

# Street Railway Journal

Vol XXVII.

NEW YORK, SATURDAY, APRIL 14, 1906.

No. 15.

PUBLISHED EVERY SATURDAY BY THE  
**McGraw Publishing Company**

**MAIN OFFICE:**

NEW YORK, ENGINEERING BUILDING, 114 LIBERTY STREET.

**BRANCH OFFICES:**

Chicago: Monadnock Block.

Philadelphia: Real Estate Trust Building.

Cleveland: Cuyahoga Building.

London: Hastings House, Norfolk Street, Strand.

Cable Address, "Stryjourn, New York"; "Stryjourn, London"—Lieber's Code used.

Copyright, 1906, McGraw Publishing Co.

## TERMS OF SUBSCRIPTION

In the United States, Hawaii, Puerto Rico, Philippines, Cuba, Canada, Mexico and the Canal Zone.

Street Railway Journal (52 issues).....\$3.00 per annum  
Single copies ..... 10 cents  
Combination Rate; with Electric Railway Directory and  
Buyer's Manual (3 issues—February, August & November) \$4.00 per annum  
Both of the above, in connection with American Street Rail-  
way Investments (The "Red Book"—Published annually  
in May; regular price, \$5.00 per copy).....\$6.50 per annum

*To All Countries Other Than Those Mentioned Above:*

Street Railway Journal (52 issues), postage prepaid..... \$6.00  
25 shillings. 25 marks. 31 francs.  
Single copies .....20 cents  
Remittances for foreign subscriptions may be made through our European office.

## NOTICE TO SUBSCRIBERS

**REMITTANCES.**—Remittances should be made by check, New York draft, or money order, in favor of the STREET RAILWAY JOURNAL.

**CHANGE OF ADDRESS.**—The old address should be given, as well as the new, and notice should be received a week in advance of the desired change.

**BACK COPIES.**—No copies are kept on sale beyond fifteen months from date of issue, except in bound volumes.

**DATE ON WRAPPER** shows the month at the end of which the subscription expires.

## NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

*Of this issue of the Street Railway Journal, 8000 copies are printed. Total circulation for 1906 to date, 122,800 copies, an average of 8187 copies per week.*

## Painting Car Floors

In most places it is the prevailing idea that the car floor needs painting only at times when the car receives its yearly general overhauling. Some roads, however, are adopting the practice of applying a coat of paint to the floor at intervals as frequent as twice a month. It must be admitted that there is

much to recommend this practice. Nothing in a car probably is more noticeable than the floor, and it is certain that there is no part more difficult to keep clean. A coat of paint applied to the floor every few weeks facilitates the cleaning wonderfully. It tends to make the floor waterproof and, therefore, does not allow the dirt to adhere, as it does to a rough worn-out floor. The additional cost of painting is to a great extent counterbalanced by the less cost of cleaning. But above all the appearance of the floor is improved wonderfully and the car is made more sanitary, due to the fact that sputa cannot soak into the floor and dry.

## Keeping Brake-Shoe Data

An attempt recently made by us to obtain definite figures regarding the wear of brake-shoes, discloses the fact that close records of this important feature are not kept in a great many car shops. In a large number of cases, neither the original weight of the shoe nor its weight when discarded, is known. The average mileage can usually be calculated in a general way by dividing the car mileage by the number of shoes put on in a given period, and in some cases figures are kept of the length of time elapsing between the replacement of individual shoes. But the cost per 1000 miles run and the percentage in weight of the shoes scrapped, are frequently unknown quantities. It may be argued that there is no need of such figures. On the other hand, it is reasonable to presume that the more definite the information that can be secured in street railway shop practice about such a considerable item of expense as brake-shoes, the greater is the probability of reducing expenses. Suppose, for instance, that the cars of an interurban system are cared for at several division shops under the direction of foremen who do not see each other once a month. One foreman may discard his shoes at a thickness such that the discarded shoes will have a weight of 20 lbs. Another foreman may have found by experience that the shoes can be worn to a thickness which gives them a weight of but 16 lbs. This little difference of opinion between foremen would in a year's time result in quite an expenditure for brake-shoes. Were all foremen on the line given instructions to discard shoes, say, at 16 lbs., and then be provided with a balance of some sort with which to weigh the shoes, quite a saving would often result. It is extremely satisfactory that the Committee on Standards has announced that one of the first subjects which will engage its attention is that of brake-shoes. We doubt whether there is any other portion of the car equipment which needs standardization more, and in which a set of standards could be generally adopted with so little inconvenience, than with the brake-shoe.

But to return to the subject which we were discussing, that

of weights. An incident, which shows one instance where a knowledge of the weights of brake-shoes came into play, may be cited. A study of the weights of the shoes when put on and when discarded and the percentage of the original weight worn away, gave the superintendent the idea that he might be able to increase this percentage. An examination of the shoe itself showed that quite a little metal could be removed from the flange of the shoe. As the shoes were cast in a local foundry, it was necessary only to cut down the patterns a proper amount, and the desired results were obtained. Of course, a close examination of the shoe might have led to the same conclusion, but, nevertheless, in this instance a record of the weights of the shoes was primarily responsible for a good move.

### Pyrometer Records in Power Plants

The notable progress which has been made of late in the measurement of high temperatures, suggests the use of the electric pyrometer as a valuable power-plant auxiliary. Very little has thus far been done by operating companies in the way of regularly keeping watch upon the performance of boiler furnaces, flues, economizers, chimneys and superheaters, and the quantitative information gathered along these lines has been almost entirely obtained in the course of occasional economy tests, rather than in the ordinary course of power-house operation. In the campaign for improved efficiency, which is now being pushed energetically in so many quarters, no department of power-station work needs more attention than the boiler room and its ramifications, and the pyrometer, as now commercially developed, offers a means of analysis which ought not to be overlooked.

The proposal to add any new complications to the modern power plants seldom receives a warm welcome from the overburdened designer, but in behalf of the electric pyrometer, it must be appreciated that the addition of such an instrument to the plant is almost as simple a matter as the purchase of a steam-engine indicator, while its operation is as easy as the reading of a voltmeter, once the installation has been made.

Indicating and recording pyrometers are now available for the measurement of temperatures, both below and above the range of the power-plant service. In comparison with the temperatures found in the manufacture of pottery, operation of blast and electric furnaces, the temperature of flue gases and superheaters in street railway plants are so moderate that little trouble ought to be experienced on the score of thermometer depreciation. In the modern power plant, the flue and superheater temperatures do not often exceed 700 degs. F.; if they do, the matter ought to be investigated. The temperature of the furnaces runs much higher, but there is no trouble in measuring them with commercial apparatus.

