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THE MASTER MECHANICS AND ELECTRIFICATION No one has ever yet been able to accuse the American Railway Master Mechanics Association of lack of enterprise, and the action taken at last week's convention by this body, one of the oldest and most influential in the technical world, is an illuminating example of the reason. The association has decided that permanent consideration shall be given by a standing committee to the subject of maintaining electric equipment, because in the words of its committee on subjects it "believes that the Master Mechanics Association should keep closely in touch with the question of electric operation, with the idea that it is impossible to predict where or when electrification of steam roads may be introduced." The action is undoubtedly a far-sighted one. Of the present steam railroad mileage of approximately 240,000, only 1800 miles are electrified—about three-fourths of 1 per cent. Of course, this does not include the lines that were built for electric operation nor the branches of steam roads leased by rival electric roads. The fact, however, that even this actual electrified mileage has been built up in the face of the dull business period dating almost exactly from the time when the first large electrification took place is good evidence that the master mechanics are right in taking up the subject.

ACCOUNTANTS' EDUCATIONAL COURSE After years of consistent effort the committee on education of the American Electric Railway

Accountants' Association has completed a working plan for a correspondence course of instruction, and will put it into operation in the fall if the requisite number of enrollments is obtained. The work which this association has accomplished in connection with the standard classification of accounts indicates the comprehensive character of its methods. The assumption that the educational work will be equally thorough is a fair one. Accounting is a subject which lends itself particularly well to correspondence instruction. Its theory and practice are definite, tangible and well developed. It is of broad interest because its underlying principles apply in fields outside of the professional accountant's activities. Hence the new course should be followed, not only by young men and women in the comptroller's department, but by those in all divisions of electric railway work in which accurate records can be utilized. The new course is like a ship ready to launch. This is the critical period. There will be comparatively plain sailing after the launching.

ANTICIPATING THE FIRST STITCH The old saw reads "A stitch in time saves nine"; and this is the first principle on which the inspection work of every good maintenance shop is based. It is clear, however, from Mr. Ransom's article in our June 6 issue on "Use of Inspection Tests to Locate Incipient Defects" that the prevention of trouble can be carried to a still greater and more profitable degree of exactness than is offered by visual examinations alone. It is the peculiar characteristic of apparatus in an electric circuit that it may be bad electrically while seemingly good mechanically. A broken strand in an insulated covering, for example, can cause all kinds of trouble with no possibility that the cause will be discovered except by a happy guess. An invisible film of insulating material may gather on some contact surface and lead to excessive heating, or current may be wastefully used in heaters and motors because of crossed or open connections. Therefore, a test set made in accordance with the principles described by Mr. Ransom gives three distinct benefits: It catches defects before they make themselves expensively felt in service, it prevents the possibility of car fires due to broken or abraded connections, and it detects the excessive or wrongful use of energy by the various pieces of current-consuming equipment in the circuit. Preliminary tests of this kind are analogous to the laudable Chinese custom of paying the physician to keep the patient well instead of to cure him.

PROTECTING WOOD POSTS IN STEEL CARS Comment has recently been made regarding the tendency of steel to rust when it is in contact with wood, the point being raised in connection with composite cars such as those that are constructed with steel side girders and wooden posts. The reason for this tendency is obvious enough when one considers that all wood, even though it may be kiln-dried, contains a certain amount of moisture that varies in accordance with conditions. In addition to this, practically all wood fiber is capable of absorbing and holding mechanically, like a sponge, some portion of any water with which it comes in contact, so that after once becoming wet a piece of wood will remain sensibly moist for a considerable period of time if it is deprived of the opportunity for eliminating the moisture by rapid evaporation. Such conditions are quite comparable to those existing in the case of side-posts which are housed in the stagnant air between the side sheathing of the car and the inner lining and at the same time are subject to the effect of

moisture that may seep in from washing or during wet weather, and it is not surprising that the metal which touches the wood displays a distinct tendency toward rusting. When composite cars are built it is a most obvious necessity to see that an ample and absolutely continuous coating of paint is interposed between the two materials because the deterioration of one invariably sets up a corresponding action in the other, the rusting of steel being inevitably accompanied by a rotting of wood which may be in contact with it.

THE NEW M. C. B. STANDARD COUPLER

The work of the Master Car Builders' Association committee on couplers, whose report was presented at the recently-concluded Atlantic City Convention, constitutes a remarkable example of accomplishment in harmonizing conflicting interests. The committee has succeeded during the past three years in developing specifications for a universal standard coupler, testing samples built by the many different makers under these specifications, and, after obtaining practical agreements from the various manufacturers in support of a one-design standard, selecting two of the samples for a service trial through extended purchase and installation by the various railroads in the country. The work has thus progressed to the point where the final adoption of the standard design depends simply upon which of the two types selected stands up the better, and the final decision, which may of course involve slight changes, will therefore be largely in the hands of the railroads themselves.

To the average interurban railway, which seldom handles cars for interchange, the direct effect of this standardization may not seem to be of vast importance at the present time. On electric roads where the present M.C.B. coupler is used, its single universal feature, that of mutual operation of all of the widely different designs, has been sufficient, and the difficulties involved by keeping in stock the vast aggregation of parts required for maintaining the types found on interchange cars have been minimized.

However, the interurban lines can no more escape the ultimate consideration of interchange equipment than can any electric railway escape the conclusion that must be drawn from the accomplishment of the committee in bringing the various coupler manufacturers together. This has been done notwithstanding the many patents and special designs upon which great volumes of business have been built up in the past, and it is undoubtedly true that the manufacturers have displayed a most commendable spirit in co-operating with the committee. But the fact that they have done so at all shows the possibilities that lie in the consistent and persistent efforts of an organized body of purchasers. The economies inherent in standardization are of enormous value, and, although the establishment of a one-design standard may eliminate much of the benefit to an industry that comes from the competition of inventive minds, no industry can fail to benefit by

it when its scope, as in the case of the universal standard coupler, extends only to apparatus that has passed through the refining process of many years of service.

WHAT IS TREASURY STOCK?

In spite of all the efforts to standardize electric railway accounting, there are still some subjects upon which opinions as well as practices differ, such as that of treasury stock. The term "treasury stock," as defined in some sources, means the stock retained by a corporation and not issued to the subscribers and capable of being disposed of only at par. The reports used by most commissions supervising electric railways consider treasury stock as having once been issued and as being a division of one branch of the outstanding stock—namely, that held by the respondent corporation. A current balance sheet that has come to our hands, however, treats treasury stock as issued but as distinct from outstanding stock.

Here, we believe, is a conflict of terms that is worth clearing up by analysis and definition. In the first place, treasury stock is not capital stock unissued, for the latter is nothing but a figure of possibilities, a measure of a privilege to issue more stock in the future. Treasury stock is rather capital stock that has been issued as full-paid and non-assessable and thereafter reacquired by the corporation by purchase or through donation. It differs from the remainder of the issued stock in that it has no vote and draws no dividends while in the treasury, and it differs from the unissued stock in that it may be sold below par without involving the purchaser in liability for the difference between the cost to him and the par value.

If treasury stock, then, is distinct from unissued stock, should it be included in the total of stock outstanding? It seems as if the subject would be made clearer if the term "outstanding" were used to refer simply to the stock held by individuals, firms or corporations other than the respondent corporation or else by the trustees of sinking or other funds. Perhaps the inter-relation of these terms may best be shown by stating how the subject is generally regarded in financial circles. A corporation with an authorized capital stock of \$1,000,000 issues all but \$100,000. Its stock list would now include: authorized, \$1,000,000; issued, \$900,000; unissued, \$100,000. A donation of \$100,000 is made to the corporation by the incorporators from the amounts issued to them, thereby reducing the outstanding total. The list would now be: authorized, \$1,000,000; issued, \$900,000; outstanding, \$800,000; treasury, \$100,000; unissued, \$100,000.

In the light of this discussion, it is interesting to note that the recent tentative Interstate Commerce Commission system of accounts provides for carrying at par under "securities owned-unpledged," securities actually issued for value by the accounting company but now held in its treasury under circumstances requiring that they shall not be treated as paid or retired. In speaking of this class of securities the com-

mission uses the term "reacquired securities," and refers to them as "nominally outstanding." The subject is complicated, however, by the fact that provision is made for carrying on the liability side of the balance sheet the amount of securities "actually outstanding," which by definition represents the securities issued but not reacquired. Nevertheless, the accounting directions state that this balance sheet item is to be divided to show the par value of the certificates "actually outstanding" and the par value of certificates reacquired or nominally issued. Under the circumstances it would seem that the heading "securities actually outstanding at date," under which the determinative amount as regards the balance sheet liability total is carried in the long column, belies its meaning as defined. If treasury or reacquired securities of a railway are carried as an asset, they must also be carried on the liability side, and a grand total caption that specifically excludes them should not be chosen. The subject is a puzzling one, especially to the investor who does not always understand just what the classification desires to show, and for this reason, if for no other, greater attention should be paid to this point.

ACCIDENT PREVENTION IN SMALL CITIES

Mr. Boyce's unusual article on "'Safety First' Work in a Small City," as published elsewhere in this issue, indicates forcibly that the smaller railway properties are capable of developing effective safety campaigns even if they cannot afford to adopt the more costly methods of their big brothers. Talks by specialists and moving pictures are splendid things in their way, but until accident lecture and film bureaus are formed to give this service at a low cost, the small railway must make the best of its more limited opportunities. Car, newspaper and highway publicity suggest themselves as natural channels, but the publicity material itself must be written "at" the patrons in a way that will appeal to their experience. Thus, the announcements of Mr. Boyce's company do not repeat the well-worn "Don't get off backward" *ad infinitum* but treat this fault in the light of its varied consequences from the onlookers' mockery at an awkward fall to the possibility of mortal injury. When such cards are written in homely yet correct language with a sympathetic eye to human failings they will make a much deeper impression than a few cut-and-dried shibboleths which public and employees soon come to read with lack-luster eyes.

Two accident-prevention methods followed by Mr. Boyce's company deserve special notice. One is the practice of having the men report bad lighting in the vicinity of bad roadway, and the other is the analysis of accidents on the basis of territorial divisions. As to the first, almost every railway which operates over unpaved or badly paved highways has had to foot more than one accident claim that should have been paid by the municipality. If the danger spots are reported by the trainmen, steps can be taken to illuminate or repair them to a degree which will insure

safety. Again, the plan of analyzing accidents on the basis of territorial division offers the advantage of concentration in reducing some one form of accident. Thus, on Mr. Boyce's line, derailments were distinctive of one section, accidents from badly lighted highways of another and accidents from disorderly conduct of a third. By applying a territorial analysis, each characteristic trouble was minimized without spending money where it was not required.

CO-OPERATION WITH THE MOTIVE-POWER DEPARTMENT

We have taken the position that the generation of power is not necessarily a part of the transportation business, essential as energy is for the movement of cars, and that power plants will be operated to a decreasing extent as parts of an electric railway system. Nevertheless, this paper expects to continue to devote a considerable amount of its space to the discussion of power plant problems and to descriptions of exceptionally interesting plants. This will be done for several reasons. In the first place, the power plant will continue to be a part of the organization of a great many electric railway systems. Second, purely as a matter of engineering progress, it is safe to say that every engineer, no matter what his specialty, and all operating electric railway men are interested in following the marvelous changes which have marked the history of power engineering during the past decade. The substitution of the steam turbine for reciprocating engines, the recent radical changes in steam boiler construction and the perfection of steam measuring instruments are typical illustrations of what is going on in this field.

While hydraulic plants are less conspicuous than those operated by steam and less spectacular developments are to be expected from them, great progress also is being made in that field of electrical generation. This fact is shown by the description of the new station of the Salmon River Power Company, printed in this issue. This plant is at the eastern end of the transmission lines of the Niagara, Lockport & Ontario Power Company which has heretofore drawn most of its power from Niagara Falls, and most of the power supplied along its transmission line is used for electric railway purposes. The new plant has unusually interesting design and operating features, owing to its location and its relation to the Niagara Falls plant. The two principal water powers in New York are now yoked into a team, the yoke being the transmission system. The electric railways in the central and western part of the State are the gainers by the union.

In the Salmon River plant provision has been made for the possible operation of the electric generators as synchronous motors, the water wheels to be run idle if necessary. The flywheels and turbine runners give such added mass to the rotating system that the plant should constitute an excellent synchronous condenser. The control of power factor thus made possible would greatly reduce the line voltage drop.

Seattle Municipal Street Railway System

A Discussion of the Construction Progress on the North Division and the Negotiations on the South Division of the Municipal Electric Railway—Tables Showing Cost of Construction and Estimated Operating Expenses of Northern Line

As noted in the May 30 issue of the *ELECTRIC RAILWAY JOURNAL*, the municipal electric railway system of Seattle, Wash., began operations on May 23, 1914. The history of the events leading up to the vote on the municipal line and of the early negotiations, construction and proposed equipment was published in the *ELECTRIC RAILWAY JOURNAL* of April 26, 1913.

CONSTRUCTION

It will be recalled that on the second attempt the voters of Seattle by a large majority, on March 7, 1911, authorized the flotation of \$800,000 of bonds for the immediate construction of a complete railway system, municipally owned, extending from Third Avenue West and Nickerson Street to Fourth Avenue and Pine Street, thence over Fourth Avenue South to Rainier Boulevard and Ryan Street, the north line to be built immediately and the southern extension to be either constructed or acquired by condemnation. The construction on the north line, Division "A," extending from Third Avenue West and Nickerson Street to Fourth Avenue and Pine Street, was begun by the Jahn Construction Company, Seattle, during September, 1912, and thirteen months later, Oct. 8, 1913, the last spike was driven.

SOUTHERN EXTENSION PENDING

The southern extension, Division "B," extending from Pine Street over Fourth Avenue South to Rainier Boulevard and Ryan Street, is now occupied by the Seattle, Renton & Southern Railway, and up to the present time the city of Seattle has made no settlement with this company. To complete the municipal line as defined in the statute the line of the Seattle, Renton & Southern Railway must be purchased outright, condemned and purchased or paralleled. The City Council and Scott Calhoun, receiver for the Seattle, Renton & Southern Railway, have not reached a basis for the purchase of the line which is mutually satisfactory, the city asserting that the price demanded by the receiver is exorbitant. Condemnation proceedings have been instituted, but these are still pending. However, at a meeting of the Council on April 6 the following resolution was passed:

"Be it Resolved by the city of Seattle as follows: that the Board of Public Works be and it hereby is authorized and directed immediately to prepare plans and estimates of the cost, and plans and specifications for the construction, of all necessary roadway, overhead construction, rolling stock, equipment and apparatus for the full and complete construction of a system of street railway along and over and upon to the following streets, to wit: First, on Rainier Avenue, from Dearborn Street to Hudson Street; second, on Rainier Avenue from Hudson Street to the south city limits; third, on Dearborn Street, Seattle Boulevard and Fourth Avenue South, from Rainier Avenue to Jackson Street; fourth, on Fourth Avenue South and Jackson Street, and fifth, on Fourth Avenue South and Spokane Street from Seattle Boulevard to a connection with the Highland Park & Lake Burien Line."

The above route parallels that of the Seattle, Renton & Southern Railway. The latest development is that the City Council has authorized an issue of utility bonds in the sum of \$500,000 to be used to construct this new

line. Councilmen urge the immediate use of the general bond issue for the first part of the work, but in case the negotiations for the purchase of the existing line are concluded soon the proposed line will not be built.

DETAILS OF NORTHERN DEVELOPMENT

At the present writing there have been constructed on the north line 4 miles of double track and 0.7 miles of single track of modern type. The rails are girder rails, being the only ones of this section in the city. Power will be obtained from the city light department, and a concrete substation has been erected at about the middle of the line at Dexter and Aloha Streets. The city light department will also have charge of the operation and maintenance of the substation and the overhead work. The complete metallic transmission system is used, two trolley wires being carried over each track.



Seattle Municipal Railway—Type of "Pay-as-you-enter" Car Used on Line

The carhouse is located near the terminus of the line and herein are housed the twelve cars owned by the city. These are of the pay-as-you-enter type purchased from the Cincinnati Car Company. Each car has seats for forty-eight passengers and standing room for twenty-seven more.

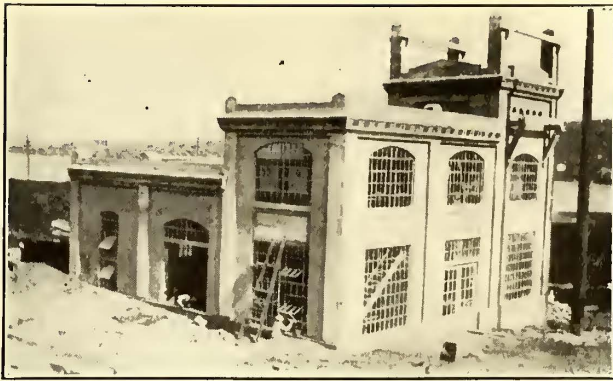
COST OF CONSTRUCTION

The cost of construction of the Seattle line, as officially reported, is as follows:

| | | |
|---|-------|-----------|
| Track: | | |
| Main line | ..... | \$169,658 |
| Carhouse tracks | ..... | 7,798 |
| Northern Pacific connection | ..... | 319 |
| | | \$177,775 |
| Overhead: | | |
| Pole line | ..... | \$9,522 |
| Trolley and feeder system | ..... | 51,022 |
| Substation (including ground, building and apparatus) | ..... | 43,943 |
| Carhouse (including ground, building and grinder) | ..... | 22,092 |
| Cars | ..... | 76,138 |
| Line car (estimated cost) | ..... | 4,000 |
| Division "B" | ..... | 1,942 |
| Estimated additional engineering expense | ..... | 2,500 |
| | | \$379,414 |

OPERATION, FARES AND TRANSFERS

The operation of the municipal line is under the supervision of the public utilities department and directly in charge of A. L. Valentine, superintendent of public utilities. A round trip on the line is made in forty-eight minutes. With eight of the new cars in use during the rush hours of the evening, this will give



Seattle Municipal Railway—Substation for Delivery of Power to City Railway

a six-minute schedule. There is no provision for transfer privileges with the lines of the Seattle Electric Company. This question has been brought to the attention of the State Public Service Commission, which is expected to make a decision in the matter some time during the year.

The following ordinance regarding fares and transfers has been considered and approved by the public utilities committee:

"Sec. 1. The rate of fare on the municipal street railway lines within the city of Seattle shall be as set forth in this ordinance.

"Sec. 2. The rate of fare when paid in cash shall be 5 cents.

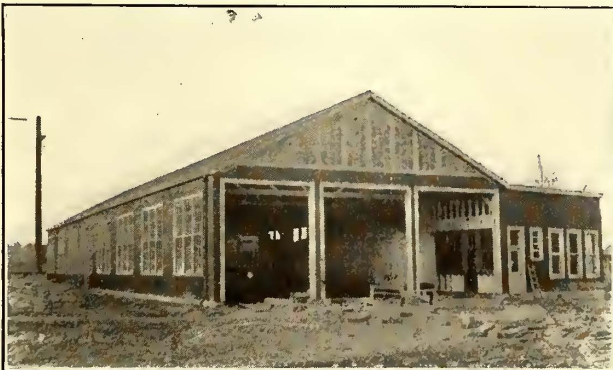
"Sec. 3. Commutation tickets, not entitling holder to a transfer, shall be sold by the conductors on the cars at the rate of six for 25 cents, twelve for 50 cents, or twenty-five for \$1. They shall also be kept on sale at the office of the superintendent of public utilities.

"Sec. 4. School children going to and returning from public schools, on school days, upon presenting a certificate of attendance on forms supplied by the superintendent of public utilities and signed by the principal of their school, shall be entitled to ride for 2½ cents. Three cents shall be accepted from school children in payment of a single fare, two school children may ride for 5 cents, or school children's tickets may be purchased from the conductors at the rate of forty for \$1, twenty for 50 cents or ten for 25 cents.

"Sec. 5. Children under six years of age shall, when accompanied by parents or guardian, be entitled to ride free.

"Sec. 6. Employees of the municipal street railway shall ride free upon displaying their badge or pass supplied by the superintendent of public utilities.

"Sec. 7. Any passenger who has paid cash fare or school children's ticket shall, upon request, be furnished with a transfer to any intersecting line of any street



Seattle Municipal Railway—Carhouse for Storing of City-Owned Cars

railway company now operating in the city limits, or that may hereafter operate therein, which shall give and receive transfers to and from all lines owned, controlled or operated by the city of Seattle, on a basis of settlement that the transfers are to be redeemed at the rate of 2½ cents for a full cash fare, or 1¼ cents for school children's tickets. Such transfer shall be good only upon the first connecting car at the point of transfer and upon cars going in the same general direction.

"Sec. 8. The rate of fare charged on any lines operated outside of the city limits shall be the same as that charged on the municipal street railway lines operated in the city limits, and shall be in addition thereto."

ESTIMATED EARNINGS AND EXPENSES OF OPERATION

According to an estimate made by the public utilities department there are 7825 people in the district directly tributary to the line. If the expectations of the department are realized these will use the municipal railway almost exclusively. Taking two-thirds of the rate used by the Seattle Electric Company to calculate possible earnings, Superintendent Valentine, in a statement submitted to the Board of Public Works and the City Council, estimates that the gross earnings of the line per annum will be \$75,000, with expenses of operation and maintenance amounting to \$68,000.



Seattle Municipal Railway—Work of Rehabilitation of Highland Park & Lake Burien Railway

The estimate of the cost of operating and maintaining the municipal system compiled by Superintendent Valentine follows:

| | | SALARIES | |
|---|---------|-----------------------|----------|
| Transportation | | | |
| 1 inspector at \$100 per month..... | \$1,200 | | |
| 24 trainmen—365 days at \$3 per day..... | 26,280 | | |
| | | \$27,480 | \$27,480 |
| Roadway | | | |
| Roadmaster, at \$100 a month, three months... | \$300 | | |
| Trackman—400 days at \$3 per day..... | 1,200 | | |
| Line repair work | 150 | | |
| | | \$1,650 | \$1,650 |
| Shops | | | |
| Carhouse foreman | \$1,500 | | |
| 2 carhouse men—365 days at \$3 per day..... | 2,190 | | |
| | | \$3,690 | \$3,690 |
| | | SUPPLIES AND EXPENSES | |
| Forms, stationery, etc..... | \$480 | | |
| Power (from city light plant)..... | 9,000 | | |
| Furniture and telephone service..... | 200 | | |
| Shop supplies and fixtures..... | 2,000 | | |
| Accident and legal expense | 1,500 | | |
| State insurance tax (3 per cent. of payroll)..... | 985 | | |
| Interest on bonds (\$375,000 at 4½ per cent).... | 18,875 | | |
| | | \$31,040 | \$31,040 |
| Common user, Fourth Avenue..... | | | 4,000 |
| Total | | | \$67,860 |

It will be noticed from the above statement that there seem to be some omissions of charges which usually appear in expense accounts of electric railways, such as salary of superintendent, salaries of clerks, fire insur-

ance, taxes, etc. It is stated that the salary of the superintendent, clerks, etc., will be apportioned partly from the earnings of the line and partly from the city's funds for compensation to its employees. Property owned by the city is not taxed. As yet no proposition has been taken up for the insurance of the buildings and equipment against fire.

EXTENSIONS

It is the intention of the public utilities department to extend the municipal railway as soon as possible in two directions, but this will not be done until the northern division has been proved a success. As soon as the Seattle, Renton & Southern Railway difficulty can be cleared up, cars can be run over Fourth Avenue to Ryan Avenue and Rainier Boulevard, and eventually connect with the Highland Park & Lake Burien Railroad. It is also planned to construct a branch line out Virginia and Fairview Streets and thence to the University district, but these plans are only tentative.

The Lake Burien line was built by a group of capitalists some years ago from West Seattle to Lake Burien, a distance of 9 miles. The road was promoted by persons who owned property near Lake Burien, and the first car was operated on July 1, 1912. For four months



Seattle Municipal Railway—Example of Rehabilitation Work on Highland Park & Lake Burien Railway

an intermittent service was maintained, and then a slide covered the track for a mile and operation was abandoned. The line has lain idle until recently when it was turned over to the city free of all incumbrances by the owners, on condition that the city maintain a service so that the property owners along the road who subscribed to the funds for the road's construction might have access to Seattle. The council immediately appropriated \$25,000 to be used in rehabilitating the right-of-way, half of which is in the city limits, and at this time the line is practically ready for use. Of the \$25,000 appropriated by the Council to be used in preparing for operations, \$7,500 will be utilized in the construction of a substation at Ninth Avenue Southwest and West Trenton Street. The Board of Public Works was recently authorized to purchase the site and receive bids for construction and for furnishing equipment.

In a recent issue of the Jacksonville (Fla.) *Times-Union* is an account of a banquet tendered by Hardy Croom, manager Jacksonville Traction Company, to the motormen and conductors of his line for the splendid manner in which they handled the crowds in Jacksonville during Reunion Week. The men attended the banquet in relays, which enabled every man to partake of Manager Croom's hospitality without interfering with the service of the line. Mr. Croom received a letter from the Jacksonville Board of Trade highly commending the men for their splendid service.

MASTER MECHANICS' CONVENTION

The forty-seventh annual convention of the American Railway Master Mechanics' Association was held in Atlantic City June 15-17, following the convention of the Master Car Builders' Association, which was held during the latter part of the previous week. At the convention a considerable amount of attention was devoted to questions of fuel economy, which included consideration of such matters as smoke prevention, and the development of mechanical stokers, superheaters and other means for reducing fuel consumption. The committee on fuel economy presented a report in which it was stated that tests of superheater locomotives had shown savings in fuel amounting to as much as 25 per cent, though somewhat less than this was to be expected in regular service. The brick arch was stated to affect about 10 per cent economy in fuel in addition to its ability to maintain a constant temperature in the firebox. No novel methods of effecting fuel economy were brought out in the report, the committee's conclusions being in the form of recommendations for the exercise of care in the selection of fuel and use of specifications in its purchase as well as in keeping accurate coal records. The importance of good boiler feed water was mentioned, treating plants being desirable in many cases as the savings due to the reduction of scale and decreased boiler maintenance would pay for the cost of treatment. Emphasis was laid upon the necessity for close co-operation between engineers and firemen and between these men and their supervising officers with regard to the economical use of fuel.

LOCOMOTIVE STOKERS

The report of the committee on automatic stokers for locomotives was largely a summary of present installations. It appeared from data furnished in the report that a mileage of 40,000 per stoker failure had become easily possible. Some fourteen roads were operating stokers on more than one locomotive each, the Pennsylvania lines west of Pittsburgh having 301 and the Baltimore & Ohio 193. All told there appeared to be 726 automatic stokers now in service. These were of six different types, of which two held the field to the practical exclusion of the remainder. Five other types of stokers were reported to be under development, but none of these had yet been built.

The report stated that when the demands upon the boiler were fairly uniform, permitting a regular feed of coal, the operation of the stoker practically took care of itself, but in the absence of automatic manipulation manual control did not always result in efficient regulation of the fire. The boiler was allowed to blow off more than necessary and there was some tendency, through neglect, to allow the fire to get low while the engine was standing on the road. It was still a question as to whether run-of-mine or screened coals were economical. There were few data to show the relative fuel consumption between hand firing and stoker firing, but the experience gained during the year seemed to give color to the belief that the stoker was not necessarily a coal-saving device. It appeared that, though the coal consumption increased as the coal became finer in character, the stoker was better than hand firing to maintain steam with fine coal. The committee expressed doubt as to whether less smoke was produced with stoker firing than with hand firing.

HEAT-TREATED STEEL

The committee on the use of special alloys and heat-treated steel in locomotive construction reported that the term "heat treatment" generally covered two principal classes, one being forgings which were annealed,

or heated slightly above the critical temperature and then allowed to cool slowly, and the second being forgings which were quenched or cooled rapidly after heating to a temperature slightly above the critical point. Replies to a circular of inquiry were received from a number of railroads, and in these there seemed to be some doubt as to the meaning of the term "heat treated." Where the replies referred to frames and steel castings it was probable that they meant annealing only, while in case of other parts, with the possible exception of springs, it might be assumed that the heat treatment covered quenching and tempering. Briefly, the replies indicated that, among thirty-seven railroads, four were using heat-treated steel castings and carbon-steel frames. Two roads were using heat treatment for main and parallel rods, nine for piston rods and twelve for axles and crank pins. Only two roads were using it for tires and wheels, as compared with five one year ago. One road had discontinued its use altogether on account of unsatisfactory service. The use of heat-treated carbon steel appeared to be still experimental and did not appear to have been appreciably extended, according to the committee's report.

Seventeen roads were using vanadium-steel frames, nine more than last year, and ten roads were using chrome-vanadium steel for main and parallel rods, nine for piston rods, four for valve-motion parts, twelve for axles and crank pins, and thirteen for tires and wheels. Many of these roads considered the use experimental only. The reports indicated that chrome-vanadium steel provided a considerable increase in wear over plain carbon steel. Tests showed that parts of case-hardened carbon steel wore much better than corresponding parts of quenched and tempered steel. However, vanadium-steel axles and driving tires appeared to be capable of considerably more wear than the same parts made of carbon steel.

The replies to the circular indicated that the method of heat treatment was an active cause of failures in both heat-treated carbon steel and alloy steel. That is, unless the quenching and tempering were properly done there was danger of checking and the production of cracks and unequal stresses. In designing locomotive parts the general practice was to use the same working stresses for heat-treated carbon and alloy steels as for plain carbon steel on account of lack of experience with the former materials.

Thirteen railroads reported the use of vanadium springs principally for test purposes, and one of these roads stated that vanadium springs did not reduce the number of spring failures in spite of the stronger physical properties. The remaining twenty-six roads that replied were using springs of 0.90 to 1.10 carbon steel. Vanadium springs were reported as designed with a fiber stress of 100,000 lb. per sq. in. which is indicated by experience to be a safe value, whereas carbon-steel springs were usually designed with a fiber stress of 80,000 lb. per sq. in.

But little quenching or tempering of carbon or alloy steel was reported by the railroads in their own shops, it being the general policy to leave this operation to the steel manufacturer, and the result was that no generally accepted practice had been developed. Due to the lack of a generally accepted method for proof-testing axles that had been quenched and tempered certain railroads had modified the usual drop test to suit the conditions. Impact tests of axles were made for the purpose of detecting flaws which might have developed in the course of quenching and tempering. Test pieces for the tension test were also used in some cases, but such tests did not determine the soundness of the axle as a whole and served only to determine physical properties of the material from which it was made. The report included

a curve which showed that on the Pennsylvania Railroad, tests for heat-treated axles were made on an M.C.B. drop with a spring anvil, the tup weighing 1640 lb., and the axle being on supports 3 ft. apart. A 9-in. axle called for a drop of 7 ft., or nearly 12,000 ft. lb., as a proof test, and a 5-in. axle called for a drop of 1 ft. 4 in., giving a 2000-ft. lb. blow. On the New York Central lines the tests were made on solid anvil supports about 57 in. apart, and a 9-in. axle was required to stand, for a proof test, a blow of 9000 ft. lb., the drop being 5 ft. 6 in. A 5-in. axle heated or cooled for a 6-in. drop and a blow of approximately 1000 ft. lb.

The committee reported a strong tendency among users of quenched and tempered steel to require a drilling of parts over 7 in. diameter, and this practice was advocated by steel makers. In the case of axles and crank pins particularly, drilling took away practically nothing from the strength of the part, and it removed material from the center where defective metal was most likely to exist and where it was least subject to the beneficial effects of heat treatment. In addition drilling allowed the forging to adapt itself to expansion and contraction while being heated or cooled. The toughness of properly quenched and tempered carbon steel was demonstrated by an illustration of a hollow-bored crank pin that accompanied the report. In this the hole was badly distorted and partly closed without any evidence of cracking in the material. Properly manufactured and treated alloy steel of different kinds had shown that it was capable of a remarkable amount of bending and distortion without fracture, and it was the belief of the committee that the manufacture of plain carbon and alloy steel, intended for quenching and tempering, would eventually be developed to the point where such material could be used in designs involving much higher unit working stresses than were possible with untreated or annealed plain carbon steel.

LOCOMOTIVE HEADLIGHTS

The report of the committee on locomotive headlights outlined the results of a series of tests made during 1913. The recommendations of the committee were that, in order for a headlight to be of such intensity as would avoid misreading of signals, obscuring of hand signals, fuses, red lanterns and classification lamps by opposing headlights, and to avoid the temporary blinding of the enginemen looking into it, the headlight should have an apparent beam not greater than 3000 cp, referred to the center of a horizontal reference plane 3 ft. above the rail at a distance between 500 and 1000 ft. ahead of the locomotive.

On the other hand, to provide sufficient illumination ahead of the engine to allow ready performance of the engineer's duties while operating in and out of passenger terminals and industrial sidings and while switching, and to permit ready location of whistle posts, yard limit and crossing signs, a headlight should not, at any time, have an apparent beam less than 450 cp at a distance of 500 ft. ahead of the focal center of the light and not less than 500 cp at a distance 1000 ft. ahead of the focal center. The reading at a point 20 ft. each side of the center line of the beam should be not less than 30 cp at a distance of 50 ft. ahead of the focal center, and not less than 300 cp at a distance of 400 ft. ahead of the focal center. As these readings were expressed in apparent beam candle power they would be considered independent of the source and intensity of the light, the design of the reflector and other features of the headlight design.

In general it was found that the headlights of very high intensity, such as called for by some States whose laws require headlights of 1500 unreflected candle power, were actually dangerous.

New Hydroelectric Plant of the Salmon River Power Company

A Hydroelectric Plant Recently Put Into Commission in Central New York to Supplement the Output of the Niagara Falls Plant of the Ontario Power Company—The New Plant Has Been Leased in Perpetuity to the Niagara, Lockport & Ontario Power Company

The Salmon River Power Company was organized to develop the power of the Salmon River, a stream which flows from the foothills of the Adirondacks in a westerly direction through the northern central part of New York State into the eastern end of Lake Ontario. While the length of the stream is only 44 miles, it drains a watershed remarkable from the hydraulic standpoint in that over a tributary area of 190 square miles there is an average annual rainfall of about 60 in. In addition, the river falls 650 ft. in the 17 miles between Stillwater and the lake and more than 400 ft. in a distance of less than 8 miles. At Salmon Falls the drop is 110 ft. While the flow of the stream is somewhat irregular, the valley above the Salmon Falls is of a form suitable for storage purposes. Moreover, the location of the site is such as to enable the power company to dispose of the entire output of the plant to the Niagara, Lockport & Ontario Power Company, which has leased the property in perpetuity and acquired all its capital stock. The latter company draws its supply at present from the plant of the Ontario Power Company at Niagara Falls and from its own steam plants at Lyons and Auburn. It can utilize the full output of the new plant to advantage in combination with the other three.

THE HYDRAULIC WORKS

From the hydraulic standpoint the features of interest are the concrete dam and spillway situated near Stillwater, the artificial lake about 8 miles in length and $5\frac{1}{2}$ square miles in area, impounded by it, the 2-mile conduit of wood-stave and steel pipe, the distributor in which the conduit terminates, the enormous and novel surge tank, the Johnson valves in the penstocks, the penstocks themselves, the turbines and their governors, and finally the tailrace.

The Salmon River is of the kind found all through the lake district of central New York. The riverbed is at the bottom of a narrow valley with rather steep hills rising on both sides. At places the valley widens considerably, as, for example, just above Salmon Falls; at others it narrows into a gorge with steep banks, as at Stillwater. By the location of a dam at the latter point with a crest at an elevation of 935 a large area was submerged with little loss of property, as the valley is sparsely settled. The height of the dam crest is limited to about 935 ft. unless more extensive dikes are

built to prevent diversion of the water into the watershed of the streams draining into Oneida Lake, several of which take their rise on the south side of a narrow ridge which parallels the Salmon River closely on the south. The artificial lake impounded by the dam has a capacity of 2,600,000,000 cu. ft. with a dam crest at 935 ft. and, at the average rate of flow of the stream, about twenty days are required to fill it. With the crest at this height the average net head produced at the power house less than 2 miles away is 245 ft.

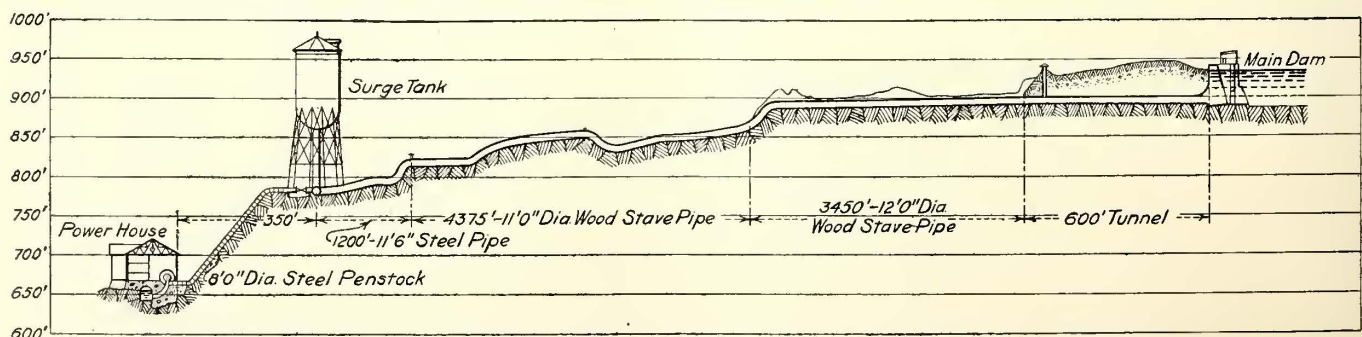
On the down-stream face of the dam is a 25-hp Pelton wheel for the gate drive, connected by long shafting and bevel gearing to a longitudinal shaft in the gatehouse. By means of clutches the gate-raising mechanism is connected to this shaft.

The conduit connecting the dam and the power house consists of five sections, a 600-ft. reinforced concrete-lined tunnel drilled through rock, a 7825-ft. length of wood-stave pipe, a 1200-ft. length of steel pipe, a steel distributor and four short penstocks.

The more novel features of this plant are found in and near the power house. On the crest of the ridge just behind are not only the most conspicuous but also the most original elements of the hydraulic equipment. First there is the distributor, a 12-ft. steel pipe made of $\frac{5}{8}$ -in. plate 210 ft. in length and joined at one end to the pipe line in a huge concrete anchor block. The other end is closed by a bulkhead. The distributor is inclosed in concrete. The elevation of the bottom of the distributor is 775 ft., or 160 ft. below the crest of the dam.

From the center of the distributor a 12-ft. riser branches off to a surge tank. The surge-tank riser joins the distributor with easy curves, but a novel and cheaper connection is made to the penstock intakes, 8 ft. in diameter. This is a simple flanged and riveted joint, which would, without some modification, produce eddies and loss of head. To prevent such, wooden fillers suitably rounded off are secured around the mouths of the intakes inside the distributor.

The surge tank consists of a cylindrical shell, 50 ft. in diameter and 80 ft. high, surmounting a hemispherical bottom which adds 25 ft. to the height. Its capacity is, therefore, 1,400,000 gal. The tank is supported on ten columns with heavy concrete footings. It and the riser are housed in with a framed wooden structure providing a surrounding air space which can



Salmon River Power Development—Diagrammatic Section of Hydraulic Works

be heated when necessary from a small house below. The top of the roof of this structure is 205 ft. above the ground, and the top of the tank is high enough above the crest of the dam so that if the flow of the water in the pipe line were suddenly interrupted its energy would be absorbed by the rise in level in the tank without overflow.

The four 8-ft. penstocks are connected to the intakes through valves of a type which represent a comparatively new development in hydraulic practice. They operate under a head of nearly 154 ft. The valve used is the invention of R. D. Johnson. It was built by the Wellman-Seaver Morgan Company. The valve is shown herewith in diagrammatic section. The principle of operation is that a plunger, *C*, slides in a cylinder, *B*, enclosed in the shell, *A*, being closed through a two-way valve by penstock pressure through the left-hand horizontal pipe and vertical pipe 2. The valve seat is furnished by the bronze rings *E*, *E*. The valve opens when pipe 2 is connected to the drain.

