. F. A. Pease, Cleveland, engineer. [Aug. 15, '14.]

Ohio Valley Traction Company, Portsmouth, Ohio.—Contracts will be awarded at once by this company for the extension from Sciotoville to Ironton.

Toledo, Bowling Green & Southern Traction Company, Toledo, Ohio.—During the next few weeks this company expects to build about 4500 ft. of double track with 100-lb. rails.

Brantford, Ont.—The Council has approved of the plan for the extension of the Brantford Municipal Railway in the form of a loop for Eagle Place, and gave permission to the Street Railway Commissioners to proceed with the work.

Toronto, Ont.—Early in April the Works Department will begin the laying of a permanent electric railway track on Bloor Street, to replace the temporary civic line.

***Sutherlin, Ore.**—Plans are being considered to build an electric railway from Sutherlin to Umpqua via Garden Valley and Coles Valley, a distance of 14 miles.

***Johnstown, Pa.**—It was announced recently that negotiations for the construction of an electric railway from Johnstown to Rockwood eventually to connect with the Pennsylvania & Maryland Street Railway line by an extension of the latter railway from Garrett to Rockwood, have been completed. J. A. Vandergrift & Company, Inc., New York City, will finance the railway project. The Penn Electric Service Company will furnish the power, while the Johnstown Traction Company's right-of-way into Johnstown will be used from Kelso Mines, about 5 miles from the central part of Johnstown. This proposed line will extend through Shamrock, Murdock, Roberts, Edgewood, Somerset, Harrison, Acosta, Jenner, Ferrelton, Boswell, Jerome and Holsopple; then northward to Davidsville and down Tire Hill to the Kelso Coal Company's operations, where a junction will be effected with the Windber line of the Johnstown Traction Company.

Pittsburgh (Pa.) Railways.—Residents of South Hills have asked this company to complete the double-tracking of the Beechview line out to Mount Lebanon as soon as possible.

Pottstown & Phoenixville Railway, Pottsville, Pa.—The extension to Linfield has been completed and work has been begun on the Spring City side of the Schuylkill River. The bridges and about half of the grading are completed for the

line from Spring City. The plans for approval of the bridge across the Schuylkill River are now being considered by the War Department at Washington; work will be begun at once on the concrete piers. The line from Phoenixville will be shortened to Spring City by a cut-off on the line outside of Phoenixville extending direct up along the canal to Spring City, which will be used by the high-speed cars only. A schedule from Pottstown to Philadelphia of one hour and a half will be established.

Reading Transit & Light Company, Reading, Pa.—A new electric railway route to Philadelphia will develop as the result of plans of this company to build a connecting link between Boyertown and Pottstown, announcement of which was recently made. This also will mean a direct electric route to Philadelphia from Lancaster by way of Reading.

***Iloilo, P. I.**—The first suburban electric railway to be built in the Philippines outside the city of Manila, and the first to be built with Filipino capital in the Philippines, is to extend between the city of Iloilo and the adjoining towns of Jaro, Arevalo and Oton. An application for a franchise has been included in a bill introduced in the Assembly recently by Delegate Mapa of Iloilo.

Beaumont, Liberty & Houston Traction Company, Houston, Tex.—Preliminary arrangements are being made by this company to begin work on this proposed line between Houston and Richmond. Edward Kennedy, president. [Nov. 21, '14.]

Marshall (Tex.) Traction Company.—During the next few weeks this company expects to rebuild in Marshall $\frac{1}{2}$ mile of roadbed with concrete base.

Petersburg & Appomattox Railway, Petersburg, Va.—Preliminary surveys have been begun by this company on its line between Petersburg and City Point. T. M. Wortham, Petersburg, president. [March 20, '15.]

Virginia Railway & Power Company, Richmond, Va.—An extension of the Grove Avenue railway from the intersection of Canal Street up to High Street near the baseball park in Petersburg is being considered by this company. The company is asked to extend its Forest Hill line for a mile from the present terminus in Richmond.

SHOPS AND BUILDINGS

Lewiston-Clarkston Transit Company, Lewiston, Idaho.—This company has awarded a contract to build a new carhouse in Lewiston.

Murphysboro & Southern Railway, Murphysboro, Ill.—During the next few weeks this company will award contracts to build two new carhouses in Murphysboro.