Probably, the portable pyrometer is the simplest apparatus for general power-plant service. Usually, the thermo-couple principle is employed, and the readings are recorded either upon a special galvanometer, or upon a calibrated indicator reading directly in degrees. It may be carried about as a portable instrument or mounted upon the power-plant switchboard, for the resistance of the lead wires is almost always negligible. If desired, recording pyrometers can be installed in the flues, economizer, and superheated steam mains, and

connected to a common recorder tablet at any part of the plant where it is desired to take readings. The analysis of such records ought to throw a great deal of light upon the efficiency of combustion, the fitness of mechanical stokers for the work in hand, the value of various methods of hand firing, steam power of different fuels, quality of chimney draft, best methods of operating mechanical draft apparatus, the maintenance of superheat in high-pressure steam mains, influence of the weather upon the boiler performance and the presence of defective conditions in the flues and furnaces. At the present time, it is a very difficult problem to compare the performance of steam boilers of different makes, and there is need of much more definite information upon the question of best heating surface, grate area and furnace form for different kinds of service. Temperature measurements do not, of course, indicate the quantity of heat which is being effectively utilized, or wasted, but they are certainly an index of the general condition of things, and for that reason there is little doubt that at no distant date pyrometer records will be widely employed in the scientific operation of boilers and heat engines in power plants.

### Inadequate Service in Chicago

In another column of this issue W. A. Blanck contributes an article outlining a method pursued by him to determine whether the downtown surface loops of Chicago are being operated at their maximum capacity. Mr. Blanck was retained by the Chicago City Railway Company to show in a comprehensive manner the traffic condition of these loops in anticipation of a jury trial of cases against the companies, in violation of an ordinance prohibiting the crowding of cars. For the present, however, the cases against the company have been halted by an injunction obtained by the railway companies. The suits in question were brought under the public comfort act, which forbids the overcrowding of cars and which also compels the railway companies to keep thermometers in them. In all about 500 suits had been filed in a justice court to recover \$200 for each offense. Judge Mack, who granted the injunction, declared that it was nonsense to bring such a multiplicity of suits when the intent of the law was to impose a fine of \$200 for a violation, and further fines if violations were continued.

It cannot be denied that the cars are overcrowded, but blame for the condition of things rests upon the city administration for not providing means by which the company can operate more cars in the downtown district. The companies have proved by actual attempts that they cannot do so. Experiments, both in Chicago and other cities, have shown that there is a certain headway in congested districts at which the greatest number of passengers can be carried. When attempts are made to run more cars, the cars interfere with each other and the schedule is decreased to such an extent that the number of cars passing a point in a given time is decreased rather than increased. During the World's Fair at St. Louis, the St. Louis Transit Company found that a 25-second headway was about the smallest that could be maintained to advantage on Olive Street, and this street is comparatively free from obstructions by traffic and crossing lines. To one who has not studied the problem and who has not had actual experience in running cars in crowded streets, it naturally appears that whenever an additional car is put on the line the

hauling capacity will be increased. This fact no doubt accounts for the recent attempts of one of Mayor Dunne's "traction experts" to put into effect a plan to do what the companies themselves have found an impossibility. He said he would show by practical demonstration that more cars could be operated around one of the cable loops. The companies were undoubtedly very glad to afford the opportunity, because they would be the greatest gainers from an increase in the track capacity. The results, however, were not very satisfactory. The first attempt resulted in the tying up for half an hour during the evening rush of a line on which the experiment was tried, and the interference of the general manager of the railway was all that prevented a complete demoralization of the traffic. A second attempt was attended with the same result.

The difficulty encountered by the average person in understanding why more cars on a line do not increase the carrying capacity in proportion, was, no doubt, the reason for Mr. Blanck's investigations. The companies knew by actual trial that additional cars on the loop would not increase the number passing a given point, so that Mr. Blanck's investigations were principally to show the reasons for this condition in a manner that would be readily comprehended by the average jurymen. The city authorities have evidently accepted the fact that no more cars can be operated in the downtown districts under existing conditions, yet suits continued to be filed against the railway companies for crowding of cars. What the city should do is to give the railway companies the opportunity to avoid violations of the law. If the companies were allowed to equip their cable lines with the overhead system and make other improvements in downtown terminals, which they are most willing to do, it would be possible to operate a sufficient number of cars so that everybody could usually obtain a seat. Then and not until then would the city be justified in bringing suits of the character that have been filed.

### The New York, New Haven & Hartford Locomotive

We are glad to be able to give our readers some details regarding the electric equipment of this very important machine. It is so obvious that the task involved in this novel equipment demands extreme skill in design that one is prepared for almost any sort of innovation. Looking over the machine, however, the thing which most impresses one is not any sensational deviation from well accepted good practice, so much as the skill and tact with which every resource of the electrical and mechanical engineer has been brought to bear upon the task. The conditions to be met were severe in an extraordinary degree. Not only was it necessary to build a single-phase commutating motor of hitherto undetermined dimensions, but it must be able to shift over at will to d. c. supply derived either from an overhead trolley or a third rail, must run efficiently and with complete speed regulation from both sources, and all this without serious complication that might lessen reliability.

The general type of the motor is the compensated series winding already tried on smaller equipments. For this heavy work at high speeds, the geared motor, which does well enough in less severe service, had to be given up, and the most striking electrical feature of the New York, New Haven & Hartford motors is that they are made boldly upon an extreme multipolar design, so as to drive directly the 62-in.

wheels of the locomotive. The ordinary designer would be rather staggered at a twelve-pole design for railway service, but here is a twelve-pole motor not only for direct current but for alternating current in particular. To fit it for alternate-current working, the armature is furnished with the high resistance leads, or, as the inventor more properly terms them, preventive leads, which are a feature of the Lamme design of commutating series single-phase motor, and which have been thoroughly described. This device makes it easy to keep down the short-circuit current produced by the alternating flux when the segment is under a brush, and with it the principal source of destructive sparking. Of course, there is very perceptible loss of energy in these leads, less, however, than if the current were allowed free play in the coils.

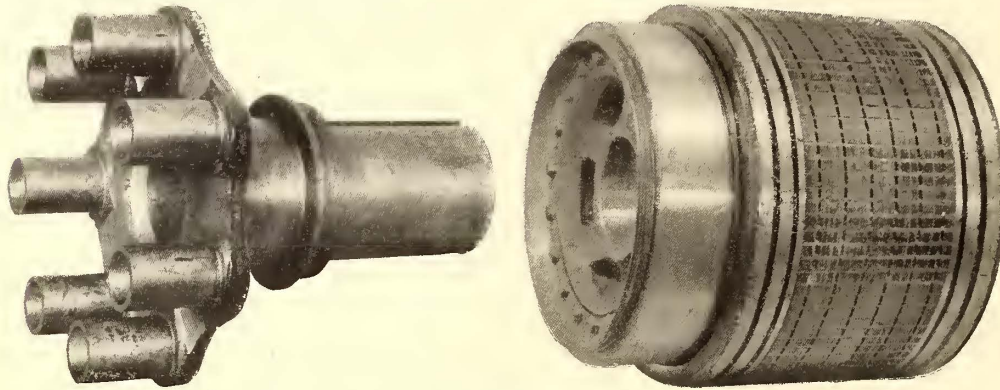
Another important feature of the motor is the artificial ventilation which is applied in this locomotive to transformers, rheostats and motors. The importance of forced cooling in transformers is well known, and the few experiments in cooling railway motors have been very encouraging. In this instance the need of a motor for slow speed, and hence inherently heavy, and also for alternating current, with its allied hysteresis and eddy currents, has given artificial cooling added importance. The increased output in this locomotive is very useful in improving the weight efficiency and in successful working on severe overloads. Since in an a. c. motor, in which one has to work the iron rather gently, the burden naturally falls heavily upon the copper, the extra cooling is highly important.