Below the valve houses are the four 8-ft. penstocks, anchored above and below in heavy concrete blocks, and laid in trenches and entirely back-filled. The steel plates vary in thickness from 1/2 in. on the upper horizontal portion of the penstocks to 7/8 in. at the lower end where they enter the power house.

The four turbines are of the Francis horizontal,

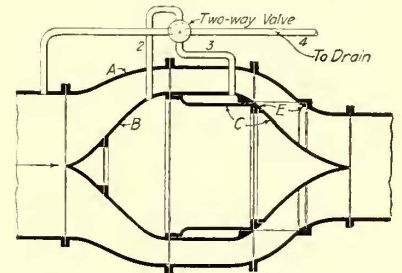


Salmon River Power Development—Power House, Surge Tank and Tailrace

and to facilitate the operation of the electrical equipment of the plant in parallel with the Niagara, Lockport & Ontario Power Company's system. The turbines are provided with relief valves operated by the governors, so that the sudden checking of overspeed cannot result in an excessive rise of pressure.

THE POWER HOUSE

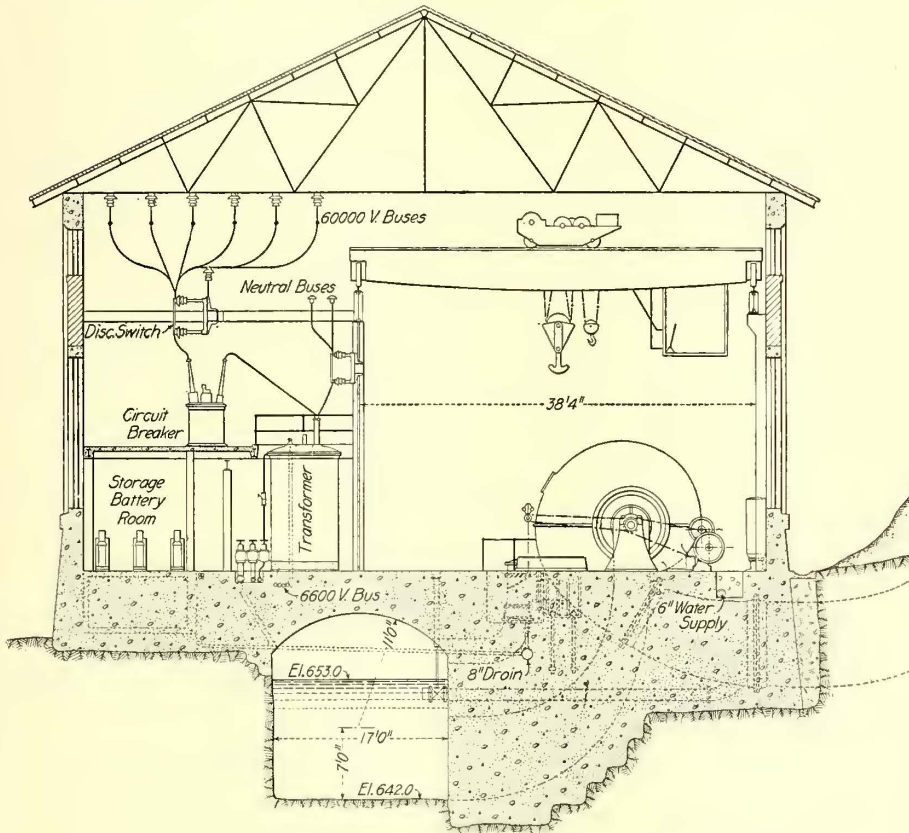
The building is rectangular with a projecting feeder bay.



Salmon River Power Development — Diagrammatic Section of Johnson Hydraulic Valve

The interior is open to the roof and, with the exception of a gallery about 12 ft. above the main floor on the feeder-bay side, forms one great room. It is served by a 40-ton Shaw electric crane with main and auxiliary hoist all driven by 250-volt d.c. motors. The crane has a 38-ft. span and the runway covers the entire length of the building.

Each of the four electrical generating units consists of a 375-r.p.m., 6600-volt, twenty-five-cycle, 5600-kva, three-phase generator with exciter mounted on an extension of the shaft; three 2200-kva, single-phase, twenty-five-cycle transformers with a normal ratio of 6600 volts to 34,650 volts, with high tension in star, giving 60,000 volts line voltage; a 6600-volt, 1200-amp, triple-pole, single-throw, type "C" oil circuit-breaker, automatic for reverse power, and the necessary connecting cables and auxiliaries. Each unit is thus as nearly self-contained as possible.



Salmon River Power Development—Section of Power House

single-spiral, double-discharge type of 10,000-hp rating each. They are provided with outside, balanced wicket gates operated by Lombard governors. These machines have guaranteed efficiencies of 82 per cent at full load, 85 at three-quarters load, 80 at half load and 70 at quarter load. The specifications on governing permit not more than 15 per cent increase in speed above the normal value of 375 r.p.m. on the sudden removal of full load, 6 per cent for half load, 3 per cent for quarter load, and 1.5 per cent for tenth load. The turbines are provided with heavy flywheels to assist in governing

The generator is of standard form except that the pole faces are furnished with damping grids and the shaft is made exceptionally rugged on account of the use of the heavy flywheel. It is of the semi-enclosed type, and the method of ventilation is interesting in that all the cooling air may be discharged through a single large opening in the top of the frame. It is designed to operate either as a generator or as a synchronous condenser, the plant being meant to be used both for energy generation and for voltage and power-factor regulation. The generator has rated capacity at 85 per cent power factor, and it is designed to carry 20 per cent overload. It is capable also of operating at full current output up to 7500 volts.

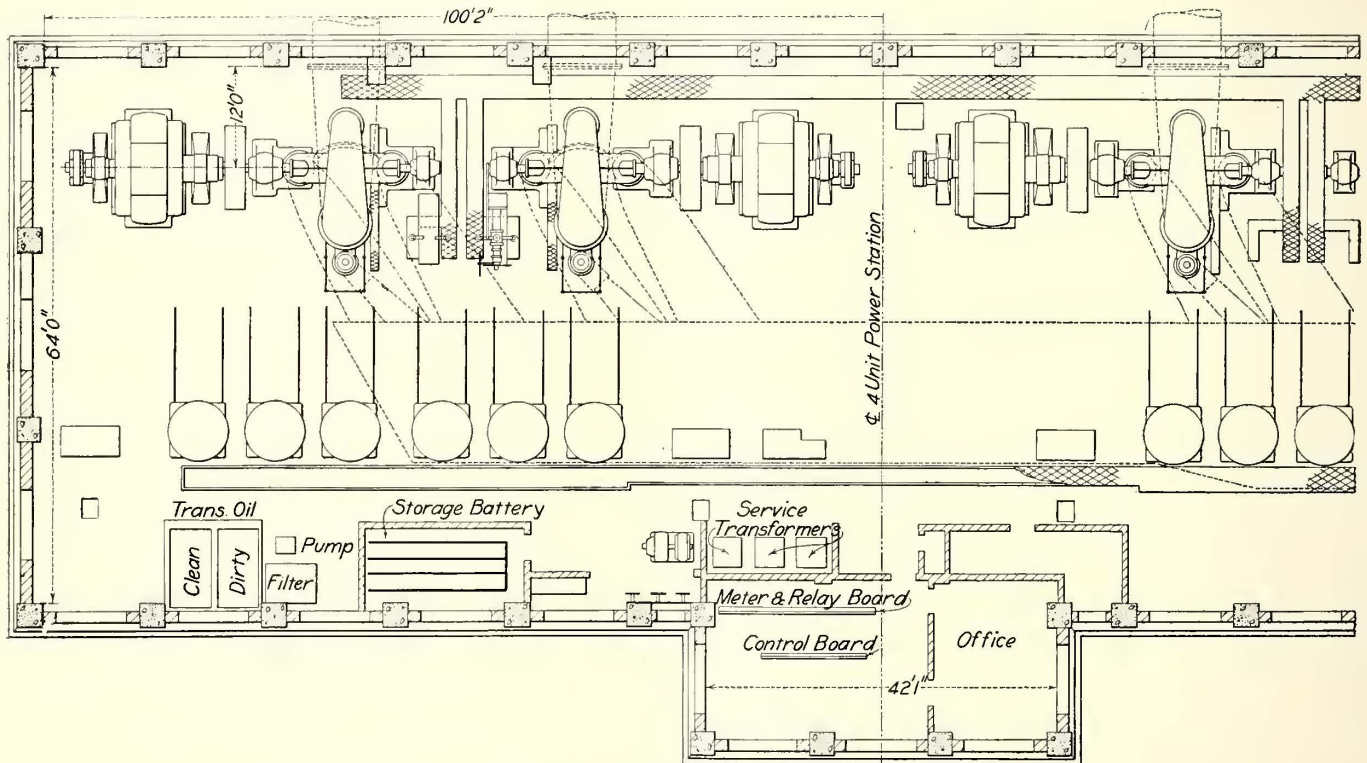
On account of the special nature of this plant, the specifications call for high efficiency at half and quarter loads. The accompanying table shows the required values.

| Volts | Power Factor | Per Cent Efficiency at Indicated Percentages of Full-Load Current | | | | |
|-------|--------------|---|------|------|------|------|
| | | 25 | 50 | 75 | 100 | 120 |
| 6600 | 100 | 89.6 | 93.8 | 95.1 | 96.1 | 96.4 |
| 6600 | 85 | 87.3 | 92.2 | 94.0 | 95.0 | 95.5 |
| 7500 | 85 | 86.1 | 90.8 | 93.2 | 94.5 | ... |

transformers are used for general service about the plant, stepping the voltage down from 6600 to 220. These are delta-connected on both sides.

The busbars, circuit-breakers, control switchboard, etc., are placed in galleries at one side of the turbine room and in the small bay already referred to. The high-tension busbars, which are in duplicate, are hung directly from the roof, and a row of disconnecting switches is mounted just below them, a switch as well as a circuit-breaker being in each line on the line side and on the transformer side. The line and transformer circuit-breakers are on the upper gallery, and all connecting wires are No. 0000 hard-drawn trolley wire, which is of sufficient stiffness to avoid the necessity of many supports. On the lower or main floor under the gallery are the generator circuit-breakers, the main and service transformers, the service circuit-breaker structure, the storage battery for switch operation, the oil storage, cleaning and drying equipment and auxiliaries.

The feeder bay, referred to before, has two floors, the lower of which contains the superintendent's office and the control switchboard. The switchboard is of the



Salmon River Power Development—Plan of Power House

Excitation for each generator is furnished by a separate directly connected shunt-wound exciter, each generator requiring from 125 amp and 125 volts at no load, normal voltage, to 235 amp and 245 volts at 7500 kva and 7500 volts. The exciter is adapted to voltage and power-factor control by the Tirrill regulator.

The main transformers are water-cooled, and each set of three is star-connected on the high-tension and delta-connected on the low-tension side. Like the generators, the transformers are designed for high efficiency at light load, the full-load copper loss being 30.8 kw and the core loss 16.7 kw. The specified regulation is 1.55 per cent at full load and 100 per cent power factor, and 4.15 per cent at 85 per cent power factor.

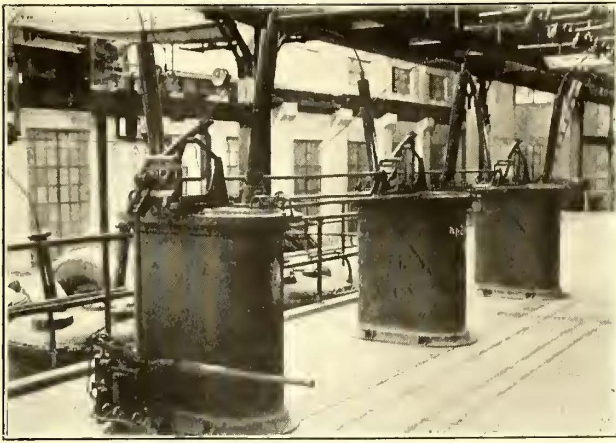
The transformer cases are mounted on flanged wheels rolling on tracks, this mounting permitting the bringing of the transformers into the field of the crane. The usual provisions are made to drain the cases of oil and to clean and dry the oil. Three 100-kw self-cooled

vertical panel type. It is, of course, quite remote from the turbine room. Above the switchboard room is the line entrance chamber with choke coils and the line "disconnects."

THE TRANSMISSION LINE

The line which connects the generating plant at Bennett Bridge with the substation of the Niagara, Lockport & Ontario Power Company at Solvay, near Syracuse, is approximately 42 miles long and comprises two circuits.

The line conductors are of No. 0000, seven-strand cable, hard-drawn copper. The elastic limit of this is not less than 35,000 lb. per square inch and the ultimate strength 50,000 lb. Permissible elongation in 10 in. is not less than 1.5 per cent and as nearly 2 per cent as possible. Conductivity is at least 98 per cent of Matthiessen's standard. The lines are protected for a distance of a few miles at each end by three ground wires,



Salmon River Power Development—Circuit-Breakers in Power House

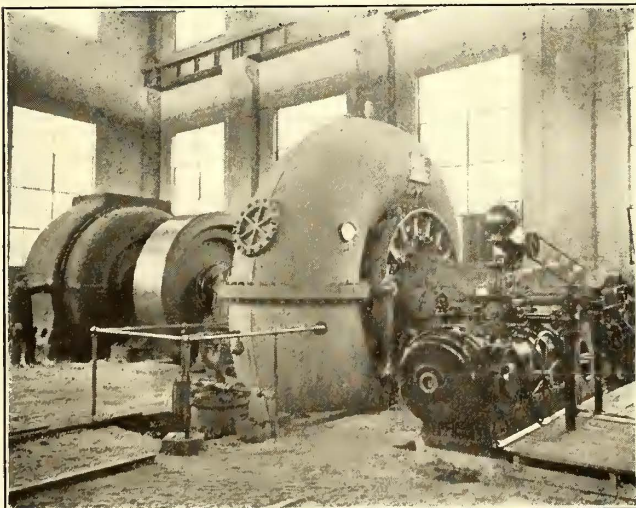
and for the rest of the way by two ground wires. These ground wires are of galvanized Siemens-Martin steel strand. A telephone line of 1/4-in. copper-clad steel is carried directly on the transmission towers.

Starting at the line circuit-breaker each line wire first includes an oil-immersed choke coil, passing thence to a disconnecting switch mounted high in the terminal chamber. The wall entrance is through a 36-in. tile set in the wall at an angle and containing a concrete diaphragm supporting a multi-sleeve porcelain bushing.

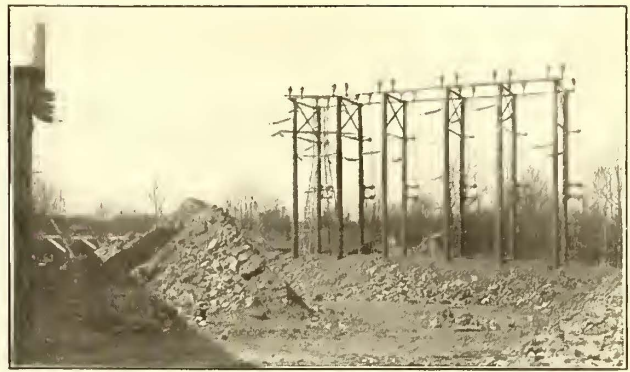
Outside the power plant is a structure built up of 50-ft. wooden poles and cross-arms and serving several purposes. It acts as an angle and strain tower, taking up all line tension and starting the line off in the proper direction. The topography of the station site is such as to make this necessary. It carries the horn-gap arresters and fuses which furnish the lightning protection for the station, keeping this apparatus at a suitable distance from the latter. Each line wire is attached to the station wall by two strings of insulators set at an angle thereto, to prevent swinging of the entrance wire, and to the angle tower by a single string at each of two points.

Each lightning arrester consists simply of two electrically parallel, grounded horn-gaps, one longer than the other. The shorter gap is grounded through a fuse.

The Salmon River line is to be tied in with the Niagara Falls plant of the Ontario Power Company,



Salmon River Power Development—Illustration Showing Generating Unit



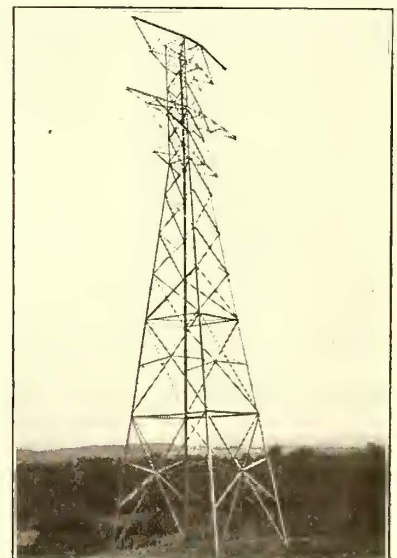
Salmon River Power Development—Terminal and Lightning Arrester Structure

acting in general as a source of energy but occasionally as a synchronous condenser plant. Towers of unusual strength for such lines were therefore installed. The specifications called for the following test load strength: For the standard towers, a load of 4000 lb. applied in a horizontal direction at any one of the conductor or ground-wire supports, or a horizontal load of 12,000 lb. applied at the center of the tower at the middle cross-arm, or a vertical load of 2000 lb. applied at any insulator or ground-wire support, should not produce failure or permanent distortion of any member. For the strain towers of standard type the corresponding figures are 4000 lb., 30,000 lb. and 2000 lb. The towers are heavy, not only on account of the great strength called for, but also because a very liberal allowance was provided for clearance to prevent the line wires from swinging together. The standard towers are designed for spacing ten to the mile.

The towers are of the square, rigid type, the arrangement being as shown in the accompanying illustration. The height of the standard tower is 44 ft. to the point of support of the lowest insulator, and provision was made for extensions to be applied to the bases to raise some towers from 10 ft. to 20 ft. higher. While the insulators are placed in general one above the other, the middle one is offset. The vertical distance between cables is 8 ft., and the middle one on each side projects beyond the uppermost and lowest a distance of 6 ft.

The towers carry four cross-arms. The top one is for the ground wires and below it are two short arms and one long one, all carrying strings of insulators at both ends. About one-fourth of the towers are strain towers, and there are several special towers constructed to comply with the regulations of the steam railroads which have to be crossed. The parts of the tower are galvanized after manufacture, and all bolts, nuts, washers, clamps and other small parts are sherardized.

All of the footings for the standard towers are of structural steel



Salmon River Power Development—Transmission Line Tower

shapes, galvanized and provided with holes for the attachment of timber or other structures for adaptation to special conditions.

SPECIAL DESIGN AND OPERATING FEATURES OF THE PLANT

From the above description it is evident that the plant of the Salmon River Power Company is unusual in a number of particulars. It is designed to operate in parallel with a plant six times as large as itself, situated 200 miles away by transmission line. Its characteristics must be such that it will carry a proper proportion of the load. The smaller plant must be protected from the effects of excessive loads on the line and of short-circuits within itself. For this reason, as will have been noted, the design of the generators is such that they will not be injured by any attempted draft of excessive current, a large inductance being allowed for this purpose.

From the operating standpoint the design of the plant involved studies of the following features: (1) The kilowatt rating of the plant in relation to the stream flow and the load characteristics, to the end that its output might be utilized to the best advantage. (2) The speed regulation of the plant, to the end that it should take its share of both slow and rapid load variations. (3) The regulation of the voltage of the plant, to the end that it should give a uniform voltage at any desired point on the transmission system. (4) Provision for utilizing the plant for power-factor regulation in the line and, when it is not carrying active load for one reason or another, for using it as a great synchronous condenser to draw leading current and thus improve the power factor of the load on the Niagara Falls plant. Some of the interesting engineering features adopted as a result of these studies are as follows:

The heavy flywheels were installed on the generating units for the purpose of increasing the flywheel effect of the rotating parts to a value equal to that of the units at Niagara Falls. The energy storage thus provided, by improving the speed regulation, will enable the plant to take its share of momentary overloads. For the present the load will be regulated by hand on telephone orders from a central point such as Syracuse. It is possible that automatic control of load will be provided later. For the purpose of improving the operation of the generators as synchronous condensers, amortizing windings were provided in the pole faces.

Among other provisions for insuring satisfactory operation may be mentioned the extra insulation of that portion of the station wiring directly exposed to line conditions from the line entrance to and including the line terminals of the choke coils. The insulation is designed for 110,000 volts so that failure is no more likely to occur here than on the line. The high-tension bus-bars are duplicate.

Provision has been made for grounding the neutrals of the generators in the station, but the desirability of doing so is still under discussion. The transformer neutrals are grounded through high resistance.

The engineering of the plant as described in the foregoing article has been under the direction of V. G. Converse, chief engineer of the Salmon River Power Company. Barclay, Parsons & Klapp had charge of the engineering and construction of the dam and acted as consulting engineers for the entire work. The plant was put into operation on April 10, 1914, and is now operating with entire satisfaction, carrying daily a maximum of 15,000 kw. Two units are now in operation and the third and fourth are in process of installation.

EMPLOYEES OF INSULL PROPERTIES FORM "SAFETY FIRST" ASSOCIATIONS

The employees of the southern Indiana Insull properties have been organized on an independent "safety first" basis, the shop men, the train men, the construction men and the water and lighting and gas operations men each being organized in separate groups, involving altogether some 400 men. On June 11 the shop men of the Louisville & Northern Railway & Light Company and the Louisville & Southern Indiana Traction Company were organized into the "Safety First" Association, shop men's division, while the next day the trainmen of the two roads and the employees of the gas, water and electric companies of Jeffersonville and New Albany, Ind., were organized. Monday saw the track construction men of the two companies and the electrical construction men organize their division. Each of the four divisions will work through committees which will report in turn to a general committee formed of the heads of the four divisions. Recommendations and suggestions as to policy will reach the officials of the several companies through the members of this general committee. Sufficient inducements will be offered for good suggestions to keep the interest of the men at a high pitch. Heretofore the "safety first" work with the men has been directed by the officers of the company. The men have held quarterly meetings, which have been presided over by representatives of the company. Hereafter the men will direct their own work. As a result of "safety first" work, not a single accident was reported on the Insull lines for the first twelve days of June.

SOCIETY FOR ELECTRICAL DEVELOPMENT

The Society for Electrical Development held its second annual meeting on June 1 at the Bellevue-Stratford Hotel in Philadelphia. J. M. Wakeman, general manager of the society, reported that the funds necessary to begin active work had been pledged. The work has been divided into the following sections: fields of co-operation, new development, commercial exchange bureau, and editorial and advertising. The society staff is made up as follows: G. B. Muldaur is in charge of the first section work and he is assisted by R. N. Lee. This work will consist of the formation of co-operative leagues to aid architects and builders in arranging for complete electric service. Mr. Muldaur will also bring the text-books and lecture courses up to date. J. P. Mallett will investigate present uses of electricity in the various industries and study the extension of these applications. Theodore Dwight will secure and index information regarding the uses of electricity. Other departments with the men in charge are as follows: news and advertising, H. C. Spaulding; motion picture department, L. G. Harkness-Smith; window trimming, A. J. Edgell.

The society membership now includes 298 central stations, 186 manufacturers, 272 jobbers and dealers, 588 contractors and 23 others. The following officers were elected to serve for the ensuing year: President, Henry L. Doherty; vice-presidents, W. H. Johnson, A. W. Burchard, W. E. Robertson, J. R. Crouse, Ernest Freeman; general manager, J. M. Wakeman; acting secretary and treasurer, James Smieton, Jr. The executive committee will be H. L. Doherty, Ernest Freeman, A. W. Burchard, J. R. Strong, Gerard Swope, L. A. Osborne, W. E. Robertson, J. R. Crouse and W. H. Johnson. Mr. Johnson was elected chairman of the executive committee.

Report of Committee on Cost of Passenger Transportation Service

Abstract of a Review, Prepared for the Committee of the American Electric Railway Association, of Studies of the Fare Situation and Cost of Urban Service

A report has been prepared for the committee on the cost of passenger transportation service of the American Electric Railway Association to review the work done in recent years in the study of the fare situation and the cost of urban service. This report has been made public by the committee in connection with the inauguration of the work of the Bureau of Fare Research of the Association. An abstract of the report follows.

Your committee has considered it important at the outset of its investigations through the Bureau of Fare Research to present in review what has been accomplished by previous studies of the cost of urban passenger transportation service.

PURPOSE OF THE REPORT

The main purpose of such a presentation is to point out differences in the method of determining such costs, differences in the pertinent facts as found by various investigators, and conflicts of opinion as to the most practicable solution to the problem of unremunerative fares where they exist, in order that the scope of the future work of the Bureau of Fare Research may be defined. Another purpose for the present report has been to emphasize the seriousness of the urban fare problem and the urgent necessity which now prevails in many cases of obtaining some form of relief if the transportation service upon which the municipalities are dependent is to continue to contribute to their development. The bureau has not as yet considered the questions of interurban service, nor has it extended this review to cover the traffic characteristics of subway or elevated urban traffic.

The widespread dissatisfaction with present fares arises from the belief that the present rates are generally inadequate to furnish city traction companies a reasonable return upon the investment necessary to provide the service demanded, that present rates are not suited to best development of the community served, and that unless radical changes are made in the rates or in the application of the rate of charge to the kind of service and the area served, the development of the business, already retarded, will be brought to a standstill with consequent injury to the community as well as to present investors.

REASONS URGED FOR INCREASE

The reasons which have been urged for an increase in the rate of fare relate principally to changes in operating conditions which have occurred since the present cash fares were made effective. These reasons and some of the facts which have been cited to support them are as follows:

a. The area within which the flat rate applied has been continually expanding, carrying with it a greater demand for service facilities at the same price. According to statistics gathered by Mr. Davis, of Ford, Bacon & Davis, covering sixteen typical American cities, this increase in area has ranged as high as 70 per cent for the ten-year period from 1900 to 1910 and the increase in area of all cities examined since 1870 has been substantial. [These statistics were presented by Mr. Davis at the 1911 midyear conference of the

American Electric Railway Association and were published in the *ELECTRIC RAILWAY JOURNAL* of Feb. 4, 1911.—Eds.] The growth of the area served unless it is accompanied by a corresponding increase in the number of fares per mile of track, or per car mile operated is one of the controlling factors of the increase in the cost of service.

b. Similarly the length of the longest haul possible for one fare has steadily increased with the expansion in area served. The increase in longest haul has carried with it an increase in the actual average haul per passenger, and a consequent increase in the amount and cost of service for the same fare. According to the figures cited by Mr. Davis, the longest possible haul in sixteen representative cities in 1910 ranged from 7.76 miles to 20 miles, and has in instances doubled within the period from 1890 to 1910.

TRANSFER TRAFFIC INCREASING

c. The proportion of transfers to revenue passengers is constantly increasing and at a rate far greater than the increase in earnings. According to the figures cited by Dr. Conway, in the "Annals of the American Academy of Political and Social Science," while this proportion on Chicago street railways was 4.6 per cent in 1884, it had increased to 58.6 per cent in 1909. Upon the New York City Railway, according to the data cited, the proportion of transfers to revenue passengers has increased from 1.10 per cent in 1888 to 55.13 per cent in 1907. This tendency has been so general that similar changes may be noted from the operating report of almost any American street railway. As a result of the growth in passenger traffic riding on transfers, the average fare per passenger carried has steadily decreased, until in some instances the average fare per passenger carried is below 3 cents. The cost of service per passenger is dependent partly upon the distance hauled. In a large measure, however, it is dependent upon the number of passengers carried, since the cost of stops, the liability of accident, the expense of supervision and many other expense items are not controlled by the number of revenue passengers but by the total number of passengers carried.

d. The demands for service during peak hours are continually growing. To provide for such service the utility must, in addition to its regular cars, provide extra or tripper service. Such service requires additional cars, additional car storage capacity, additional power plant capacity, etc., all of which are only in use a small portion of the day. The cost of injuries and damages, and the supervision of transportation, are greater during rush hours, and it is often impossible to procure services of conductors and motormen during such rush hours at rates per hour which would obtain were the employment extended throughout the day. While these facts are generally known to the industry, aside from isolated instances, no comparative data have evidently been published as to the extent and increase of the amount of peak-hour service.

INCREASES IN COSTS OF MATERIALS AND LABOR

e. Large increases have been sustained in both the cost of material and labor, and this factor alone, inde-

pendent of the traffic conditions enumerated, has served to make present rates of fare unremunerative. Dr. Conway, in his analysis of the reasons for decreased returns of urban street railways, cites United States Bureau of Labor reports as disclosing "that average wholesale prices of street railway materials and supplies, as evidenced by operating expenses, less wages and salaries, increased from approximately 4.7 cents per car mile in 1902 to 6.2 cents per car mile in 1907, or from approximately 21.9 per cent to 24 per cent of the gross earnings," and points out that the census enumeration reveals an increase of 8 per cent in wages per street railway employee during the same period. According to the experience of the Philadelphia Rapid Transit Company, also referred to, girder rail has increased in cost 139 per cent, switches 23 per cent, frogs 17 per cent, ties 30 per cent, cars 100 per cent, coal 33 per cent, during the fifteen-year period 1896 to 1910. According to the data referred to by Mr. Burleigh, wages of track and line laborers have increased $16\frac{2}{3}$ per cent, and materials going into maintenance of track from 15 to 25 per cent during ten years. [The paper of Mr. Burleigh on "The Present Tendency of Street Railway Operating Expenses" was presented before the 1913 midyear conference of the American Electric Railway Association. An abstract was published in the *ELECTRIC RAILWAY JOURNAL* of Feb. 1, 1913.—EDS.] Similarly street paving requirements have increased from 0.172 cent per car mile in 1904 to 0.309 cent in 1912, and platform labor has increased nearly 25 per cent during the same period. Taxes, which in 1904 amounted to 5.12 per cent of total operating revenue, have grown in volume each year until they amounted to 7.12 per cent of the total operating revenues in 1912. Among other items of increase which have assumed importance at the present time are the costs of employees' liability and benefit plans, items which were not anticipated when present fares went into effect. These increases do not contain any reference to the growth of the cost of injuries and damages which in itself, has, in many instances, assumed alarming proportions.

f. Standards of service now demanded by the public are far more costly than standards which prevailed when present fares became effective. Heavier cars, a higher grade of maintenance, safety devices, etc., have all involved items of expense which relate to betterment of service rather than betterment of income. Expenditures of this class have a definite effect upon the cost of operation, although it is not always possible to measure the amount statistically.

g. The cost of obtaining money for betterments and extensions has, within the past few years, increased at a rapid rate. This money stringency has probably been due in part to general market conditions. It is certain, however, that it has in large part been due to an increased appreciation by investors of the risks inherent in the business. Among such risks, aside from the factors influencing the cost of service already enumerated, are the uncertainty created by expiring franchises and the hostile attitude of municipalities.

LITTLE PUBLICITY OF THE FACTS

The reasons for increase in the cost of service enumerated, while including the principal elements, do not by any means exhaust the list. The question of their relative importance and the facts underlying them still require substantial verification, and this is one of the matters upon which the bureau will gather data. Aside from the few instances noted, there has been little or no publicity of the facts supporting a case for increased rates.

There appears to be little dispute as to the items

which will comprise the total cost of service, although there are differences of opinion as to their amount and application to the problem as to how far it is possible to haul passengers for a given fare. Total cost of service includes the ordinary expenses or cash cost of operation, including taxes, reasonable reserves for postponed costs for depreciation, injuries and damages, legal expenses, insurance, contingencies and pensions, and a fair return upon the investment or value of the property necessary to perform the service. These items will probably differ in each case, and the work of the bureau consists in determining the application of such total costs to existing and proposed systems of rates.

After the total cost of service has been determined, consisting of the ordinary operating expenses, included in maintenance of way and structures, maintenance of equipment, traffic, transportation, general and undistributed expenses and fixed charges, the latter consisting of taxes, insurance against contingencies, depreciation and return upon the investment, the application of these costs to the ascertainment of what is the paying haul per passenger or per car, is a problem of which various solutions have been proposed. Some of the differences underlying the various methods are fundamental, and it may be well to describe the various bases suggested with examples of their application in practice, and some of the objections which have been urged against each.

METHOD SUGGESTED BY MR. FORD

In his memorandum attached to the 1911 report of the committee on determining the proper basis of rates and fares, Frank R. Ford has suggested a method of calculation, based upon the passenger mile, and points out its application to a zone system of fares. [The memorandum by Mr. Ford was published in the *ELECTRIC RAILWAY JOURNAL* of Dec. 2, 1911.—EDS.]

As applied to assumed quantities the process outlined by Mr. Ford would be as shown in Table I.

TABLE I—APPLICATION OF PROCESS SUGGESTED BY MR. FORD

| | |
|--|------------|
| a. Cost of service per annum (including fixed charges and return upon the investment)..... | \$100,000 |
| b. Revenue passengers carried per annum..... | 2,000,000 |
| c. Average haul per revenue passenger..... | 3.5 miles |
| d. Revenue passenger miles per annum ($b \times c$)..... | 7,000,000 |
| e. Cost of service per revenue passenger per mile..... | 1.43 cents |
| f. Average fare per revenue passenger (assumed)..... | 4.90 cents |
| g. Length of paying haul per revenue passenger ($f \div e$)..... | 3.43 miles |

Under the conditions assumed in Table I an existing line upon which a revenue passenger is hauled an average of 3.5 miles would be justified in drawing in the single fare point, or center zone, so as to reduce the average haul to 3.43 miles, or a proposed extension of an existing line would have its fare points determined after merging added costs and added passenger miles to the total costs and passenger miles, for the entire line.

Two important objections have been raised against the application of such a plan.

1. The basis of measurement is not definite. To provide for an average haul of 3.5 miles per passenger may take 5 miles of route. An inspection of typical car loading curves indicates that the average haul in any direction does not originate at the center of the zone, but from a discharged area of varying width upon different lines. Even where extensive passenger traffic data are available, therefore, the geographical placing of fare points becomes a matter of judgment from the facts in hand. This will, of course, be true of any determination of the zone in which the single fare is properly applied, since a strict application of cost of service to each line would result in an impracticable, irregular area, in which paying lines would be extended, and losing lines contracted until there would result abnormal distortions in traffic density.

2. Operating expenses do not depend entirely upon passenger miles, and in determining the profitability of new extensions, where traffic is small and fixed charges heavy, the application of the passenger mile treatment would result in an understatement of the cost involved in making the extension. This is recognized in the joint report of conferees upon rapid transit development in New York, in which it is suggested that the passenger mile basis of apportioning expenses be applied to only such expenses as cannot be definitely localized.

PLAN OF MR. BRADLEE

Unlike the passenger mile or Ford formula, as it has been referred to, the basis suggested by Mr. Bradlee computes the paying haul upon the car rather than passenger basis. [The memorandum of Mr. Bradlee was part of the report of the 1911 committee on determining the proper basis of rates and fares of the American Electric Railway Association. The memorandum was published in the ELECTRIC RAILWAY JOURNAL of Dec. 2, 1911.—EDS.]

As applied to assumed quantities the process outlined by Mr. Bradlee may be illustrated as shown in Table II.

TABLE II—APPLICATION OF PROCESS SUGGESTED BY MR. BRADLEE

| | |
|--|-----------|
| a. Cost of service per annum (including fixed charges and return upon the investment)..... | \$100,000 |
| (1) Operating expenses (exclusive of taxes, depreciation and obsolescence)..... | \$48,000 |
| (2) Fixed charges (taxes, depreciation and obsolescence and return on investment)..... | 52,000 |
| b. Car miles per annum..... | 320,000 |
| c. Operating expenses per car mile ($a1 \div b$)..... | \$0.15 |
| d. Length of one-half trips..... | 4.7 miles |
| e. Revenue passengers per one-half trip..... | 24 |
| f. Passenger revenue per one-half trip ($e \times 4.9$ cents per passenger)..... | \$1.18 |
| g. Investment per \$1 operating revenue..... | \$4.00 |
| h. Fixed charges (taxes, depreciation and obsolescence and return on investment) per \$1 operating revenue (13 per cent of $g = a2$)..... | \$0.52 |
| i. Amount of passenger revenue per one-half trip available for operating expenses (48 per cent of f)..... | \$0.57 |
| j. Paying haul per one-half trip per car ($i \div c$)..... | 3.7 miles |

In brief the process consists of assessing each dollar of revenue with the same proportion of fixed charges, and providing that ordinary operating expenses be prorated on a car mile basis. Under the conditions assumed, the reasonable haul which it is possible to run a car is 3.7 miles, whereas the present trip distance from the center of the line is 4.7 miles. Mr. Bradlee, in the supplementary memorandum contained in the 1912 committee reports [published in the ELECTRIC RAILWAY JOURNAL of Nov. 30, 1912.—EDS.] has applied his suggested process to twenty selected electric railways. The results disclose maximum half trip lengths in miles, ranging from 1.71 miles to 4.54 miles, as applied to nine companies with annual gross receipts of over \$1,000,000—2.24 miles for one company in the revenue groupings of from \$750,000 to \$1,000,000; 2.02 miles and 3.22 miles for two companies within the revenue grouping, \$500,000 to \$750,000; 1.21 miles to 2.51 miles for four companies with revenues from \$250,000 to \$500,000, and 1.23 miles to 2.88 miles for four companies with gross receipts less than \$250,000 per annum.

The objections which have been urged to the method suggested are:

(1) The distribution of fixed charges upon the basis of revenue obviously does not place upon new extensions the full cost applicable thereto. Many extensions exist which involve heavy investments for the revenue obtained, being as high as \$10 for each \$1 of operating revenue instead of the average of \$4 assumed in the illustration.

(2) Many ordinary operating expenses are more properly distributed upon some other than the car mile unit.

SUGGESTION OF NEW JERSEY COMMISSION

Under this heading may be included various suggestions which have been made from time to time with regard to separating the cost of service into two classes: *a*, expenditures, fixed in their nature which may be expected to continue irrespective of the amount of traffic involved, or the length of haul, and, *b*, expenditures dependent upon traffic, and the application of such separated costs to a system of rates. Such a process has been employed in the determination of rates for electric, gas, telephone, water and railroad service, where such rates are based on cost. Rates consisting of a fixed charge per passenger plus a charge per passenger mile, are suggested by the Board of Public Utility Commissioners of the State of New Jersey.

MILWAUKEE CASE

A more extended basis of analysis is that outlined by the Railroad Commission of Wisconsin in the Milwaukee fare case, in which the Ford and Bradlee formulas are also applied, and the results so obtained compared and discussed. [An abstract of the decision of the commission was published in the ELECTRIC RAILWAY JOURNAL of Aug. 31, 1912, and Sept. 7, 1912.—EDS.]

The Wisconsin commission finds in its analysis of the Milwaukee situation, that the fixed or terminal expenses amounted to 58 per cent of the total cost of service in that case, and the variable or movement expenses 42 per cent of the total cost.

C. N. Duffy, in his contribution to the work of the committee for determining the proper basis of rates and fares, has pointed out that the proportion of costs attributable to terminal and movement expenses, according to the scheme of analysis as developed by the Wisconsin Railroad Commission, is dependent upon the load factor, that is, the ratio of the number of passengers to the maximum seating capacity of the cars. [An abstract of Mr. Duffy's paper, which was presented at the 1913 midyear conference of the American Electric Railway Association, was published in the ELECTRIC RAILWAY JOURNAL of Feb. 1, 1913.—EDS.]

Like the method suggested by Mr. Ford, the Wisconsin method relates to a paying haul per passenger rather than to a paying haul per car. With the same assumed quantities used in illustrating the "passenger mile basis" and the "car haul" basis, the process of calculation may be illustrated as shown in Table III.