Boston (Mass.) Elevated Railway.—Plans are being made by this company to build a new passenger station in Malden.

Boston & Worcester Street Railway, Boston, Mass.—During the next few weeks this company expects to award contracts to build a new carhouse to replace the one destroyed by fire in Westboro. The location for the new structure has not been decided upon.

Niagara Gorge Railroad, Niagara Falls, N. Y.—This company is completing its new fireproof office and carhouse in Niagara Falls.

Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio.—Citizens of Shelby have asked this company to consider the question of locating its new power house and carhouses in Shelby.

POWER HOUSES AND SUBSTATIONS

Ohio Valley Traction Company, Portsmouth, Ohio.—Plans are being made by this company to build three new substations. They will be located at Franklin Furnace and Hanging Rock. The structures will be 40 ft. x 20 ft. and one story in height.

Gallipolis & Northern Traction Company, Gallipolis, Ohio.—We are advised that after May 1, 1915, this company expects to close its power house in East Gallipolis and buy its current from the Gallipolis Electric & Power Company, in Gallipolis, Ohio.

Toronto (Ont.) Suburban Railway.—This company has taken out a permit at Galt, Ont., for the erection of a new transformer station.

Manufactures and Supplies

ROLLING STOCK

Murphysboro & Southern Railway, Murphysboro, Ill., expects to purchase three standard interurban cars.

Scioto Valley Traction Company, Columbus, Ohio, has purchased one 60-ft. steel center-entrance passenger car from the Cincinnati Car Company.

Ohio Valley Traction Company, Portsmouth, Ohio, is reported as having ordered four 65-ft. combination passenger and baggage interurban cars from the G. C. Kuhlman Car Company.

Iowa Railway & Light Company, Cedar Rapids, Ia., has purchased one 50-ton electric locomotive, the body and trucks to be furnished by the St. Louis Car Company, and the electrical equipment by the General Electric Company. The latter consists of four GE-207, 600-1200-volt motors with Type M control.

Hagerstown & Frederick Railway, Frederick, Md., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 27 as expecting to purchase new car equipment, has ordered from The J. G. Brill Company two 37-ft. Brill patented semi-convertible combination passenger and baggage cars and one 19-ft. near-side vestibule car.

Marshall (Tex.) Traction Company has ordered three 21-ft. 6-in. all-steel one-man car bodies from the Cincinnati Car Company through its Eastern sales agent, W. R. Kerschner, Inc., New York. The order was placed through H. E. Molé, consulting engineer American Public Securities Company, 50 Liberty Street, New York.

Empire United Railway, Syracuse, N. Y., is reported as rebuilding a car in its own shops, with the view of securing unusual lightness and thereby effecting economies in power consumption. The results obtained from this sample car will probably serve as a basis for the purchase of new light equipment.

Charles City (Ia.) Western Railway has ordered two single-truck city cars, one double-truck interurban car, and one 35-ton electric locomotive from the McGuire-Cummings Manufacturing Company. The three cars will be of all-steel construction and equipped with GE-217, 50-hp motors with Type K control. The electric locomotive will be equipped with four GE-205, 80-hp motors with Type M control.

Interborough Rapid Transit Company, New York, N. Y., has ordered from the Pullman Company 478 all-steel car bodies to replace the composite bodies now being used in the subway. The steel bodies will be placed upon the trucks now used under the composite cars and the present motors will also be used on the new cars. It is the intention of the company to use the composite car bodies on the elevated lines, as they are replaced by the all-steel bodies in the subway. The car bodies will be duplicates of the steel bodies now operating in the subway. The contract calls for delivery to commence within 100 days, at the rate of twelve bodies per day.