Incidentally, the fact that one is working the iron at low density enables one to make a virtue of necessity and regulate on the d. c. circuits with the potent aid of a shunted field. On the whole, therefore, the d. c. regulation is found to be rather smoother and more efficient than usual.

In a motor such as here considered, the torque is essentially a matter of importance, and the fact that the motor is also direct coupled has enabled the designer to kill two birds with one stone. By means of a highly ingenious arrangement of springs, the flexible connection between motor and axle also furnishes the cushioning necessary to steady the torque. The general character of the drive from the armature on its quill to the axle is familiar, but the details are most ingeniously worked out. The connection of the armature with the driving wheel is secured by concentric spiral springs to take up the transverse movement, or end thrust, of the armature, and by eccentrically wound springs surrounding the pins on the armature shaft which cushion the movements of the armature in the plane at right angles to the axle. At the same time the fields are carried independently of the truck by a frame supported on the truck journals. The control is, of course, electro-pneumatic from master controllers, so that the essential wiring is at 14 volts from a small storage battery. This allows all the high-voltage wiring to be kept well out of the way of the operator. The current collectors, on account of the three sources with which they must connect, high-voltage a. c. and low-voltage d. c. trolley wires and third rail, are a bit intricate, but they are, so far as the trolleys are concerned, of the sliding form, well tried out on the Continent, and quite certain to give good service. Altogether the details of this locomotive seem to have been worked out in a masterly manner, and while they are probably not yet perfect, they certainly give promise of results well worthy the ingenuity here displayed.

## SINGLE-PHASE DIRECT-CURRENT LOCOMOTIVE FOR THE NEW YORK, NEW HAVEN & HARTFORD RAILROAD

The plans of the New York, New Haven & Hartford Railroad for the electrification of portions of its main line have been referred to frequently in these columns, and a short description of the locomotive and motors to be used was published in the issue of March 24. Further particulars of these locomotives, of which thirty-five have now been ordered from the Westinghouse Electric & Manufacturing Company, have just become available. As the New Haven locomotive at the Pittsburg works is the largest which has yet been constructed



FIGS. 1 AND 2.—ARMATURE AND DRIVING QUILL

for single-phase operation, an account will first be published of the motor and its construction.

### ARMATURE

The active armature winding is one of the well-known direct-current types. However, the winding is closed on itself and is not directly connected to the commutator, but is indirectly connected to it through the preventive leads which are a feature of the Westinghouse design of single-phase motor. These leads serve the same function as the well-known preventive coils used in alternating-current work when passing from one tap to another of a transformer. In fact, the armature, in one sense, may be considered as a transformer with a lead brought out from each coil to a contact piece, the various contact pieces being assembled together to form a commutator. The brush, in passing from one contact to another, short circuits an intermediate coil, just as in the case of a transformer under similar conditions. The size and capacity of the preventive coils or leads in a motor are such that under continuous operation they will attain the same temperature as the active winding.

The function of the preventive coils or leads is to reduce to a rather low value the short-circuit current caused when the brush passes from one commutator bar to the next. For reducing the loss, due to this source, to the lowest possible value, the preventive action in the leads should be as high as possible. But, as the working current supplied to the motor must pass through the same leads, it is evident that a high resistance would produce a high  $I^2R$  loss from the working current. It is, therefore, evident that there is some intermediate condition which gives the most efficient results, both as regards economy of power and commutation of the current. The preventive leads on these motors have been proportioned for this condition. Thus the losses are actually less when the preventive leads are used than when they are omitted, and the commutation is correspondingly better, especially at low speed and at start. Without these leads excessive current will be found, especially at start, and would be indicated by glowing and spitting at the tips of the brushes. This action appears to be practically absent in the New Haven motors.

The active armature winding consists of several coils per slot, with one turn per coil. The coils are made of form wound strap, and are inserted in the slots from the top. Fibre wedges are used for holding the coils in place in the body of the armature, while binding wires serve for supporting the ends of the winding.

There are several brushes per holder, and both the brushes and holders resemble closely those used in direct-current work. The brushes have a thickness of  $\frac{1}{2}$  in. and are pressed against the commutator by means of a coiled spring. The total locomotive mileage is not yet sufficient to determine the life of the brushes, except by approximation from the present

rate of wear, and this has been so small that an accurate estimate cannot yet be made. A flexible copper jumper or shunt is used for carrying the current to the brush. The major insulation, between the holder and the framework of the motor, is mica in the form of tubes, which fit snugly over studs, which are riveted to the body of the holder. Over each mica tube is placed a short porcelain sleeve and a long metallic cartridge. A clamp serves for squeezing the cartridge

tightly against the mica tube and for retaining the brush holder in place on the framework of the motor. The porcelain sleeve furnishes a certain amount of mechanical protection to the mica tube, and it aids in insulating the holder from the frame, but its mechanical strength is not utilized in connecting the holder to the frame.

### FIELD

The field winding, which is of the conductively compensated type, is arranged in two circuits, namely, the main field

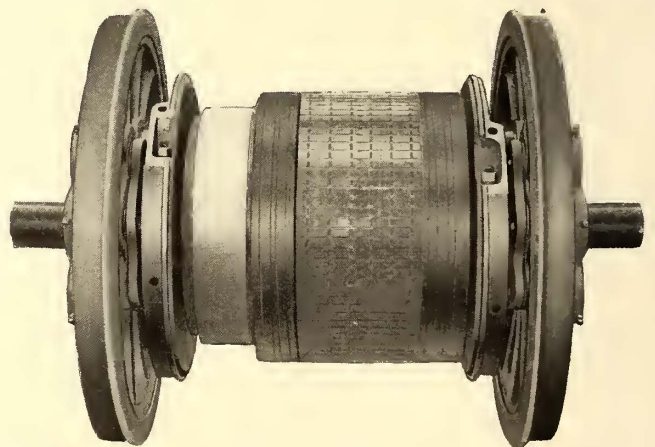


FIG. 3.—A PAIR OF DRIVING WHEELS, WITH ARMATURE AND BEARING HOUSINGS FOR SUPPORTING FIELD FRAME

coils which are placed around projecting poles on the field core and produce the active field flux, and the compensating field coils, which are placed in slots in the projecting pole faces and serve for opposing the armature magnetomotive force, and thus of neutralizing the reactance of the armature. Each pole is provided a number of slots for containing the neutralizing coils which remain at all times electrically in series in the armature circuit, whether the machine is operated by direct current or alternating current. The neutralizing coils are mechanically so arranged on the core that the active field coils can be removed without disturbing the other coils.