TABLE III—ILLUSTRATION OF WISCONSIN METHOD

| | |
|--|------------|
| a. Cost of service per annum (including fixed charges and return upon the investment)..... | \$100,000 |
| (A) Costs independent of traffic..... | \$10,000 |
| (B) Costs proportional to car movement..... | \$2,000 |
| (C) Costs proportional to passengers carried..... | \$8,000 |
| b. Revenue passengers carried per annum..... | 2,000,000 |
| c. Average haul per revenue passenger..... | 3.5 miles |
| d. Revenue passenger miles per annum ($b \times c$)..... | 7,000,000 |
| e. Car miles per annum..... | 320,000 |
| f. Seats per car (including standing by preference)..... | 48 |
| g. Seat miles per annum ($e \times f$)..... | 15,360,000 |
| h. Load factor ($g \div d$), per cent..... | 46 |
| i. "Terminal" cost (aA) + 54 per cent (aB)..... | \$52,280 |
| j. "Movement" cost (46 per cent (aB) + (aC))..... | \$47,720 |
| k. "Terminal" cost per revenue passenger ($i \div b$)..... | 2.61 cents |
| l. "Movement" cost per revenue passenger mile ($j \div d$)..... | 0.67 cent |
| m. Average fare per revenue passenger (assumed)..... | 4.90 cents |
| n. Length of paying haul per revenue passenger ($m - k$) \div l..... | 3.42 miles |

PLAN OF PROFESSOR RICHEY

The influence of the element of idle capacity required in furnishing service, expressed as "load factor" by Mr. Duffy, is also pointed out in an analysis of the cost of rush hour service by Prof. Albert S. Richey. Total cost of service is divided into a fixed cost independent of car hours and running cost dependent upon car hours, 50 per cent being found assignable to each.

Professor Richey finds in the illustration assumed that the total cost of operation of an "18-hour car,"

operated 350 days per year, is \$1.624 per car hour, whereas a "rush-hour" car, operated 300 days for three hours with eight hours of service on Sunday, is \$3.659. Reduced to units of passengers carried, the costs range from 3.2 cents where the car is in service eighteen hours a day, to 15.7 cents where the car is in service only one hour a day, the cost curve being similar in form to the readiness to serve cost curve for electric service.

The criticisms which have been made of the method suggested by the Railroad Commission of Wisconsin may be summarized as follows:

a. Similar to the objection referred to, with regard to the passenger mile basis of Mr. Ford, the application of passenger mile basis to the length of car haul is not always definite.

b. The scheme of analysis is complex and involves many separations of items which form a small portion of the total cost and which therefore do not materially affect the conclusions.

c. The grouping of expenses employed in many instances proceeds on debatable ground. Whether separate items of expenses vary with the car mile, car hour or passengers carried, and are properly apportioned in accordance with these units, is a question concerning which differences of opinion exist which cannot in all instances be settled by statistical comparisons. The grouping of return upon the investment as an item of cost proportional to traffic has been particularly questioned.

SIMILARITY IN METHODS

The review and comparison of these methods show some points of similarity. The principal differences have arisen in the basis of pro-rating the total cost of service over the outer edges of the service area, which in any practical adjustment of single fare points, or establishment of zones will prove debatable ground. It seems certain that in any analysis of costs as complex as those involved in the traction business, no single unit of comparison such as the car hour or the car mile will be applicable to all separate items of cost. Platform labor is bought by the hour, much of the work of maintenance is done by the mile or by the car rather than because of traffic conditions. It is possible, however, that when all these more accurate separations are assembled, the resulting division will conform closely with that obtained by applying some single unit. In the detailed analysis made by the Railroad Commission of Wisconsin, for example, it is noted that a similar division would have been obtained had the basis of apportionment been entirely the car mile, rather than the mile, the car hour, the car mile, and the number of passengers. Considerable work has already been done by the association in examining into the practical nature of many units of operation, and methods of separations of cost between freight and passenger business have been recommended. [Reference is made to the report of the joint committee on a statistical unit for car operation of the American Electric Railway Accountants' and Transportation & Traffic Associations and the report of the joint committee on express and freight accounting of the Accountants' and the Transportation & Traffic Associations, presented at the 1912 convention. Abstracts of these reports were published in the *ELECTRIC RAILWAY JOURNAL* of Oct. 10, 1912.—EDS.] Similarly the question of weight in car operation, of weather and wear in track maintenance, of demand factor in station operation, are typical problems of economy of operation which have claimed the attention of operating departments of our companies, the conclusions of which are particularly important in determining upon the proper units of comparison.

It is obvious, therefore, that before definite recommendations can be made as to the methods of computing the paying haul by the bureau, considerable additional investigation is necessary in order that many of the factors of cost proposed may be disposed of as either unimportant or their application clearly defined.

It is very apparent from the results of such investigations as have already been made that whatever the statistical method of determining the area within which a given fare can apply and yield the company a fair return upon its investment, there can be no doubt that present fares for urban transportation service in many cases are not highly remunerative, and that in many other cases present tendencies if left unchecked will undoubtedly reach the point where the service demanded will be unprofitable. These conclusions are not in any sense premature, but must follow from any scrutiny of the elements entering into the cost of service.

In addition to the ordinary operating expenses or cash cost of operation, including taxes which are readily obtainable from the income account of any traction company, the total cost also includes reserves for postponed costs of operation, such as injuries and damages, insurance, legal expenses, pensions, etc., provision for depreciation and a return upon the investment. Both the allowances for depreciation and the rate of return are a function of the investment or value, and their importance as a portion of the total cost will depend upon the amount of such investment, or value in tangible and intangible property. Mr. Bradlee has pointed out that such investment in twenty selected traction properties ranges from \$3 to \$5.55 per dollar of operating revenue, and the conservative character of these figures is corroborated by valuations of traction properties which have been made by and for municipalities and commissions. [The memorandum, presented by Mr. Bradlee in connection with the 1912 report of the committee for determining the proper basis for rates and fares, before the American Electric Railway Association, was published in the *ELECTRIC RAILWAY JOURNAL* of Nov. 30, 1912.—EDS.]

DEPRECIATION AND RETURN ON THE INVESTMENT

The allowance for depreciation and return upon the investment in percentage of the investment are likewise subject to variation in each case. In several cases the amount deemed as reasonable for depreciation by commissions and city authorities has exceeded 4 per cent of the total value of property assumed as reasonable. Placing the rate of return at 8 per cent the total amount for depreciation and return will amount to at least 12 per cent of the investment or value. If the investment or value in turn amounts to \$4 for each dollar of revenue, 48 per cent of operating revenue is claimed by the two items, depreciation and rate of return, leaving only 52 per cent available for current, ordinary operating expenses, reserves for postponed costs and taxes. It is obvious that many urban transportation companies cannot approach this operating ratio under present rates of fare.

Both increases in operating costs and the large investment necessary for the service demanded are serving to make the present dollar of earnings inadequate. These conclusions conform with those reached from other hypothetical figures, based upon the actual investment and returns in traction properties. [Reference is made here to the memoranda of Mr. Bradlee and Mr. Duffy, presented with the 1912 report of the committee for determining the proper basis for rates and fares. These were published in the *ELECTRIC RAILWAY JOURNAL* of Nov. 30, 1912.—EDS.]

Predictions as to the traffic and revenue possibilities

of extended fare limits and reduced rates of fare sometimes form an important part of investigations by public officials and experts into the question of what is remunerative service. Frequently these predictions have but slight foundation in fact or proceed from an attempt to apply results in one locality to another in which the factors underlying the estimate are essentially different. The location of residence districts, business centers, factory sites, etc., are determined largely by the geographical layout of the town, the right of way of railroads, shipping facilities and other factors, and may be expected to differ in each case. The industrial factors affecting growth, even were the layout similar, are also essentially different for each city, so that any predictions of value must be based upon other than generalized data.

FUTURE GROWTH OF TRAFFIC

The existence of so-called laws of growth based upon statistical studies covering a large number of instances are, however, repeatedly referred to, and it is important that the facts upon which they are based be examined into, not only for the purpose of defining their limitations but also with the end in view of reaching conclusions as to the limits under which no service is remunerative. Among such studies are those of Mattersdorf, a German engineer, who has made extended statistical analyses of traffic, growth in population and revenues based upon the returns of German street railways, contained in the 1905 supplement of the "Zeitschrift für Kleinbahnen." [An abstract of the conclusions of Mr. Mattersdorf was published in the STREET RAILWAY JOURNAL of June 2, 1906.—EDS.]

A similar study based upon returns of street railways in the United States—contained in the census reports for 1902 and 1907—is that made by Watkins for the Public Service Commission, First District, New York. A study of the relation of growth of earnings to population is contained in the Arnold report on the Pittsburgh transportation problem. [An abstract of Mr. Arnold's report was published in the ELECTRIC RAILWAY JOURNAL of Aug. 13, 1910.—EDS.]

It is Mattersdorf's conclusion that the amount of traffic measured in the number of passengers carried may be expected to increase in cities up to 500,000 population as the square of the population, but in the cities above this population, only in direct proportion. In other words, in the smaller cities where population doubles, traffic may be expected to increase fourfold.

Attention is properly called to the fact that Mattersdorf does not claim for his conclusions a universal application as immutable as a law of physics such as has been attributed to him. "How the foregoing fundamental rules may be applied," he states, "in practical financing and operating questions need not be especially considered in this article. It may be enough to state that the establishment of such rules does not reduce the necessity of properly combining the various factors in the study of a particular case. It may, however, be of some assistance in such an examination." It should be noted also that the rides per capita per annum, and the various factors of traffic density disclosed in Mattersdorf's diagrams indicate conditions dissimilar from typical American cities where data are available so that the question as to whether these conclusions would be substantially confirmed by similar studies in this country is open to conjecture.

In making prediction as to future traffic requirements in New York City, Watkins, in the Public Service Commission, First District, 1910 report, points out that the quadratic formula of Mattersdorf is similar to

the rule sometimes applied in estimating prospective traffic on steam roads, but does not hold in all cases, and when carried beyond a point of saturation reduces itself to a manifest absurdity.

"If rides increase in the proportion of the square of population," he says, "the number of rides per capita must increase in the same proportion as the population. A city of 30,000 may have traffic amounting to 100 rides per capita per year. Taking this as a somewhat arbitrary starting point for our mathematical assumption, we may compute hypothetical traffic figures for any size of urban center. A city of 100,000 should, on this basis, have 333 rides per capita, and one of a million 3333. On the other hand, if a city of 500,000 has 200 rides per capita, one of 50,000 should have but 20 and one of 5,000,000 should have 2000 rides per capita. Six rides a day for every man, woman and child in the community is a very high average. According to this, a person in the prime of life would be taking about twelve rides a day. It would seem that he could scarcely have time to do much else. The fact is, there must be a saturation point for traffic, in the neighborhood of which the number of rides per capita will increase very slowly."

The mathematical rule proposed by Watkins is that traffic will increase at a rate per cent twice that of the increase of population rather than at the same ratio as population, or as the square of the population, and supports this by an analysis of statistics of 31 American cities. He is careful to state also that "No one claims that any of these formulas are more than rough working approximations."

A recent criticism of Watkins' rule is made by an Italian engineer, Renzo Norsa, who has made a personal inspection and report of traffic conditions in the United States. Norsa points out that the quadratic rule as he interprets it from Watkins' diagram is identical with the percentage rule proposed. He says:

"Watkins proposes to substitute for the quadratic rule the following: The per cent increase of traffic is double the per cent increase of the population. This rule should have the advantage of giving a slower variation of traffic than that which corresponds to the quadratic rule, and based on it Watkins would obtain the curve indicated in diagram C. (Public Service Commission Report, 1910, p. 40, Diagram IV.) However, not agreeing for the most part with the other conclusions from Watkins' diligent study, this proposition does not seem acceptable to us.

"The reason why Watkins finds a curve which is removed from the quadratic is that he applies his rule to determined values of the population and they are 100,000, 200,000, etc., while the quadratic rule is a continuous rule, that is, it serves for any value of the population. Finally it must be observed that there are also cities in which traffic has been developed much more rapidly than would correspond to the quadratic rule." Renzo Norsa—*Problemi di Traffico Urbano e Ferrovie Metropolitane Agli Stati Uniti*, Milan, 1913 (Problems of Urban and Metropolitan Railway Traffic in the United States), p. 23.

The same general rule which has been developed by Dr. Mattersdorf, with respect to population and traffic, is reached by Mr. Arnold, with regard to probable increases in earnings, "A study," he states, "of the relative growth of population and of transit earnings of the large American cities, during the past ten years, shows some surprising results, and points to the conclusion that as a rule, the earnings from local transportation increase as the square of the population. Upon this assumption, it is estimated that when the population of the Pittsburgh district reaches 2,000,000, an-

nual passenger income will aggregate \$40,000,000 or \$20 per capita."

A popular impression which has become current from this and similar conclusions, is that because of such assured increases in gross earnings anticipated increases in net earnings will likewise prove substantial and this reason has in some instances been urged as a justification for reduced rates.

It is to be regretted that the conclusion of Mattersdorf, as to the relation of population and earnings, which supplement his investigations of the quadratic rule has not been given the same publicity in this country as his conclusions as to traffic. Reducing passenger earnings for various German surface traction lines to the same comparative basis, and plotting the results, Mattersdorf shows that revenue per car kilometer increases as the number of passengers per capita per annum, up to from 80 to 100 passengers per capita, and is then a decreasing quantity for greater densities of traffic. When it is considered that these conclusions are summarized in most cases from zone systems of fare which yield a greater relative compensation for longer hauls than is possible under the systems of flat rates for any distance in vogue in this country, that rides per capita upon American surface lines generally exceed the transition point of about 100 rides, and that operating expenses may be expected to keep pace with the car miles run, it is probable that careful investigation will disclose that optimistic expectations of increased net returns with growth of population are not borne out by experience.

With the greater increase in population in the outskirts of the city, it is apparent that there must follow an increase in long haul traffic, which, under a flat rate system of charges, is the least remunerative traffic. R. B. Stearns has pointed out the results of a study of the amount of such increases made in Milwaukee. [The paper by Mr. Stearns was presented before the American Electric Railway Association midyear conference in 1913. An abstract was published in the *ELECTRIC RAILWAY JOURNAL* of Feb. 1, 1913.—EDS.] When the past records of population are separated into zones and the usual forecasts of future growth are made, it is found that the relatively greater increase in population will occur where, under present flat rates, it is a source of the greatest additional expense to the company. Such prognostications of Mr. Stearns indicate that while 93.3 per cent of the total revenue passengers in Milwaukee in 1912 were contained in the 3½-mile zone, this may be expected to decrease to 76.5 per cent of the total in 1930. Outlying zones on the other hand show corresponding increases. It is apparent from this summary that much additional investigation is necessary of such factors as riding habit and earning capacity with reference to population served, etc., before conclusions may be reached, as to the value of these generalized theories.

CONCLUSIONS FROM THE STUDIES

The following appear to be reasonable conclusions derived from such quantitative studies as have so far been made with respect to the cost of urban transportation service.

1. Due to the varying conditions obtaining as between various American electric railways, in matters of investment costs, revenues, operating expenses, taxes and general condition of maintenance of property, no general figure measuring the length of remunerative haul for a given urban fare can be stated, and it seems probable that considerable variation of this figure will be evident when more complete data are available.

2. Each railway system presents problems peculiar

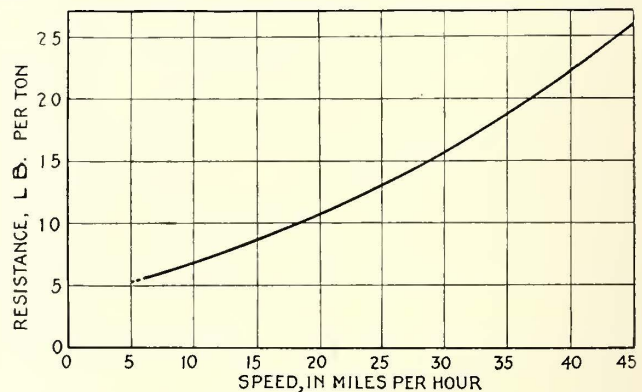
to itself, and the profitableness of a given rate of fare must be determined for the particular locality in the light of the facts individual to the railway system rendering service therein.

3. The factors which are increasing the cost of service, consisting in part of increased areas served, increased length of haul, increasing proportion of transfers to revenue passengers, development of peak hour traffic, increases in operating costs, higher standards of service demanded, and increase in the cost of obtaining capital are properly subjects of further investigation by the bureau. While much has been accomplished in developing methods for estimating the distance which a passenger or car may be hauled with profit, the bases proposed are suggestive but conflicting, and deserve more critical study.

CAR RESISTANCE TESTS AT THE UNIVERSITY OF ILLINOIS

The electric test car of the University of Illinois has recently been utilized in making an elaborate series of tests on car resistance. This car was described in the issue of the *STREET RAILWAY JOURNAL* for June 9, 1906, volume 27, page 907. The car is a 45-ft. interurban car, weighing approximately 28 tons and having a cross-sectional area of car body and trucks of 90 sq. ft. It is equipped with four 50-hp motors. The car contains elaborate recording apparatus by means of which continuous graphical records of current, voltage, speed, time, distance, brake-cylinder pressure and location on the road may be kept. These records are drawn upon a chart 40 in. wide. The continuous electrical records can be checked by means of recording watt-hour meters.

The tests were made on several selected sections of track of the Illinois Traction System in the vicinity of the university. This track was in good condition.



Illinois Resistance Tests—Final Curve, All Tests

The weather during the tests was generally fair and the average temperature was moderate. The wind velocity did not exceed 26 m.p.h. The general plan of the tests was to run the car backward and forward over the chosen track section at various speeds, maintaining the same constant speed during each pair of opposing runs. A total of 269 resistance determinations were made, about one-half of the runs being with the wind and the other half against it. The resistance in each case was calculated from the electrical input to the car, from which all of the motor and other losses were deducted. Several groups of tests were made on different sections of track and with slightly different details of operation.

The results of the test have been expressed in the form of equations as follows

$$R = 4 + 0.222 S + 0.00582 S^2 \quad (1)$$

R is the resistance in pounds per ton, and S is the speed in miles per hour.

This equation has been modified as shown in formula 2 to take more definite account of air resistance. In formula 2, A is the cross-sectional area of the car expressed in square feet and W is the car weight in tons.

$$R = 4 + 0.222 S + 0.00181 \frac{A}{W} S^2 \quad (2)$$

These formulas are the equations of a parabola which corresponds closely to the curve shown in the first accompanying figure.

A second illustration shows curves for the University of Illinois car plotted from a number of well-known formulas.

The third illustration, of an individual test, is given to indicate the variations from the curve made by individual observations. The black dots indicate the meas-

in which v = the component of the wind velocity parallel to the track.

R_w = the resistance for a run at speed s with the wind

$$R_w = R_s + c (s - v)^2. \quad (3)$$

Subtracting equation (3) from (2) and solving for c gives

$$c = \frac{R_a - R_w}{4 s v}. \quad (4)$$

Substituting equation (4) in equation (2) and solving for R_a , we have

$$R_s = R_a - \frac{R_a - R_w}{4 s v} (s + v)^2. \quad (5)$$

Substituting equation (5) in equation (1)

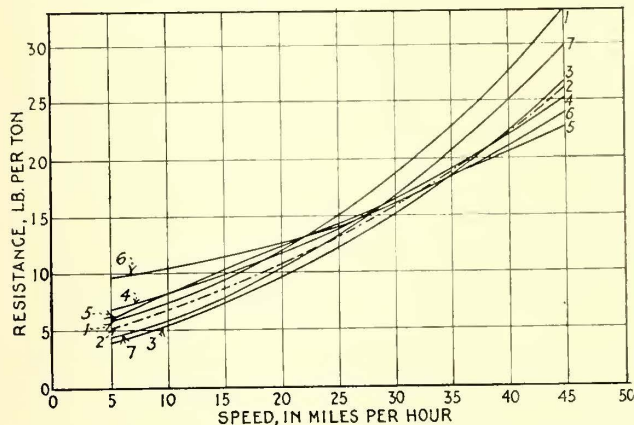
$$R = R_a - \frac{R_a - R_w}{4 s} (2 s + v).$$

The tests described above were planned by E. C. Schmidt, professor in charge of the department of railway engineering, University of Illinois, and were carried out under his general direction and supervision. The work was under the direct charge of H. H. Dunn, assistant in railway engineering, University of Illinois, engineering experiment station. Mr. Dunn was assisted by E. I. Wanger and D. C. Faber, who were formerly connected with the department of railway engineering and the engineering experiment station respectively.

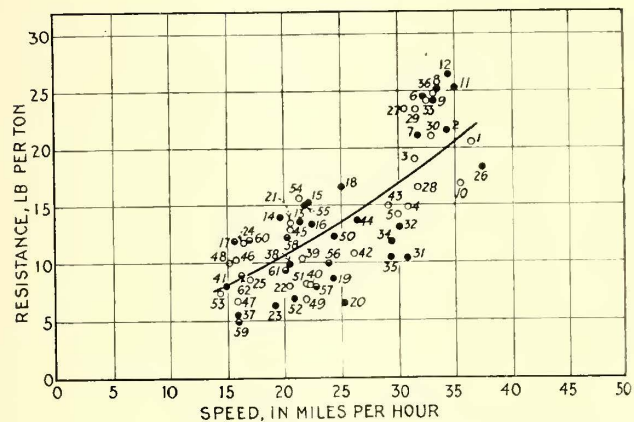
ELECTRICAL RESEARCH AT BOSTON "TECH"

In a statement issued last week, the Research Division of the Massachusetts Institute of Technology's electrical engineering department announced that by July 1 nine research associates and assistants will be devoting their entire time to scientific investigation. Close relations with the instructing staff are insured by the organization of the division, and the advice and co-operation of the electrical engineering teaching force of both the Institute and Harvard University are assured by the recent co-operative agreement between the two institutions. Among the subjects of interest to the electric railway industry which are being investigated are a study of the effect of the passenger ride upon the net return on the investment in street railway properties, a research expected to require about five years, during which time the revenues, expenses and traffic data of a number of large cities will be analyzed; a study of core losses in electrical machinery; a study of skin effect in solid and standard conductors when carrying high-frequency currents; the measurement of the alternating current resistance of rails of various compositions at frequencies up to sixty cycles, and a study of transient electric phenomena in a 750-mile artificial transmission line.

The proceedings of the tenth annual meeting of the American Wood Preservers' Association, which was held in New Orleans, La., in January, have recently been published. The book contains the usual account of the convention activities with the complete series of the papers presented, as well as a reprint of the constitution and by-laws of the society and a list of the names and addresses of the members. The last part of the book, pages 430 to 482, is devoted to the compilation of statistical data, showing the quantity of preservatives consumed in 1913, the number and geographical location of plants and the amount of wood treated, and to a short discussion on what forestry is doing in the United States.



Illinois Resistance Tests—Curves Plotted from Various Formulas



Illinois Resistance Tests—Typical Individual Test

urements made with the car going against the wind, the open circles those with the car going with the wind, and those half shaded with the car moving in still air.

In drawing the curve for individual tests a method was devised which would give more accurate results than an arithmetical average of resistances with and against the wind. The method is based on the assumption that the air resistance varies with the square of the speed.

Let R_s = the resistance at speed s excluding air resistance

R = the total resistance at speed s .

$$R = R_s + cs^2 \quad (1)$$

in which c = some constant quantity.

R_a = the resistance for a run against the wind at speed s

$$R_a = R_s + c (s + v)^2. \quad (2)$$

“Safety First” Work in a Small City

One of the Novel Methods Used to Reduce Accidents Was to Analyze them According to Territorial Divisions—All Correspondence on Accidents Is Written on “Safety First” Letterheads and Envelopes

In a “Safety First” campaign which has been conducted by the Beaver Valley Traction Company, New Brighton, Pa., during the past four years, the prevention of accidents has been approached from a number of angles as follows:

First—By lectures and bulletins to trainmen and shopmen.

Second—By acting on suggestions from trainmen, such as information in regard to badly lighted places along the highways; school children who, when leaving school, endanger themselves by jumping on or off cars, etc., and reckless drivers.

Third—By dividing the territory into sections about 1 mile long and classifying the accidents which happened in each section. It has been found that in certain sections particular classes of accidents were constantly recurring. In some sections the fault was found to be with bad track or special work, as shown by the number of derailments in those sections; in others, poorly lighted highways were responsible for certain classes of accidents. There are now forty-five clusters of 23-watt lamps illuminating these dark spots. In still other cases, most of the accidents were caused by disorderly conduct on the cars, and the remedy applied was to have a special officer ride on the cars in the territory more frequently.

Fourth—An advertising campaign was carried on by the use of newspaper space, blotters and paper drinking cups in the schools, one-half sheet posters on the car dashes, warning cards on the interior of the cars and warnings printed on the back of transfers.

The newspaper, poster and car card advertising copy has been varied to catch the attention of the widely different classes from whom this company derives its patronage. To a certain class some of the copy may seem harrowing or morbid, but it is believed that to reach a number of the patrons a variety of copy of the nature of that reproduced here must be used. It should be understood, of course, that the original copy was set in display type and signed by the Beaver Valley Traction Company.

1. “WOULD YOU want to fall in the street while the passengers of a crowded car gazed upon you during the dreadful moment of your mishap? Some may laugh, even though you should be seriously injured. A person falling inspires merriment among certain people. If you would prevent falling, and rebuke those who laugh and provide against injury, never get off a street car except while facing the front of the car, and be sure that the car has stopped. **DO NOT GET OFF BACKWARDS.**”

2. “DON’T PLACE ALL CONFIDENCE in the performance of your automobile. You may dash across the street in front of a moving car a hundred times safely and fail once. You may spin around a car that is not moving fast enough for you many times without an accident, but a tire may burst once and involve you in a disastrous collision. Always be careful when you are approaching a street car track. The path of the motorman is defined. He cannot turn out to avoid an accident with you. He does not know where you are when you come driving furiously down a side street, but you always know where he is. So for your own sake and for the sake of those who use the cars be careful in driving your automobile.”

3. “DEATH OR INJURY awaits the person who wanders aimlessly about the streets. Keep the children away from the street-car tracks during their play. Teachers and parents can help this work of preventing accidents by warning the children. You do your part and few accidents will occur on our lines.”

4. “ARE YOU AWARE OF THE FACT that on account of the thoughtlessness of some people we are compelled to provide against more than one hundred ways in which accidents could occur on a line less well governed than the BEAVER VALLEY TRACTION COMPANY?”

5. “WE ADVISE that you punish your boy every time that you learn he has been stealing a ride on the street cars. It may save his life or limb.”

6. “THE EYE WITNESS—Did you ever see an accident? If you did and talked to those about you that also witnessed it, you will know that no two persons exactly agree on how it happened. That is why, when an accident occurs on our lines, the conductor requests you to sign a card giving your name and address. It aids us in an effort to place the blame correctly.”

7. “DON’T FAIL TO IMPRESS YOUR CHILDREN with the necessity to be always careful when boarding and alighting from cars. Tell them to wait until the car comes to a full stop.”

8. “DON’T pass behind a car without first making certain another car or vehicle is not approaching. Many accidents are caused by people running excitedly around the rear of a car, from which they have alighted, directly into a car or vehicle coming from the opposite direction.”

9. “DON’T allow children to put their heads or arms through the open window of a car. A passing wagon may be too close and cause injury or possibly death.”

10. “DON’T allow children to steal rides on rear of a wagon or carriage. Their discovery by the driver often startles them into running in front of a moving car. The motorman may not see them in time to prevent an accident. Tell them it is extremely dangerous.”

11. “YOUNG MAN, you may be able to get on or off a car while it is in motion a thousand times without injury, but one failure may cost you your life or limb.”

12. “A PATRON RECENTLY SAID: ‘If I had a child that would steal rides on street cars or wagons I would turn the lad across my knee and argue the question with him in a manner that he would remember.’”

13. “THIS company does not permit passengers to ride on the front platform or engage the motorman in conversation.”

14. “STOP! LOOK! LISTEN! Before you start across a street car or railway track.”

15. “DON’T be negligent or careless. We are operating our cars as safely as we can without your assistance. We desire you to co-operate and make travel on our lines absolutely safe.”

16. “IF YOU ARE A TEAMSTER don’t drive your team in the car tracks. If you must do so see that they are out of the way of any approaching car. There is nothing to prevent a car from striking your wagon when you drive directly in front of a car. Be reasonable. The horses would prefer the right side of the street. Be as reasonable as the horses.”

17. “IT MAY BE SAFE for your wife to go to the country but it is not safe for her to get off a car backwards. To save her, kindly ask her how she gets off



"Safety First" in a Small City—Fig. 1—Poster Illustrating a Frequent Accident

a street car. Explain the proper way, and then enforce it."

18. "WE DO NOT CARE if you are a suffragette. You have no business trying to get on or off a street car while it is in motion."

19. "CARELESSNESS is correctly defined as that which all public service companies must guard against; that which large factories must guard against. Carelessness: the act of the pedestrian whose mind wanders; the act of the man, woman or child who wanders about heedless of the dangers that exist on all sides. Are you careless?"

20. "IT WON'T HURT to wait until the car stops perfectly still. Then, to alight, place your bundles under your right arm, grasp the left hand rail with your left hand and step down on to the street and away from the tracks."

21. "WE WANT to hammer it in so that young men will realize that it is not smart to get on or off a street car while it is in motion."

22. "THERE IS an excuse for everything—except a person alighting from a street car in the wrong way. Please, madam, in alighting face the front of the car, grasp the hand rail with your left hand, stepping down to the street with your face to the front of the car. If you grasp the hand rail with your right hand you are bound to get off backwards. That may mean a fractured skull or just a spill in the street that is not at all dignified."

CAR CARDS

The following copy is part of what was used on car cards which are of various colors and are lettered with card writer's brush and contrasting ink:

1. "We are guarding against 125 different kinds of accidents. How many can you name?"



"Safety First" in a Small City—Fig. 2—Signs at Carhouses and Shops

2. "The B. V. T. Co. is doing its best to absolutely prevent accidents on its lines. Will you help us in the name of public safety?"

3. "Don't get off until the car stops perfectly still."

4. "Don't get off facing the rear of car."

5. "Don't put your head or arms out of the window."

6. "Don't pull the bell rope."

7. "Don't allow your children to run or play on the streets. It's dangerous."

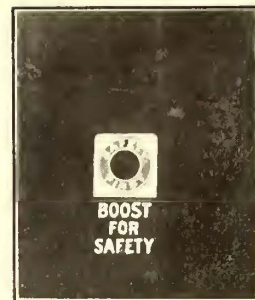
8. "Don't allow your boys to steal rides on the cars."

9. (Fig. 1.) "Death is about to claim this woman. It will be her fault. She crossed behind a car and did not look."

10. "Young lady, why won't you learn how to get off a street car? Always face the front of the car."

11. "Please get off the car facing the front. Wait until the car stops. Take hold of hand rail with left hand."

12. "It's easy to get off the car in the right way. It's mighty hard to patch a fractured skull."



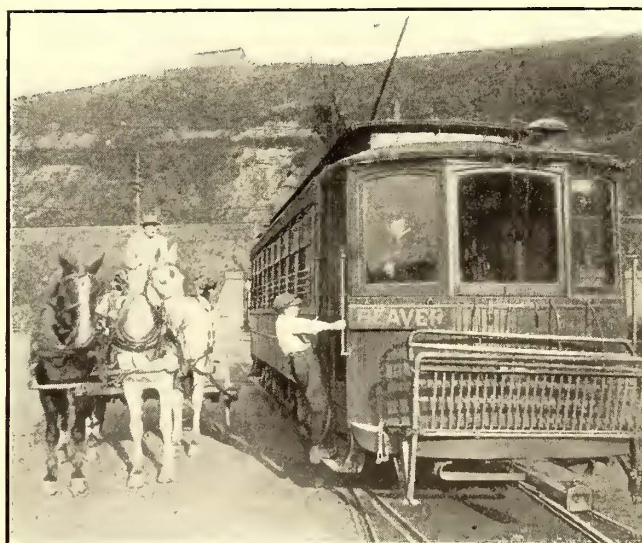
"Safety First" in a Small City—Fig. 3—Signs in Offices and Crew Rooms

POSTERS

The following copy was used on posters, size 18x25 in. Some of them were blue letters on white background and some of them blue on pink background. Poster No. 1 reads—"Death or injury awaits the person who does not heed warning of approaching danger. Stop! Look! Listen! Before crossing the tracks!" Poster No. 2 reads—"It's easy to wait until the car stops. It's so hard to patch a broken skull or mend a broken arm. Wait until the car stops." Poster No. 3 says—"Death or injury may result from crossing tracks without looking both ways." Poster No. 4 is—"Death or injury await your children if permitted to play on street car tracks or 'hook' rides on cars, wagons or automobiles. Warn them now before it is too late."

TRAINING OF EMPLOYEES

Warning signs are placed in conspicuous places in the trainmen's rooms, cars, shops and power house, to keep the subject constantly before all employees. These signs are of two kinds, enameled and printed. The



"Safety First" in a Small City—Fig. 4—Boy Ready to Jump in Front of Truck

printed signs are placed in a black frame with a glass front 11½ in. x 27 in. like Fig. 2. Some of these signs have red letters on a white ground, black letters on pink background, black letters on white, or red letters on yellow background.

The following copy is used in 3½-in. letters:

1. "Safety first means a lot to you."
2. "Quit taking chances. The odds are against you."
3. "Give the side of safety the benefit of doubt."
4. "If you are injured, no matter how little, tell your foreman about it right away and go to the doctor."
5. "You have no right to take chances. The other fellow may get hurt."
6. "Make yourself a committee of one to prevent some accident."
7. "Regardless of schedule, motormen must run slowly during fog."
8. "Suggestions from employees for the prevention of accidents are always welcome."
9. "It is far easier to do a thing right than to explain why you did it wrong."
10. "Small neglects are apt to cause serious accidents."
11. "You are responsible for the safety of others, as well as yourself."

The small enameled sign, Fig. 3, is distributed freely through office and crews' rooms. Enameled warning signs are also placed on the building which contains our electric welding equipment. This sign is printed in several Slavic languages as well as in English.

In the crews' rooms is an enlarged copy of the foggy weather rule. This copy is 18 in. x 44 in. in size and reads as follows:

"FOGGY WEATHER—During foggy weather, or at any time that smoke, steam or anything obscures the view, motormen must run their cars carefully and regardless of schedule time, at a rate of speed not faster than will admit of them stopping their car in the distance they can see ahead, gong being rung freely."

In addition to this, a sign 10 in. x 24 in. in red letters on white background, reads: "Regardless of schedule, motormen must run slowly during fog."

CO-OPERATION OF SAFETY COMMITTEE

We also have a safety committee, composed of the following men: two early and two late run trainmen, master mechanic, chief engineer, two dispatchers, track foreman, line foreman and the company attorney, all working under the direction of the superintendent.

This committee, in addition to making the usual recommendations concerning shop, power house and rolling stock safeguards, receive the complaints of trainmen against wagon and automobile drivers who are inclined to be reckless or incautious.

This information is transmitted to the superintendent, with an account of the occurrence, the date, time and location. The facts are then sent to the vehicle owner in a courteous letter dictated and signed by the superintendent and written on the special letterhead of our safety committee, which has been named the Beaver County Safety League. The mission of this league, as given on the letterhead, is "the prevention of street car, auto, fire, live wire and other accidents." Such letters are inclosed, further, in a special Safety League envelope, the upper left-hand corner of which bears the inscription "Beaver County Safety League, Beaver Valley Traction Company, New Brighton, Pa.," while "First aid to the uninjured" appears on the center of the face on the lower margin." The reverse side has the following in the four sections:

"Do not alight from a street car until it stops—stops still. Do this and prevent accident."

"Keep the children away from the car tracks."

"It is so easy to prevent accidents and so hard to patch a fractured skull or broken limb."

"Madam, face the front of the car when alighting."

The replies to such letters are generally to the effect that the addressee has taken the steps necessary to prevent a repetition of the complaint.

The Beaver Valley Traction Company will be glad to furnish to any company the results obtained from this accident-prevention campaign.

CONVENTION OF NATIONAL ASSOCIATION OF CORPORATION SCHOOLS

The second convention of the National Association of Corporation Schools was held in the Curtis Auditorium in Philadelphia on June 9 to 12. The Curtis Publishing Company issued a daily paper with a title "Ourselves" during the convention. Representatives were present from a large number of the eighty or more manufacturing and operating companies attended. Dr. C. P. Steinmetz, of the General Electric Company, was elected president for the coming year.

The Association of Corporation Schools is an organization which, as the name implies, is intended to promote continuation training while students are earning their living at various occupations. A very large number of corporations have educational plans of different kinds in operation, and the association is intended merely to act as a clearing house for information regarding these schools. In an editorial published in the June 12 issue of "Ourselves" Dr. Steinmetz outlined the purposes of the association. He pointed out that 96 per cent of the graduates of the public schools are forced to go into the industries without any industrial training. This situation is due to the complete breakdown of former systems of industrial training which has in the past few years proved a national danger. The general education of the masses has become an industrial necessity since modern industries began. With the rising education and increasing intelligence of the masses came the demand for a share in the government of society and the share of the good things of the world. Education consists of two parts: general education as given by our public school system and special training for the trade or profession. This was formerly afforded by the apprentice course, but when the economic laws forced the organizations of the industries into big corporations, the necessity of subdivision of labor left no place where the young man or woman could in a few years pass through all the different operations of a trade. This left no place in which to learn a trade. Thus while the public school system has developed and become very efficient, its function is and always has been the general education required by any person before he can specialize in learning a trade, but there is no place left in modern industry to learn a trade. This is the great problem which confronts our civilization and endangers our prosperity, and this has led to the establishment of apprentice courses and corporation schools and thereby the association. The work of solving the problem has hardly begun.

During the meeting, at which a very large number of papers were read, addresses were delivered by such men as L. L. Parks, superintendent of apprentices, American Locomotive Company; Paul Kreuzpointner, Pennsylvania Railroad Company; N. S. Dougherty, Pennsylvania Railroad Company; S. W. Thomas, Santa Fé Railroad System; M. W. Alexander, General Electric Company; R. J. Watson, Westinghouse Electric & Manufacturing Company; Charles R. Beeman, Carnegie Steel Company; C. R. Dooley, Westinghouse Electric & Manufacturing Company, and many others.

Electrification of the Usui-Toge Railway, Japan

The Line Was Electrified at 650-Volts Direct-Current with Under-Contact Third-Rail Owing to Tunnel Clearances—Electricity Has Eliminated the Use of Separate Locomotives for the Adhesion and Rack Sections

The Usui-Toge electrified division of the Japanese State Railway crosses a mountain chain some 75 miles to the northwest of Tokio. The original line was constructed in 1893, and to overcome a difference in level of 1837 ft. in a length of 6.8 miles the line was constructed with the Abt rack system on grades between 2.5 to 6.7 per cent. The length of trains is limited by the length of the single turnout at Kumanotaira at the center of the line, which is only 410 ft. between two rocky ridges. With steam operation ordinary locomotives were used for the sections without racks, while rack locomotives were employed on the steeper grades of the line.

The gage of the line is the Japanese standard of 3 ft. 6 in. Originally the trains consisted of one locomotive with five to six passenger and freight cars. Later, double trains consisting of two locomotives and ten to twelve coaches were used. The steam locomotives were designed for a speed of only 5.6 to 6.2 m.p.h.

Electrification offered the only way to secure longer and faster trains. Smoke elimination was also a consideration, as the town of Karuizawa, situated at a height of 2752 ft. above sea level, is a popular health resort. The line passes through twenty-six tunnels, which comprise in aggregate length about 2.2 miles of the 5-mile rack section.

Bids for electrification were invited in 1909 in accordance with specifications drawn up by the Imperial Japanese Railway authorities. At the end of the same year the order for the delivery of the electric rolling stock was placed with the Allgemeine Electricitäts Gesellschaft. It included twelve d.c. rack locomotives, which have been in service since May, 1912. As was to be anticipated, the traffic has increased considerably, and the time taken in traveling from Yokogawa to Karuizawa has been reduced from one and one-half hours to forty minutes.

POWER AND DISTRIBUTION

Electric energy is obtained from a power station erected near Yokogawa specially for the railway. It contains three 1000-kw General Electric Curtis vertical

turbines which supply three-phase current at 6600 volts, fifty cycles. The excitation current is provided by two 125-volt exciters with outputs of 75 kw each, direct-coupled to vertical steam engines. The steam for the turbines is generated in eight water-tube boilers with superheaters and automatic stokers. The boiler plant was constructed entirely in Japan, and Japanese coal is used as fuel.