Metropolitan Street Railway, Kansas City, Mo., noted in the ELECTRIC RAILWAY JOURNAL of Feb. 20 as having ordered fifty single-end, double-truck closed prepayment motor cars from the American Car Company, has specified the following details for this equipment:

Date of delivery.	June 1, 1915	Gears and pinions,	
Seating capacity.....	48		GE, grade K
Estimated weight of car		Gongs.....	Amer. Car Co.
body, fully equipped,	18,600 lb.	Hand brakes,	
Bolster centers, length,	19 ft. 7 in.	Peacock & Amer. Car Co.	
		Heaters,	
		Consol., RU thermostat	
Length of body..	29 ft. 10 in.	Headlights....	Golden Glow
Length over bumpers,		Journal boxes,	
	44 ft. 10 in.	Brill 3 3/4 in. x 7 in.	
Width over sills...8 ft. 6 in.		Motors,	
Width over all....8 ft. 8 in.		4 GE-247-D, inside hung	
Height, rail to sills...31 in.		Paint...Chicago Varnish Co.	
Height, sill to trolley base,		Registers	International
	11 ft. 6 1/2 in.	Sanders,	
Body.....	wood and steel	Met. St. Ry., foot pedal	

Interior trim.....	cherry	Sash fixtures,	
Headlining	Agasote	Forsyth beadless brass	
Roof	arch	(lower only).	
Underframe	steel	Seats,	
Air brakes,		Brill non-reversible, offset	
GE. CP-27, with emergen-		rail across top of back	
cy feature.		Seating material....	rattan
Axles.....	Jones & Laughlin	Step treads,	
Bumpers.....	8-in. channel	Universal anti-slip	
Conduits and junction boxes,		Trolley catchers.....	Earll
National Formed Metal		Trolley base....	U. S. No. B
Products Co.		Tracks.....	Brill 77-E
Control	K-35	Varnish	Murphy
Couplers,		Ventilators,	
Met. St. Ry., modified		Ry. Utility Co., honey-	
Curtain fixtures,		comb	
Forsyth short tip, ring fix-		Special devices:	
ture, Rex rollers.		Consol. door lamp signal,	
Curtain material..	Pantasote	Aluminum stanchions, For-	
Destination signs....	Hunter	syth pressed-steel carlins	
Fenders	Eclipse		

TRADE NOTES

Railroad Track Work Company, Philadelphia, Pa., which recently shipped one of its reciprocating grinders to Nashville, Tenn., is demonstrating a machine in Louisville for the Louisville Railway. It has been in use on several of the streets for the last week, the local company having much to contend with in the way of corrugated rails.

Burke Electric Company, Erie, Pa., has recently made arrangements whereby George Hills, an expert on electric welding, has become head of its arc welding department. Mr. Hills will be located at the main office and works at Erie, Pa.

ADVERTISING LITERATURE

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued a sheet describing its portable hydraulic wheel press and sand dryer.

General Electric Company, Schenectady, N. Y., has issued bulletin No. 43900, superseding No. 4925B, which describes its combined unit series mercury arc rectifier, for converting alternating into direct current for the operation of series luminous arc lamps. The rectifier set consists of the constant current transformer, d.c. reactor, tube tank, exciting transformer, static discharger and pilot lamp mounted on a common base.

New Jersey Meter Company, Plainfield, N. J., has issued a bulletin describing its "Tool-om-eter" or compressed-air meter. It has a capacity of 10 cu. ft. to 100 cu. ft. of free air per minute. This meter shows direct on a scale, in cubic feet of free air per minute, the flow of air in a pipe or hose. It measures the air consumption of any machine or application of compressed air and the actual net production of air by any compressor or pump within its capacity. These meters have only one moving element which floats on air and consequently does not cause friction and is non-wearing.

NEW PUBLICATION

The Law of Carriers of Goods. By Ralph Merriam. La Salle Extension University, Chicago, Ill. 1914. 180 pages. Cloth, \$1.25.

The object of this book is to furnish the reader with a knowledge of the elementary principles of the law of carriers of goods, and to train him for the analysis and application of court decisions on this subject. It is neither exhaustive nor super-technical in character, but is so written as to equip the ordinary man for the investigation of particular traffic questions that may arise in his business. The first subject discussed is the general principles of common carriage, and attention is then turned in succession to the following topics: Duty of carriers to accord indiscriminating service at reasonable rates, delivery to carriers, exceptions to the rule of extraordinary liability, limitations of liability, liability of initial and connecting carriers, delivery by carriers, bills of lading, actions against carriers, carrier's compensation and carrier's lien. Each chapter is followed by test questions, which serve aptly to bring out the main points of the preceding discussion in a comprehensive manner.