Although during normal direct-current operation the field coils receive twice as much current per armature ampere as during alternating-current, and, therefore, in effect the coils of each motor are arranged in two groups, which are placed in series for direct current and in parallel for alternating current, the active field coils of each motor are in reality joined permanently in series and only two leads pass from the field frame for this purpose. Two motors are operated as a unit, and the separate field circuits of these motors are placed in series or in parallel, as desired, according to the current used. These facts are discussed more fully elsewhere.

#### THE FRAME

The frame, truck and cab of the locomotive were built by the Baldwin Locomotive Company, according to designs developed with the coöperation of the New Haven Railroad and the Westinghouse Electric & Manufacturing Company. The frame is of the rigid type, with side pieces made of steel channels, to which are bolted and riveted other steel channels placed transversely, two over each truck, forming transoms for the transmission of the weight to the center-pins. These channels are placed outside the wheels and as close together

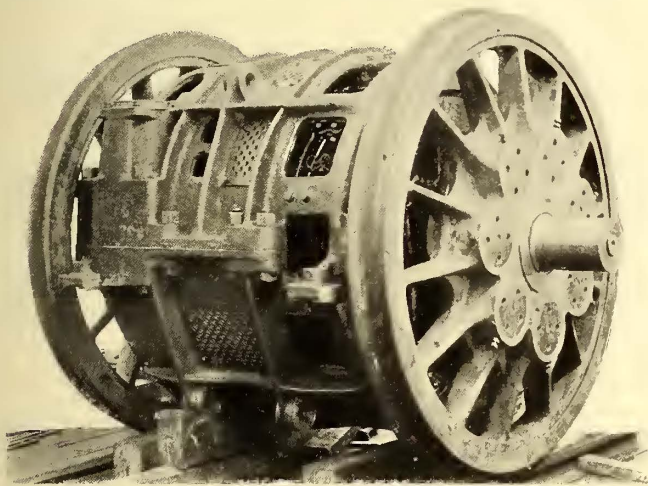


FIG. 4.—A PAIR OF WHEELS WITH MOTORS MOUNTED IN PLACE

and as low down as the wheels and draw-head will permit, and are braced and squared by substantial steel flooring plates which are riveted and bolted to the top flanges. The transoms are further braced by gusset plates, which are riveted and bolted to the bottom flanges of both sets of channels, and which transmit the tractive power from the center-pin to the side channels. The frame is still further strengthened and secured by diagonal plate braces.

#### THE TRUCKS

The running gear consists of two trucks, each mounted on four 62-in. driving wheels. The trucks have side frames of forged steel, to which are bolted and riveted pressed steel bolsters which carry the center plates. The weight on the journal boxes is carried by small semi-elliptic springs under the ends of the equalizer bars, to assist in restoring equilibrium. A very strong construction is secured without excessive weight, by the use of bolsters 30 ins. wide at the center plate and extended to nearly double that width at the ends which are bolted to the side frames. Center pins, 18 ins. in diameter, transmit the tractive effort to the frame. They are well lubricated, to permit free motion on curves. The truck pedestals are provided with wedge and gib adjustments to take up wear, and the bearing brasses are easily removable by hand. The distance between truck centers is 14 ft. 6 ins.

#### CAB

The cab is formed of sheet steel, mounted on a framework of Z bars, which supports the walls and roof. Windows are provided at each end, giving an outlook on both sides and in front of the locomotive; and the driver is so close to the front that he can see the track a very few feet ahead. This advantage is not possessed by any type of steam locomotive now in service. The master controllers, auto-transformers, instruments, grid resistances, air operating valves, compressors, and other auxiliary apparatus are mounted inside the cab upon an angle-iron framework, which is built into the cab and securely anchored to floor and roof. A clear passage-way is left through the center. Trap doors in the floor furnish easy access to the motors for inspection or repair.

#### MOUNTING OF MOTOR

Mechanically considered, the motors are of the gearless type, and interest in the equipment is naturally centered in the methods employed for suspending the motors and for transmitting the torque to the drivers. Special precautions are taken to insure that both the gravitational force of the

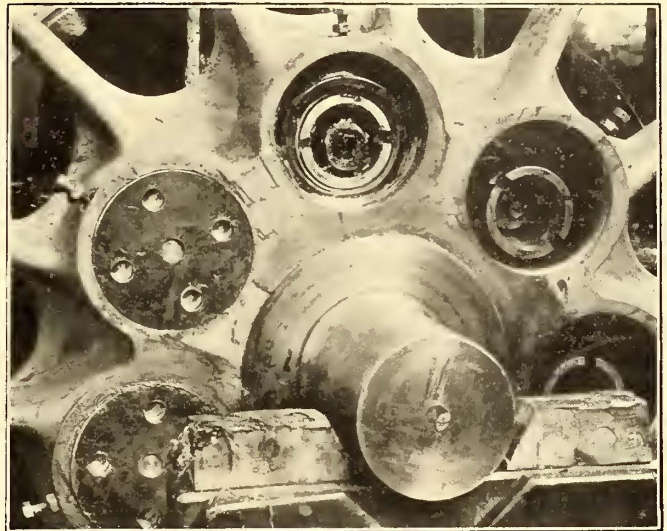


FIG. 5.—DETAIL OF DRIVING WHEEL, SHOWING POCKETS

motor on the axle and the torsional force of the armature on the drivers should be transmitted through elastic mediums, on account of the effect which the great weight of the motor equipment would produce at high speeds. The problem of suspension, as exemplified in these motors, was much more difficult than that encountered in gearless motors intended solely for direct-current work, by reason of the fact that one of the prime essentials in the construction of single-phase series motors is that the air gap must remain constant, while with certain direct-connected motors of the bipolar type it has been found possible to allow the mechanical position of the armature in the field structure to vary between wide limits.

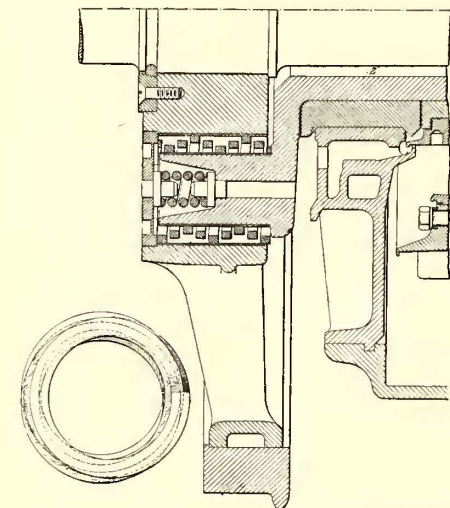
The hollow shaft of the armature is constructed in two halves, one of which is shown in Fig. 1. These two halves are alike and each is provided with an end disk from which project seven hollow pins. Each half is forced, by hydraulic pressure, into the ends of the hollow armature spider (Fig. 2) and is securely keyed in place. Fig. 1 shows the key way and also a collar which forms the side of a bearing upon which the field frame is journaled. The mounting of the armature and quills on the locomotive axle is indicated in Fig. 3. The split disks, shown at each ends of the armature in this illustration, rest upon the bearings on the armature shaft to which attention has just been directed, and to them is

rigidly clamped the outer field frame of the motor, as represented in Fig. 4.