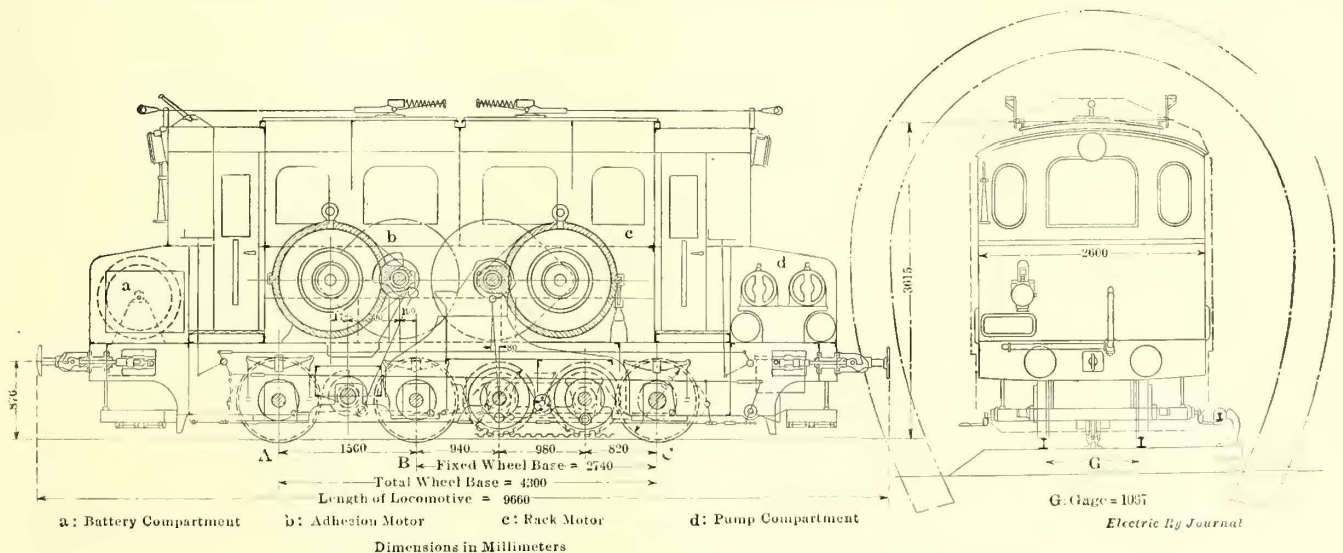
The high-tension three-phase current is led to the two substations through underground iron-armored cables, where it is transformed to 240 volts and then converted to 650 volts d.c. by means of four 450-kw rotary converters. The four converters constitute a sufficient reserve in themselves, but each substation also has a further reserve consisting of a 312-cell storage battery with a capacity of 1322 amp-hr. in connection with a 100-kw Pirani booster.

One of the chief reasons for the selection of the low pressure of 650 volts was found in the difficulty of securing satisfactory insulation in the narrow tunnels, which made overhead high-tension impossible from the outset. On the other hand, with the outputs and currents in question, only the third-rail system could be considered for the rack section of the line, and this system just came within the limits of practicability for a pressure of 650 volts when allowance was made for the somewhat moist atmospheric conditions of the tunnels. At the Yokogawa and Karuizawa yards, the current is collected with a trolley wheel from a catenary line.

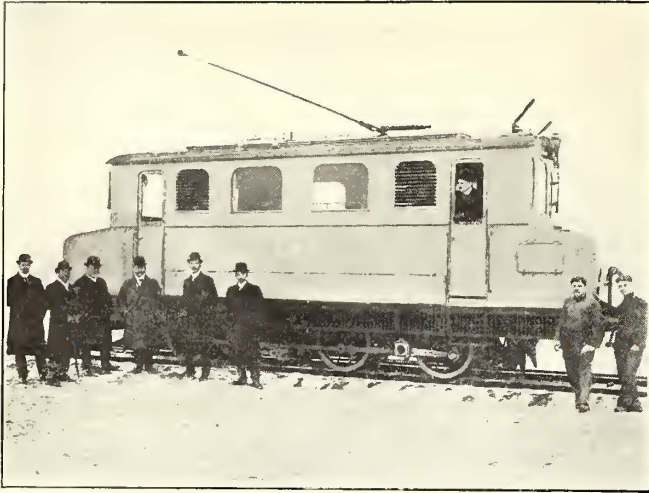
For feeding the overhead line four insulated feeder cables pass from each substation to the line, where they are fixed to wooden poles on the open track and insulators in the tunnels. The current is returned through the rails and special cables, laid beside the track.

LOCOMOTIVES

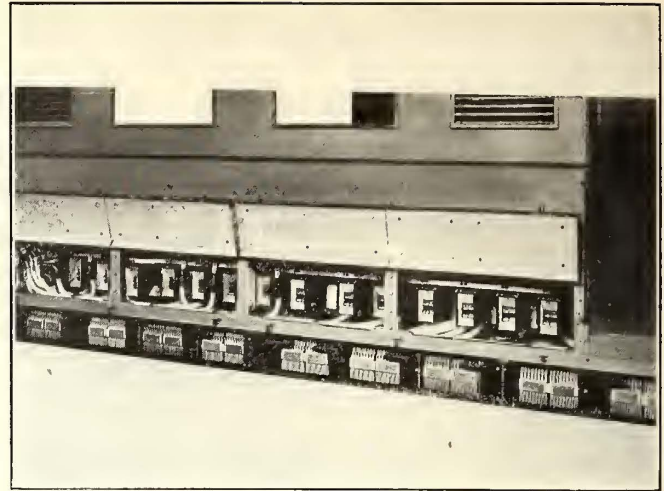
The rack locomotives are designed with separate drives for the adhesion and rack sections of the line. They are capable of drawing a train 90 metric tons in weight, or, when two locomotives are used, a double train weighing 180 tons on a grade of 6.7 per cent at a speed of approximately 10 m.p.h. per hour. They are



Usui-Toge Railway—Elevation and Clearances of Locomotive



Usui-Toge Railway—Rock and Adhesion Locomotive with Under-Running Shoes and Trolley Wheel



Usui-Toge Railway—View Showing Contactors and Resistances on Locomotive

by far the largest rack locomotives of their kind yet constructed.

The system of drive by means of raised motors and parallel cranks was necessitated by the large output required from the motors and also by the special nature of the rack machinery, which makes it somewhat difficult to mount the motors low. The locomotive weight of 42 tons is distributed practically uniformly over the three adhesion driving axes. The hourly rating is 350-hp per motor at a speed of 650 r.p.m.

The motor for the adhesion drive is rigidly mounted in the spring-supported main frame of the locomotive. It works with a gear ratio of 1:6.4 on to the gearing shaft and from that on to the jack shaft, from which the driving wheels are driven by coupling rods. The two pinions are mounted on two axles in the fixed inner frame; the pressure of the gearing teeth is here taken up by the movement of the locomotive springs. The inner frame also carries the driving motor for the rack machine. This motor is mounted in the inner frame on a cast-steel bracket which can turn. It is geared 1:5.9.

The drive is carried out directly by a driving

rod working on to a pinion shaft. As in the adhesion drive the cranks are set at an angle of 90 deg.

The motors are alike electrically but differ mechanically. Both motors are divided in the center, and the upper half and the rotor can be raised or lowered by means of a crane. The motors are controlled by means of thirty-two contactors. These contactors are in asbestos-lined compartments along the sides of the locomotive, so that contactor inspection and maintenance offer no difficulties. The contactors and the controller, which is placed on one side of the locomotive near the contactors, are operated by 80-volt battery current. The advantage of taking the control current from a battery is that the short-circuit brake can be used even when no line current is available. The controller contains three drums. The main drum and reversing drum correspond to the drums of an ordinary controller for contactor control, but the third has two auxiliary contactors which, corresponding to the three positions "adhesion," "rack" and "brake," group the main contacts in the manner required for the different forms of service.

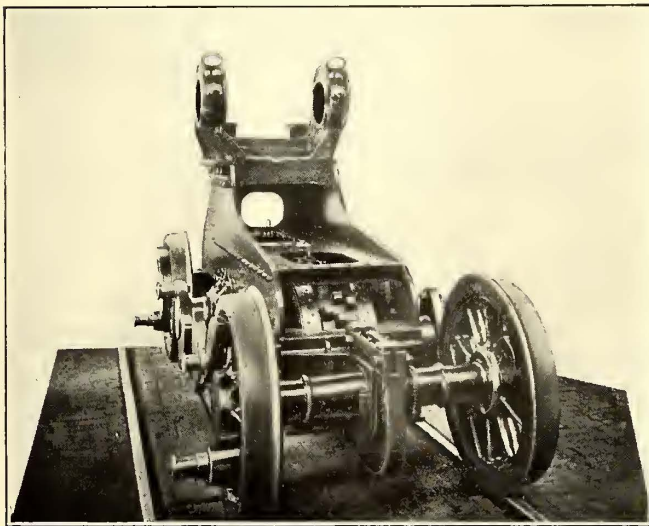
On the adhesion section the locomotive is driven solely



Usui-Toge Railway—Electric Train with Head and Center Locomotives

by the adhesion motor. The rack motor runs on no-load and maintains a constant speed, which is approximately the same as that of the adhesion motor. By this means the locomotive can run on to the rack even at high speeds without any injurious vibration. The synchronism between the loaded motor and the rack motor running on no-load is obtained by connecting the field of the rack motor in series with the field and armature of the adhesion motor, the armatures of the two motors being connected in parallel. The factors which determine the speed are therefore the same for both motors if the pressure drop and armature reaction are left out of consideration. On the rack section the motors work with the usual series-parallel connections, the motors being in series on the first nine steps and in parallel on the remaining six steps. On the ninth and fifteenth steps the motors are shunted. By altering the shunt resistances the distribution of the load, which changes with the wear of the running wheel diameter, can be adjusted between the rack and adhesion motors.

The first six positions of the controller are used for operating the electric brake. For the short-circuit brake, which is always used on down grades, the arma-



Usui-Toge Railway—Rigid Inner Frame of Locomotive for Rack and Adhesion Service

ture of one motor is connected in series with the field of the other motor and with a set of resistances. This crossed-brake connection makes the brake act with absolute certainty whether the position of the reversing controller corresponds to the direction of rotation of the motors or not. If the current fails in the third-rail while the train is traveling upward, the motorman only has to remember that the grouping drum must be placed on the position "brake" before the braking can be carried out at the main drum. The current then generated in the motors is converted into heat in the resistances which are also used for starting up. For this purpose the resistances are suspended along the sides of the locomotive in such a manner that they can be adequately cooled. On down grades the short-circuit brake is supplemented by a vacuum brake. In addition, a hand brake combined with the vacuum brake rigging is provided for contingencies.

The locomotives have now been in service for nearly two years. After a few preliminary difficulties in connection with the parallel crank drive, which were overcome by strengthening the cranks, the traffic is now handled smoothly and satisfactorily. The electrification of the line cost \$1,750,000.

INSULATED RETURN FEEDER TESTS IN ST. LOUIS

During the months of February and May a number of tests of the return feeder system in St. Louis, described in the article in the *ELECTRIC RAILWAY JOURNAL* for Jan. 17, were made by A. F. Ganz, F. N. Waterman, S. S. Wyer, H. S. Warren and Elam Miller. Two principal kinds of tests were made: (1) Measurements of over-all voltages, and (2), measurements of potential gradients. The over-all voltage measurements were made on the tracks between the point of lowest potential and various points on the boundary of the Ann Avenue substation district. The measurements of potential gradients were made in various sections of the district to determine the voltage drop per 1000 ft. of track. So far as possible the potential gradient tests were made with one-hour recording volt meters. The gradient measurements were made during the hour of evening peak. Simultaneously with the taking of the records of voltages and gradients, observations of current output from the Ann Avenue substation were made.

Of the nine sets of over-all voltages measured, the averages for the highest ten consecutive minutes during the hour of peak loads are less than 7 volts in seven cases, exactly 7 volts in one case and 9 volts in the remaining case, the average for the nine measurements being 4.67 volts. The averages of the over-all voltages vary from 2.5 to 8.4, an average of 4.13 for the nine over-all voltage measurements made. Of twenty-seven gradients measured, eleven are 1 volt or less for the highest ten minutes. Of those exceeding 1 volt eight were accounted for by finding high resistance or open bonds or special work in the section of track included in the measurements. Potential gradient measurements were made in all cases in tracks immediately adjoining return feeder connections.

In comparing the conditions found in the Ann Avenue substation district with the ordinances recently enacted in several American cities it was concluded by the engineers that the requirements of these ordinances can be readily complied with even in a large city electric railway system, as they considered the Ann Avenue substation district typical of the general conditions met in electric railways in large cities. They also concluded that the results have been obtained at an initial cost which cannot be considered large and at an annual cost small in comparison with the benefits derived. They point out that it is vital to the successful operation of the insulated return feeder system, as well as of any other system of electrolysis mitigation, that the rail bonding be kept in good repair. Special work should be independently shunted by jumpers of ample size. Return pilot wires are of great value in furnishing a ready means of supervising and checking the conditions of the return system. Such wires were not used in St. Louis.

JOVIAN LEAGUE ORGANIZED IN LOUISVILLE

Jovians of Louisville have effected an organization of a Jovian League, of which R. E. Brian, manager of the Louisville branch of the Federal Sign System, is president. Robert Montgomery, manager of the Commercial department of the Louisville Gas & Electric Company, is vice-president, and Carl A. Klemm, manager of the Louisville office of the Westinghouse Electric & Manufacturing Company, is secretary. The board of directors of the league includes in its membership Walter O. Smith, superintendent of construction of the Louisville Gas & Electric Company, and James Clark, Jr., head of the electric company which bears his name, and statesman of the order.

ILLINOIS TRACTION BILLBOARD ADVERTISING

At its largest terminals the Illinois Traction System makes generous use of large painted signboards setting forth the merits of its several services. The three boards shown herewith are located in St. Louis. These illustrate and advertise the sleeping-car service, freight service, general train service and the protection afforded by automatic block signals. These boards are 10 ft. high and 50 ft. long and are painted in four or five colors. The wording and pictures on the boards are changed often enough to make them attractive.

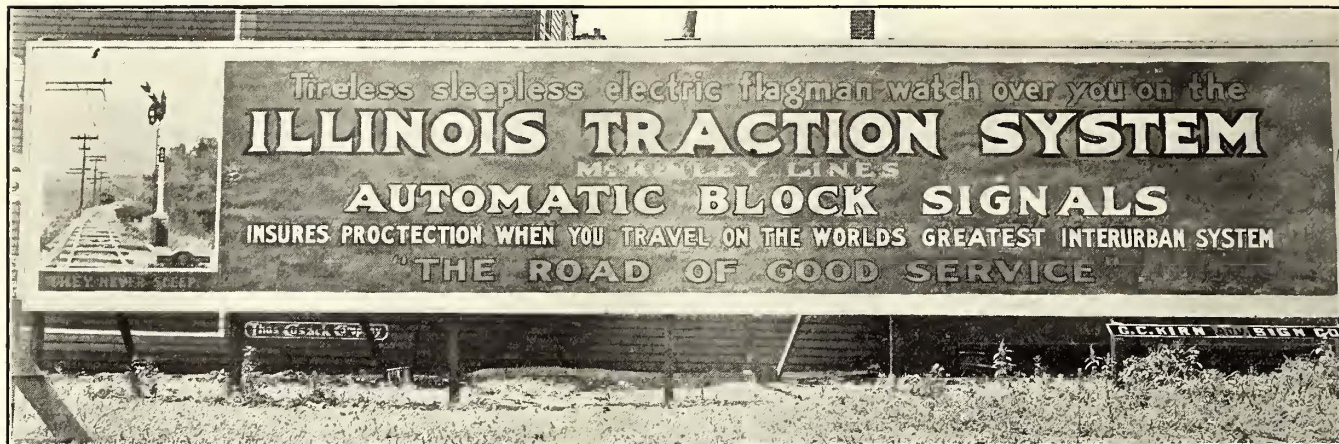
In designing these boards, striking photographic views used in the regular printed advertising were reproduced in natural colors. For example, the board shown in the upper engraving displays a photograph

of a piece of track and a block signal, the middle board shows one of the twelve 800-hp electric locomotives built in the company shops. This "engine" is hauling a long train of coal cars and a standard caboose.

The lower board shows pictures of two much-used sleeping car photographs entitled "Good Night, St. Louis," and "Good Morning, Peoria."

These signboards are located at street intersections where extra land was purchased so that curves could be enlarged. They are placed so that they may be read by the passengers on the cars and from two intersecting streets.

The preparation of material for display on these boards and the carrying out of the work is part of the publicity campaign of the Illinois Traction System, of which E. E. Soules, Peoria, is publicity manager.



Illinois Traction System—Large Signboards at St. Louis

IMPROVEMENTS IN CAR DESIGN

An extended paper on this subject was read by C. H. Cross, mechanical engineer of The Milwaukee Electric Railway & Light Company, at a meeting of that company's company section on June 11.

Mr. Cross said that ten years ago the standard cars for city service were the convertible and semi-convertible types of cars with drop platforms. Both types arranged for single and double-end operation were to be found. Such local types as the California, with open and closed compartment, and the Denver side-center entrance cars were at a standstill. The imported double-deck car had ceased to be the center of attraction, and the discussion of car design was confined almost wholly to the long versus the short car. This discussion was conducted not from the engineer's standpoint but was rather limited to the subject of the amount of walking the conductor would have to do and the possibility of missed fares during the rush hours and on crowded cars. Such economic questions as the minimum weight per seat or per square foot of car floor area or per foot of car length, also the relation of the weight of the car to the coal pile, had not been duly considered and, if clear to some of the fraternity, had not been brought out for general consideration. The speaker said that within the last few years the relation between the weight of the cars and the coal pile had become clear to some, but a further real saving is sure to follow if the operating department of a company takes care not unnecessarily to destroy the light-weight equipment while it is in service.

STANDARDIZATION

The speaker said that standardization, whether in size of car, body or power equipment, had not yet been obtained. Even to-day standardization in the city cars may appear ridiculous to some, yet careful consideration of the subject will show that there are many details connected with the city cars of which no plausible objection can be afforded to standardization. Examples will be found in height of steps, size of glass for windows, length of cross-seats, width of aisles, distribution of car area to seats and standing space, etc.

Of the different types of car bodies now in use, investigation shows that bodies with the same relative dimensions vary in weight as much as 80 per cent, although designed for similar service. Whether a car is built of all-steel, semi-steel or all wooden construction is immaterial from the standpoint of weight, provided it is used under similar traffic conditions and the loading is calculated on a definite standard, as, for example, number of pounds per square foot of floor area or per foot of car length. The fact that moving useless dead weight costs money should be an incentive to the car designer to keep the weight of the car down to a minimum. As a collision is an extraordinary occurrence and as experience with the modern lightweight cars shows that a certain damage results to the structure, regardless of whether impact has been taken into consideration in the design or not, it certainly is not economical to add weight to the car when such a plan does not enhance the total factor of safety in operation.

PAY-AS-YOU-ENTER CARS

Mr. Cross said that in the *STREET RAILWAY JOURNAL* of August, 1890, page 377, is found a description of some cars built in 1871, proposing a system of pay-as-you-enter car operation. He added that no doubt these cars were suggested by Ridgeway's patent, granted in 1870. He added that the article comments as follows: "If everybody always had the exact fare ready, this plan would have worked, but the individuals with

bundles and packages were as numerous then as now, and the scheme had to be abandoned."

The speaker then said that within comparatively few years there has been in service a type of single truck, one-man operated, city car equipped with a stationary fare box, into which passengers as they entered were expected to drop their nickels. When the passenger did not have the proper coin, change was made by the car conductor who also issued transfers. That time brings changes, he added, there can be no doubt, as it has been deemed advisable to modify within the last few years even this early type of the prepayment car to a more modern, up-to-date type of prepayment city car. In this connection the speaker said that cars without bulkheads were described in the *STREET RAILWAY JOURNAL* for August, 1890, page 378. These cars were used in the District of Columbia near Washington.

In his discussion, the speaker said, he did not propose to enumerate the various new or novel designs, but he thought it might be of interest to set forth the results as determined in connection with one design and the success of the inventor in the litigation had with its defence. The design, he said, is known as the "Milwaukee type" and a description and floor plan are given in the *ELECTRIC RAILWAY JOURNAL* for Aug. 3, 1912, page 167. Additional details, he continued, are given as follows from the brief and argument, together with the memorandum of the decision, reached in the case of the Prepayment Car Sales Company, plaintiff, vs. Orange County Traction Company, defendant, a case tried both in the United States District Court for the Southern Division of New York and in the United States Circuit Court of Appeals for the Second Circuit.

According to Mr. Cross, the Orange County Traction Company purchased ten cars equipped with the type of mechanism developed in Milwaukee and, as a result, were made defendants in a suit by the Prepayment Car Sales Company. The cars were alleged to infringe the plaintiff's patent No. 935,929, as defined in claims Nos. 3 to 16. According to the speaker, the plaintiff's attorney stated "the central invention and the center thing in issue is the invention covered by this patent, No. 935,929." In the plaintiff's patent, according to Mr. Cross, the twenty original claims mentioned means for forming a restricted passageway arranged in the barrier or extending longitudinally into the car, while only five of the claims mentioned means for moving the doors.

In continuation, Mr. Cross said that in the construction of the commonly called pay-as-you-enter cars a railing is placed on the platform at the end of the car so as to provide separate entrance and exit passage, while the fare is collected as the passenger enters the car by a conductor stationed on the platform in a convenient position with reference to the entrance passage to the body of the car. According to Mr. Cross there are really five elements to the combination claimed by the complainant; namely, (1) a car having a car body and platform or vestibule space merging unobstructedly; (2) a movable side entrance door of some type; (3) means for controlling the door; (4) means for separating the entrance and exit passageways; (5) the location of both these means of various parts in the car with reference to the position of the side entrance door.

In continuation Mr. Cross said that the defendant's structure shows a car having a car body space and end platform or vestibule and unobstructed mergence of the two parts, but that both these elements are disclosed in a passenger car embodying the construction of the claim under consideration in the Ridgeway patent No. 102,435, issued as early as 1870 and already mentioned. Mr. Cross also said that doors operated by

means of a distant control on the platform were well known to the art prior to the date of the patent in suit and cited as perhaps the best known instances, the Boston Elevated, Chicago West Side Elevated, Northwestern Elevated of Chicago, Minneapolis, Minn., Rochester and Eastern surface cars.

He also said that the defendant traction company is also licensed under application for patent serial No. 398,517 which application was filed Oct. 21, 1907, seven months prior to the date of plaintiff's application for patent serial No. 935,929. He added that in the spring of 1907, a car was built in Chicago under the application for patent serial No. 398,517, and that this car, he said, was completely successful, performing its functions for over a year until it was removed due to a change in the management of the road.

Mr. Cross then continued: "If, therefore, there be a patentable invention in placing the door of a car in the side of the car body and operating it from a distant control upon the platform, that invention was not made by the plaintiff's patentee."

"The opinion is therefore rendered that there is no patentable invention in the location of the door controlling means upon the platform in accordance with the convenience of the person who is to operate it. Wherever located, its function is the same and change in its location involves ordinary mechanical skill, not invention."

"The issue is decided in favor of the defendant. U. S. Circuit Court of Appeals, Second Circuit, Judges Lacombe, Coxe and Rodgers affirmed the judgment of the District Court, Eastern District of New York, which decision was rendered by Judge Veeder in favor of the defendant, the Orange County Traction Company, Newburgh, N. Y.'"

Mr. Cross then said:

"The object of giving the detail in this case is that of showing the true status of the prepayment type of car equipped with doors on the platform. Various companies broadcast over this country are unwilling to engage in litigation, yet if the facts be known, this type of car can be made use of without question should they so desire, and no royalties need be paid."

SEATING AND ROOF CHANGES

Another requirement, according to Mr. Cross, connected with the prepayment system was proper seating to avoid congestion. The most common method is to use longitudinal side seats near the end of the car body to provide additional stream flow space and a limited number of cross seats near the center where the flow of traffic was less. In center-entrance cars, various types of folding seats are in use both at the ends and in every idle space near the center well and doors, this being done to get the most seats possible.

One of the more marked changes in car design is the adoption of the single arch roof with the use of pressed light-sheet steel carlins. The change from the monitor to the arch type, while seemingly new, is in reality nothing more than a reversion to the original type of steam car roofs and to those used on foreign electric railway cars. As early as twenty years ago the suggestion was made that a simple natural arch was more pleasing than the monitor, but the change was not made at the time because of the lack of something better for ventilation. Although many mechanical and natural ventilators have been developed within the past few years some doubt still exists as to whether the stronger roof and lighter arch is not secured at the expense of ventilation during the season that the cars must be heated. In Milwaukee the monitor roof of type 500 cars weighs 600 lb. more than the arch roof

cars of type 600 cars. The change in roof shapes had also been accompanied by the introduction of composition and metal headlining as the veneers were becoming too high in price and were expensive to maintain. The United Railroads of St. Louis also uses composition material for outside panels, and in the South it is used for roof sheathing without any roofing canvas.

The quality of cane for seat upholstery, Mr. Cross said, has deteriorated very much, notwithstanding the fact that the price has increased. Substitutions of pressed steel shapes for malleable castings for seat frame parts has been made chiefly because of the demand for lighter weight seats.

The speaker then reviewed the adoption of steel for electric cars from the composite underframe of 1903 to the pressed steel designs of to-day. For city cars built with drop platforms the combination of wood with steel underframe was still the most popular.

SPECIAL CARS

Although the Ohio and California type of cars was in use previous to 1903, Mr. Cross said that no improvements of any consequence were made in them until the prepayment system encouraged the adoption of folding steps, special doors, railings, etc. A much more important development, however, has been the rejuvenation of the side-entrance car. Among the prominent types are the motor and trailer cars of the Denver Tramways, the low-floor cars of the Pittsburgh Railways, the motor and trailer cars of the United Railways of St. Louis and the center entrance cars of the Washington Railways & Electric Company and Brooklyn Rapid Transit System. All of these cars have been described at length in the *ELECTRIC RAILWAY JOURNAL*. It may be noted that in the St. Louis trail car the center line of the car body does not coincide with the king pin of the truck. The body was set 2 in. off center, owing to the extreme width of these straight side cars, to provide suitable devil strip clearance. An interesting fact in connection with the St. Louis motor cars is that a saving of 600 lb. or more per car is obtained by the use of the storage air brake instead of the individual compressor system. The speaker felt that the most striking features of the Brooklyn center entrance design were the light, all-steel framing, the large seating capacity and the wide doors. By using pressed steel shapes this structure had been fabricated to weigh, when fully equipped, only 639 lb. per seat.

CONCLUSIONS

In closing Mr. Cross presented the following conclusions:

"First, pay-as-you-enter cars equipped with movable doors or gates controlled by distant handles, operated either by the conductor or the motorman can be used in this country without paying royalties.

"Second, the better type of recently designed cars, whether for surface or subway use, are either of the 'all steel' or 'semi-steel' type into which as much other non-combustible construction material have been incorporated as is possible consistent with minimum weight.

"Third, the stepless arranged center-entrance type of car has proven its worth from many points of view in actual service for handling both the rush hour and normal traffic."

In a recent issue of *The Tramway and Railway World* is announced the withdrawal of first-class cars on the Hagley Road route in Birmingham, England, because of insufficient patronage. First-class cars, however, are still being used in Liverpool, among other cities.

American Association News

Delegation from the Association Appeared Before the Senate Interstate Commerce Committee to Protest Against the Inclusion of Electric Railways in the Provisions of the Rayburn Bill—Committee Activities Continue

HEARING ON THE RAYBURN BILL

Five representatives of the American Electric Railway Association appeared before the Interstate Commerce Committee of the United States Senate on Tuesday (June 16) to make a vigorous protest against the inclusion of electric railway lines in the provisions of the Rayburn bill for government control of stock and bond issues.

The witnesses were: Horace F. Clark, Washington, D. C., attorney, representing the American Electric Railway Association; Arthur W. Brady, Anderson, Ind., president Union Traction Company; Bernard F. Weadock, Detroit, Mich., attorney Detroit United Lines; James M. Barrett, Fort Wayne, Ind., president and general counsel Fort Wayne & Northern Indiana Traction Company; and Charles L. Henry, Indianapolis, Ind., president Indianapolis & Cincinnati Traction Company.

Attorney Clark made a brief statement of introduction for the other witnesses who, he said, appeared as representatives of the American Electric Railway Association. He told the committee that when the House considers a long series of safety appliance bills, this association had been able to secure the inclusion of a provision to except electric railways from the operation of the Stephens "safety appliance" bill. He felt that a similar exception should be written into the Rayburn bill. Mr. Clark said that less than 1 per cent of the business of the electric lines was interstate and that because of this fact congress should not hesitate to make the exception asked.

Mr. Brady told the committee that the association represented about 45,000 miles of traction lines. He said that only about 335 out of 1200 or 1300 lines in the country could be listed as interstate carriers. These, he said, had about 17,000 miles of track, but three-fourths of them were less than 50 miles in length. He said that in his own state of Indiana, the interurban business had been developed about as much as in any other state, but even in Indiana 99 per cent of the total business done by the electric lines was intrastate traffic. In answer to a question, Mr. Brady said that the laws of Indiana regulate the terms and conditions of securities issued by companies. He said that this was one reason why the exclusion asked by his association should be granted by congress.

Chairman Newlands asked the witness if national regulation would not be just as acceptable as state regulation, provided a comprehensive measure were passed putting the entire work in the hands of the Interstate Commerce Commission and excluding the local security commissions. To this Mr. Brady replied that he thought there were serious objections to such a plan. "It would be unwise, unfair and unnecessary," said Mr. Brady, "to vest this jurisdiction in the Interstate Commerce Commission, and we would not be here if we did not think that we had good reason for that position."

Mr. Brady pointed out that at present his lines are subject in many ways to the Interstate Commerce Commission. They are forbidden to grant rebates or to make discriminations. They must make reports regularly to the Interstate Commerce Commission. Their accounting systems are subject to its jurisdiction, and they are even subject to the provisions of a valuation act. Mr. Brady insisted that it would be unfair to

lines having such a small percentage of interstate business to treat them as though they were interstate carriers of the same character as the New York Central Railway or the great transcontinental lines of the country.

Mr. Brady emphasized his belief that it would be unwise and unnecessary for the federal government to take over the control of the security issues of the electric lines because these concerns were essentially local and already subject to full state regulation. "We object to it strenuously," he said, "for the reason that we believe that it would add greatly to the difficulties that we have to meet."

Most of the lines of this character, Mr. Brady told the committee, were short systems not strong financially and represented a development of the last fifteen years. They have been built wholly in advance of the need for them. Many of them are struggling under adverse conditions and some of them are barely able to make both ends meet. One vital objection to the proposed regulation was the fact that it would compel these small companies to send representatives to Washington—from all over the United States—every time they found it necessary to issue securities or notes. This, he said, would involve a considerable expense, particularly because the individual issues would be small. An output of \$25,000 in securities, he said, was often a big item for one of these lines. In an issue of that size the expense of several hundred dollars entailed by sending a representative to Washington might amount to more than the usual commission for handling such a transaction.

The witness also explained to the committee that such a proposal would add greatly to the burdens of the Interstate Commerce Commission which now has its hands full with the regulation of some 250,000 miles of steam railroad. This commission, he feared, would make its rules to cover the operation of the large railroads with hundreds of millions of dollars of financing, and this would not fit the case of the smaller lines. He suggested that congress wait until similar legislation had been worked out practically by the Interstate Commerce Commission for the big roads before applying it to the electric railways.

"You have made what seems to me," said Senator Robinson of Arkansas when Mr. Brady concluded, "a very clear and rather forcible statement of your position."

Mr. Weadock told the committee that the 800 miles of the Detroit lines were subject to the regulations of 166 municipalities in Michigan—under rigid home rule—as well as the Michigan Railroad Commission, the Public Utilities Commission of Ohio, a city commission in Detroit and the Interstate Commerce Commission. He said that there was also a state securities commission in Michigan which passed upon the issue of utility bonds and that its approval also had to be obtained for security issues. Mr. Weadock said that in his state the interstate business of the electric lines was less than 1 per cent.

If there were federal control of securities, Mr. Weadock explained to the committee, it would take the larger part of a week for a representative to come to Washington to lay his case before the committee and return to Detroit. A decision could be asked and obtained from the Michigan commission within twenty-

four hours. With the enormous work already imposed upon the Interstate Commerce Commission, he said, the small electric railways could not secure the same attention given to steam railroads, and he did not believe they would be entitled to it. In answer to a question, he said that he would welcome complete regulations by the Interstate Commerce Commission provided it could come to Michigan and oust the state commission and the 166 municipalities as well as the city commission of Detroit and common council of that city.

Mr. Barrett told the committee that the Fort Wayne & Northern Indiana Traction was the third largest electric railway in Indiana. He said that it had about 130 miles of interurban lines and 68 miles of city lines. However, none of these lines reaches to within 20 miles of the state lines. From a connecting line, however, which crosses the state line, he said that his company obtained a very small amount of interstate traffic. This, he said, was a very minute fraction of the company's business. Under the proposed law, he would have to come to Washington to secure the right to issue securities for his city lines, although they were purely of local concern. He said that the state commission could handle such a matter far more expeditiously than the Interstate Commerce Commission and that it could also personally inspect the property. This, the Interstate Commerce Commission could not do. He felt that if such a law were passed his company would find it cheaper to refuse absolutely to carry any interstate commerce business.

Mr. Henry told the committee that the Indianapolis & Cincinnati Traction Company was now trying to extend its lines into Cincinnati. If the proposed law were passed without the exemption, he said it would be necessary, before this extension could be built to get the approval of the Indiana and Ohio commissions as well as that of the Interstate Commerce Commission. He said that the average fare on his line was 24 cents and that the interurban companies could not make from 70 to 90 per cent of their moneys out of freight as the steam roads did. He believed congress should give the company ten years more of development and that then, if they had grown enough, it would be time enough to put them under federal control.

COMMITTEE ON EDUCATION

A meeting of the committee on education was held in New York on June 16. After a discussion of the fundamental principles which must underlie a successful correspondence course of instruction, the following tentative plan was outlined: The course will be subdivided into three general divisions corresponding to the natural divisions of the mechanical, civil and electrical engineering departments of an electric railway. One course will, therefore, be for young men in the shops, another for those in the track and structural departments and the third for those employed in power houses and substations and in line work.

The course to be outlined can be completed by an average student in about two years on the assumption that he spends a reasonable proportion of his evenings on the work and during the day observes closely what he sees about him. It is proposed that regular reports of the work of students be furnished to foremen or superintendents and to the committee on education of the association.

Leading instructors of a correspondence school will at once undertake a study of conditions existing on electric railway systems so that they may be able to outline courses of study, utilizing existing texts with a view to meeting the needs of young men in the electric

railway industry. They will, as soon as possible, outline three grades of courses in each of the three divisions mentioned. One course will be very complete, the second somewhat condensed, while the third will contain only the bare essentials. The courses will be very practical in their nature, and problems, drawings and other student work will be closely related to the every-day duties of electric railway employees.

As soon as the sample curriculums have been prepared a meeting of the committee on education will be held to consider them. The sample curriculums will also be submitted to the chairman of the committees of the American Electric Railway Engineering Association, which are active in the three respective fields. The correspondence school officials will then calculate carefully the cost of the proposed instruction and will make a special rate which will be as low as is consistent with a reasonable profit.

While no date has been set for the meeting of the committee on education, it is expected that one can be held in the course of a few weeks and that the complete plans of the committee can be put into shape in ample time to have them brought to the attention of the members of the association before the coming convention.

MEMBER OF THE CLASSIFICATION COMMITTEE

M. W. Glover, president of the American Electric Railway Accountants' Association, Mobile, Ala., announces the appointment of P. S. Young, treasurer Public Service Railway, Newark, N. J., as a member of the committee on a standard classification of accounts, in place of F. E. Smith, resigned.

WATER-POWER LEGISLATION

For the committee on public lands, Representative James M. Graham, of Illinois, has filed a favorable report on the federal administration's water-power leasing bill. The bill authorizes the Secretary of the Interior to lease to citizens of the United States or properly qualified associations or corporations for a term of not more than fifty years, water-power sites in the public lands of the United States, exclusive of the national parks. The Secretary is to have the power to prescribe the regulations for these leases, which are to be irrevocable except for a breach of their terms. The Secretary is to have the power of giving preference to political subdivisions, such as states, counties or municipalities. He is also authorized to grant temporary permits for one year, with extensions in certain contingencies, to enable intending applicants to investigate the possibilities of power development.

Whenever the power developed is sold outside the state of its development the regulation and control of the service, charges for service and the issuance of stocks and bonds are conferred upon the Secretary of the Interior or upon such body "as may be provided by federal statute." Similar control is given over intrastate business where there is no state public utilities commission. Combinations and agreements in restraint of trade or increase of prices are forbidden. Sale or delivery of power to distributing companies except for thirty-day periods in cases of necessity are also prohibited. Provision is made for keeping the property intact as a "going concern" at and after the time when the lease terminates. This is to be done by giving the United States the right to take over the property, upon not less than three years' notice prior to the expiration of the lease, upon payment of the actual costs of right-of-way, water rights, lands and interest, as well as of all structures and fixtures.

COMMUNICATIONS

EDUCATIONAL COURSE OF ACCOUNTANTS' ASSOCIATION

THE AMERICAN RAILWAYS COMPANY,
PHILADELPHIA, PA., June 17, 1914.

To the Editors:

Referring to the announcement in your issue of May 30 of the educational course of the Accountants' Association, I wish to trespass upon your space to urge upon the various member companies the importance of this work.

One of the most serious problems facing our industry to-day is our relations with the public and the regulating bodies of the national government and the various States. Those of us who are called upon to represent our companies before these bodies and boards of trade and the like realize the vital importance of having at our command well authenticated facts and figures to bear out our contentions, and the only way that we can receive this information is through a thoroughly well-trained organization along accounting lines.

It seems to me that this course should not be confined entirely to men in the accounting department but that the younger men in the various operating departments, and more particularly in the engineering department, could profit very largely by following this course. They would then be in a much better position to respond intelligently to the requests of the accounting department for figures and statistics bearing upon the construction and operating costs.

And to the younger men in the accounting department I would urge the importance of being well grounded in the theory of accounting, thus fitting themselves for promotion to fields of larger responsibility and greater remuneration. There should be one or more students in this course in every company connected with the Association.

C. L. S. TINGLEY, Second Vice-President.

SAN FRANCISCO MUNICIPAL RAILWAY REPORT

WILLIAM DOLGE, CERTIFIED PUBLIC ACCOUNTANT
SAN FRANCISCO, CAL., May 29, 1914.

To the Editors:

Gentlemen: I have read with much interest your editorial in the issue of May 23 on the San Francisco Municipal Railway report.

The preparation of the report brought out many novel points, among them the propriety of capitalizing the expense of the elections held Dec. 30, 1909, and April 22, 1913, and not capitalizing the elections held Dec. 2, 1902, Oct. 8, 1903, and June 24, 1909. Expense of a municipal election on account of a municipal public service enterprise may be likened to the promotion expense incurred by a private corporation. For that reason, it seemed proper to capitalize the cost of the election at which the bonds were authorized (Dec. 30, 1909) and also to capitalize the cost of the referendum election April 22, 1913. The three prior elections may be compared to three separate attempts to promote the undertaking, and I am quite sure that if in a private corporation the three earlier promotions (elections) were unsuccessful that the Railroad Commission of the State of California would not permit the railroad corporation to capitalize the cost of the three unsuccessful attempts.

Apparently the writer of the editorial overlooked the chronology appearing on the inside cover of the report, for it is there stated that the budget appropriation of \$325,000 made in June, 1906, for the Geary

Street Railway was used for the reconstruction and rehabilitation of streets and buildings destroyed in the disaster of April 18-22, 1906. In so far as there were any expenses for legal services, engineering, etc., prior to 1909, I question whether the Railroad Commission would permit their inclusion as capital expenditures. In any event, the amount was a negligible one, for all or nearly all of the \$325,000 appropriated for the railroad was spent for the reconstruction and rehabilitation of streets and public buildings.