The field structure of each motor is thus mechanically connected to its armature structure through two bearings, which insure that the armature will remain at all times concentric to the field poles. The central portions of these two bearings, as explained, are formed on the hollow cast-steel shaft of the

armature, and the external portions are composed of split bronze bearings, which fit snugly into the field housing. The weight of the entire motor, therefore, may be carried by the armature shaft or by the field structure, according to the relative values of the upward pressures exerted on these members.

The axle of the locomotive passes through the armature quill, and when actually concentric with it, there is a clearance of about  $\frac{5}{8}$  in. on all sides between the axle and the inside of the shaft. This allows a slight movement of the armature, in respect to the axle, required by the flexible suspension of the motor which is about to be described.



FIGS. 6 AND 7.—END VIEW OF ECCENTRIC SPRING AND SECTION THROUGH DRIVING WHEEL AND MOTOR. SHOWING HELICAL AND ECCENTRIC SPRINGS IN PLACE

On each end of the locomotive axle is mounted a 62-in. driving wheel, in the hub of which are formed seven circular pockets which contain helical springs for assisting in carrying the weight of the motor and for transmitting the torque from the armature. Into each of these pockets there projects

er than the thickness of the stock from which the spring is built. The convolution of the spring first touches the outer circumference, then passes inwardly and gradually approaches the inner circumference, which is reached by the end of the second turn; it then gradually passes from the inner to the outer circumference, which latter is reached at the end of the fourth turn, and so on to the end of the spring. Between the outer circumference of the spring and the inner circumference of the pocket is fitted a sheet-iron tube, and a similar tube is placed between the spring and the pin. These tubes and the spring form a unit which may be taken intact from the pocket when the outer end cap is removed. On account of their mechanical form and their position in the pockets, these springs cannot be stretched beyond their elastic limit, and, since each pocket is provided with adequate lubrication, it is

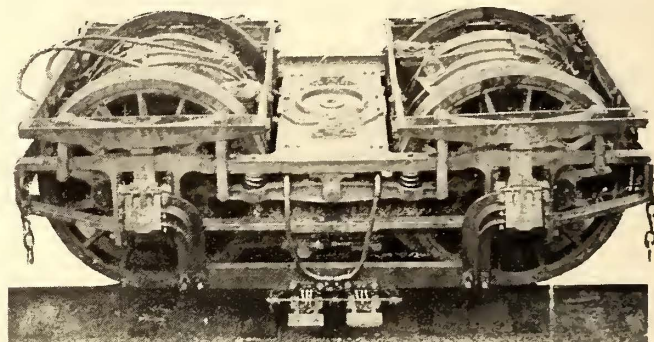


FIG. 8.—SIDE VIEW OF TRUCK

expected that they will withstand the most severe wear and will last indefinitely. They are capable of sustaining the whole weight of the motor, but they will normally be used solely for transmitting the torque to the drivers. Each pin contains a hollow space, in which is placed an additional pocket, which serves for receiving the end thrust of the motor against the drivers. To illustrate the general plan of this construction, Fig. 6 and 7 are reproduced from drawings contained in two patents issued April 3 to R. Siegfried, and by him assigned to the Westinghouse Company. An end view of the eccentric spring is shown in Fig. 6, while Fig. 7 is a section through the locomotive wheel, hollow armature shaft, pin and motor. The clearance between the armature shaft and locomotive axle is shown at 2. As these are patent drawings, and not working drawings, they do not necessarily show exactly the construction adopted, but are presented to give the reader a general idea of this novel and ingenious form of gearless armature drive.

FIELD SUSPENSION

Having now fully discussed the method of attaching the motor to the driving wheels, it will be in order to consider the

method of carrying the weight of the motor from the truck and of resisting the backward torque of the field structure. This is accomplished by providing a steel frame entirely distinct from the truck and pivoted from the journal boxes of each locomotive axle. From this frame the weight of the motor is carried by springs, on which rest lugs of the field structure. The adjustment of the tension on these springs determines what proportion of the weight of the motor is carried by them and just how much weight is carried through the pins on the armature quill. The general construction of

one of the hollow pins on the end of the armature shaft, and illustrated in Fig. 1. Each pin is surrounded by a spring placed between the outer circumference of the pin and the inner circumference of the pocket, as shown in Fig. 5. This spring is arranged so as to tend to hold the pin concentric with the pocket, and it resists yieldingly to any gravitational or torsional force for a total movement of  $\frac{3}{4}$  in. The spring is of unusual form; its turns are progressively eccentric. Thus an end view of the spring would show an inner radius and an outer radius differing from each other by  $\frac{3}{8}$  in. great-

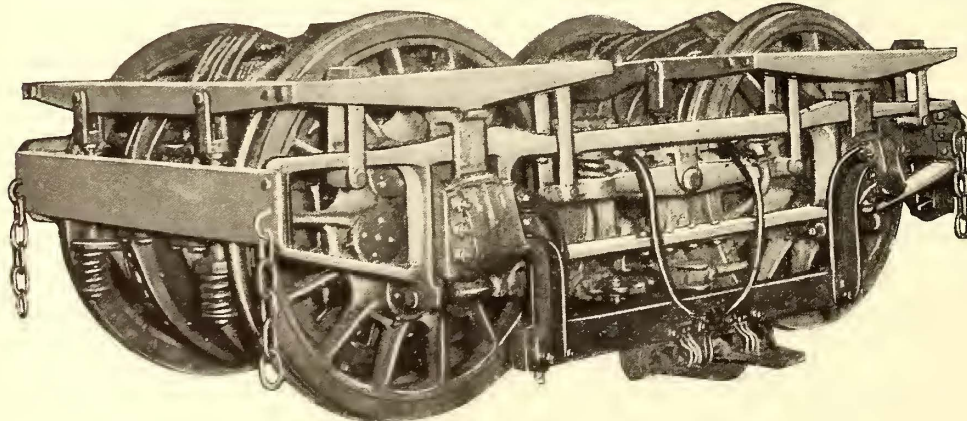


FIG. 9.—END VIEW OF TRUCK

this frame is shown in Figs. 8 and 9. Since the frame from which the motor is suspended is distinct from the truck, the swinging of the locomotive can have no effect on the motor, and it would seem that it is not possible for the motor to deliver other than a cushioned blow to the rails. Recent observations show that, even when traveling at a speed of 40 m. p. h. over an exceedingly rough track, the motor was not subjected to excessive vibrations, and the locomotive rode smoothly. The backward torque of the field structure is transmitted to the truck through rods which permit a certain amount of vertical or horizontal motion.

#### PULSATING TORQUE

In connection with the pulsating torque of the single-phase series motor it is especially noteworthy that, although the torque of the machine pulsates at twice the circuit frequency and the electrical torque varies from its maximum value to zero, and even assumed a reversed value if the field flux is not in time-phase with the armature current, such condition does not exist with reference to the mechanical torque which reaches the drivers. The pulsation in the value of this latter torque depends upon the inertia of the matter, which may be moved by the electrical torque before the mechanical torque produces motion, and upon the elasticity of the medium which permits the movement. Thus with the locomotive in question, when the drivers are stationary, each mechanical position which the field and armature structures of the motor assume causes to be transmitted through the springs to the drivers a certain definite value of mechanical torque. In order for the mechanical torque to reach zero fifty times per second, it would be necessary for the field and armature structures to be returned by the springs to the zero torque

an equal number of times in this period. The final result is that, unless the inertia of the moving mass and the elasticity of the springs happen to be adjusted for vibrational resonance at the circuit frequency, the armature and field structures will vibrate through very narrow limits, and the torque, which reaches the drivers, and which fluctuates in unison with the electrical torque, will be almost constant at a value equal to about one-half of the maximum electrical torque.

Observations have shown that the mechanical torque exerted by the locomotive drivers varies only slightly, although the torque of the motors as found under brake tests fluctuates through a considerable range. A fluctuating mechanical torque would be undesirable under conditions where the motors are required to exert a torque sufficient to slip the drivers. In this case the torque available for acceleration would bear to that which could be obtained with direct-current motors the ratio of the average to the maximum torque, viz.: 50 per cent for rigid suspension, and values up almost to 100 per cent for spring suspensions. In the New Haven locomotive the necessary and unavoidable weight of the equipment is so much larger than that corresponding to the product of the required draw-bar pull and the co-efficient of tractional friction that the slipping of the drivers is almost impossible.

#### CONTROL

As has been intimated above, the two armatures on each truck with their corresponding compensating field coils are

joined permanently in series, and are operated at all times as a unit. For direct-current work, the two motor units of each locomotive are connected in series at starting and in parallel at full speed, while for alternating-current work the two units are operated separately from the secondaries of the step-down transformers at variable voltage, so that they are practically joined in parallel at all times. Although during direct-current operation, the familiar series-parallel method of control is employed, several unusual features have been introduced so that the losses during acceleration are equally as small as, and perhaps smaller than, would be the case if there were complete series-parallel of the four motors by the method used ordinarily with four-motor equipments. The motors, being of the compensated type, will run sparklessly with the fields weakened to any desired extent, and this condition is taken advantage of during the acceleration period before passing from the series to the parallel position. Thus there is eliminated a large portion of the loss which would take place in the resistances if the motors were changed directly from the normal series position without resistance to the parallel position with the full resistance

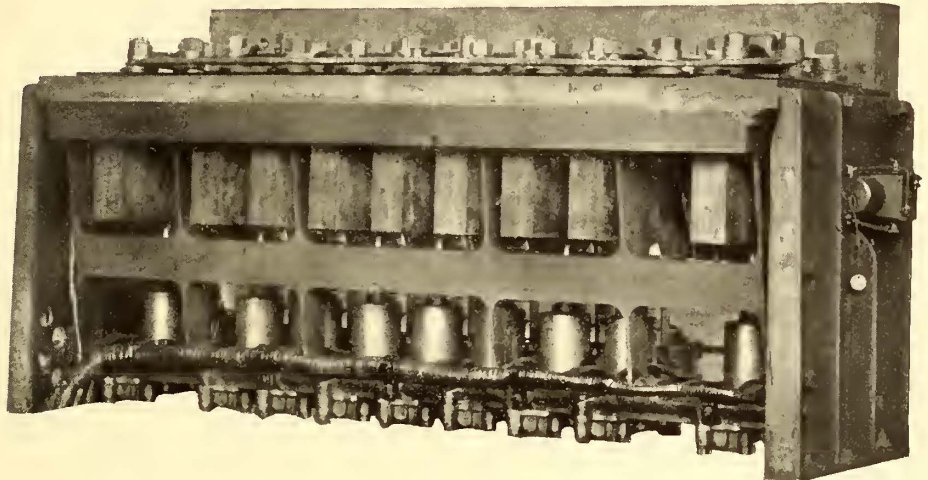


FIG. 10.—GROUP OF A. C. UNIT SWITCHES

in circuit; much of the lower part of the normal speed range in the parallel position is covered by the motors connected in series with shunted field coils.

The acceleration is extremely smooth, which condition is to be attributed partly to the facts just stated and partly to the fact that in passing from the series to the parallel connection the circuit to neither motor is opened, nor is either motor short-circuited. In the initial series position at starting, one motor unit is connected on the ground side, and the other on the trolley side, with the resistance in series between them. In the final series position the resistance is out of circuit, and the two units are in series across the line. If now there be connected in parallel with each motor unit a resistance of a value such that one-half of the line voltage will cause to flow through it a current equal in value to that passing through each motor, the two motor units will in effect be connected in parallel across the line, each unit having in series with it a resistance which absorbs one-half of the line voltage. Under this condition, no current will flow directly through the middle-voltage connection between the two motor units, and this connection may be broken without changing the performance of the motors, after which the resistance in series with each motor unit may be decreased until the two units are directly in parallel across the line. In the middle-voltage connection between the motors is placed a limit switch, the tripping coil of which is so ad-

justed that the change from the series to the parallel position cannot take place until the current in this connection decreases to a certain predetermined safe value.

During alternating-current operation each motor unit is fed at variable voltage from the secondary of a step-down transformer, there being two separate and distinct transformers on each locomotive. There were three objects in using two rather than one main transformer; one was on account of the convenient disposal of the weight of the transformers on the locomotive; the second related to the increased reliability of service in case a transformer circuit should be disabled, while the third had reference to the convenient arrangement and employment of the same unit switches for

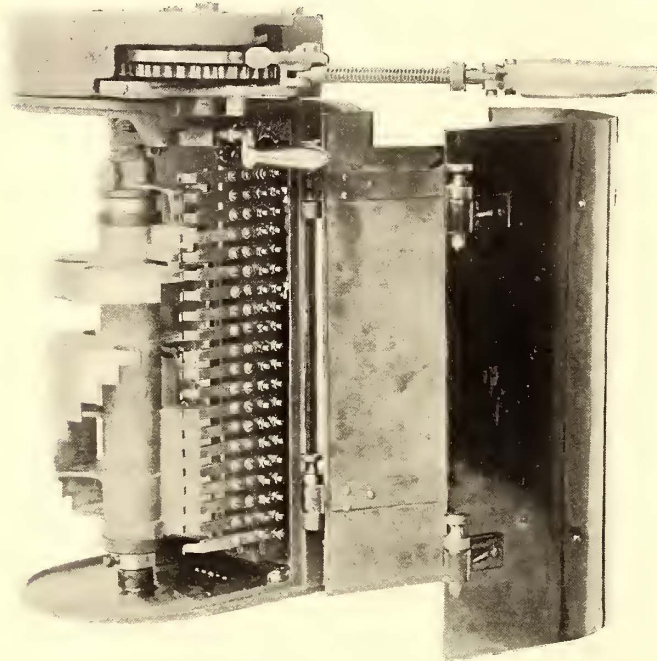
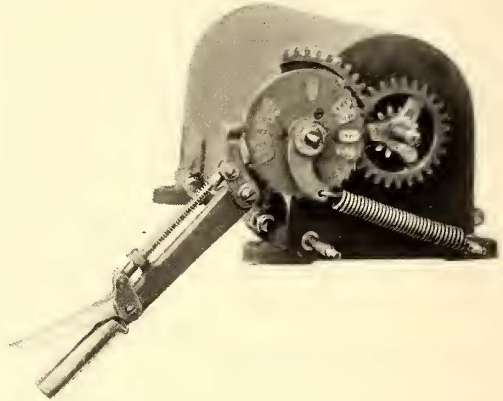