It was feared that to set up a separate reserve for injuries and accidents (in the first report that was bound to have a wide circulation) would prove a temptation to accident fakirs and ambulance chasers. At this time the important thing is that the reserves set up shall be deemed adequate by competent authority. So long as there is no deliberate misstatement, I am frank to say that I do not believe that "the effect" (of combining the reserves for depreciation and for injuries and accidents) "to others than the close analyst is bound to be misleading."

WILLIAM DOLGE.

NEW ELECTRIC RAILWAY POWER CONTRACT IN ALABAMA

Recently a contract has been signed between the Alabama Power Company and the Birmingham Railway, Light & Power Company, of Birmingham, Ala., which company is part of the American Cities Company, for the furnishing of energy to the Birmingham district from the hydroelectric plant of the Alabama Power Company, situated on Coosa River, some 60 miles from Birmingham.

The Alabama Power Company at its plant on Coosa River has installed four units of 17,500 hp, which will generate sixty-cycle, three-phase power at 6600 volts. This will be transformed and transmitted to Birmingham at 110,000 volts, over a steel-tower transmission line of the latest design, equipped with suspension type insulators and No. 00 stranded-copper cables. This voltage will be reduced at the Magella substation of the Alabama Power Company, which is situated on the outskirts of Birmingham, to 22,000 volts and will be delivered to the several substations of the Birmingham Railway, Light & Power Company at that voltage.

The capacity of the present steam plant of the Birmingham Railway, Light & Power Company is 17,400 kw. From this station current is furnished to approximately 140 miles of street railway, for the lighting of Birmingham and suburban towns, and to numerous power consumers in the district. This plant will be retained as a reserve station and to insure continuity of service. In addition to this, the Alabama Power Company has a 12,500-kw steam turbine station at Gadsden, Ala., which is also connected to its system.

Approximately 60,000,000 kw-hr. of electrical energy is being consumed each year in the Birmingham district. A considerable portion of this is furnished to mining and manufacturing plants, which are taking advantage of the extremely low power rates offered.

In a recent order issued by the Pennsylvania Railroad, passenger trainmen are instructed that whenever passenger coaches are crowded, a member of the train crew must announce the number of seats available in other coaches, and must also tell the number of seats available in each coach. Special attention is directed to this practice at the larger terminals, where passengers are liable to be inconvenienced by the congestion of travel.

Equipment and Its Maintenance

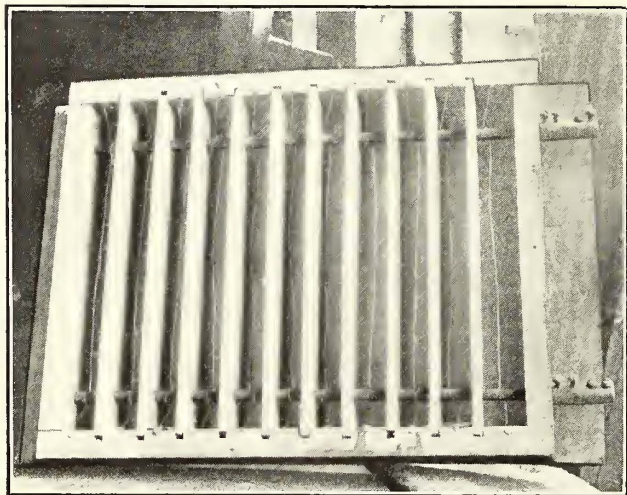
Short Descriptions of Labor, Mechanical and Electrical Practices in Every Department of Electric Railroading

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

HOME-MADE CAR LIGHTNING ARRESTER

BY C. B. GAW, MASTER MECHANIC, KALAMAZOO, MICH.

A home-made car lightning arrester which has been in service for more than two years without a failure has been developed by the mechanical department of the Michigan United Traction Company at Kalamazoo, Mich. Essentially, this device consists of a frame $12\frac{1}{2}$ in. wide x 16 in. long x $2\frac{1}{2}$ in. deep and divided into eleven cells. At one side of this frame is a section of No. 00 trolley, which is connected into the power circuit, and on the other side of the frame also a section of No. 00 trolley which is connected to ground. These two copper bars are connected in each of the eleven cells with short pieces of No. 29 double cotton-covered magnet wire with an insulated Western Union splice in each. The con-



Michigan United Home-Made Car Lightning Arrester

nection of this magnet wire to the No. 00 copper bus in the power circuit is bare, and that to the ground is insulated by the cotton insulation on the No. 29 wire. After a thorough test it has been found that this insulation is just sufficient within reasonable working limits to prevent its breaking down in the Western Union joint when the 600-volt trolley current is on the line. In case of lightning discharge, however, this insulation is broken down and an instantaneous connection to ground is made.

The lightning arrester cabinet is made of $\frac{7}{8}$ -in. pine strips with a $\frac{1}{2}$ -in. sheet asbestos back and $\frac{3}{16}$ -in. transite board partitions between the eleven cells. The two sections of bare No. 00 copper trolley are passed transversely through the transite board partition walls at each side of the cabinet. Both of these copper buses fit into sockets at one side of the cabinet and pass through the opposite side of the cabinet, terminating in two-way sleeve connectors. Each of the No. 29 magnet wires in the cells contains, as mentioned before, a Western Union splice at its center, which, after it is made, is dipped in a thin solution of shellac to prevent chafing. The No. 00 copper bus is connected into the power cir-

cuit between the trolley base and the choke coil. The grounded bus is connected by a ground wire securely fastened to one of the motor cases.

For more than two years 100 arresters of this type have been in service, and there has not been a single instance where lightning has reached the electrical equipment. In cases where lightning did strike a car protected with this arrester, one or more of the No. 29 wire connections were burnt in two, thus requiring renewals from time to time. Variation in the quality of the insulation at the Western Union splice, as well as at the insulated connection to the grounded No. 00 copper bus causes the weakest wire to fail with each lightning discharge. As will be seen from the description of the cabinet and the material used, this arrester is comparatively inexpensive, and its successful protection of car electrical equipment after two years of service indicates its practicability.

GAGE AT SPECIAL WORK

BY "CONTRIBUTOR"

The March 28 issue of the ELECTRIC RAILWAY JOURNAL contained an article on derailment at facing point switches by H. H. George which was inspired by some comments by the writer on the same subject. The writer has read Mr. George's conclusions with great interest and feels called upon to explain a little more fully his own position in the premises. It is his humble opinion that the subject cannot be disposed of theoretically. A great many distinctly practical elements enter into it. First, it must be acknowledged that there are in operation over special work practically no perfect wheels set to exact gage, or at best only a very small percentage are in this ideal condition. Then again, the writer has found that trucks are sometimes out of square, and that wheels vary in diameter, develop double treads and all kinds of odd-shaped flanges which do not conform at all to the standard wheels for which the special work is designed. With these points, briefly stated, in mind, the writer decided that the street was the place to determine causes. Some of our derailments at facing point switches were very puzzling, but after several years we proved that on the Connecticut Company's system at least nine out of ten such derailments occurred when the wheels were riding on the tongue; in other words, derailments when the wheels were guarding against the side of the switch tongue were so rare that we eliminated them from consideration.

For example, let us take a diamond switch tongue in a Y-layout or turnout: $\frac{1}{4}$ -in. wide gage would be very satisfactory (although we think unnecessary) for one-way operation but fatal for the other because we would have guard action in only one direction. Hence, cars operated in the opposite direction would be in trouble due to the back of the wheel flange striking the mate point with a possible chance for derailment.

Another case in point: It has become standard with the Connecticut Company to use the open point switch

A common form of calibrating spring is one spirally wound with nicked steel wire. A loop is provided at one end for hooking to the armature while a nickel-plated brass cap is soldered to the other end, this cap being tapped out to receive the adjusting screw. This method of fastening the cap to the spring is not satisfactory as the cap becomes unsoldered and the end of the spring pulls out. A form of cap which will not pull out and does not depend on solder for its fastening is shown in an accompanying illustration. This cap is $\frac{3}{8}$ in. long and has a spiral groove on the outside into which the spring screws tightly. With this cap the active length of the spring is reduced by one turn, but with carefully made springs this reduction does not affect the tension of the spring appreciably. Another trouble sometimes found with new calibrating springs is that they are wound with too much initial tension, so that the circuit-breaker will not open on overload even with no tension on the spring when the armature is in the raised position.

HAND TRIP

An easy means must always be provided for opening circuit-breakers by hand. This usually takes the form of an insulated knob on the armature or latch. Generally provision is also made that the movement of the operating handle in a direction opposite to that for closing will trip the latch and cause the contacts to open. A severe blow results from the sudden opening of the breaker and some means must be provided to absorb this and to prevent the rebound of the contacts. Soft rubber bumpers were used on older types but these proved unsatisfactory due to the short life of the rubber.

The various levers and arms comprising the operating and trip mechanism should be designed for strength, and all fulcrum points made as large as possible. An accompanying illustration shows a release latch for a GE circuit-breaker which has been redesigned by the operating company to prevent excessive breakage of this part and the spring which operates it. The original design had a flat spring riveted to the latch. This spring was continually breaking. The accompanying design shows the replacing spring of coil type which has overcome the trouble due to breakage. At the same time the lever has been strengthened and more metal has been added around the fulcrum points, as these wore through quickly in the original design.

One of the greatest defects in the design of old types of circuit-breakers was the great number of small parts. Manufacturers have recognized this disadvantage and in the late type of breakers an effort has been made to keep the parts few in number, rugged in construction and all mechanism as simple and reliable as possible.

INSULATION AND ARC CHUTES

Another important part of the construction of a circuit-breaker is the insulating material which separates the contacts and current-carrying parts from each other and from ground. Some of the essential qualities of a good insulating material are the following: It must withstand a considerable degree of heat, and where used as arc chutes it must withstand the arc without melting; it must be permanent and of sufficient mechanical strength to withstand rough usage; it must also resist carbonization, since excessive carbonization forms a path for the current to leak to ground and it must not absorb moisture from the air.

The arc chute serves to confine and direct the arc caused by opening the circuit until the magnetic blowout extinguishes it. It is therefore subjected to more carbonization and burning than other insulating parts. On inspection the arc chute should be carefully wiped out

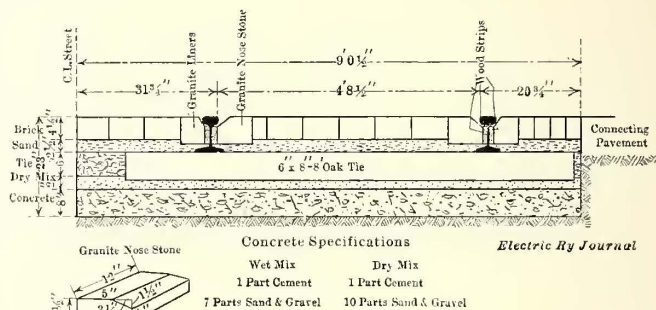
with cheesecloth and shellacked, making certain that the shellac is completely dry before the car is allowed to return to service.

LOCATION

Circuit-breakers may be subjected to excessive short-circuits and overloads which represent a tremendous amount of energy. Their function is to open the circuit under these conditions without injury to themselves or any adjacent parts. They should therefore be located so that the arc and hot vapor can be readily dissipated without the danger of floating to some grounded part or setting fire to any inflammable material. In standard railway practice the circuit-breaker is usually mounted under the canopy, where it is readily accessible to the motorman and where it can be quickly closed so as to avoid delays.

CONCRETE MIXING AND PLACING AT INDIANAPOLIS

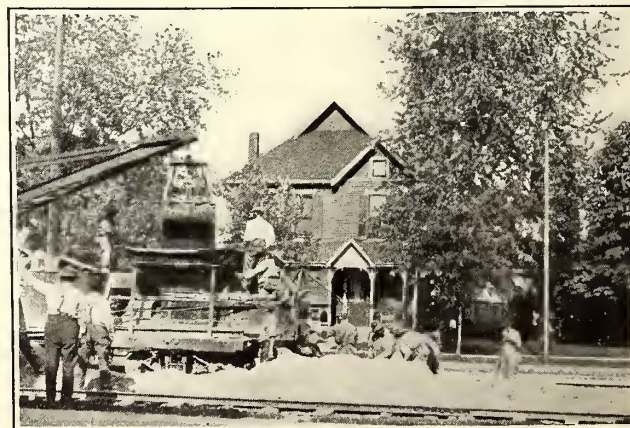
The track and roadway department of the Indianapolis Traction & Terminal Company has gone a step further than many other railways in reducing the force necessary to mix and place large quantities of concrete in track rehabilitation and extensions. Its outfit com-



Indianapolis Concrete Mixing Plant—Cross-Section of Concrete Track Construction

plete is made up of four cars, namely, a general utility motor car, a 3800-gal. tank car, a derrick car and a mixer car. With this equipment working up to capacity this company has never had sufficient work open to keep the plant in operation during an entire day. It has, however, demonstrated that it can average approximately 270 lin. ft. an hour of 8-in. concrete slab 9 ft. wide. This totals approximately 70 cu. yd. per hour of concrete in place when the plant is manned by fourteen men.

The tank car is used to provide a constant water supply and also to avoid the extending of connections to fire hydrants at street intersections. This tank car is



Indianapolis Concrete Mixing Plant—Side View of Mixer

connected to the mixer by way of a 2-in. rotary pump mounted on the mixer car. The derrick car is coupled to the mixer car, and the clamshell boom swings over a large metal hopper on the mixer. The derrick equipment is of the Byers double-drum hoist type with a swinging gear, and a 1/2-yd. Hayward clamshell bucket. The hoisting mechanism is operated electrically, consequently a single operator is all that is required. The concrete mixer car is equipped with a continuous mixer of the Drake duplex type, motor driven. Gravel is de-



Indianapolis Concrete Mixing Plant—View from Mixer End

posited on the street by dump cars, and the batches are virtually measured by the quantity of material picked up by the clamshell bucket. As the worm gear in the continuous mixer mechanism is arranged to feed two sacks of cement to each clamshell bucket-full, the derrick operator is required to pick up a full bucket with each operation.

A force of from twelve to fifteen men is required to man the plant completely. These men are engaged chiefly around the mixer and derrick car. After the material has been deposited on the street by the dump



Indianapolis Concrete Mixing Plant—View of Train

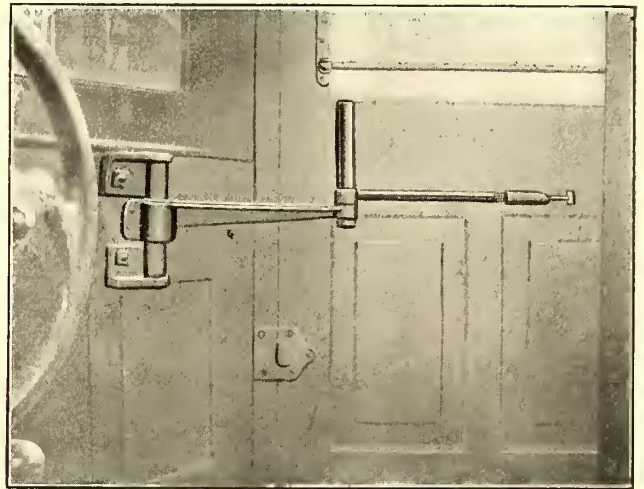
cars the track is raised clear of the finished slab and set on blocking, after which the concrete is deposited in place. When the slab has set from twenty-four to forty-eight hours the track is dropped to the slab and then tamped to its permanent surface with a mixture of dry gravel and cement. A sufficient quantity of cement is added to the gravel merely to make it possible to tamp it firmly in position under the ties. The slight amount of surface water which later percolates through the pavement causes the mixture to set and form a fairly good grade of concrete.

In connection with the foregoing account, it is perti-

nent to present a cross-section of the standard wooden tie and T-rail concrete track construction for which the concrete mixing and placing outfit described is used. This engraving not only shows the track construction in detail but also presents the specifications for the concrete and the form of granite nose block.

SIMPLE DOOR-OPERATING MECHANISM

By the process of elimination the master mechanic of the Kalamazoo (Mich.) Street Railway has reduced his door-operating mechanism to a very simple form. At first this mechanism consisted of the usual crank and handle, with a combination of bell cranks under the ves-



Simplified Door-Operating Lever, Kalamazoo

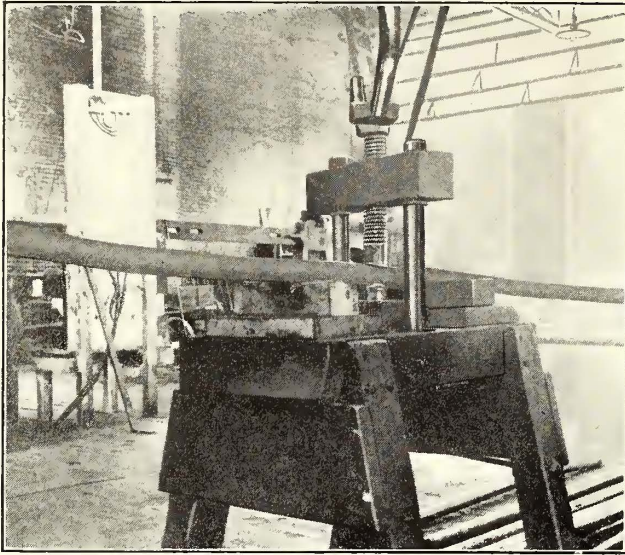
tibule floor and just under the bonnet. As shown in the illustration, the simplified mechanism consists of nothing more than a handle applied at the pin which connects the pivoted lever attached to the door and the one bolted to the front of the vestibule. By making these pivoted levers slightly tight in the straight-line position, the motorman is able to press the handle beyond center, which serves to lock the door in the closed position. To open and close the vestibule door the motorman must shift his position a little, which makes it practically impossible for him to close the door and start the car simultaneously.

At the meeting of the Hastings & District Electric Tramways, Ltd., Hastings, England, G. Kitchin, who presided, said that last May he told the directors that the bill for the substitution of the overhead system of electric traction for the Dolter surface-contact system had been rejected by the House of Lords. The company had also been notified by the Board of Trade that in September it would call upon the company to cease using the stud system. After considering various alternatives the company decided to install the Tilling-Stevens petrol electric system on the Front line, and now has six cars in service and eleven more under order. The new cars are running satisfactorily.

In a recent consular report it is indicated that the proposed railway from Valparaiso to Santiago, via Casa Blanca, in Chile, is soon to be realized. It is suggested that \$11,193,000, which had originally been intended for the electrification of the present steam railroad, be diverted for the building of the new line. The President and parliamentary representatives of Valparaiso are unanimous in support of the project, therefore it is only dependent on favorable action by the Senate to insure the success of the undertaking.

HOME-MADE TROLLEY POLE STRAIGHTENER

In order to facilitate the work of straightening trolley poles, a handy and inexpensive trolley pole straightener has been developed by the mechanical department



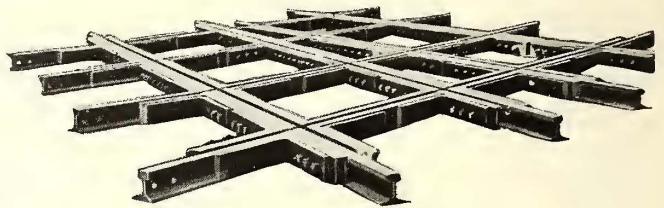
Toledo Railways—Home-Made Trolley Pole Straightener

of the Toledo Railways & Light Company, Toledo, Ohio. Essentially it consists of a substantially built wooden bench securely bolted to the shop floor, to the top of which a screw press has been attached. Blocking at each side of the bench permits the press to be used in straightening short kinks, and also to serve as a clamp for straightening long bends by springing the ends of

the trolley pole. Clamping and pressure action is brought to bear on the trolley pole by a double-handle crank attached to the pressure nut.

TRACK CROSSING MADE AT KANSAS CITY

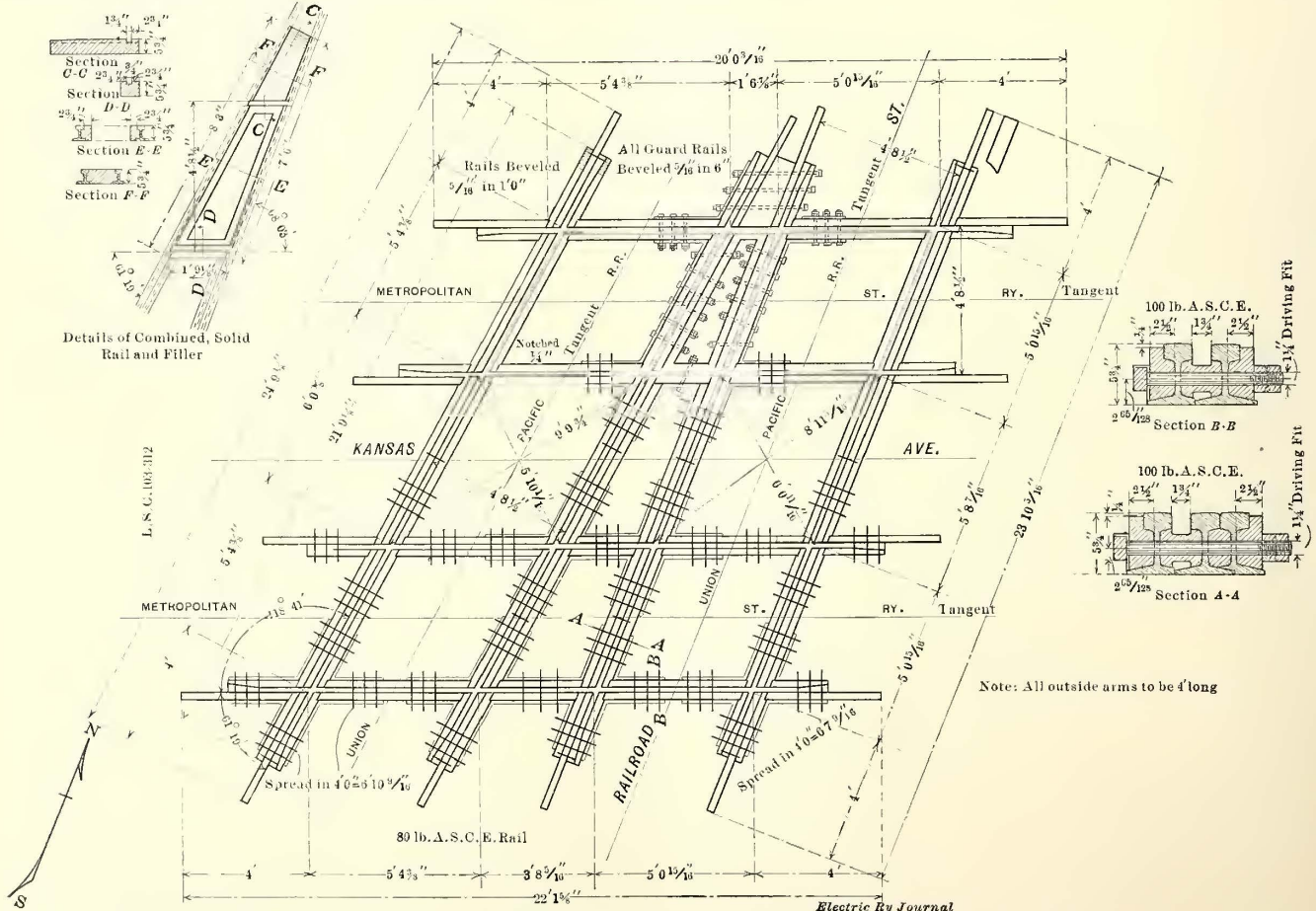
The Metropolitan Street Railway, Kansas City, Mo., has recently completed at its shops under the direction of A. E. Harvey, chief engineer, and G. J. Smith, master mechanic, the T-rail crossing shown in the accompanying drawing and half-tone. This is a steam railway crossing for use at an intersection with the Union Pacific Railway at Kansas Avenue and Railroad Street, Kansas City, Kan. While the company has built



Kansas City Crossing, Complete

a number of crossings at its shops, that just finished is by far the largest that it has ever made.

In general design the crossing does not differ from others used by this railway, but there is considerable difference in detail. Thus all knee braces were planed to fit the section of the rail, and they were also made unusually heavy in view of the company's experience that such braces prove often to be the weakest part of a crossing. All holes were reamed before the crossing was assembled, and the crossing was put together with bolts that had been turned and then installed with a driving fit.



General Layout and Construction Details of T-Rail Steam Railroad Crossing Built at the Shops of the Metropolitan Street Railway, Kansas City, Mo.

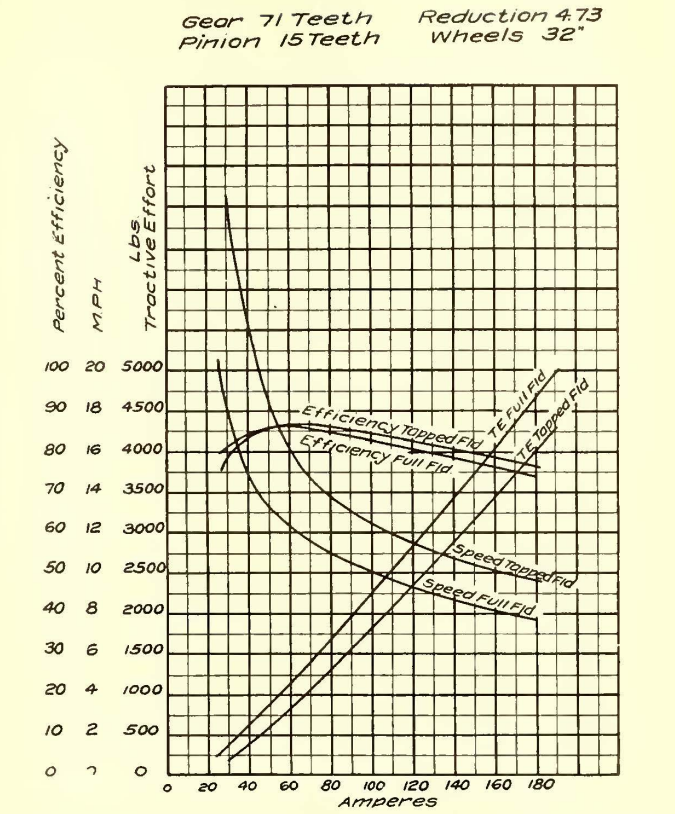
TAP FIELD MOTORS FOR CHICAGO CITY RAILWAY

The 200 new motors in two-motor equipments recently supplied by the General Electric Company to the Chicago City Railway for service on its new cars, while following generally the well-defined lines of modern railway motor practice, embody many improvements. These motors, known as GE-242-A, are of the ventilated, commutating pole type, designed for tapped field operation, and are fitted with induced ventilation.

Under the A. I. E. E. standard, the GE-242-A motor has an hourly rating of 65 hp on 600 volts, and of 55 hp on 500 volts, but has a largely increased service capacity when compared with motors of the closed type having the same hourly rating, on account of the positive circulation of air which is maintained through the motor. The characteristic curves show the tractive effort, speed and efficiency at various inputs when operating with both full and tapped fields. The use of cast iron has been entirely eliminated from the design, steel or malleable iron being used for castings, and pressed steel or drop forgings wherever practicable.

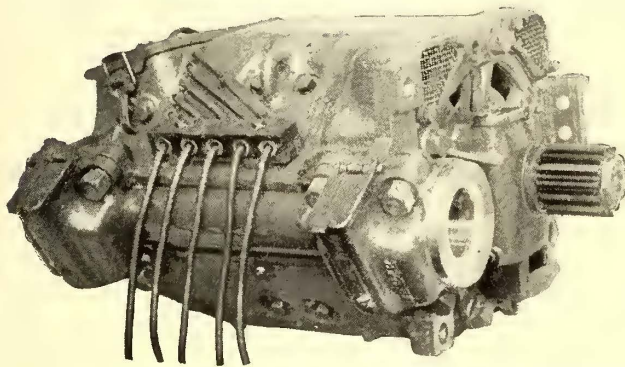
The frame, which is of soft cast steel, approximately octagon in transverse section is of the box type. A bored opening, to take the frame head, is provided at each end, the one at the pinion end being sufficiently large to enable the armature, field coils and pole pieces to be easily exchanged. The solid malleable iron frame heads form the housings for the armature shaft bearings. They have boxes for oil and waste, and auxiliary oil wells for filling and gaging the supply of oil. They also have wells into which is drained any oil that may be thrown off by the deflectors on the armature shaft.

Provision is made for jack screws to facilitate the removal of the frame leads for inspection or repairs. The housings for the axle bearings are cut at an angle of 30 deg. to the vertical, the upper half being integral with the motor frame. This relieves the stress on the bolts and facilitates operations when mounting the motor on the truck. The bearing caps have large oil wells and are bolted to planed and tongued surfaces on

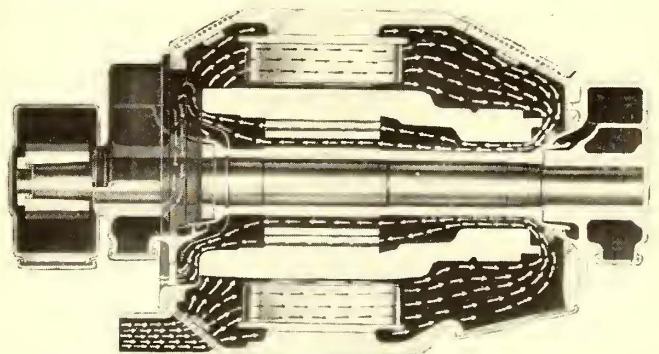


Characteristic Curve of GE-242 600-Volt Railway Motor on 550 Volts

laminations. The commutating pole pieces are drop forgings. The field coils are wound of strip copper, insulated between turns with asbestos, the whole being mummified and insulated with varnished cambric and heavy tape to make them practically indestructible and moisture-proof. They are supported by improved spring metal seats and spring flanges to give an evenly



View Showing Tap-Field Motor with Ventilator Openings at Right



Cross-Section of Tap-Field Motor, Showing Course of Ventilation

the frames by four bolts securely locked. All covers for oil boxes have deep lips and are lined with thick felt spring-pressed against machined surfaces.

Ample facilities for internal inspection have been provided. The cover over the commutator has a spring locking device, which combines absolute security with instant removability. The armature shaft bearings are of bronze, lined with babbitt of such a thickness that should the babbitt be melted out by overheating, the bronze will still support the shaft without injuring the bearing surfaces and also prevent the armature from touching the pole pieces. The axle is completely inclosed between bearings by a sheet steel dust guard.

The four exciting pole pieces are built up of soft iron

distributed pressure and prevent movement and consequent abrasion.

The armature core is built up of soft steel laminations. The shaft may be removed without disturbing the windings or commutator connections. The vacuum-impregnated armature windings are made of rectangular wire. When all coils are assembled, the armature is heated and temporary binding bands are put on under great tension, which press down the coils well into place. When cold, these bands are removed and permanent bands of tinned steel wire are wound on in special recesses. These are secured by mechanical means in addition to their being soldered. This construction insures permanently tight armature coils.

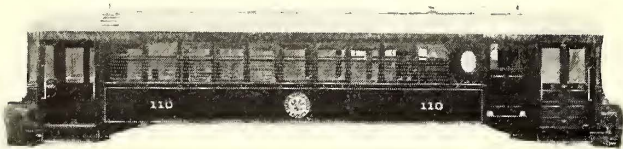
The commutator is built up of hard drawn copper bars, insulated from the steel shell by mica cones and from each other by a mica, grooved to a depth of $3/64$ in. below the surface of the commutator. The brush-holder supports consist of a drop forging into which are pressed two mica insulated studs. These studs pass through porcelain insulators with very long creepage distances, and are held by drop forgings bolted to the frame by tap bolts inserted from the outside. The brush-holder body slides in finished ways on the support and maintains correct alignment throughout the range of adjustment. The bronze body affords thorough protection to the fingers and springs. The brushes slide in accurately machined ways, independent pressure fingers being provided for each brush. The fingers have drop-forged copper tips, which are pressed against the brushes by open-wound spiral springs. These springs are of oil-treated steel, and are of such a design that the tension remains practically constant throughout the limits of wear of the brushes. The tension can be adjusted by means of a ratchet wheel and pawl. A flat shunt of woven copper wire is provided. The brush-holder lead is attached to the support, which admits of removal of the holder without disturbing any electrical connection.

Circulation of air through the motor is maintained by means of a fan cast integral with the pinion end armature head. Air is drawn in through screened openings in the corners of the frame at the pinon end. It passes over and around the field coils and pole pieces to the commutator end; from thence it returns through the commutator shell, through longitudinal ducts in the armature core to the fan, and is exhausted through cored holes in the pinion end frame head to the exterior.

The gears and pinions are of armorized steel, known as "Grade K." These have a ratio of 4.73 to 1, a diametral pitch of three, and a working face of 5 in.

COMBINATION CAR FOR CENTRAL NEW YORK LINE

Two arch-roof combination cars with very neat outlines as illustrated were recently built by the Wason Manufacturing Company, Springfield, Mass., for the Geneva, Seneca Falls & Auburn Railroad, Seneca Falls, N. Y. These cars are of steel construction with mahogany trim in the passenger compartment, and with ash and stained mahogany in the baggage room located at one end. The weight of the car body alone is 23,000



Combination Car for Seneca Falls, N. Y., Before Mounting on Trucks

lb., and its principal dimensions are as follows: Length over body, 32 ft. 6 in.; length over vestibules, 44 ft. 6 in.; width over sills and over posts at belt, 8 ft. 5 in.; bottom of sill to trolley base, 8 ft. $9\frac{5}{8}$ in.; height from the top of the rails to the sills, 31 $5/16$ in., and distance between bolsters, 20 ft. The seating capacity per car is forty-four in winter and forty-five in summer. The bodies are mounted on Baldwin M.C.B. trucks of 6 ft. 4 in. wheelbase and equipped with 34-in. wheels. These trucks carry four Westinghouse No. 533-Y motors. The miscellaneous equipment of the cars includes Brill exhaust ventilators, Van Dorn radial couplers, Consolidated push-buttons, Peacock brakes and Providence fenders.

A NEW SIGNAL FOR ELECTRIC RAILWAYS

The Street Railway Signal Company of Philadelphia has just placed upon the market a new type of contactor signal that can be arranged for either single or double track. A description of the general features of the single track form is given herewith. These signals, which are called "Model E," are of the trolley-contact operated, all-light type, having the three-position aspect for single-track opposing protection but permitting following movements as recommended by the block signal committee of the American Electric Railway Association in its 1913 report.

In the past trolley contact operated signals usually have been mounted on existing trolley poles, but the Model E signals may be mounted either on individual iron poles or else upon existing trolley poles. When the signal is mounted on an individual iron pole the aspect case is carried by an iron bracket which is fastened to the signal pole. This in turn is mounted on the relay case, and the relay case is fastened to a



Signal of Trolley Contactor System as Mounted on an Individual Pole

concrete foundation. This relay case contains the counting relays, the neutral relays, resistances and a terminal board which has the fuses and disconnecting switches mounted thereon. The relay case has doors in front and in back through which complete access to the apparatus is afforded.

The aspects are as follows:

Red alone—Stop. Do not pass contactor.

Green—Proceed by contactor to operate signal.

Red and yellow—Proceed if green aspect changes to this on passing contactor.

Red and yellow—Block occupied by car running in same direction if car is approaching this aspect. Proceed under control if yellow light changes to opposite side of red on running under contactor.

When the block is unoccupied a green light shows in each of the signals, of which one is installed at each end of the block. A car entering the block at one end changes the signal at the other end from green to red, and also changes the first signal from green to red and yellow. A second car may enter the block at

the first signal, extinguishing the yellow light that is burning and lighting the one on the opposite side of the red. This provides a positive and permanent indication that it has been registered. The car will register out regardless of whether it runs through the block and leaves at the opposite end or whether it backs out at the end where it entered.

Should two cars attempt to enter an unoccupied block from opposite ends at the same time and engage their respective contactors simultaneously both signals will change from green to red, and both will not change back to green again until both cars have backed past the contactors. It is not necessary to pull the trolley pole down where either car backs. Should a car overrun a red signal it will not change that signal, and in backing out it is not necessary to pull down the pole. The counting relays are so constructed that the change of the yellow lights for following cars will not take place unless the car has been properly registered.

One of the most important features of these signals is that if a car enters the block simultaneously with one leaving it, or if these entering and leaving operations overlap in any way, such as when a car enters the block at one end, runs through it and then stops under the contactor on either track of the turnout while another car enters at the opposite end all cars will register properly. This is of great importance where the headway is approximately equal to the running time through the block.

The signal mechanisms are of the dry type and have no inflammable parts. The insulation between contacts is of ebony, asbestos and bone. The contacts themselves are of a liberal size and have a heavy contacting pressure, a long rub, and the break is horizontal, permitting natural extinguishment of the arc. Three-quarter-inch air gaps are maintained between all bare, current-carrying parts. Immunity from lightning is assured by this extraordinarily high insulation. There are no delicate adjustments, and the individual parts are large and independently removable to the highest practical degree.

The lights are high-powered and are provided with efficient sun shades to give them arrestive effect even in bright sunlight. The green can readily be seen for 1200 ft. and the red for 1500 ft. No reflectors are used and hence there is no possibility of phantom indications. Two lamps are connected in multiple behind each lens to provide against burn-outs.

The trolley contactors are of the mechanical style, having the same high insulation and large individual parts as the signals. To install them does not necessitate cutting or bending the trolley wire. They operate independent contacts according to the direction in which the car moves under them. They are of decidedly high-speed design.

GASOLINE MOTOR CARS ON CENTRAL NEW YORK SOUTHERN RAILROAD

Two of the latest 1914, model C, engine-motor cars have been delivered by the McKean Motor Car Company to the Central New York Southern Railroad, Ithaca, N. Y. This line, extending between Ithaca and Auburn, N. Y., a distance of 39 miles, was formerly the New York, Auburn & Lansing Railroad, the corporate name of which was changed upon the recent elimination of the receivership.

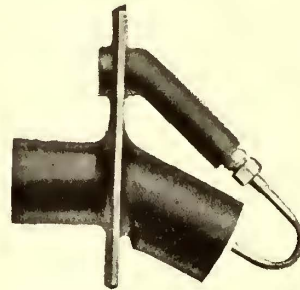
The steam equipment, which heretofore provided the passenger service, has been displaced by these 70-ft. motor cars to secure more attractive, economical and profitable passenger schedules.

The motive power machinery of the cars is similar

to the 200-hp equipments of the Bessemer & Lake Erie, Soo Line and Sunset Central Lines, a description of which was published in the *ELECTRIC RAILWAY JOURNAL*, page 144, Jan. 17, 1914. The special features with which these cars are equipped are: The Warner railway meter which registers the mileage (ahead and backing up) per trip in addition to total mileage covered; pneumatic gong ringer; steam connection for heating cars in winter when not housed at terminal; rear door in passenger compartment for communication between the motor car and trailers; conductor's brake valve and pedal-operated whistle in rear for use of conductor when backing up, and an illuminated indicator on the rear similar to the observation platform indicators on first-class passenger trains.

SAND TRAP FOR USE WITH OFFSET AND SINGLE HOPPERS

The Nichols-Lintern Company, Cleveland, Ohio, specialist in track sanding equipment, has placed on the market a new sand trap, designated as No. 3. This trap was developed for conditions where the sand hopper cannot be located directly over the rail, in which event the adjustment of the sand conducting hose from



Sand Trap for Single Hopper Equipment

the hopper to the rail may prove difficult. This device is so designed that solid piping from the trap can be carried over the rail. It is also designed to give clearance to the truck, dropping down (when the hopper is inside of the car) so that only a comparatively short piece of flexible conduit is required from the solid piping to within a few inches of the rail. This arrangement effects economy on conducting spouts, for

usually when the lower part of the conduit is worn or disarranged, some 30 in. or more of this spout must be renewed. On the other hand, only a very short piece of hose is necessary for replacement when this trap and method of piping are used.