FIG. 11.—SIDE AND END VIEWS OF MASTER CONTROLLER, WITH COVER REMOVED

to the locomotive frame. The lead from the trolleys to the oil switch is protected by a grounded covering, and, as only the 14-volt battery runs to the master controller, it would seem as though the danger-to-life element had been practically eliminated. The motor circuits pass either from the direct-current trolley, third-rail shoe or the taps on the secondaries of the transformers to the unit switches and through the motors to the ground.

The unit switches differ inappreciably from those used in ordinary direct-current work. They are arranged in groups for convenience, as shown in Fig. 10, and the switches of each group have their magnetic blow-out coils placed mechanically in the same line so that they assist one another in producing the blow-out flux. Each blow-out coil consists of two complete turns built up of copper sheets insulated by japan for the purpose of decreasing the losses from eddy currents. Precautions are also taken to minimize the eddy currents in the iron cores of the magnets. The pole faces are not laminated, but slots are cut across them in such direction as to prevent the production of excessive eddy currents. It is worthy of note in this connection that if a cur-



either direct-current or alternating-current work. The same master controllers are used for alternating current as for direct current. At each running point the motor circuits are joined directly to a certain tap on the transformer winding and no extra resistance is in circuit. In passing from a tap to one next higher in voltage, the usual method is followed of first inserting a resistance between the taps, then the connection to the lower-voltage tap is broken, thereby placing the resistance in series with the motor at the higher voltage; then the resistance is short-circuited, leaving the motor joined directly to the higher voltage tap. The "preventive resistance" used between the taps is exactly the same resistance unit which is used at a certain step in the direct-current control, while the same short-circuiting switch is employed in each case.

#### UNIT SWITCHES

Each switch used in the motor circuits is of the Westinghouse "unit" type, operated by air under 80 lbs. pressure, and controlled by an electromagnet which receives current from a 14-volt storage battery. There are, therefore, on the locomotive three systems of wiring: the 11,000-volt primary circuits to the step-down transformers; the lower-voltage motor circuits (corresponding to the secondary circuits from the transformers and the equivalent 600-volt direct-current circuits), and the battery electromagnetic circuits. The high-potential circuits pass directly from the trolleys through the manually-operated oil switch to one terminal of the primary of each of the step-down transformers, the other terminals of which are effectively grounded

rent of a certain value is to produce a given flux, the reactance is less when a magnetic core is used than when air alone is depended upon to convey the flux. For a certain frequency, the reactance is proportional to the product of the flux and the turns, and the less the number of turns required for the production of a certain flux, the less will be the reactance. It will be seen, therefore, that the magnetic core which is more or less desirable for direct current is practically essential for alternating current.

#### MULTIPLE OPERATION

The locomotive may be controlled from either end by means of a master controller which is of the usual type, except that its handle is somewhat different from those heretofore used. As indicated in Fig. 11, the handle resembles somewhat the throttle lever of a steam locomotive, and is provided with a gear mechanism which allows the drum to be revolved through about twice the arc covered by the lever. The reverse lever is mounted immediately below the operating lever of the controller. The circuits which run to one master controller are directly in multiple with those to the other controller. A continuation of these circuits through flexible leads from one locomotive to another allows any number of locomotives to be operated simultaneously from one master controller. When the master controller is in the off position, connections are so established that all circuit-breaker trips which may be open are closed by the simple closing of a small switch conveniently located in the locomotive cab. Current is supplied to the control circuits by



two sets of 7-cell storage batteries, each of which has a capacity of 40 amp-hours and weighs 150 lbs. In connection with the switch groups, cut-out switches are provided so that either pair of motors may be cut out by simply ren-

lector. When the collector is in its lowest position, a catch engages the mechanism and holds it in place. The catch can be released by means of an electropneumatically operated lever when compressed air is on hand, or it can be released manually if desired. The framework of the pantagraph mechanism is built up of steel "bicycle" tubing and the col-