This trap is also adaptable for the truck connection of sand pipes, where the pipes are carried on the trucks to follow the rail around the curve. In most cases, a one-hopper equipment is more desirable than two, for reasons of car construction, regular supply of sand and reduction of detail parts. In general, the No. 3 trap is especially adapted for sanding both rails from one hopper, whether for curve or tangent work.

The trials of multiple-unit trains on the Lauban-Königszelt mountain railways in Silesia, Germany, have proved very satisfactory, and the service is to be extended to Fellshammer, and shortly to the Austrian frontier, at Halbstadt, a total distance of 21.7 miles. The full electrical service will be put into operation before the end of the year, and the working of through trains by locomotives will commence during this summer. To the existing motor-generator station at Nieder-Salzbrunn will be added others at Ruhbank, Hirschberg and Lauban.

The Aurora, Elgin & Chicago Railroad, Wheaton, Ill., has applied to the State Public Utilities Commission of Illinois for permission to donate \$400 for band concerts. It has been the custom of the company for years to donate a similar amount.

News of Electric Railways

Discussion on Municipal Purchase in San Francisco

With the approach of the opening of the Panama-Pacific Exposition, there has been a great deal of discussion in San Francisco in regard to the possibility of the purchase of the United Railroads of San Francisco by the municipality and the consolidation of the system with the present municipal line. It is generally agreed that the direct purchase by the city at the present time is impossible unless the plans for financing the Hetch Hetchy water supply plant are postponed, and all agree that the water situation must take precedence. While the limit of bonded indebtedness of the city, which is now 15 per cent, could be increased by an amendment of the charter, such a move would have to receive the sanction of the Legislature and would require a two-thirds vote. Attention has consequently been directed to plans which will allow the city to acquire the right at once under a scheme of financing which will not involve a large bond issue. One plan considered is that the bonds to be issued shall be a lien only on the earnings of the property.

A meeting to consider this subject was held recently at the Commercial Club, at which the speakers were J. W. Lillenthal, president of the United Railroads; M. W. O'Shaughnessy, city engineer; Percy V. Long, city attorney, and B. J. Arnold.

Mr. Lillenthal, the first speaker, said that he had been diffident about accepting the invitation. If he should advocate municipal ownership and the purchase of the United Railroads it would probably be insinuated that he was trying "to put something over," but if he declined the invitation he would be charged with a lack of sincerity in a statement which he was entrapped into making with reference to what should be done with the United Railroads. He classified public utilities as the absolutely indispensable, the partly indispensable and the non-indispensable. Water supply was the only utility which occurred to him as belonging to the first class. A municipal corporation should not be dependent upon a private corporation for its water supply. Transportation facilities came under the classification of the partly indispensable, and he believed the greatest good and greatest profit to the people themselves would be secured if street-car operation was carried on by private corporations under proper conditions and regulations. But the restrictions placed to-day upon the investment of capital, the demonstrated efficiency of public officials and the conceded need of greater facilities meant that the community had got to suffer or else handle the transportation problem as an entirety. This meant that the city should acquire the United Railroads if it could do so under the proper conditions and on the proper terms. This might be by outright purchase, by lease or in other ways. The speaker said that frankly he did not know which plan would be the best for the city, but he presented some statistics in regard to the capitalized earnings and expenses of the property. The franchises begin to expire in 1929, but some continue until 1952. If the city took over all lines without compensation at the termination of the several franchises the property would still show during its term of life estimated gross earnings of \$306,000,000 and estimated net earnings of \$107,100,000. This allowed nothing for the physical value of the property at the expiration of the respective franchises, and showed that if municipal ownership was ripe it would be worth while to make the effort to acquire the United Railroads with a view of what the system had to sell. No action had been taken by the directors of the company in regard to any proposed sale, but speaking as a citizen Mr. Lillenthal said that if a plan should be worked out by both parties favorable to both sides he would use such influence as he had with the company, or with the stockholders, to carry out such a plan.

Mr. O'Shaughnessy said that the operation of the present municipal line was now successful. It was taking in \$1900 a day, and the Union Street Railway, acquired last November, was taking in about \$900 a day. This made combined earnings of nearly \$1,000,000 a year on an outlay of about \$2,300,000. On a similar basis, with a combined property eight times as large, the earnings should be

\$8,000,000 on an investment of \$19,000,000. However, it could not be expected that traffic on the other lines would be as good as on the Geary road. The speaker remarked that proportionally San Francisco was decreasing in population. It had an increase of only 7000 inhabitants a year for the last four years, whereas, according to statistics of the trans-bay traffic, the cities across the bay had increased about 15 per cent during the same period. The speaker felt that the cause of this was inadequate transportation and inadequate water supply in the city of San Francisco. He thought the limitation of the bonded indebtedness of the city ought to be removed. He said that the cost of the present municipal line per mile of track was much less than the sum at which the United Railroads was capitalized.

Percy V. Long, city attorney, referred to the expenditures to condemn the property of the local water company and said that this sum added to the bonds already issued almost exceeded the bonding capacity of the city. He thought that some agreement by lease or purchase by instalments could be carried on without a change in the present charter limitations on bonds. There would naturally be a radical difference of opinion as to what the city should pay for the properties.

Mr. Arnold said that he hoped that some of those who opposed the recommendations made in his report of two years ago thought more favorably of them now. He had drawn up an amendment to the city charter by which the company would continue in the operation of the line but under which the earnings of the property would gradually amortize the investment of the company and it would ultimately become the property of the city. This amendment, however, had been rejected at a city election. The question now was whether the city, if it took over the operation of the United Railroads, could be sure that there would be the same integrity of management as now exists with the municipal railway property. The speaker then described the franchise situations in Chicago and Cleveland, and the recommendations which he had made in Kansas City. In conclusion, he warned the citizens about extending the municipal line to sparsely settled districts. He had said two years ago that if municipal ownership could be made a success anywhere it could be made a success with the Geary Street line. The city should be careful also about reducing fares and increasing labor charges. The ideal plan was to have a combined system, with universal transfers, operated without parallel extensions.

Toledo Franchise Association Submits Ordinance

The franchise committee of the Toledo Citizens' Franchise Association submitted to the members of that organization on the evening of June 16 a draft of the proposed street railway franchise prepared for the purpose of effecting a compromise between the city of Toledo and the Toledo Railways & Light Company on the questions of the rate of fare and service on the city lines. This draft follows the Doherty proposal closely in most of its provisions, but certain changes have been made to comply with the demands of the administration. The new proposal has been approved by the executive committee of the Franchise Association, and on the evening of June 16 more than 400 members approved the proposal. The vote followed detailed explanations of the proposal by Attorney Frank L. Mulholland and Judge John H. Doyle, both members of the committee which prepared it.

The new proposal provides for a renewal of the Toledo Railway & Light Company's franchise for a period of twenty-five years. During the first four months from the date of the ordinance a rearrangement of the lines is to be prepared by an expert or experts with a view to giving the best service possible with the highest operating efficiency. This must provide for a cross-town line and such additions, extensions and eliminations as Council may direct. The compensation of the men employed to do this work must not exceed \$25,000 and is to be paid by the company. The changes required by this rearrangement are to be completed within two years after Council adopts the plans of the experts, and

that body is given four months after the report is received in which to adopt it in full or modified. Thus the company would be expected to complete the rearrangements within thirty-two months after the ordinance goes into effect. Franchise rights are to cease on all portions of track eliminated in the rearrangement and the company must restore the streets to good condition.

The ordinances proposed a trial period of operation of twelve months at a rate of fare of five tickets for 15 cents, immediately following the expiration of the thirty-two months or on the completion of the rearranged system. The cash fare is to be 5 cents. During the period of rearrangement and reconstruction, beginning with the date of the franchise, the rate is to be five tickets for 15 cents, good between 5.30 and 8.30 a. m. and 4.30 and 6.30 p. m., and six tickets for 25 cents, good at all times of the day. This is the same as in the past, except that the low-priced tickets are good one hour longer in the morning than under the old contracts, and it would probably mean quite a loss to the company for the thirty-two months.

At the expiration of the experimental period of twelve months, Council by resolution is to fix the rate of fare, for not less than five years, from data collected during the experimental period. This rate must be sufficient to cover all legitimate expenditures, including the interest and dividends on the investments. No franchise value is to be considered in fixing the rate, however. The rate of fare so fixed is to continue so long as neither party shall ask a revision, but in no event for less than five years. After the expiration of each five-year period, either party may ask for a revision made under the same conditions as the first. All actions relating to the establishment of a rate of fare are to be submitted to a vote of the electors. Babies in arms are to be carried free and a fare of 1 cent is to be charged for children under eight years of age. The fare on interurban cars within the city limits is to be 5 cents. The company is to give transfers without charge except to and from parallel lines.

The City Council is to name a commissioner or commissioners, not to exceed three, to secure facts and data during the "twelve months try-out period." The books, records, maps and receipts are all to be open to such commissioner or commissioners. They may also value the property and do such other work as may be required. The company is to furnish office room in its general offices for the commissioner or commissioners and such help as may be necessary. The commissioner is also to have the right to direct the operation of the company as to routing and rerouting cars and schedule of cars, with general supervision over the operation. This is in accord with the proposition originally made by Henry L. Doherty for the company. All facts and information obtained are to be reported to the Council so as to assist in arriving at an equitable rate for the first five-year period following the try-out period.

The company is to reimburse the city for the amount paid the commissioner or commissioners for compensation and expenses, but the sum is not to exceed \$25,000. The city may appoint a commissioner or commissioners at any other time during the life of the franchise, and they are to have the same authority and powers as in the first instance, but all expenses thus incurred are to be paid by the city. The company is to furnish all its cars with pay-as-you-enter equipment within eight months after the ordinance goes into effect.

The right to purchase the property at any time within the period of the franchise is reserved by the city, but notice of twelve months must be given the company of intention so to do. The company is to agree to sell at the appraised value to be determined by arbitration. The decision to purchase the property may be reached by an initiative or referendum vote, but the right must be exercised within sixty days after the result of the vote is ascertained. A description of the method to be used in ascertaining the value of the property is included in the draft. It includes nothing for franchise rights.

In case the city should purchase only the tracks and track equipment the company agrees to furnish current at a fair price for the operation of cars for at least eighteen months after the property is acquired by the city. Condemnation proceedings are provided for, if necessary, to secure the property in whole or in part.

Provision is made for the operation of interurban cars over

the city tracks, under the regulation of the city, the compensation to be not less than 60 per cent of the city fares collected. Transfers are to be exchanged between the city cars and those of the Toledo, Ottawa Beach & Northern and the Maumee Valley Railways & Light lines. Interurban companies operating over city tracks are each to furnish a bond of \$50,000 to insure the company and city against damage.

The company is to pay the expenses of paving, repaving and improving streets between its tracks and 12 in. from the outer tracks. Freight cars may be operated between 12 o'clock midnight and 5 a. m. In addition, mail, funeral, express, observation and special cars may be operated over the tracks at any time. Tracks and a space 12 in. each side must be kept clear of snow in the winter and sprinkled in the summer.

The city reserves the right to nominate a purchaser for the company's property at the expiration of the franchise.

Should the city and the company fail to agree upon the valuation and terms, provision is made for arbitration and the method is fully set out in the ordinance. The city is to have the right at any time within two years before the expiration of the franchise to invite bids for a franchise and to offer the company's property to the successful bidder, at a price to be fixed by arbitration. The present company or its successor may submit a bid upon the same terms and conditions as any other company.

Statement by Majority of Northampton Arbitration Board

Owing to a dispute regarding the interpretation of the recent finding of the arbitration board in the wages case of the Northampton (Mass.) Street Railway, a majority of the board has issued a statement emphasizing the relation of the finding to the conditions of labor on the company's cars. The board points out that the arbitration agreement of Dec. 23, 1913, specified that the question to be determined by the board was the rate of wages for motormen and conductors, linemen, carhouse men, track walkers and track greasers for a period of one year from June 1, 1913. The agreement of June 1, 1912, which expired on June 1, 1913, and under which the employees were working up to the time when the findings of the arbitration board take effect, provided the following rates of pay: First year, 21 cents an hour; second year, 22.5 cents; third year, 23 cents; fourth year, 24 cents; fifth year, 24.5 cents; sixth year and thereafter, 25 cents. This agreement provided that nine and one-half hours' work inside of twelve consecutive hours should constitute a day's work, men whose runs were less than nine and one-half hours reporting to the superintendent's office subject to orders for the balance of their day's duties. On Sundays only a nine-hour day was required.

The employees, under the 1912 agreement, received ten hours' pay for this nine and one-half hours' work at the foregoing rates an hour, with the result that the following actual wages were paid: First year, 22.1 cents an hour; second year, 23.68 cents; third year, 24.2 cents; fourth year, 25.26 cents; fifth year, 25.79 cents; sixth year and after, 27.36 cents. These were the hourly rates which the men actually received up to June 1, 1913, and offered to continue. The men contended that they were insufficient. The award of the board in May, 1914, increased the hourly rates to 23 cents for first-year men; to 24 cents for the second year; to 25 cents for the third year; to 26 cents for the fourth year; to 27 cents for the fifth year, and to 28 cents for the sixth and succeeding years. The board points out that the desire of the employees to work only nine hours, since the passage of the so-called "nine hours in eleven" bill in the summer of 1913, does not affect the matter at issue. There is nothing in the law to prevent employees from working more than nine hours if they so desire, and there was no evidence before the board upon which it could be found that the company ever agreed to give any of its employees ten hours' pay for nine hours' work. The demand of \$2.50 a day for the first six months, \$2.75 for the second half-year and \$3 per day thereafter was never presented to any official of the company until the first day of the hearing before the board. The report embodies only such fundamental matters of contention as were at issue in the hearings, and the board avers that the award of a wage scale based upon actual platform time is clearly expressed

and in harmony with the requirements imposed upon it. The statement is signed by Thomas A. McDonnell and Timothy G. Spaulding.

Hearing on Boston Consolidation Bill

The joint legislative committee on street railways and metropolitan affairs gave a hearing at Boston, Mass., on June 11 upon the bill prepared by counsel for the Bay State Street Railway with the object of effecting a consolidation of all electric railways within the Boston metropolitan district. Frederic E. Snow, counsel for the Boston Elevated Railway, set forth the company's willingness to co-operate in the proposed merger, provided the necessary legislation was enacted. Mr. Snow said that the bill under consideration was in no sense a bill of the Boston Elevated Railway, and while a number of suggestions made to James F. Jackson, author of the drafted statute, have been adopted, the bill was in the main substantially in the form recommended by the Bay State company. Under its charter the Boston Elevated Railway was limited to a 5-cent fare and was obliged to give free transfers, although in many instances the ride was so long that passengers were carried at a loss. Persons living in those parts of the metropolitan district not served by the Boston Elevated Railway did not enjoy the same facilities as the patrons of that company for going to other parts of the district, nor could they in some instances ride to the center of Boston for a single 5-cent fare.

Mr. Snow said that it was the aim of the bill to equalize the transportation facilities and rates of fare within the district defined in the proposed act, through consolidation of companies and a general readjustment of the rates of fare. The bill was a permissive one, requiring the consent of the Public Service Commission as well as that of the companies.

P. F. Sullivan, president of the Bay State Street Railway, who has considered carefully the problem as a whole, believed that it would enable the companies to provide a consolidated transportation service which would benefit the entire community. The Boston Elevated Railway had neither directly nor indirectly committed itself to consolidation with the Bay State company upon any terms, but it was not opposed to the proposed legislation.

J. B. Eastman, of the Public Franchise League, recommended that the bill be referred to the Public Service Commission for study. James H. Vahey, counsel for the unions of street railway employees in the district involved, held that present agreements between the companies and their employees were not sufficiently protected by the bill. Mr. Jackson informed the last speaker that he was agreeable to any provision which would protect these agreements. The hearing was continued to June 15.

San Francisco Considers Purchase of United Railroads

Official steps toward the possible acquisition of the United Railroads by the city of San Francisco were taken at a meeting of the Board of Supervisors on June 8 when a resolution was unanimously adopted empowering the public utilities committee to confer with the officials of the company and take preliminary steps to determine the value of the property.

The resolution was introduced by the public utilities committee. It declared that the president of the United Railroads had announced his willingness to sell to the city, and in a lengthy preamble set forth the benefits which are expected to accrue to the city through municipal ownership of the existing railways. The public utilities committee was then empowered as follows:

To examine and investigate carefully all legal and financial questions involved in such acquisition.

To examine, investigate and value the physical properties and franchise of the United Railroads.

To confer with the president or other officers of the United Railroads, whenever the same may be expedient or necessary.

To request of the United Railroads the price and terms upon which it will sell and transfer its railway properties to the city and county of San Francisco.

To use and employ the services of the board of public works, the engineering department and the city attorney's office, as far as may be necessary and proper.

To report upon completion of such investigation, its findings and conclusions to the Board of Supervisors.

Before the adoption of this resolution the board was assured that the public utilities committee would spend no money in conducting its investigation without first securing the specific consent of the entire board.

Bion J. Arnold appeared before the meeting and made a brief talk to the Supervisors. He issued a warning against what he termed a natural propensity to extend the present municipal railway into non-paying territory.

The remarks in regard to municipal ownership in San Francisco made recently at the Commercial Club in that city by J. W. Lilienthal, president of the United Railroads; M. W. O'Shaughnessy, city engineer; Percy V. Long, city attorney, and B. J. Arnold are referred to on page 1410 of this issue.

Kansas City Ordinance Passed by Both Houses

The franchise ordinance extending the grant of the Metropolitan Street Railway, Kansas City, Mo., nineteen years is practically ready for the people's vote on July 7. The measure passed the upper house of the Council on June 15, and went to the lower branch on June 17. Mayor Jost, one of the framers of the measure, will probably sign it, and the next step will be to present it to the people for their ratification or rejection. Indications are that the franchise ordinance will be passed, though the *Kansas City Star* and *Times* are waging a bitter fight against the measure. On the other hand, the *Journal* and *Post* are in its favor.

The company is taking active steps to determine sentiment on the franchise question. All employees of the company have been asked to question their friends as to their attitude on the franchise and responses indicate that the ordinance has an excellent chance of passing.

Everything considered, sentiment is very favorable to the franchise, and unless some marked change of attitude develops it is very probable that the measure will be passed.

The interurban roads have come out in favor of the ordinance, and will co-operate as far as possible in securing a favorable vote. Some of those interested in the situation have sounded the Missouri Public Utilities Commission as to its attitude. The commission has maintained a policy of silence, however, and will probably not take action on the proposition unless it is asked to pass on some of the questions involved.

Boston Transit Commission Continued

Governor Walsh of Massachusetts has signed the bill to extend the term of the Boston Transit Commission three years. The Governor's statement follows:

"The bill to extend the term of office and to define the duties of the members of the Boston Transit Commission is similar in form to the acts which have been passed at intervals of three years on five different occasions, each extending the term of the commission.

"While I do not approve the extending of the term of service of the members of commissions by legislative action, yet the power to do so is inherent in the Legislature, and the Legislature, under our constitution, can not only extend the terms of office of public officials, but actually appoint the personnel of every commission in the State. The right given to the Governor to name members of commissions is entirely delegated by the Legislature, but it is the established policy of the State to have the personnel of commissions named by the Governor.

"To veto the present bill might lead to the failure of the present Legislature to make provision for the continuance of the work this commission is doing, all power of which is vested solely in the commission. I do not care to assume the responsibility for a situation which might arise of complete chaos—legal, structural and financial—in this work. The failure of the Legislature to provide for the continuation of the work of this commission would lead to great embarrassment to contractors, to the city, to prospective lessees and to the public. It does not seem to me that the principle involved is of such supreme im-

portance in view of the Legislature's constitutional power and previous action in this matter to warrant a veto of the bill."

P. F. Sullivan on the Depreciating Fare Unit

Patrick F. Sullivan, president of the Bay State Street Railway, Boston, Mass., addressed the members of the United Improvement Association at the Boston City Club on June 3, 1914. Mr. Sullivan said in part:

"It is safe to say that transportation to-day is the lowest element in the so-called cost of living. Transportation, particularly in street railways, has decreased in cost. Since street railways are tied up with the public interest their capital has passed from the control of the investors. It is looked upon differently from capital invested in private enterprises. There is no reason why there should be a difference in attitude. Because of it street railways find it difficult to get money for essential improvements.

"Capital must have a sufficient return when invested, but its regulation by the State when invested in public service corporations is one of the most pressing subjects before the American people. To-day more service than ever is given for each unit of fare, and that unit has less purchasing power than it had ten years ago.

"I contend that a man who invests \$100 in a public service corporation is entitled to reasonable protection and a reasonable return for his investment. But because of the control there is another attitude in the matter and it is difficult for a street railway to get money even for necessary improvements. The 5-cent fare unit is unscientific, un-businesslike, uneconomic.

"Had it not been for some increase in business, more than 90 per cent of the capital invested in street railways to-day would be pretty near receivership.

"Street railways in this State have taken no account of depreciation. The Public Service Commission now insists that depreciation shall be recognized and charged into account. That is a most serious situation at the present time. Depreciation is an operating expense, part of the cost of doing business, and when that cost is added there will have to be an increase of rates or else there will be a serious state of things.

"There are twenty-six railway corporations in this State that did not pay or earn any dividend last year. Nearly every one of those companies operated in unprofitable territory, some of which would not pay even with a 10-cent fare. The unit of 5 cents was established when the routes were short, with no basis except the convenience of the nickel as a coin."

Illinois Utilities Board Rules of Procedure.—The State Board of Public Utilities of Illinois has issued a booklet, "Rules of Practice and Procedure and Forms Governing Matters Before the Commission," to guide the utilities and the municipalities in transacting their business with that body.

Steel Trolley Poles in Meriden.—J. K. Punderford, vice-president and general manager of the Connecticut Company, has sent to the Mayor of Meriden, Conn., a letter indicating the conditions under which the company would be willing to substitute tubular steel poles for wooden poles within territorial limitations which are specified by the company.

Municipal Operation in Nelson, B. C.—The Nelson (B. C.) Street Railway has been taken over by the city and the line is now being operated by the City Council. A. S. Horswell is chairman of the street railway committee and F. C. Ingram has been retained as superintendent. Nothing has been decided as to what alterations or extensions will be made this year.

Philadelphia Chamber of Commerce Favors Transit Plan.—The directors of the Chamber of Commerce of Philadelphia, Pa., have adopted a resolution urging Councils to take prompt action in regard to the plans of A. Merritt Taylor, city transit director, for financing the various projects for the establishment of rapid transit service throughout the city. The resolution has been referred by Councils to its special committee on transit.

Rapid Transit Construction Progress in Brooklyn.—The New York Municipal Railway Corporation (Brooklyn Rapid Transit System) has issued its report dealing with progress during May on the work which the company is doing under the dual subway contracts. The principal feature of the report, perhaps, is the summary of the progress with the improvements which are being made to increase the capacity of the present Brooklyn elevated railway structures.

Regina Railway Unprofitable.—The commissioners who are responsible for the operation of the Regina (Sask.) Municipal Railway are said to have concluded that the excess of operating expenses over revenue promises to be of such proportions that steps must be at once taken to reduce the probable loss. It has been suggested that the service be cut down on certain lines; that a straight 5-cent fare, with a 3-cent fare for school children, be established, and that the operation of cars on Sunday be stopped.

Vote on Radial System in Ontario.—On Sept. 21 the townships of Whitchurch, Uxbridge, Markham, Scarboro, Pickering, West Whitby and Reach and the various towns and villages that comprise what is known as the hydro-radial northeastern district, will vote on by-laws for entering into an agreement with the Hydro-Electric Power Commission of Ontario for the construction of a radial railway system that will serve the whole district. This was decided on at a meeting of the authorized representatives of the municipalities, held in Toronto on June 10, when the final routes were agreed upon.

Extension of Seattle Municipal Line.—The city of Seattle has begun the operation of the Lake Burien line, the second division of the municipal railway. Cars are run every hour after 9 o'clock. The property was accepted six months ago as an unincumbered gift to the city from the property owners along the line. Approximately \$25,000 was spent by the city for improvements. It is expected that connections will be made with the ferry operating from Lake Burien to Vashon Island, and an extension of the line may be made from Lake Burien to Three Tree Point on Puget Sound, a distance of about 2 miles.

New York Workmen's Compensation Law.—The New York State Workmen's Compensation Commission has sent out a notice from its headquarters at 1 Madison Avenue, New York, calling attention to the fact that the provisions of the new law creating the State insurance fund take effect on July 1. Employers affected are required to insure payment of compensation either by insuring it in the State fund, or through insurance corporations or associations authorized under the law, or by convincing the Compensation Commission of financial ability to pay and depositing securities should the commission so require.

Conference Regarding Subway Plans in Detroit.—William Barclay Parsons and H. M. Brinckerhoff, New York, consulted the members of the Detroit Street Railway Commission and Mayor Marx on June 15 in regard to the proposed subway which the commission has outlined. They may be retained by the city to devise a comprehensive subway plan. According to the commission Messrs. Parsons and Brinckerhoff agreed that a subway would be feasible, but suggested that the city build for the future if it undertakes anything at all. Prof. E. W. Bemis, who is mentioned as the probable choice of the commission to appraise the properties of the Detroit United Railway within the city, is expected to confer with the commissioners at an early date.

Amalgamated Representatives to Study European Conditions.—W. D. Mahon, president of the Amalgamated Association of Street & Electric Railway Employees of America, and E. L. Bland, another official of that association, have sailed from New York on the *Vaterland* to attend the British Trades Union Congress in Portsmouth, England, early in September. They propose to visit the principal Continental cities to study street railway management and operation. Mr. Mahon said: "We believe that municipal ownership is bound to come. We will do all we can to hasten its coming. We will get the views of the delegates at the congress from different parts of the world where there is municipal ownership, so that we will be able to conduct our agitation armed with a knowledge on the subject which we could not gain in any other way."

Washington Valuations.—In accordance with the law requiring that the State Tax Commission appraise the railroad property of the State of Washington for presentation to the various companies, that body has announced the total appraised valuation of both steam and electric lines for 1914 as \$391,121,083, an increase of \$1,580,651 over the equalized value of last year of \$389,540,432. These appraisals will go before the State Board of Equalization next fall for consideration, at which time the railroads may protest against any features not deemed to be equitable. Features of the appraisals this year are the reduction of the valuation of the Puget Sound Electric Railway from \$4,000,000 to \$3,000,000, and the increase of the Puget Sound Traction, Light & Power Company from \$16,898,596 to \$17,212,500. The total tentative valuation of the electric railways for 1914 is \$47,872,140 as compared with \$47,009,329 for 1913.

Bad Faith Charged in Seattle Negotiations.—The receivers and the security holders of the Seattle, Renton & Southern Railway operating in the Rainier Valley out of Seattle, Wash., will oppose any attempt of the city of Seattle to invade the Rainier Valley with a rival municipal line or to injure the company's property in the improvement of Rainier Avenue, which it is proposed to grade and pave. Scott Calhoun, receiver of the company, charges the City Council with playing politics on the municipal ownership question and says that it is to the political advantage of certain members to keep agitation alive without reaching a settlement of any question. Bad faith is charged in the negotiations which the city has had with the company looking to the acquirement of the line as a municipal project. The city has ordered plans prepared by the city engineer for the construction of an electric railway to parallel the Seattle, Renton & Southern Railway.

Strike at Westinghouse Works.—On June 12 a number of employees of the Union Switch & Signal Company walked out at noon without presenting any reasons for so doing. The company promptly announced that the works would be shut down until June 15 at which time the employees would be expected to return. Practically the full quota of men has now returned. This, coupled with the unsuccessful attempt of the strikers to call out the men at the Westinghouse foundries at Trafford City, indicates a speedy return to normal conditions. The management has devoted its energies so far towards safeguarding the properties placed in its charge. Owing to the policy adopted several months ago of manufacturing goods for stock during the dull period, a large amount of goods, sufficient in many lines for several months, had been made and distributed to the company's warehouses in various parts of the country, from which orders have been filled daily without delay.

New York Subway Contract Awards.—The Public Service Commission for the First District of New York during the week ended June 13 awarded the contract for the construction of one section of subway in Manhattan and opened bids for another section. The contract awarded was that for the construction of Section No. 1-A of Routes Nos. 4 and 38, the Seventh Avenue subway. This section covers the connection between the new Seventh Avenue subway and the existing subway at the Battery. The contract was awarded to the Rapid Transit Subway Construction Company, which is controlled by the Interborough Rapid Transit Company for \$474,244, which was the lowest of four bids received for the work. The contract on which bids were opened was for the construction of Section No. 7 of Route No. 5, the Lexington Avenue subway, extending from Forty-third to Fifty-third Streets. This subway is now under construction north of Fifty-third Street. Section No. 7 does not include the diagonal connection which is to be built across Forty-second Street, which will be made a separate section. According to unofficial reports of the totals of bids the Rapid Transit Subway Construction Company is the lowest bidder at \$1,915,164.

Franchise Offer in Rockford.—The Rockford (Ill.) City Traction Company has submitted to the joint committee on railroads, streets and alleys of the City Council of Rockford conditions under which it would be willing to accept an extension of its franchise for twenty years. The present franchise of the company, under which no compensation is paid to the city, extends for nine years from October,

1914. The company is willing to pay to the city the following percentages of its gross passenger revenue during the life of the new grant: for each of the first five years one-half of 1 per cent; for each of the years in the second five-year period, 1 per cent; for each of the years in the third five-year period, 1¼ per cent, and for each of the years in the fourth or final five-year period, 1½ per cent. Regarding transfers the company says: "Although the Rockford & Interurban Railway is a separate organization, we will accept upon all city cars transfers from all incoming passengers from interurban cars, on the condition that no transfers shall be issued or good from city cars to interurban cars. City cars are now operated on all lines over which interurban cars pass out of the city. The granting of transfers from city cars to interurban cars is unwise for the reason that it results in crowding interurban cars with passengers who could just as well ride upon city cars. Interurban passengers are thereby seriously discommoded."

PROGRAMS OF ASSOCIATION MEETINGS

Illinois Electric Railways Association

The summer meeting of the Illinois Electric Railways Association will be held at Keokuk, Ia., on June 24. The headquarters of the association will be at the Hotel Iowa. The program is as follows:

Address by Walter A. Shaw, member the Illinois State Public Utilities Commission.

Paper, "Low-Head and High-Head Hydroelectric Developments" (Illustrated), by E. M. Lake, of the Stone & Webster Engineering Corporation.

Paper, "Maintenance of Electrical Equipment," by Miles Lambert of the Westinghouse Electric & Manufacturing Company.

At the close of the program the regular association luncheon will be served at the Keokuk Elks' Club rooms. The afternoon will be devoted to a tour of inspection of the hydroelectric plant of the Mississippi River Power Company.

New York Electric Railway Association

The complete program has been announced for the thirty-second annual meeting of the New York Electric Railway Association to be held at the Hotel Champlain, Bluff Point, N. Y., on June 30 and July 1. At the regular business meeting of the association at 10 a. m. on June 30 the following addresses will be delivered:

"Employees' Accident Insurance," by Robert E. Dowling, chairman of the Workmen's Compensation Commission of the State of New York; James J. Hoey, Second Deputy Superintendent of Insurance of the State of New York; Cyrus W. Phillips, Deputy Commissioner, Workmen's Compensation Commission of the State of New York, Rochester, N. Y.; John T. Stone, president of the Maryland Casualty Company, Baltimore, Md.; Ernest Gonzenbach, general manager of the Empire United Railways, Inc., Syracuse, N. Y., and F. Spencer Baldwin, manager of the State Insurance Fund, Workmen's Compensation Commission of the State of New York.

"Accident Prevention," by James P. Barnes, general manager of the Syracuse & Suburban Railroad, Syracuse, N. Y.

On July 1 at 10 a. m. the following addresses will be delivered:

"Efficiency," by Charles J. Witherwax, general passenger agent of the Schenectady (N. Y.) Railway; F. A. Bagg, chief engineer of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., and W. H. Sawyer of Ford, Bacon & Davis, New York, N. Y.

At this session the question box will also be discussed. The program will be concluded with the election of officers.

The banquet of the association will be held at the Hotel Champlain on June 30 at 8 p. m. The toastmaster will be Frank Hedley, president of the association. The speakers will be W. L. Conwell, vice-president and treasurer of the Transportation Utilities Company, New York, N. Y.; Edward A. Maher, Jr., assistant general manager of the Third Avenue Railroad, New York, N. Y., and Howard MacSherry, attorney of the Public Service Corporation of New Jersey, Newark, N. J.

Applications for hotel accommodations should be made to Albert Thieriot, Hotel Champlain, Bluff Point, N. Y.

Financial and Corporate

Stock and Money Markets

June 17, 1914.

The trading on the Stock Exchange to-day was on a moderate scale, with frequent intervals of pronounced dullness. In the last half of the day the market was influenced by the despatches reporting further Mexican complications. Interborough-Metropolitan declined slightly and heavy tone was shown in United Railways Investment issues. Rates in the money market were: Call, 2 per cent; sixty days, 2 @ 2½ per cent; four months, 2½ @ 2¾ per cent; six months, 3¼ @ 3½ per cent.

On the Philadelphia Exchange the tone was steady to-day in a broad market with small trading.

In Chicago all departments were steady to-day, but the trading was dull.

To-day was a holiday in Boston. Yesterday's market was dull and featureless. Price changes yesterday were not significant.

In Baltimore the sales of stock totaled 752 shares to-day. More than 200 shares of United Railways & Electric stock changed hands. The bond transactions totaled \$41,900, par value.

Quotations of traction and manufacturing securities as compared with last week follow:

| | June 11 | June 18 |
|--|---------|---------|
| American Brake Shoe & Foundry (com.) | 89 | 90½ |
| American Brake Shoe & Foundry (pref.) | 137 | 138 |
| American Cities Company (com.) | 29 | *29 |
| American Cities Company (pref.) | 67 | 65½ |
| American Light & Traction Company (com.) | 336 | 340 |
| American Light & Traction Company (pref.) | 108 | 109 |
| American Railways Company | 37 | 37 |
| Aurora, Elgin & Chicago Railroad (com.) | 34 | 34¾ |
| Aurora, Elgin & Chicago Railroad (pref.) | 77 | 78 |
| Boston Elevated Railway | 87½ | 87½ |
| Boston Suburban Electric Companies (com.) | 7 | 7 |
| Boston Suburban Electric Companies (pref.) | *65 | 65 |
| Boston & Worcester Electric Companies (com.) | *6¼ | *6¼ |
| Boston & Worcester Electric Companies (pref.) | 36 | 36 |
| Brooklyn Rapid Transit Company | 92 | 90¾ |
| Capital Traction Company, Washington | 99 | 98½ |
| Chicago City Railway | 135 | 135½ |
| Chicago Elevated Railways (com.) | 20 | 20 |
| Chicago Elevated Railways (pref.) | 65 | 65 |
| Chicago Railways, pteptg., ctf. 1 | 95 | 96 |
| Chicago Railways, pteptg., ctf. 2 | 34½ | 33¼ |
| Chicago Railways, pteptg., ctf. 3 | 5 | 5 |
| Chicago Railways, pteptg., ctf. 4 | 2 | 2 |
| Cincinnati Street Railway | 103¼ | 102¾ |
| Cleveland Railway | 105 | 103½ |
| Cleveland, Southwestern & Columbus Ry. (com.) | *4 | *4 |
| Cleveland, Southwestern & Columbus Ry. (pref.) | *30 | *30 |
| Columbus Railway & Light Company | 13 | 13 |
| Columbus Railway (com.) | *53 | *53 |
| Columbus Railway (pref.) | 79½ | 79½ |
| Denver & Northwestern Railway | 63 | *63 |
| Genroit United Railway | a80 | a80 |
| General Electric Company | 148¼ | 147½ |
| Georgia Railway & Electric Company (com.) | 120 | 120½ |
| Georgia Railway & Electric Company (pref.) | 83¾ | 86½ |
| Interborough-Metropolitan Company (com.) | 15 | 14¼ |
| Interborough-Metropolitan Company (pref.) | 64½ | 62½ |
| International Traction Company (com.) | 30 | *30 |
| International Traction Company (pref.) | 85 | *85 |
| Kansas City Railway & Light Company (com.) | 22 | 22 |
| Kansas City Railway & Light Company (pref.) | 39 | 39 |
| Lake Shore Electric Railway (com.) | 6 | *6 |
| Lake Shore Electric Railway (1st pref.) | 90 | *90 |
| Lake Shore Electric Railway (2d pref.) | *22 | *22 |
| Manhattan Railway | 131½ | 129¼ |
| Massachusetts Electric Companies (com.) | 12½ | 11 |
| Massachusetts Electric Companies (pref.) | 62 | 61 |
| Milwaukee Electric Ry. & Light Co. (pref.) | 95 | 95 |
| Norfolk Railway & Light Company | 26 | 26 |
| North American Company | 76½ | 68¾ |
| Northern Ohio Traction & Light Co. (com.) | a70 | 60 |
| Northern Ohio Traction & Light Co. (pref.) | 97¼ | a101 |
| Philadelphia Company, Pittsburgh (com.) | 38¾ | 38¾ |
| Philadelphia Company, Pittsburgh (pref.) | 37 | 37 |
| Philadelphia Rapid Transit Company | 15¾ | 15¾ |
| Portland Railway, Light & Power Company | 47 | 47 |
| Public Service Corporation | 112 | 112 |
| Third Avenue Railway, New York | 42¾ | 41½ |
| Toledo Traction, Light & Power Co. (com.) | 20 | 13 |
| Toledo Traction, Light & Power Co. (pref.) | 70 | 70 |
| Twin City Rapid Transit Co., Minn. (com.) | 105¼ | 103 |
| Union Traction Company of Indiana (com.) | 11½ | *11½ |
| Union Traction Company of Indiana (1st pref.) | *75 | *75 |
| Union Traction Company of Indiana (2d pref.) | 14 | 14 |
| United Rys. & Electric Company (Baltimore) | 28 | 27½ |
| United Rys. Inv. Company (com.) | 13 | 11 |
| United Rys. Inv. Company (pref.) | 37½ | 32 |
| Virginia Railway & Power Company (com.) | 48¾ | 49 |
| Virginia Railway & Power Company (pref.) | 99½ | 97 |
| Washington Ry. & Electric Company (com.) | 87½ | 86 |
| Washington Ry. & Electric Company (pref.) | 83 | 82½ |
| West End Street Railway, Boston (com.) | 67½ | 67¾ |
| West End Street Railway, Boston (pref.) | a92 | 88 |
| Westinghouse Elec. & Mfg. Company | 76¾ | 75½ |
| Westinghouse Elec. & Mfg. Co. (1st pref.) | 124 | 124 |

* Last sale. a Asked.

ANNUAL REPORTS

Standard Gas & Electric Company

The statement of income, profit and loss of the Standard Gas & Electric Company, Chicago, Ill., for the year ended Dec. 31, 1913, follows:

| | |
|--|-------------|
| Earnings: | |
| Interest on bonds owned | \$565,408 |
| Dividends on preferred stock owned | 245,698 |
| Dividends on common stock owned | 606,701 |
| Special dividends on common stock owned | 34,568 |
| Interest on notes and accounts receivable | 86,935 |
| Total | \$1,539,310 |
| General expenses and taxes | 36,506 |
| Net earnings | \$1,502,804 |
| Deduct: | |
| Interest on bonds | \$615,669 |
| Interest on collateral trust notes | 79,419 |
| Interest on preferred stock scrip | 5,893 |
| Miscellaneous interest | 50,043 |
| Loss on sale of securities—net | 273 |
| Total | \$751,297 |
| Net income | \$751,507 |
| Profit and loss—surplus at beginning of period | 1,008,659 |
| Profit and loss—gross surplus | \$1,760,166 |
| Profit and loss charges: | |
| Dividends on preferred capital stock | \$912,420 |
| Premium on coupon notes redeemed | 18,500 |
| Premium on bonds redeemed | 150,000 |
| Total | \$1,080,920 |
| Profit and loss—surplus at end of period | \$679,246 |

The combined income of all the subsidiary companies of the Standard Gas & Electric Company for the year ended Dec. 31, 1913, was \$12,926,288; the operating expenses \$7,109,628, and the net earnings, \$5,816,660. Included in the above operating expenses were \$801,446 for taxes and \$735,794 for maintenance. The net earnings were disposed of as follows: Interest on bonded indebtedness, \$3,190,631; interest on debentures, \$25,387; interest on floating indebtedness, \$194,325; dividends on preferred stock, \$1,300,112, and dividends on common stock, \$650,364, leaving a balance of \$455,841.

Instead of declaring in dividends all the applicable earnings of the subsidiary companies, the directors of such companies, with the approval of the board of directors of the Standard Gas & Electric Company, allocated them on the books of the respective subsidiary companies as follows: Depreciation reserve, \$285,442; undistributed surplus, \$282,998, and then reinvested the entire amount of \$578,440 in the property of the respective companies. The combined excess of current liabilities over current assets of all the controlled companies amounted on Dec. 31, 1913, to \$435,241. By Jan. 31, 1914, this excess of current liabilities over current assets had decreased to \$372,040. The combined depreciation reserve account of all subsidiary companies on Dec. 31, 1913, aggregated \$2,249,856. This amount was exclusive of \$735,794 included in the operating expenses for the year for maintenance. During the period replacements were made out of the previous depreciation reserves amounting to \$31,487. The taxes of the various subsidiary companies increased \$102,212 over 1912.

Of the sixteen subsidiary companies of the Standard Gas & Electric Company, the report states that ten are progressing so satisfactorily as to require no special mention. The six that are specifically discussed include the Fort Smith Light & Traction Company and the Arkansas Valley Railway & Light Company. It is stated that the former for the last fifteen months has suffered severe losses of both gross and net earnings on account of the period of depression in that part of the country, aggravated by increases in labor and fuel costs. The loss in net earnings for the latter company is directly attributed to the coal miners' strike leading to a greatly increased cost of fuel and to the large increase in taxes of \$91,995 over 1912. The gross earnings of the company increased \$38,000 during the year, however, and the earnings for 1914 conservatively estimated indicate a substantial increase in net.

The report of the Standard Gas & Electric Company is in many respects one of the most complete public utility reports that has been published. Aside from the above facts, it gives a résumé of the capitalization of the companies

controlled and population served and a detailed description of the stock, bond and note issues of the subsidiaries. The report also discusses the question of franchises, competition, public service commissions and holding company management, and by means of an inserted map affords the investor an excellent illustration of what is meant by the diversity of location factor. Furthermore, at the end of the report there are placed a well-constructed balance sheet for the main company and tables showing the gross and net earnings of the subsidiaries, the amounts of stocks and bonds owned by the main company, the subsidiary bond issues, none of which are owned by the main company, and also general business statistics. Finally, a supplementary report is presented containing a consolidated statement of earnings for all the subsidiaries and individual balance sheets and detailed descriptions of the physical property of each subsidiary. The one striking point in which the two reports are deficient is that in neither one can there be found any statement showing the analysis of the operating revenues and the operating expenses of the subsidiary companies.

The J. G. White Companies

J. G. White, chairman of the boards of directors of the J. G. White Companies, New York, transmitted to the stockholders on May 27 the amalgamated balance sheet of the companies for the respective fiscal year ended Dec. 31, 1913, of the J. G. White Engineering Corporation and the J. G. White Management Corporation and for the year ended Feb. 28, 1914, of J. G. White & Company, Inc. It was considered advisable to amalgamate the balance sheets of the J. G. White Engineering Corporation and the J. G. White Management Corporation with the balance sheet of J. G. White & Company, Inc., which owns all of the common capital stock of the subsidiary companies, in order to present a more comprehensive view of the results of operation of the companies. The individual balance sheets of the three companies were also presented.

The amalgamated balance sheet shows that the cash in banks, branch offices and on hand was \$553,941, and the bills and accounts receivable \$596,574, making total current assets of \$1,150,515. The total debts of the companies for the corresponding dates were \$533,068, being less than the cash on hand and less than one-half of the current assets. The combined surplus account shows that the actual profits of the companies for the year were \$349,070. After the payment of dividends at the rate of 7 per cent on the preferred stocks of the engineering and the management corporations and at the rate of 6 per cent on the preferred stock of J. G. White & Company, Inc., the sum of \$179,937 was added to the surplus account, or about 12 per cent on the outstanding common stock of the incorporated company not in the hands of trustees. The committee of directors appointed to value the securities, co-operating with the officers, has charged to surplus account the sum of \$159,260, leaving the balance carried forward at approximately the same figure as last year.

Mr. White expressed the opinion that the formation of the two companies to take over the engineering and the management business heretofore conducted as departments of the parent company had resulted in materially increasing the efficiency of the organization and strengthening the position of the companies.

American Railways, Philadelphia, Pa.—All of the outstanding 5 per cent collateral trust gold bonds of the Johnstown (Pa.) Traction Company, dated Jan. 1, 1910, have been called for payment at 102 and interest on July 1 at the office of the Real Estate Title Insurance & Trust Company, Philadelphia, Pa.

Aurora, Plainfield & Joliet Railroad, Joliet, Ill.—The Illinois Secretary of State has granted letters of incorporation to the Aurora, Plainfield & Joliet Railroad, with principal office in Joliet, Ill. The nominal capital is \$25,000. The incorporators and the first board of directors are W. A. S. Mulligan, James E. Hauonic, Robert Oehmig, O. P. Stewart and Frank P. Page. The company will own and operate a road from Aurora, Kane County, through Plainfield to Joliet. The line originally constructed and operated by the Joliet, Plainfield & Aurora Railroad and sold to the Joliet & Southern Traction Company will be

taken over by the new corporation, as well as the line formally owned and constructed by the Joliet & Southern Traction Company.

California Railway & Power Company, San Francisco, Cal.—An initial dividend of 2 per cent was paid on June 10 on the \$6,874,400 of 7 per cent cumulative preferred stock of the California Railway & Power Company, all of which is owned by the United Railways Investment Company.

Charlottesville & Albemarle Railway, Charlottesville, Va.—The directors of the Charlottesville & Albemarle Railway have declared an initial dividend of 7 per cent on the preferred stock, 3½ per cent payable on July 1 and 3½ per cent on Jan. 1, 1915.

Chicago (Ill.) Elevated Railways.—The Chicago Elevated Railways has arranged to refinance the \$30,000,000 of 5 per cent notes maturing on July 1. These notes were secured by \$25,000,000 of first mortgage 5 per cent thirty-year bonds of Northwestern Elevated Railroad and practically all the stocks of the South Side Elevated, Northwestern Elevated, Metropolitan West Side Elevated and Chicago & Oak Park Elevated Railways. The \$25,000,000 first mortgage of the Northwestern Elevated Railroad will be cancelled and a new mortgage for about \$12,000,000 will be made and the bonds will be sold. There will also be issued \$14,000,000 of two-year 5 per cent notes secured by the stock pledged as collateral for the notes maturing on July 1. The notes will be offered to the public at about 98. An issue of \$7,000,000 debentures will also be authorized but will not be offered to the public.

Dedham & Franklin Street Railway, Westwood, Mass.—The Dedham & Medway Street Railway has been organized as a successor to the Dedham & Franklin Street Railway, sold under foreclosure as noted in the *ELECTRIC RAILWAY JOURNAL* of May 23, and has been leased to the Milford & Uxbridge Street Railway for five years, subject to renewal for five years, with an option of purchase at any time within the ten years. It is understood that the lease also applies to the old Medfield & Medway Street Railway, also sold under foreclosure recently.

Fort Worth (Tex.) Southern Traction Company.—The Fort Worth Southern Traction Company, recently acquired by Stone & Webster, Boston, Mass., has filed amended articles of incorporation, changing the name to the Tarrant County Traction Company and increasing the capitalization from \$1,500,000 to \$2,500,000.

New York (N. Y.) Railways.—On June 16 the Public Service Commission for the First District of New York held a hearing, before Commissioner Milo R. Malbie, on the application of the Broadway & Seventh Avenue Railroad for permission to issue bonds to the amount of \$500,000, for the purpose of retiring bonds issued under its second mortgage and due July 1, 1914. The petition sets forth that in May, 1890, the company leased its roads and franchises to the Houston, West Street & Pavonia Ferry Railroad for the entire term of its charter, which company was subsequently merged with the Metropolitan Street Railway. Since Jan. 1, 1912, the New York Railways, as successor of the Metropolitan Company, has operated the property. In 1884 the company executed a second mortgage to cover an issue of \$500,000 of 5 per cent bonds, payable on June 1, 1914, and in 1893 executed its first consolidated mortgage to cover an issue of \$12,500,000 of 5 per cent bonds. The company has common stock outstanding in the amount of \$2,100,000; \$1,500,000 of first mortgage 5 per cent bonds; \$500,000 of second mortgage 5 per cent bonds, and \$7,650,000 of first consolidated mortgage 5 per cent bonds, out of a total authorized issue of \$12,500,000. The petition stated that the application was "made without prejudice to the right of your petitioner to claim or assert that it has the legal right to issue said bonds without the approval of your honorable commission."

Ogden (Utah) Rapid Transit Company.—The stockholders of the Ogden Rapid Transit Company have approved the proposal of the board of directors of that company for the amalgamation of the company with the Logan Rapid Transit Company as the Ogden, Logan & Idaho Railroad. It is stated unofficially that M. S. Browning, president of the Ogden Rapid Transit Company, will be the president of the new company; L. R. Eccles and Joseph Scowcroft first

and second vice-presidents respectively, and P. D. Kline, general manager, with headquarters at Ogden. The plan to amalgamate the companies has not yet been voted upon by the stockholders of the Logan Rapid Transit Company.

Philadelphia Company, Pittsburgh, Pa.—Patrick Calhoun, former president of the United Railroads, San Francisco, resigned as a director of the Philadelphia Company at the annual meeting of the stockholders, and George S. Davidson was elected to succeed him. The other directors whose terms had expired were re-elected.

Philadelphia (Pa.) Rapid Transit Company.—Stockholders of the Union Traction Company are being asked, in a letter sent to them over the signatures of James G. Balfour and John M. Fogelsanger, to signify their written protest against the company lending financial assistance or credit to the Philadelphia Rapid Transit Company in carrying on the proposed new transit plan.

Rochester (N. Y.) Railway.—A. H. Smith, president of the New York Central & Hudson River Railroad, has been elected a director of the Rochester Railway to succeed W. C. Brown, formerly president of the New York Central Railroad.

Syracuse & Suburban Railway, Syracuse, N. Y.—The Public Service Commission of the Second District of New York has authorized the Syracuse & Suburban Railway to issue \$300,000 of five-year 6 per cent notes, the proceeds to be used to take up outstanding short-time notes aggregating \$91,000 and to complete improvements, including the installation of signals.

United Railways & Electric Company, Baltimore, Md.—The Maryland Public Service Commission has withheld its approval of the issue of the \$1,000,000 of two-year 5 per cent convertible notes of the United Railways & Electric Company. The notes are convertible into the common stock at 33 for the \$50 shares, and it is this feature, it is understood, to which the commission took exception. The plan for issuing the notes was referred to in the ELECTRIC RAILWAY JOURNAL of June 13, 1914.

Washington Railway & Electric Company, Washington, D. C.—Hambleton & Company, Baltimore, Md., are placing at 83½ and interest \$1,000,000 of consolidated mortgage 4 per cent gold bonds of the Washington Railway & Electric Company, dated 1902 and due Dec. 1, 1951, but redeemable as a whole or in part on thirty days' notice at 105 and interest on any interest date. The bonds are in the denomination of \$1,000. The trustee under the mortgage securing the issue is the United States Mortgage & Trust Company. The proceeds of the \$1,000,000 now being offered will be used to retire on Oct. 1, 1914, \$500,000 of first mortgage 5 per cent bonds of the Columbia Railway, and \$500,000 of extension mortgage 5 per cent bonds. Of the \$17,500,000 of consolidated mortgage bonds authorized \$11,642,350 has been issued, including the \$1,000,000 now offered. The remaining \$5,857,650 is reserved to retire a similar amount of underlying liens and bonds of subsidiary companies, none of which mature until Feb. 1, 1925. After the retirement of the Columbia Railway bonds on Oct. 1, 1914, the consolidated bonds will be a first mortgage on about 46 miles of single track and a general mortgage on the balance of the property subject to \$4,829,000 of underlying liens of the Metropolitan Railroad and the Anacostia & Potomac River Railroad. The consolidated bonds are additionally secured by the pledge of \$8,256,750 of stock and \$465,000 of bonds of subsidiary companies. The subsidiary railways own more than 64 miles of single track, upon which the only underlying liens are \$1,750,000 of bonds of the City & Suburban Railway.

Wilkes-Barre & Hazleton Railroad, Hazleton, Pa.—A protective committee composed of Wilson Woelpper, of Woelpper, Crawford & Company, Philadelphia, William S. J. Wetherill, Morris Ebert, M. H. Boehmer, Ellison Elmer and F. E. J. Hansom has been formed in the interest of the bondholders of the Wilkes-Barre & Hazleton Railroad, which defaulted on May 15 in the payment of the interest on the \$1,900,000 of its 5 per cent bonds. The company asked the holders of the bonds to surrender their May 15 coupons and all others up to Nov. 15, 1916, and to accept non-interest bearing certificates for the coupons when they become due.

Dividends Declared

- American Cities Company, New York, N. Y., 3 per cent, preferred.
- Asheville Power & Light Company, Asheville, N. C., quarterly 1¾ per cent, preferred.
- Bangor Railway & Electric Company, Bangor, Maine, quarterly, 1¾ per cent, preferred.
- Boston & Worcester Electric Company, Boston, Mass., \$1, preferred.
- California Railway & Power Company, San Francisco, Cal., quarterly, 1¾ per cent, prior preferred; quarterly, 2 per cent, preferred.
- Capital Traction Company, Washington, D. C., quarterly, 1½ per cent.
- Carolina Power & Light Company, Raleigh, N. C., quarterly, 1¾ per cent, preferred.
- Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.
- Cleveland (Ohio) Railway, quarterly, 1½ per cent.
- Columbus Railway, Power & Light Company, Columbus, Ohio, quarterly, 1½ per cent, preferred.
- Eastern Texas Electric Company, Dallas, Tex., 3 per cent, preferred.
- Illinois Traction System, Peoria, Ill., quarterly, 1½ per cent, preferred.
- Memphis (Tenn.) Street Railway, quarterly, 1¼ per cent, preferred; one-half of 1 per cent, common.
- Northern Ohio Traction & Light Company, Akron, Ohio, quarterly, 1½ per cent, preferred.
- Puget Sound Traction, Light & Power Company, Seattle, Wash., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.
- Toronto (Ont.) Railway, quarterly, 2 per cent.
- Union Passenger Railway, Philadelphia, Pa., \$4.75.

ELECTRIC RAILWAY MONTHLY EARNINGS

| AMERICAN RAILWAYS COMPANY, PHILADELPHIA, PA. | | | | | | |
|--|----------------|--------------------|--------------|---------------|-------------|-------|
| Period | Gross Earnings | Operating Expenses | Net Earnings | Fixed Charges | Net Surplus | |
| 1m., May, '14 | \$475,534 | ..... | ..... | ..... | ..... | ..... |
| 1 " " '13 | 435,402 | ..... | ..... | ..... | ..... | ..... |
| 11 " " '14 | 5,068,314 | ..... | ..... | ..... | ..... | ..... |
| 11 " " '13 | 4,686,465 | ..... | ..... | ..... | ..... | ..... |
| CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN. | | | | | | |
| 1m., Apr., '14 | \$90,429 | *\$57,600 | \$32,829 | \$27,597 | \$5,232 | |
| 1 " " '13 | 92,389 | *55,488 | 36,901 | 24,277 | 12,624 | |
| 12 " " '14 | 1,200,748 | *717,501 | 483,247 | 311,573 | 171,674 | |
| 12 " " '13 | 1,114,529 | *671,582 | 442,947 | 277,122 | 165,825 | |
| COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH. | | | | | | |
| 1m., Apr., '14 | \$243,426 | *\$66,782 | \$176,674 | \$80,000 | \$96,674 | |
| 1 " " '13 | 106,730 | *10,845 | 95,885 | 30,000 | 65,885 | |
| 12 " " '14 | 2,916,800 | *713,450 | 2,203,350 | 960,000 | 1,243,350 | |
| 12 " " '13 | 1,399,395 | *158,982 | 1,240,413 | 360,000 | 880,413 | |
| CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME. | | | | | | |
| 1m., Apr., '14 | \$186,634 | *\$115,608 | \$71,026 | \$63,745 | \$7,281 | |
| 1 " " '13 | 167,748 | *98,553 | 69,195 | 56,872 | 12,323 | |
| 12 " " '14 | 2,407,857 | *1,384,718 | 1,022,139 | 741,474 | 281,665 | |
| 12 " " '13 | 2,189,830 | *1,319,612 | 970,218 | 665,760 | 304,458 | |
| EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL. | | | | | | |
| 1m., Apr., '14 | \$213,998 | *\$143,327 | \$70,671 | \$55,708 | \$14,963 | |
| 1 " " '13 | 205,464 | *117,705 | 87,759 | 48,844 | 38,915 | |
| 12 " " '14 | 2,745,570 | *1,701,837 | 1,043,733 | 607,090 | 436,643 | |
| 12 " " '13 | 2,528,522 | *1,401,849 | 1,126,673 | 582,908 | 543,765 | |
| FORT WAYNE & NORTHERN INDIANA RAILWAY, FORT WAYNE, IND. | | | | | | |
| 1m., Apr., '14 | \$145,232 | \$85,661 | \$59,571 | \$52,288 | \$7,283 | |
| 1 " " '13 | 129,898 | 93,564 | 36,334 | 47,317 | 11,023 | |
| 4 " " '14 | 602,644 | 344,683 | 257,961 | 204,091 | 53,870 | |
| 4 " " '13 | 558,440 | 325,798 | 232,642 | 190,034 | 42,608 | |
| KENTUCKY TRACTION & TERMINAL COMPANY, LEXINGTON, KY. | | | | | | |
| 1m., Apr., '14 | \$66,937 | \$34,872 | \$32,065 | \$20,719 | \$11,346 | |
| 1 " " '13 | 60,668 | 30,148 | 30,520 | 19,177 | 11,343 | |
| 10 " " '14 | 666,658 | 338,121 | 328,537 | 204,863 | 123,674 | |
| 10 " " '13 | 635,085 | 335,910 | 299,175 | 186,915 | 112,260 | |
| VIRGINIA RAILWAY & POWER COMPANY, RICHMOND, VA. | | | | | | |
| 1m., Apr., '14 | \$426,809 | \$201,331 | \$225,478 | \$134,969 | \$90,509 | |
| 1 " " '13 | 406,086 | 198,207 | 207,879 | 126,758 | 81,121 | |
| 10 " " '14 | 4,334,836 | 2,132,308 | 2,222,529 | 1,343,959 | 878,570 | |
| 10 " " '13 | 4,099,447 | 2,012,128 | 2,087,619 | 1,243,990 | 843,629 | |

*Includes taxes.
†Deficit.

Traffic and Transportation

Final Arguments in Middlesex & Boston Arbitration

Final arguments were heard recently by the board of arbitrators sitting in the Middlesex & Boston Street Railway wage case. The board consists of George L. Mayberry, Waltham, Mass., chairman; James H. Vahey, Boston, representing the employees' union, and Arthur A. Ballantine, Boston, representing the company. An abstract of the company's argument as presented by G. M. G. Nichols, of Gaston, Snow & Saltonstall, Boston, follows:

The only points at issue before the board are wages of carhouse employees and their overtime work; and the wages of blue uniformed men and the graduated scale. The demands for blue uniformed men are 27 cents an hour the first year; 30 cents the second year, and 33 cents the third year and thereafter; and for carhouse men a 20 per cent increase and time and one-half for overtime. The company's answer is that it can get at its prevailing rates of pay all the men needed, that the present rates are fair and reasonable and that at this time the road cannot afford to pay more.

Carhouse employees, about forty in number, are as a rule taken by the company as green men at 17.5 cents per hour and raised to a maximum of 25 cents an hour. The company contends that little highly skilled labor is required at its carhouses, as the work consists largely of removing certain designated parts and substituting others. At the Waltham carhouse, the work is more difficult, but the wages are higher. Steady employment the year round is a feature.

The company acknowledges that its blue uniformed men perform well a serious and a substantial work, but that work requires little individual initiative or constructive ability, and offers continuous and permanent employment. Some things tend to increase the difficulty of platform work and others to decrease it. The increase in the number of passengers, transfers and stops, the collecting of 6-cent fares, the more complex equipment, larger cars and to some degree higher speed may have increased the work of the men, but the introduction of vestibules, of seats, air brakes, arc lights, electric switches, block signals and sand cars, the establishment of a free transfer point during rush seasons at Commonwealth Avenue, and the prepayment station and transfer point at the busy station of Norumbega Park and the sale of tickets by the company, all tend to make the work easier. In addition, wages have been increased, hours of work lessened and many other conditions changed to the advantage of the men.

The union evidence showed that a craftsman in the trades may work one, nine or ten months a year on the average.

At present the company is paying on a graduated scale 21 cents an hour to men in the first six months, 21.5 cents in the second six months, and then by graduations by years from 22.5 to 27 cents, the maximum being reached in the eighth year. In 1900 a flat rate of 20 cents was paid all over the system. Five increases have been granted since 1900. The company does not dispute that the cost of living has increased since 1900, but contends that the standard of living has also increased. Men earning the maximum pay have earned such amounts for four consecutive weeks as \$20.18, \$19.60, \$19.50 and \$20.80. A fair summary of the earnings of twenty-seven representative men would be from \$16 to \$18 a week. According to the twenty-sixth annual report on Statistics of Manufacturers, Massachusetts public document No. 36, of 389,485 male wage earners more than 18 years of age in manufacturing plants, two-thirds received less than \$15 per week. In the boot and shoe trade, exclusive of findings, 50 per cent received less than \$15, and 30 per cent of the males \$12 a week or less. In the cotton goods trade, 89.4 per cent received less than \$15; in the leather trade, 77.7 per cent; in the paper and wood pulp trade, 76.8 per cent; in the woolen, worsted, felt goods and felt hats trades, 82.3 per cent. No evidence has been submitted, which when analyzed, proves that the platform men of the road are, as a class, generally unable to live within their income.

Unable since its organization to earn upon the money

actually invested in its properties, the fair rate of return to which its investors are entitled, hampered by many non-paying lines, and struggling with the problem of building up that paying volume of average business which it has always lacked, the road cannot stand a demand for increased wages at this time. All the various lines in the system were united in the attempt to build up a general system which would be able to continue public service with a fair return to stockholders and insure its permanency. The operating expenses per car mile compare favorably with other roads in the State, but the traffic density is too low to yield an adequate return. Many of the lines making up the system would have been unable to earn their operating expenses without help from the other branches. On June 30, 1913, the road had outstanding capital stock of \$1,987,000; mortgage bonds to the amount of \$1,983,000, and notes payable to the amount of \$1,232,350. There were 92.5 miles of main track operated. The fixed charges for the year amounted to \$198,452. The gross income, less operating expenses and fixed charges, left for the year a net divisible income of \$79,926. The payment of a 4 per cent dividend left as a surplus for the year, \$446. The total deficit, as of the above date, was \$266,569. The company has never paid a dividend in excess of 6 per cent and only one at that rate. The aggregate dividends paid by the roads making up the system has been far short of a fair return on the capital invested.

Much of the equipment has reached the age where expensive additions and renewals are becoming imperative. The capitalization, issued under authority of the Massachusetts Railroad Commission, represents a bona-fide outlay. Any substantial additional burden laid upon the company at this time might cause it to seek relief by abandoning certain non-paying services.

Investigation of Service at Somerville, Mass.

Upon petition of citizens of Somerville the Massachusetts Public Service Commission held a hearing recently relative to service conditions on the local lines of the Boston Elevated Railway. Somerville is one of the principal suburbs of Boston and has a population of about 80,000. It is connected with the business center of Boston by several trunk lines of car and train service, the more prominent of which are the elevated lines from Sullivan Square to the Washington Street tunnel district, the surface lines leading into Boston via the East Cambridge Viaduct, and the Union Square-Central Square Cambridge line connecting with the Cambridge subway train service to and from Park Street.

The committee recommended that more cars be placed on each of the Somerville lines during the rush hours. On May 18 the company put into effect a new time-table providing four cars every fifteen minutes in the a.m. and p.m. rush hours between Sullivan Square terminal and Powder House Square, an increased service being provided over two combined routes of seven and eight minute headway each. On Somerville Avenue the company has instituted a twelve-minute service in place of the former fifteen-minute schedule obtaining in the middle of the day. On the Highland Avenue-Viaduct line from Scollay Square subway station nineteen outward trips have been established in the afternoon rush hours with a minimum headway of four minutes, between 4:48 and 6:18 p. m. The company showed that it is necessary, in order to meet requests for added service on Highland Avenue, Somerville, to turn back cars at Davis Square, and unless the city authorities grant a location which has been asked the company has no option but to utilize crossovers in the street.

At the hearings a request was made for additional service during the morning and afternoon rush hours between the top of Winter Hill and Sullivan Square terminal, upper level. The company is operating a ten-minute service from the top of Winter Hill through the lower level into Boston. The company does not feel it to be wise to attempt to provide a line of extra cars over this route to compete with a line not at present utilized to its proper capacity. Regarding the running of shuttle cars between Sullivan and Union Squares via Central Square, the company pointed out that no special work exists at Central Square which will permit this, and further contended that the route proposed would be roundabout in character. With the construction of the

East Cambridge Viaduct and the provision of direct service over it to and from Somerville via Somerville and Highland Avenues, the company does not see its way clear to install tracks through Beech Street to connect Elm Street with Massachusetts Avenue, Cambridge, and the Cambridge subway. The handling of traffic along radial lines is thus deemed essential to rapid transit and a properly economical service.

The petitioners requested the establishment of service from Spring Hill to Scollay Square over the Viaduct. The company points out that it is not feasible to add another through service to the two direct connections now afforded with the rapid transit system. It is impossible to operate large semi-convertible cars to the top of Spring Hill, and the company does not consider it good railroading to operate smaller cars on the Viaduct, which is exclusively utilized by large units.

The petitioners urged the adoption of the skip-stop system. The company believes that such an arrangement would not give the relief which it is the desire of the committee to secure. In order to facilitate the movement of the cars, the company's view is that the best results can be obtained by continuing the present policy of running non-stop cars from certain points inward in the morning and from the terminal to certain points outward in the evening.

A Seat per Passenger Ordinance During Non-Rush Hours Proposed for Chicago

With ever-increasing congestion the surface lines of Chicago are facing a serious problem. Steps for improving conditions are being discussed by the local transportation committee of the Chicago City Council, L. A. Busby, president of the Chicago Surface Lines, and George Weston, of the Board of Supervising Engineers. The local transportation committee after careful consideration has decided that it is impracticable to require the company to provide a seat per passenger during the entire day, and now proposes that an ordinance be passed requiring a seat per passenger to be provided during the non-rush-hour periods. Mr. Busby tentatively agreed to an ordinance containing such a provision. He also expressed the opinion that it was possible to limit the number of passengers per car to eighty during the rush-hour periods. Other suggestions for the relief of downtown surface-line congestion were that ordinances be passed requiring automobiles to be parked outside the loop district and requiring teams to be kept off the streets during the rush-hour periods. The latter is being seriously considered, but the question of authority has arisen. The legal department of the city has been requested to render an opinion on this subject before further steps are taken toward the preparation of an ordinance.

Toronto Traffic Report Presented

Charles R. Barnes, chief railway inspector of the Public Service Commission of the Second District of New York, who was retained by the Ontario Railway Board to report on the Toronto street railway system with a view to suggesting new routes and rerouting, has filed his report. Mr. Barnes suggests the fuller carrying out of what the Toronto Railway is doing now, particularly with regard to installing push-buttons, making passengers dismount by the front door, prohibiting passengers standing in the motor-man's vestibule, etc. Mr. Barnes urges the installation of modern heating apparatus and recommends an increase in the seating capacity of Toronto cars. The present seating capacity of 29,069 during rush hours should be increased by 10,813, half of this number by Nov. 1 and the rest a year from that date. He recommends that thirty-seven single-truck cars and seventy-one closed trailers be replaced by new cars approved by the board by Nov. 1. An additional twenty-nine cars should be in service on new lines by the same date. In addition to this the platforms should be lengthened on 200 double-truck cars.

The extensions recommended are: Wilton, through to Pape and north to Danforth; Teraulay, from Agnes to College; Bloor, from Lansdowne to northwestern gate of High Park; tracks from Dundas and extension of Queens service to Quebec, pending construction of subways under railway

tracks; Harbord to Ossington, Hallam, Lappin and Antler Streets to Dundas; new belt line along MacPherson Avenue from Avenue Road to Bathhurst, and operation of Dupont cars up Bathhurst to MacPherson and east to Avenue Road. The rerouting suggested is: Connect Parliament and Queen lines; Broadview and Dundas lines; Winchester and Harbord lines; eliminate stub on High Park end of College line; re-route College through to Teraulay via Queen, Bay and Wellington to Front.

The report will be taken up at a public meeting of the board, to which representatives of the company and city will be invited.

Arbitration in Springfield.—The officers of the Springfield (Mass.) Street Railway and the representatives of the employees have agreed to settle by arbitration the differences which have arisen regarding the discharge of five men.

Fare Increase Desired.—The Barre & Montpelier Traction & Power Company, Montpelier, Vt., has announced that it is confronted by conditions that render an increase in fares imperative if a receivership for the company is to be avoided.

Lower Steps in New Hampshire.—The Boston & Maine Railroad, Concord & Manchester Electric Branch, has placed in operation the first of its cars reconstructed to comply with the recent order of the Public Service Commission of New Hampshire prescribing the height of electric railway car steps.

Inquiry Into St. Louis Service.—The Public Service Commission of Missouri will inquire into the service furnished by the United Railways, St. Louis. The commission has designated J. L. Harrop, its chief engineer, to study traffic conditions in that city and to report his findings to the commission.

Service Questions in Pittsburgh.—At a meeting of the members of the Council of Pittsburgh, Pa., on June 11, it was decided to have the law department present to the Pittsburgh Railways suggestions looking toward the betterment of service in Pittsburgh with the idea of adjusting matters without carrying the case to the Public Service Commission.

Smoking on Brooklyn Cars.—The Public Service Commission of the First District of New York has authorized the Brooklyn Rapid Transit Company to permit smoking on the four rear seats of its semi-convertible surface cars. For some time past smoking has been permitted on the four rear seats of the open surface cars of the company fitted with running boards.

Group Insurance in Meridian.—The Meridian Light & Railway Company, Meridian, Miss., has arranged with the Equitable Life Assurance Society to insure under the group insurance plan all white employees who have been in the service of the company for six months or longer for an amount which approximates a year's salary of each employee. The insurance is being placed without cost to the men.

Increase in Fare on Seattle Suburban Line.—The receivers of the Seattle, Renton & Southern Railway, Seattle, Wash., are seeking to put into effect an increased schedule of rates on July 10. They propose to divide the road into four 5-cent zones. Under the new plan the cost of a ride to the city limits will be increased from 5 cents to 10 cents and it will cost 20 cents to ride to Renton unless commutation tickets are used.

Decision in Ferry Fare Case.—The United States Supreme Court has affirmed the decision of the New Jersey Court of Errors and Appeals holding that the Chosen Freeholders of Hudson County, N. J., had the right to order a reduction in fares to six cents per round trip on the Port Richmond & Bergen Point Ferry, operated between Bergen Point, N. J., and Port Richmond, Staten Island, N. Y., and owned by the Public Service Corporation.

East Liverpool Arbitrators Report.—The arbitrators who have been considering the wage question on the Steubenville & East Liverpool Railway & Light Company, East Liverpool, Ohio, made their award on June 13 covering the linemen, substation operators, etc. They reported in favor of an increase for line foremen from \$90 to \$96 a month and line-

men from \$3 to \$3.20 a day. They also recommended slight raises for other employees except the substation operators.

Seattle-Tacoma Fare Amendment.—An amendment has been filed with the Public Service Commission of Washington by the Puget Sound Electric Railway, Tacoma, Wash., to experimental tariff No. 6 covering passenger rates, which became effective on June 1, 1914, naming an experimental round-trip fare between Tacoma and Seattle of \$1 instead of \$1.25 as at present, effective on July 1, 1914. No change will be made in the single-trip fare.

Hearing on Commutation Fares in Missouri.—A hearing was held by the Missouri Public Utilities Commission at Jefferson City, Mo., on June 10 and 11 in regard to commutation rates on the Kansas City, Clay County & St. Joseph Railway. John M. Olin represented the company and argued against commutation rates. P. L. Saltonstall, president of the company, also attended with J. R. Harri-gan, general manager. A brief will be filed in the case by the electric railroad in the near future.

Mail Service on Illinois Traction System.—As a result of frequent conferences between W. C. Vandervoort, Chicago, acting superintendent of the mails of the sixth division; H. E. Chubbuck, vice-president executive of the Illinois Traction System, and Seth Howard, chief of the railway mail service in Peoria, it is now practically assured that the mails will soon be carried on the McKinley lines. Mail compartments will be built into the regular cars if the service is installed. It is reported that the traction company will receive the same compensation paid to steam roads. Parcel-post matter will be carried.

Petition for Exchange of Transfers in Seattle.—Corporation Counsel Bradford, of Seattle, Wash., has been authorized by the City Council to petition the State Public Service Commission for an order directing an exchange of transfers between the Seattle Municipal Railway and the lines of the Puget Sound Traction, Light & Power Company and other systems operating in Seattle. Under its franchise the Puget Sound Traction, Light & Power Company is required to issue and accept transfers to and from the Seattle, Renton & Southern Railway, but the franchise is silent as regards the exchange of transfers with a municipally owned and operated line.

Running Boards a Menace.—On June 9 the Ontario Railway Board decided that the running boards on the cars of the Toronto (Ont.) Railway were a menace to the conductors. The board did not issue an order to compel the company to discontinue their use, but Chairman McIntyre gave the company's representatives a month in which to have plans prepared with a view to rearranging the present cars. R. J. Fleming, general manager of the company, intimated during the hearing that the company might be forced to run closed cars during the summer if the board issued an order prohibiting the running board. He contended that the present cars were not wide enough to permit the installation of cross seats and a center aisle.

Philadelphia Company Announces Prizes in "Safety First" Competition.—Twenty-nine hundred and forty youthful champions of the "safety first" movement, competing for the second series of cash awards offered to school children by the safety bureau of the Philadelphia (Pa.) Rapid Transit Company, have expressed in essay, verse and drawing, a practical code of behavior for the prevention of street accidents. So gratifying has been the spirit with which the young safety conservators have entered the competition that those in charge of the bureau have decided to reward the efforts of 361 competitors. Originally, it was intended to distribute \$250 in prizes, but this amount has been doubled. Awards of a first prize of \$10; twenty second prizes of \$5 each; fifty third prizes of \$2 each, and the balance of \$290 in prizes of \$1 each were announced at the schools on June 10.

New Cleveland Working Schedule Accepted.—The local branch of the Amalgamated Association of Street & Electric Railway Employees at Cleveland has voted to accept the new schedules prepared by representatives of that organization and the officers of the Cleveland Railway. When the vote was taken 1500 members were present. Not an objection was made to the schedules on any of the lines. Under the new arrangements the minimum day will be eight

hours, and the men will not be compelled to be at the car-houses so many hours to secure a day's work. If, under the orders of the company, men work less than eight hours they will receive pay for the minimum day. No change will be made in the operation of cars during the rush hours. More men will be required to carry the schedules into effect, however, and Street Railway Commissioner Witt it is expected will advise Council to allow the company the additional funds to meet the increased expense.

Hearing on Arlington Service.—A hearing was held by the Massachusetts Public Service Commission on June 16 on a petition of the town of Arlington for various changes in the methods of handling traffic at the terminals of the Boston Elevated Railway and the Middlesex & Boston Street Railway. The principal request of the petitioners was that a loop be built into or around the carhouse properties of the two roads, which occupy opposite sides of Massachusetts Avenue, in Arlington Heights. H. B. Potter, for the Boston Elevated Railway, opposed the expenditure of more money at this point as the company considered that it has made adequate provision for handling its traffic. George M. Cox, general manager, said that the Middlesex & Boston Street Railway, could not afford to make any changes. With close regulation of traffic by the town police the construction of additional track would be unnecessary. The company was willing to meet its share of this regulation. Chairman McLeod of the commission suggested that the companies endeavor to secure the additional co-operation of the police department as outlined by Mr. Cox and that they return to the commission if no feasible plan is worked out during the summer.

Peculiar Service Conditions in Pittsburgh on July 4.—The Pittsburgh City Council is again demanding that the Pittsburgh Railways issue transfers on July 4 as on other days. For ten years the company has not issued transfers on this holiday. P. N. Jones, general manager of the company, appeared before the Council on June 9. He said the receipts on July 4 were about one-third greater than on average days. An average day was about \$30,000. Mr. Jones did not think that any other city with a corresponding population had so many different lines routed direct to the business portion of the city. On July 4 radical changes were made in some of the routes to afford direct service for the people to the parks and other places of amusement. Travel was light during the first half of July 4, but congested during the afternoon and evening, and consequently it would be next to impossible to issue transfers, keep the cars on schedule and avoid confusion, abuse, disputes and possibly disorder. In cases where cars were operated over strictly transfer routes the cars were operated as usual on July 4, but no fare was charged on such cars in either direction. On this account Mr. Jones did not think it was reasonable to ask the company to change a method of operation that had been in effect so long.

Rerouting Plan in Columbus.—The Columbus Railway, Power & Light Company, Columbus, Ohio, has submitted a plan to the City Council for rerouting cars. The Council committee on street railways has invited a public discussion of the plan, with a view to securing an idea as to whether it will meet with the approval of a majority of the people. In connection with this Walter L. Lillie has advised the City Council to repeal that portion of the franchise ordinance requiring the company to sell tickets at the rate of eight for 25 cents and make the rate seven tickets for 25 cents, the difference to be used in the purchase of equipment and in improvements of other kinds. Mr. Lillie said that the city is compelling the company to haul passengers at cost and that it can have no surplus to invest in new tracks or equipment under the provisions of the ordinance. Council should take a liberal view of the matter and broaden the city's development by allowing the company to accumulate funds and carry out a policy of growth. This could be accomplished by reducing the number of tickets to be sold for a quarter. He would have the rate of seven for a quarter continue for two years. If Council should adopt this view of the situation, the company would probably be able to carry out its plans for financing needed extensions and the purchase of additional equipment. This plan has already been explained in the ELECTRIC RAILWAY JOURNAL.

Personal Mention

Mr. Samuel Russell has resigned as general freight and passenger agent of the Northern Electric Railway, Chico, Cal.

Mr. D. W. Houston, heretofore acting superintendent of the Regina (Sask.) Municipal Railway, has been appointed superintendent, vice Mr. H. Doughty, resigned.

Mr. J. R. Wilson, for nine years commercial agent of the Illinois Central Railroad in San Francisco, has been appointed general freight and passenger agent of the Northern Electric Railway, Chico, Cal., to succeed Mr. Samuel Russell.

Drs. Miguel and Teofilo Lacroze, directors of the Lacroze Tramways Company, Argentina, sailed recently on a visit to Europe and America to study the subway and electric railway systems, in connection with the proposals of the Lacroze Company to extend its system.

Gen. George H. Harries, president of the Louisville (Ky.) Gas & Electric Company, was given the degree of doctor of laws by the State University of Kentucky at Lexington on June 4. Governor McCreary of Kentucky is chairman of the board of trustees of the university.

Mr. J. W. Ground, Kansas City, Mo., a director of the Joplin & Pittsburgh Railway, has been elected vice-president of that company. Mr. Ground succeeded Mr. W. W. Calhoun, who died shortly after the last annual meeting. The vacancy on the board of directors created by Mr. Calhoun's death was filled by the election of Mr. J. F. Harrison, Carthage, Mo.

Mr. F. A. Nichols, who has been appointed manager of the East Liverpool Traction & Light Company, East Liverpool, Ohio, was graduated from the State University of Kansas in 1902. He entered business with the General Electric Company in its testing department and spent four years with the company in various capacities. He then entered the employ of the International Railway, Buffalo, N. Y., with which he served for eight years in the electrical department. The last four years that he was with the International Railway Mr. Nichols was electrical engineer of the company.

Mr. G. A. McCarthy has been appointed engineer of the railway and bridge section of the works department of the city of Toronto to succeed Mr. C. W. Power. The section of the works department to which Mr. McCarthy has been appointed is responsible for the operation of the electric railway lines owned by the city. Mr. McCarthy was graduated from McGill University. For seven years he was in the engineering department of the Intercolonial Railway. He was also employed for a time by the Canadian Pacific Railway and was assistant chief engineer of the Algoma Central Railway. He was connected with power development work at Niagara Falls, and from 1905 to 1909 was chief engineer of the Timiskaming & Northern Ontario Railway. From 1909 to 1912 he was with a private firm of engineers in Toronto. He has recently been employed on the Feather River power development in California.

OBITUARY

Walter E. Read, electrical engineer and master mechanic for the Ogden (Utah) Rapid Transit Company, was killed and two companions were injured in an automobile accident in Ogden Canyon on May 31. For many years Mr. Read was connected with the old Salt Lake City Railway, of which his father was superintendent. He was thirty-seven years old.

Peter C. Dolan, for many years active in electric railway work in western Massachusetts and in Connecticut, died at Pittsfield, Mass., on June 12. Mr. Dolan was born in Ireland on Nov. 9, 1855, and came to this country when seven years old with his parents, who settled near New Britain, Conn. When Peter C. Dolan was twenty-two he and his brother Patrick H. Dolan bought a controlling interest in the horse railway at New Britain. In 1891 they sold the New Britain property and in June, 1892, bought a controlling interest in the Pittsfield Street Railroad, a 3-mile

line which had just been equipped with electricity. The road has been steadily enlarged and is now included in the Berkshire Street Railway with 110 miles of line. In 1902 the brothers bought the Hoosac Valley Street Railway. This property they sold in 1906 to the New York, New Haven & Hartford Railroad. In January, 1908, Peter C. Dolan was elected president of the Pittsfield Street Railway, of which he had previously been general manager. Following the death of his brother in 1909 Peter C. Dolan sold the Pittsfield property to the New England Investment & Security Company and retired from business.

James Campbell, chairman of the board of directors of the North American Company, New York, died at Greenwich, Conn., on June 12 at the age of sixty-seven years. Mr. Campbell was born in Ireland and was brought to America by his parents when he was two years old. He was educated in the public schools at Wheeling, W. Va., and entered business in 1859 when he was eleven years old. During the Civil War he was attached to the staff of Gen. John C. Fremont as a messenger. Later General Fremont placed Mr. Campbell in the engineering department of the Southwest Pacific Railroad. He was subsequently appointed chief engineer of the Kansas City, Missouri & Mobile Railroad, which later became a part of the Frisco system. In 1877 Mr. Campbell opened an office as a broker in St. Louis. He became interested in public utility properties and was identified with the electric railways in St. Louis and with public utilities elsewhere. In addition to being chairman of the board of the North American Company Mr. Campbell was at the time of his death a director of the Utah Utilities Company, the National Bank of Commerce of St. Louis, the Mercantile Trust Company of St. Louis, the Southwestern Telegraph & Telephone Company and numerous other public utility companies.

Thomas Dolan, formerly president of the United Gas & Improvement Company, Philadelphia, Pa., and for many years a commanding figure in the financial and business activities there, died on June 12 at Torresdale, Pa., at the age of seventy-nine years. Mr. Dolan was for many years identified with the Whitney-Widener-Elkins street railway syndicate. He was born in Montgomery County in October, 1834, and was educated in the common schools of that county. He became a clerk in a retail dry goods store in Philadelphia. During the depression incident to the Civil War the firm with which Mr. Dolan was connected failed and he embarked in the knit goods manufacturing business in 1861 on his own account. This business subsequently became the prosperous Keystone Knitting Mills. Mr. Dolan is credited with being one of the organizers of the Brush Electric Company. In 1892, five years before his retirement from the manufacturing field, Mr. Dolan was offered the presidency of the United Gas Improvement Company. In the meantime he had become identified with street railway development in Philadelphia, in connection with P. A. B. Widener and the late William L. Elkins. These men formed the Philadelphia Traction Company and subsequently took over the holdings of the Welsh syndicate in the Philadelphia Union Traction Company. Later the organization of the Philadelphia Rapid Transit Company, as the successor to the separate companies, was brought about. Mr. Dolan was one of the participants in the syndicate which negotiated all these deals. He was also associated with Mr. Elkins, Mr. Widener and William C. Whitney in the Metropolitan Street Railway, New York, and in many of their other operations. On March 16, 1912, Mr. Dolan resigned from the presidency of the United Gas & Improvement Company.

Propelled by energy from a battery of primary cells carried on a flat-car following it, one of the street cars of the Wichita Falls (Tex.) Traction Company was recently operated through the streets of the city without trolley connection or other source of supply. The battery used employs carbon and zinc with a secret solution which, like the zinc, must be renewed at intervals. Julius J. Krohn and John McGivney are the inventors. On its trial trip the car carried thirty-five persons, but had to be helped over some of the grades by a trolley car.

Construction News

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

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

RECENT INCORPORATIONS

***Aurora, Plainfield & Joliet Railroad, Joliet, Ill.**—Incorporated in Illinois to operate an electric railway from Aurora to Plainfield and Joliet. The line originally constructed and operated by the Joliet, Plainfield & Aurora Railroad Company and sold to the Joliet & Southern Traction Company will be used by the new corporation as well as the line formally owned and constructed by the Joliet & Southern Company. Capital stock, \$25,000. Incorporators and first board of directors: W. A. S. Mulligan, J. C. Hauronic, Robert Oehmig, O. P. Steward and Frank P. Page.

***International Suburban Railway, Windsor, Ont.**—Application is being made to the Canadian Government for the incorporation of this company with power to build a railway in Essex and Kent Counties, Ont., and to connect the same by ferry or tunnel across the Detroit River, with Detroit, Mich., and to use gasoline, steam or other motive power for operation. The lines specified in the application would extend from Ojibway through Sandwich, Windsor, Walkerville and Ford City to Belle River, and thence easterly to Chatham, and from Ojibway southwesterly to Amherstburg. Rodd, Wigle & McHugh, Windsor, Ont., are solicitors for applicants.

***Pier Railway, Port Arthur, Tex.**—Incorporated in Texas to build electric railways in Port Arthur. Capital stock, \$60,000. Incorporators: K. M. Smith, J. W. Williams and C. N. Bosler.

***Parkersburg Railroad & Terminal Company, Parkersburg, W. Va.**—Incorporated in West Virginia to build an electric or steam railway in Parkersburg. Capital stock, \$10,000. Incorporators: K. B. Stephenson, C. B. Kefauver, E. H. Watson, H. D. Archer and R. C. Stapleton, all of Parkersburg.

FRANCHISES

***Los Angeles, Cal.**—The Joseph Ball Company has asked the Council for a franchise to build a municipally owned suspended monorail electric system for the city of Los Angeles.

East Hartford, Conn.—The Connecticut Company has asked the Public Utilities Commission for the approval of the method of construction of its tracks on Burnside Avenue in East Hartford.

Lafayette, Ind.—O. L. Brown, Indianapolis, representing the Lafayette & Northwestern Traction Company has asked the County Commissioners for a franchise through Jasper County. This line will connect Kankakee, Wolcott, Rensselaer, Brook and Morocco. [E. R. J., May 23, '14.]

***Transcona, Man.**—J. H. Kern, Moose Jaw, Sask., has received from the Council a franchise for an electric railway in Transcona. The agreement calls for the completion of the following line by October: From the Nairn Road to King Street, thence north to Regent Avenue, or to Transcona and to Leola Street and Oxford Street, thence north to Stafford Avenue, about 6 miles. The Council had been in negotiation with the Winnipeg Electric Railway relative to the building of such a line, but withdrew from the negotiations upon the question of the cost of subways.

Stonewall, Man.—The Winnipeg Electric Railway has received an extension of time on its franchise until Nov. 15 from the Councils in Stonewall and in Rockwood, in which to complete the line to Stonewall. The City Council of Winnipeg has authorized the construction of a loop on Portage, Clifton, Spruce and Classic Streets in Winnipeg. This is a temporary line, pending the construction of a modern subway.

Keansburg, N. J.—The Jersey Central Traction Company has received a fifty-year franchise from the Council for an extension of its present lines from Palmer Avenue, Keansburg, down Carr Avenue to the landing of the Keansburg Steamboat Company.

Newark, N. J.—The Public Service Railway has asked the Council for five franchises to extend and double-track some of its lines in Newark.

Buffalo, N. Y.—The International Railway has asked the Council for a franchise on Tracy Street to connect the Grant line at West Avenue with the Elmwood and Hoyt Street lines in South Elmwood Avenue in Buffalo.

Sydney, N. S.—The City Council has authorized its officials to sign a supplementary agreement with the Cape Breton Electric Company respecting the construction of the extension from Sydney to New Waterford.

Lancaster, Ohio.—The Lancaster Traction & Power Company has received a twenty-five-year franchise from the Council to extend several of its lines in Lancaster.

Hamilton, Ont.—The Hamilton Street Railway has received a franchise from the Wentworth County Council to build a line on Main Street between Ottawa Street and Kenilworth Avenue, Hamilton.

Ottawa, Ont.—The Western Central Railway Company's application for an extension of time for construction and for increased powers was withdrawn from further consideration before the railway committee of the House of Commons. The company has power to build electric lines from London to Windsor, from London to Toronto and branches to Woodstock, Stratford and other points in Ontario. [E. R. J., May 16, '14.]

Astoria, Ore.—The Pacific Power & Light Company has received a franchise from the Council to extend its lines in Astoria to Alderbrook and into Taylor's Astoria.

Grove City, Pa.—Thomas H. Greer, Butler, representing the Northwestern Pennsylvania Traction Company, has received a franchise from the Council for a line through Grove City.

Charleston, S. C.—The Charleston Consolidated Railway, Gas & Lighting Company has asked the Council for a franchise for a right-of-way through Chicora Park, North Charleston.

Dallas, Tex.—O. S. Thomas, Dallas, has asked the County Commissioners for a fifty-year franchise to build a double-tracked electric line over Atkins Boulevard to the Southern Methodist University in Dallas.

Orange, Tex.—Augustus M. Hodges, C. E. McKee and C. F. Smythe, Orange, have received a franchise from the Council to build an electric railway over certain streets in Orange. [E. R. J., May 30, '14.]

***Casper, Wyo.**—John B. Fleming has received a twenty-five-year franchise from the Council to build an electric railway in Casper.

Seattle, Wash.—The Puget Sound Traction, Light & Power Company has received a franchise from the Council in Seattle for an extension on Ravenna Boulevard. The company has asked the Council for a franchise for an extension on Avalon Way from West Spokane Street to the junction of West Alaska Street and Twenty-ninth Street in Seattle.

TRACK AND ROADWAY

Birmingham Railway, Light & Power Company, Birmingham, Ala.—An extension from Ensley to Wylam is being planned by this company.

Mobile & Baldwin County Railroad, Mobile, Ala.—During the next four weeks this company expects to purchase rails for an extension. The first section of this line has been completed, and within the next sixty days a 5-mile extension will also be completed. This line will eventually connect Mobile, Bay Minette, Blakely, Volanta, Fairhope, Yerkon, Magnolia Elberta and Pensacola.

***Medicine Hat, Alta.**—Estimates are being prepared by the City Council for the building of an electric line along Ansley Spur to the West Industrial site, a distance of 3½ miles, to handle products and supplies from the various factories.

***Tucson, Ariz.**—A company is being formed to build an electric railway to extend from Stone Street and University Street in Tucson across Bronx Park and out to Pastime Park, a distance of 13 miles. This railway will be independent of the Tucson Rapid Transit Company. No names are yet given of those interested in the new company.

Northern Electric Railway, Chico, Cal.—Work has been begun by this company on its extension to North Sacramento, 1½ miles.

Fresno (Cal.) Interurban Railway.—This company has been granted authority from the State Railroad Commission to issue \$120,000 in bonds and \$60,000 in stock to build an electric railway from Fresno to Clovis, 9 miles. This line will connect in Fresno with the lines of the Fresno Traction Company. J. B. Rogers, Fresno, president. [E. R. J., June 6, '14.]

Los Angeles, Cal.—Proposals for the city to build a suspended electric monorail railroad system, which would require a bond issue of \$7,000,000 to finance, were filed with the Council recently by the Joseph Ball Company.

San Francisco-Oakland Terminal Railway, Oakland, Cal.—This company is asked to extend its main line through Castro Valley in the near future.

Sacramento Valley West Side Electric Railway, Willows, Cal.—About 3 miles of track has been laid on the first unit of this railway from the junction with the Oakland, Antioch & Eastern Railway to Dixon, and the grading has been completed to the city limits of Dixon. Rails are being laid from the south towards Dixon. With the completion of the bridge, track laying on the remaining 8 miles will progress rapidly. The work so far has been delayed by the building of culverts and small bridges. [E. R. J., May 16, '14.]

Jacksonville (Fla.) Traction Company.—Extensive improvements and betterments generally are being planned by this company on the line out North Main Street and in the East Springfield section of Jacksonville.

Jacksonville & St. Augustine Public Service Corporation, St. Augustine, Fla.—Grading has been completed by this company from South Jacksonville a distance of 6 miles and plans are being made to build a new bridge to cross the bay from North Beach. This is part of a plan to build an electric railway from South Jacksonville to Beach Junction, Diego, Pablo Beach and St. Augustine. Thomas R. Osmond, St. Augustine, general manager. [E. R. J., March 28, '14.]

Augusta-Aiken Railway & Electric Company, Augusta, Ga.—A 2-mile extension from O'Dowd's corner in Augusta to Aumond is being planned by this company.

La Salle County Electric Railway, Chicago, Ill.—Work has been resumed by this company on its line between Ottawa and Mendota. W. C. Vittum is interested.

Chicago, Peoria & Quincy Traction Company, Quincy, Ill.—Citizens of Dalzell have petitioned this company to build a line to Dalzell. This railway will connect Chicago, Peoria and Quincy. [E. R. J., June 6, '14.]

Union Traction Company of Indiana, Anderson, Ind.—Surveys and plans of proposed changes in bridges are being made by this company in Anderson.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—This company has placed in operation its line between Kansas City and Bonner Springs. Ultimately this line will be extended to Topeka. J. D. Waters, Bonner Springs, president. [E. R. J., May 2, '14.]

Winnipeg, Selkirk & Lake Winnipeg Railway, Winnipeg, Man.—The entire right-of-way has been purchased by this company for its line through Stony Mountain. Grading will be begun at once.

Transcona, Man.—In connection with the proposed electric railway in Transcona press reports state that negotiations are in progress with the Canadian Northern Railway, which, if completed successfully, will result in the electrification of a portion of the Dundee branch, with which connection would be made by the extension of the present Winnipeg Electric Railway line running through St. Boniface to the Dawson Road. To carry out this project, about 3 miles of the Canadian Northern Railway branch would be electrified. An alternative proposal is for the building of a special track for an electric railway on the Canadian Northern Railway right-of-way for 3 miles.

Boston (Mass.) Elevated Railway.—A new line has been placed in operation by this company from Eighth Street in East Cambridge, to North Point, Marine Park, South Boston, via the Charles River Dam, Park Square and Summer Street Extension.

Detroit (Mich.) United Railway.—This company has agreed to construct a line into the Fourth Ward over the route to extend out West Court Street in Detroit. The company is asked to consider plans to extend the crosstown line from Mount Elliott Avenue, the present terminus, to Cadillac Avenue in Detroit.

Electric Short Line Railroad, Minneapolis, Minn.—This company has awarded a contract to the Roufs & Pfliegerhaer Company for grading the section of its line between Watertown and Winsted.

St. Paul, Minn.—A. Guthrie & Company, 391 Endicott Building, closed a contract recently with the Board of Regents of the University of Minnesota for work on the electric line which is to connect the agricultural college campus with the main campus. The line in reaching the main campus will extend up Fourth Street to Seventeenth Avenue southeast, run in front of the armory to a "Y" in the rear of the electrical engineering building. At the agricultural college end the line will begin at the Belt line bridge and take a straight course to the plaza in front of the administration building of the university farm. For the intervening distance the lines of the St. Paul City Railway will be used. An appropriation of \$60,000 made by the last Legislature will cover the cost of construction and equipment. Arrangements also will be made for the hauling of freight. [E. R. J., May 16, '14.]

Fulton, Mo.—F. S. Mordaunt, Chicago, representing capitalists of that city, spent a week at Fulton, Mo., recently to ascertain the possibilities for an electric line from Fulton to Montgomery City, where it would connect with the main line of the Wabash Railroad between Kansas City and St. Louis. He also contemplates an extension of the line to Columbia, with a city system there, and an extension to Jefferson City.

Keyport & Matawan Street Railroad, Keyport, N. J.—A new roadbed and new rails will be laid from Walnut Street at Keyport to West Keyport by this company.

Long Island Electric Railway, New York, N. Y.—This company has been ordered by the Public Service Commission, First District, to double-track its line in New York Avenue between South Street and Farmers Avenue, Borough of Queens. That part of the additional trackage between South Street and Oak Street must be constructed immediately, or at the same time as the paving of that portion of New York Avenue is done; and between Oak Street and Farmers Avenue the additional tracks must be constructed within 18 months from July 1 next, or at the same time that the paving of this part of the avenue is done, provided it is done before the expiration of 18 months.

Port Jervis Electric Light, Power, Gas & Railroad Company, Port Jervis, N. Y.—Plans are being made by this company to extend its line to Milford, Pa.

Cleveland (Ohio) Railway.—This company is asked to extend the East Seventy-ninth Street line in Cleveland to Kinsman Road, S. E.

Chardon, Jefferson & Meadville Interurban Railroad, Cleveland, Ohio.—This company has received the approval of the State Public Utilities Commission to finance the proposed electric railway from Chardon to Jefferson, 10 miles. The company has been given authority to issue \$400,000 of 5 per cent bonds and \$300,000 common stock. [E. R. J., May 9, '14.]

Cleveland, Youngstown & Eastern Railway, Cleveland, Ohio.—Plans are being considered by this company to rebuild the greater part of its railway. New rails are ordered for nearly the entire line, and 75 per cent of the ties will be replaced with new ones. About half the bridges must be made that amount to new construction.

Tri-State Railways, Toledo, Ohio.—Right-of-way has been secured and surveys are being made by this company on its line between Hillsdale, Mich., and Pioneer, Ohio. The main line will extend from Elkhart to Adrian and connect there with the lines of the Toledo & Western Railroad for Toledo. A branch from Adrian to Jackson, which will connect several lake resorts in Lenawee and Jackson Counties, also is planned. Miles T. Davis, Hillsdale, is interested. [E. R. J., Oct. 14, '14.]

Portland & Oregon City Railway, Portland, Ore.—Right-of-way has been secured by this company on its 25-mile line from Portland to Viola and other suburban points to the southeast. This line will also extend through Clackamas Station, Stone and Logan.

***Lancaster & Berks Railway, Lancaster, Pa.**—The Public Service Commission has approved this company's petitions for certificates of public convenience and necessity to build this electric railway in Lancaster.

Scranton & Binghamton Traction Company, Scranton, Pa.—Plans are being made by this company to double track the line from Scranton, where the city line terminates, to Factoryville.

Rhode Island Company, Providence, R. I.—Tracks are being laid by this company on the new Franklin Street extension in Providence.

Regina (Sask.) Municipal Railway.—The following contracts for electric railway material have been awarded by the City Council: United States Steel Products Company, Winnipeg, for 100 tons 7-in. steel tee rails and specials; Canada Cement Company, Winnipeg, 9000 bbls. Portland cement; Northern Electric & Manufacturing Company, Winnipeg, 2 miles trolley wire; Ohio Brass Company, trolley wire and fixtures; General Railway Signal Company, Winnipeg, interlocking plants.

Saskatoon (Sask.) Municipal Railway.—The ratepayers have voted in favor of a by-law to raise \$25,000 for extensions to the municipal railway, and to raise \$55,000 to reconstruct a portion of the Long Hill. This latter work is being undertaken in view of the early construction of an extension of the municipal railway.

North Anderson Street Railway, Anderson, S. C.—A 5-mile extension is being built by this company to Brown Park.

Chattanooga Railway & Light Company, Chattanooga, Tenn.—Work will be begun at once by this company on the extension of its Vance Avenue line to Highland Park.

Middle Tennessee Traction Company, Franklin, Tenn.—Preliminary arrangements are being made by this company to begin the construction of this line in the near future. It will connect Franklin, Columbia, Shelbyville, Fayetteville and College Grove. [E. R. J., May 16, '14.]

Nashville Railway & Light Company, Nashville, Tenn.—Extensive improvements are being planned by this company in Nashville.

Clarksville, Tex.—Financial arrangements are being made to build an electric railway between Clarksville and Texarkana.

Fort Worth Southern Traction Company, Fort Worth, Tex.—This company, recently acquired by the Stone & Webster Corporation, Boston, Mass., has filed amended articles of incorporation, changing the name to the Tarrant County Traction Company and increasing the capitalization from \$1,500,000 to \$2,500,000. George H. Clifford, Fort Worth, general manager.

McKinney, Bonham & Paris Interurban Railway, McKinney, Tex.—Fred A. Jones, Dallas, Tex., who has the contract to make surveys for this railway, has selected Blue Ridge as the point to be touched between McKinney and Bonham. [E. R. J., June 6, '14.]

Southwestern Traction Company, Temple, Tex.—Work will be begun in a short time by this company on a line from Waco to Austin.

Ogden (Utah) Rapid Transit Company.—Contracts have been awarded by this company for all the material for the construction and operation of its extensions in Cache Valley north and south from Logan. Much of the material for the Hermitage-Idlewild extension has also been awarded. Surveys have been completed and contracts for grading will soon be awarded.

***Seattle, Wash.**—The City Council has voted to issue \$500,000 in public utility bonds to be used with a like amount in general bonds recently authorized to build 8 miles of municipal electric railway through Rainier Valley. The route of the proposed line parallels the line of the Seattle, Renton & Southern Railroad.

SHOPS AND BUILDINGS

Mobile & Baldwin County Railroad, Mobile, Ala.—This company has completed its new passenger station at East Fairhope.

Springfield (Mass.) Street Railway.—This company is asked to consider plans to build a new passenger station in Mittineague.

Twin City Rapid Transit Company, Minneapolis, Minn.—A new carhouse will soon be erected by this company at Washington Avenue, north, in Minneapolis. The cost is estimated to be about \$75,000.

Public Service Railway, Newark, N. J.—This company has awarded a contract to build the foundation and connecting subway of the new terminal in Park Place, Newark, to Holbrook, Cabot & Rollins Corporation, New York.

Hudson Valley Railway, Glen Falls, N. Y.—A new passenger station will be built by this company at Broadway and Congress Street in Saratoga.

POWER HOUSES AND SUBSTATIONS

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—This company has contracted with the Babcock & Wilcox Company for furnishing and installing two 450-hp boilers in the existing station, making the total capacity 4900 hp at normal rating. The company has also contracted with the Westinghouse Machine Company for the improved type of Roney stokers to be installed under the new boilers, as well as in connection with the present boiler equipment. It is planned to set these latter stokers 3 ft. from the old setting, thus increasing materially the combustion chambers. Sargent & Lundy, Chicago, are the engineers.

Iowa Railway & Light Company, Cedar Rapids, Ia.—Announcement was recently made of the approval of plans for the enlargement and partial rebuilding of this company's gas and electrical plants in Cedar Rapids. These improvements include the construction of a new building for the gas plant and the tearing down and rebuilding of the boiler room of the electric plant and the equipment of both with new machinery. The work of enlarging and rebuilding the power plant will be begun in July. The estimated cost is about \$50,000.

Winnipeg, Selkirk & Lake Winnipeg Railway, Winnipeg, Man.—Plans are being made by this company to build a new substation at Stony Mountain. The contract for the construction of this building will be awarded as soon as the location is decided.

Berkshire Street Railway, Pittsfield, Mass.—This company is building a new substation at Otis.

Benton Harbor-St. Joe Railway & Light Company, Benton Harbor, Mich.—This company will add to its substation equipment a 500-kw motor generator set, switchboard and accessories. The order for the apparatus has been placed with the General Electric Company.

Port Jervis Electric Light, Power, Gas & Railroad Company, Port Jervis, N. Y.—This company has recently bought a site in Middletown on which it plans to build a new power house. The cost is estimated at about \$150,000.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—This company has purchased for one of its substations a 1120-kw motor-generator set and switchboard. The apparatus was purchased from the General Electric Company.

London & Lake Erie Railway & Transportation Company, London, Ont.—This company's steam power plant at London has been overhauled and put into condition for use as an auxiliary plant during the summer. Steam will be kept up, so that in case of a breakdown of the hydroelectric power plant at any time the service will not be interrupted for more than a very short time.

Ottawa (Ont.) Electric Railway.—The equipment of a new steam auxiliary power plant on Middle Street is being installed, consisting of three Babcock and Wilcox water tube, marine type boilers, with chain feed stokers, and a 4000-hp steam turbine.

Beaumont Electric Light & Power Company, Beaumont, Tex.—This company will add to its substation equipment a 700-kva motor-generator set and has ordered the machine from the General Electric Company.

Manufactures and Supplies

ROLLING STOCK

Mobile & Baldwin County Railroad, Mobile, Ala., expects to purchase within a month one additional gas electric car.

Batavia (N. Y.) Traction Company has ordered four single-truck cars from the G. C. Kuhlman Car Company.

Mahoning & Shenango Railway, Youngstown, Ohio, has ordered from the Standard Steel Car Company twenty new steel street cars to cost about \$7,000 each.

Buffalo & Williamsville Electric Railway, Williamsville, N. Y., noted in the *ELECTRIC RAILWAY JOURNAL* of April 25, 1914, as expecting to purchase two passenger cars, has ordered these cars from the Pullman Car Company.

Interborough Rapid Transit Company, New York, N. Y. is reported to be preparing plans for a new design of steel trailer car in anticipation of the expected third tracking of its elevated system.

Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont., has ordered two 55-ft. passenger cars from the Tillsonburg Electric Car Company, Tillsonburg, Ont.

Moncton Tramways, Electricity and Gas Company, Ltd., Moncton, N. B., is considering the purchase of three single-truck cars and one double-truck car during this year.

Regina (Sask.) Municipal Railway.—This railway has indefinitely postponed the proposed purchase of four double-truck cars, tenders on which were invited recently, as noted in the *ELECTRIC RAILWAY JOURNAL* of May 16, 1914.

Port Arthur (Ont.) Street Railway has received three single-truck car bodies, mounted on Brill 21-E trucks, 8 ft. wheelbase, from the Preston Car & Coach Company. The cars are being equipped at the railway shops at Port Arthur.

New Orleans Railway & Light Company, New Orleans, La., noted in the *ELECTRIC RAILWAY JOURNAL* of June 6 as having issued specifications for fifty new city cars, has ordered these cars from the Southern Car Company. The cars will be equipped with Brill 39-E trucks. The total weight of the car will be 35,000 lb., car body, only, 16,000 lb. Orders have not yet been placed for the electrical equipment or air brakes. The builders are to commence delivery about Oct. 1, 1914.

Walla Walla Valley Railway, Walla Walla, Wash., has ordered one 41-ft. 4-in. combination electric locomotive and express car from the Russell Car & Snow Plow Company. This car will be used chiefly to handle less than car-load fruit shipments. The car will be equipped with four GE 55-H motors. Tractive effort per motor will be 16,400 lb., maximum tractive effort at starting, 25,000 lb. Control will be Type M. Other dimensions are: Length over car body, 34 ft.; length of open end platform, 3 ft.; width over all, 9 ft.

Union Electric Company, Dubuque, Ia., has specified the following details for the six prepayment closed cars which are being built by the American Car Company:

| | | | |
|---|-------------------|-----------------------------|--------------------------|
| Seating capacity | 40 | Fare boxes | Johnson |
| Bolster centers, length, | 18 ft. 4 in. | Wheelguards | H. B. |
| Length of body | 27 ft. 4 in. | Gears and pinions | G. E. |
| Length over vestibule | 41 ft. | Gongs | Elec. Ser. Sup. Co. |
| Width over sills | 8 ft. | Hand brakes, | Am. Car Co. and Peacock |
| Width over all | 8 ft. 2 in. | Weights | Consol. |
| Height, rail to sills, | 32 3/4 in. | Headlights | Esterline |
| Height, sill to trolley base, | 8 ft. 8 1/2 in. | Journal boxes | Brill |
| Body | wood | Motors | 2 G. E. No. 203 |
| Roof | plain arch | outside hung | |
| Underframe | metal | Paint | Am. Car. Co. |
| Air brakes | G. E. | Registers | International |
| Axles | Brill | Sanders | Elec. Ser. Sup. Co. |
| Bumpers | 3/8 x 6-in. plate | Sash fixtures, | Dayton and O. M. Edwards |
| Cables | G. E. | Seats | Brill winner |
| Car trimmings | Brill | Seating material | rattan |
| Control | G. E. | Springs | Brill |
| Couplers | Am. Car Co. | Step treads | Universal |
| Curtain fixtures, | Cur. Sup. Co. | Trolley catchers | O. B. |
| Curtain material | Pantasote | Trucks | Brill 39-E |
| | | Varnish | Murphy |
| | | Ventilators | Brill exhaust |

Manhattan Bridge Three-Cent Fare Line, New York, N. Y., noted in the *ELECTRIC RAILWAY JOURNAL* of April 11 as having ordered six semi-convertible, prepayment cars from the Southern Car Company, has specified the following details for this equipment:

| | | | |
|---|------------------|-----------------------------|-------------------------------|
| Seating capacity | 48 | Destination signs | Hunter |
| Weight (car body only), | 16,500 lb. | Fenders | H. B. |
| Bolster centers | 21 ft. | Gears and pinions | Bliss |
| Length of body | 33 ft. 3 in. | Gongs | Wallace |
| Length over vestibule, | 43 ft. 6 1/2 in. | Hand brakes | Peacock |
| Width over sills | 8 ft. 4 in. | Heaters | Consol. |
| Height, rail to sills, 30 3/4 in. | | Headlights | Esterline |
| Height, sill to trolley base, | 8 ft. 7 in. | Journal boxes | Symington |
| Body | composite | Motors | 2 West. 323-A, |
| Interior trim | cherry | inside hung | |
| Headlining | Nevasplit | Paint | Devoe & Reynolds |
| Roof | arched | Registers | International |
| Underframe | composite | Sash fixtures | Wallace |
| Air brakes | West. | Seats | Hey. & Wake. |
| Axles | Baldwin | Seating material | rattan |
| Bumpers | Hedley | Springs | Ry. Steel Spring |
| Cables | West. | Step treads | Mason |
| Car trimmings | Wallace | Trolley base | Nuttall |
| Control | H. L. | Trucks, | Baldwin 54-18 M L-2 |
| Curtain fixtures, | Cur. Sup. Co. | Varnish | Devoe & Reynolds |
| Curtain material | Pantasote | Ventilators | Railway Utility |
| | | Wheels | Standard Steel & Star special |

TRADE NOTES

National Steel Rail Company, St. Louis, Mo., has purchased from the Chicago & Alton Railroad seventy track miles of 60, 70 and 80 lb. section relaying steel T-rails. The purchase was a cash transaction. It is understood that part of these rails are sold to an interurban line in the Southwest.

Curtain Supply Company, Chicago, Ill., has received orders to equip with its Ring-89 fixtures and Rex rollers twenty-five cars of the Third Avenue Railway, one car of the Binghamton (N. Y.) Railway, three cars of the Washington, Baltimore & Annapolis Electric Railway, and six cars of the Jamestown, Westfield & Northwestern Electric Railway.

Terry Steam Turbine Company, Hartford, Conn., announces that it has just finished one of the largest months in its history in the point of orders received, in spite of the prevailing dull conditions reported by many manufacturers. In order to properly take care of this business and possible additional business extra machine tools have been installed, increasing the capacity of its plant approximately 25 per cent.

Westinghouse Machine Company, East Pittsburgh, Pa., has appointed W. A. Bole as vice-president in charge of production and erection, a new position. Mr. Bole has since 1882 been in the employ of this company successively in the positions of general shop foreman, superintendent, manager of works and consulting engineer. He will have charge of the plants at East Pittsburgh and Trafford City.

Julius Andrae & Sons Company, Milwaukee, Wis., manufacturer and dealer in electrical supplies, has appointed L. W. Orear in charge of its engineering department. Mr. Orear, who graduated from the electrical engineering department of the Missouri State University in 1900, was for many years connected with the United States Steel Corporation and later with the Jones & Laughlin Steel Works and the Lehigh Portland Cement Works, at New Castle, Pa.

National Brake Company, Buffalo, N. Y., has received an order to equip with Ackley adjustable brakes the eighty-five new cars which have been ordered by the United Railways & Electric Company from The J. G. Brill Company. This item is a correction of an unavoidable error which appeared in the specifications for these cars in the *ELECTRIC RAILWAY JOURNAL* of May 9. Since the year 1904 every car purchased by this railway has been equipped with brakes made by the above company.

H. Scholey, of the firm of Scholey & Company, Ltd., London, England, is at present paying a visit to the United

States, and his headquarters for a short time will be The Engineers' Club, New York, N. Y. Scholey & Company represent a number of American specialties in England, and have a valuable connection among the various municipalities operating stations both for electric lighting and tramways, and among the various electric-lighting and electric-tramway companies. They have also a valuable connection among the electric railway companies now in existence in England, and have been particularly successful recently in securing orders for Tool Steel gears for various electrification schemes now being carried out.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., owing to the increased activities of its railway and lighting department in connection with the work of railroad electrification and heavy power house apparatus, has created the positions of assistant managers of this department. E. P. Dillon and M. B. Lambert have been appointed to these positions. Mr. Dillon will have charge of the commercial activities of the company in connection with the generation and distribution of power, involving power house, substations, transformer stations and similar apparatus. Mr. Lambert will have charge of all sales work pertaining to electric traction, including steam, interurban and city railway propositions. Both Mr. Dillon and Mr. Lambert have been connected with the railway and lighting department of this company for a number of years and are widely known in the electrical field.

ADVERTISING LITERATURE

Nichols-Intern Company, Cleveland, Ohio, has issued a bulletin describing its pneumatic sand traps, sander valves, sand hoppers and accessories.

Holland Manufacturing Company, Erie, Pa., has issued Catalog No. 22 describing its various kinds of devices and tools for use in electric railway shops.

Lumen Bearing Company, Buffalo, N. Y., manufacturer of autobronze sticks and bushings, has issued a leaflet which gives a review of the prices of non-ferrous metal for May, 1914.

General Railway Signal Company, Rochester, N. Y., has issued Catalog Section B, Part 3, which gives detailed data on its mechanically operated train order signals. Part 6 gives data on its table and wall lever stands.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletin No. 34-C describing its class H-SG and N-SO pneumatic gasoline and fuel oil engine driven compressors for use with rock drills and pneumatic tools. Another leaflet describes its "Giant" fuel oil and gas engines for all power purposes.

Westinghouse Electric & Manufacturing Company, East Pittsburgh Pa., has issued its *Westinghouse Railway Data Exchange* No. 8, which deals with the efficient use of cars, giving considerable data as to the relative cost of operation of different systems. The cost of stops is also treated and some interesting data in dollars and cents given as to the cost of different lines.

Whitman & Barnes Manufacturing Company, Akron, Ohio, has issued its new machinists' supply catalog No. 82, which describes and illustrates its complete line of twist drills and reamers, drop forged and screw wrenches, spring cotters and other machinists' supplies. The catalog also contains numerous tables of speeds and feeds, decimal equivalents, and rules for proper grinding and ordering.

Canadian Consolidated Rubber Company, Ltd., Montreal, Que., has issued Catalog A which describes and illustrates its general line of mechanical rubber goods, most of which is adapted for electric railway use. Among the products described are belting, hose for every special use, including air brake and fire hose, packing and gaskets. The company has also issued a Catalog F, which describes its line of textile goods.

Wasson Engineering & Supply Company, Milwaukee, Wis., has issued a catalog explaining the method of operation of its air retrieving trolley, which was described in an illustrated article in the *ELECTRIC RAILWAY JOURNAL* of June 6. Views are shown of standard cars of the Milwaukee & Northern Railway, Pacific Electric Railway and Chicago & Milwaukee Electric Railroad, equipped with the air-retrieving trolley base.

Williams, Dunbar & Coleman, New York, have issued a booklet entitled "Short Stories of Public Utilities." The booklet is prefaced by a brief sketch of the growth of public utilities, and contains general descriptions and financial statistics of the American Light & Traction Company, Cities Service Company, Denver Gas & Electric Company, Utah Securities Corporation, Tennessee Power Company and Denver Gas & Electric Light Company.

Manganese Track Society and the Manganese Steel Foundries Society have just issued their book of standards No. 2. In this book the joint standardization committee of the two societies, whose membership includes the principal manufacturers of steam and electric railroad special work in this country, presents what in its opinion constitutes the best practice in regard to the design of manganese steel crossings for steam railroads. Drawings of ten types of crossings are shown as being those best suited to the different angles and varying conditions in steam-railroad layouts.

Electric Service Supplies Company, Philadelphia, Pa., has issued the 1914 edition of its catalog on protected rail bonds and appliances. This book consists of 72 pages and covers the subject of rail bonding in its entirety. The illustrations, besides showing the many different types of bonds, show clearly the value of proper installation, the importance of accurate testing apparatus and the use of bond compressors. The section of the catalog describing and illustrating the methods of installing rail bonds enters into the subject in detail and shows graphically the importance of assuring a perfect moisture-proof contact between the bond and the rail.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. 41,302 which covers the complete line of its standard polyphase induction motors. The characteristics of the different forms of these motors are analytically described, and the windings used for various classes of service are shown. The illustrations show in detail the construction of the component parts of the motors and describes the various types of compensators and control apparatus required. The illustrations are keyed by suitable letters to a list of parts to facilitate ordering. Bulletin No. 46,201 describes Type I-14 single-phase watt-hour meters of low capacity, 5 to 25 amp. Bulletin No. 43,402 describes systems of lighting in machine shops.

Drew Electric & Manufacturing Company, Indianapolis, Ind., has issued a very clever folder inviting everybody to attend the June meeting of the Central Electric Railway Association at Toledo, Ohio. The written composition is ingenious in that it is a play on the names of the various members of the association, telling why all should attend and what is on the program. The closing paragraph is as follows: "This bulletin issued in light vein is for a C.E.R.A.ious purpose. We want a big meetin' and it's goin' to be one. So put away your hammer, dust off yer pass book, send yer best string tie to the laundry and come with us because the summer meetin's in Toledo on the 25 and 26 and there won't be anybody anywhere else on them two days but the crossin' flagman, and he's on the job for 'Safety First' and can't be with Drew."

H. A. Strauss Data-Card Service Company, Chicago, Ill., has issued an announcement and sample cards of its data card service, which is conducted by subscription. At least four cards every fortnight are mailed to the subscriber. These cards contain data taken from actual practice. The range of subjects covers the entire field of engineering. The cards are designed to furnish concise, accurate and reliable predigested information for the engineer who is suddenly called upon to write a specification, report on an engineering project, post himself for a conference or advise himself in general upon the subjects treated on the cards. Among various kinds of information supplied is that relating to interurban railways. One card shows unit operating data compiled from an analysis of fifty typical interurban electric railways, together with an explanation of how to work out the problem of the probable annual financial statement of the prospective typical interurban railway. Another specimen card of handy reference value supplies data as to weight, cost and electrical operating information of a typical modern passenger car for high-speed interurban electric railway service.