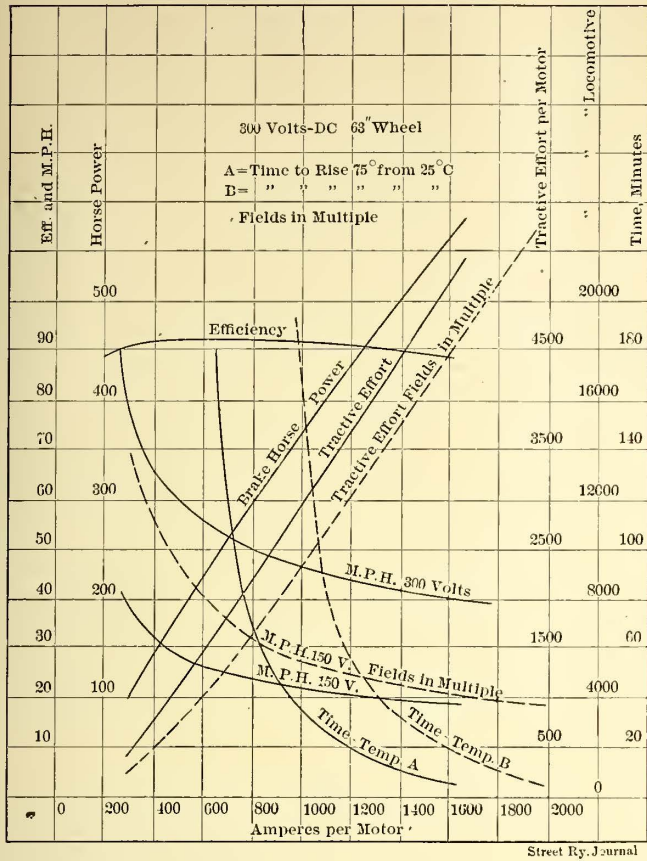


FIG. 11.—CHARACTERISTIC CURVES OF 250-HP GEARLESS MOTOR OPERATING ON 300 VOLTS, DIRECT CURRENT

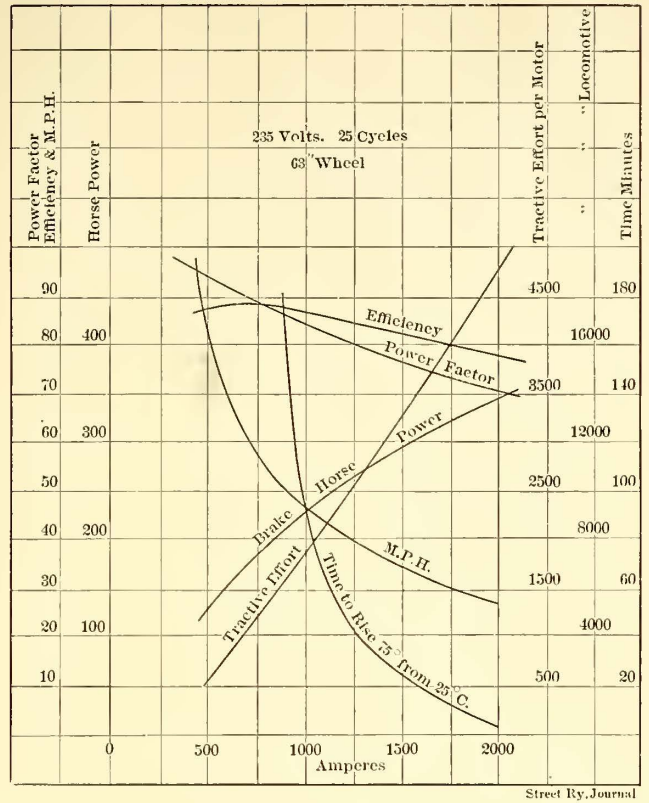


FIG. 12.—CHARACTERISTIC CURVES OF 250-HP GEARLESS MOTOR OPERATING ON 235 VOLTS, ALTERNATING CURRENT

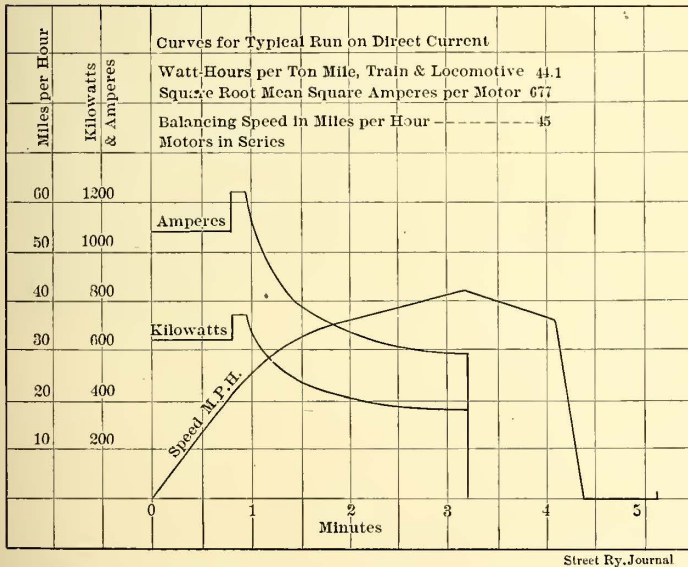


FIG. 13.—TYPICAL RUN OF LOCOMOTIVE ON DIRECT CURRENT WITH MOTOR-GROUPS IN SERIES

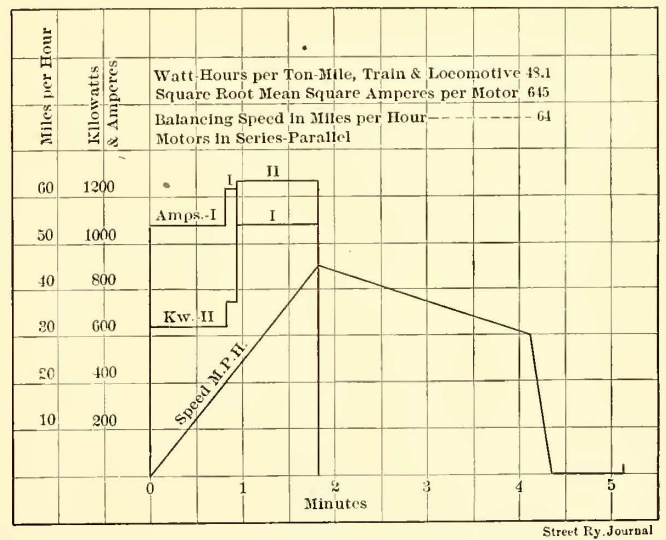


FIG. 14.—TYPICAL RUN OF LOCOMOTIVE ON DIRECT CURRENT WITH MOTOR-GROUPS IN PARALLEL

dering certain switches inoperative. It is thus possible to cut out the motors without manipulating the main circuit.

CURRENT COLLECTORS

There are two pantagraph bow trolleys for collecting the current from the 11,000-volt overhead conductor system. The upward pressure against the wire is supplied by springs in the base of the pantagraph equipment. Compressed air is admitted to a cylinder when it is desired to lower the col-

lector bow is a broad strip of soft copper. It is proposed to "zig-zag" the overhead wire so that the wear may be uniform over the bow. The collector mechanism is mounted on massive porcelain insulators bolted to the roof of the locomotive.

For use over the New York Central portion of the route, there have been provided both a second and lower overhead direct-current pantagraph trolley and a system of third-rail contact shoes. The direct-current trolley is of the same

general type as that used for the high-potential collectors, and it is mounted immediately over the center of the locomotive. There are two mechanically separate but electrically interconnected contact shoes on each side of each truck, making a total of eight shoes per locomotive. These shoes are designed for use with either an over-running or an under-running rail, and the mechanical pressure in each case is supplied by springs. On account of the fact that no third

and those on the motors proper. The flexible conduit is made up of heavy canvas tubing, which is reinforced with wire and given an accordion pleating. It is stated that by the use of the air blast the temperature of the motors under load has been so decreased that the continuous rating is almost equal to the one-hour rating.

DIMENSIONS AND PERFORMANCE

The New Haven locomotive measures 36 ft. 4 ins. over the bumpers and weighs approximately 85 tons. It is capable of handling a 200-ton train in local service on a schedule speed of 26 m. p. h., with stops averaging about 2 miles apart—making, in such service, a maximum speed of about 45 m. p. h. It can also handle a 250-ton train on through service with a maximum speed of about 60 m. p. h. With heavier trains it is planned to couple two or more locomotives together and operate them in multiple. The tests which have been made on the first locomotive equipped show that it will, without difficulty, meet all the requirements for which it has been designed.

Figs. 11, 12, 13, 14 and 15 show the performance of the motors considered separately and of the locomotive as a whole. Fig. 11 gives the calculated performance curves of the motors on direct current at 300 volts per motor, while Fig. 12 gives the performance curves of the machines on 25-cycle current at 235 volts per motor. A study of these two curves indicates that the motors are excellent direct-current machines and that they operate on alternating current at a good power factor and a satisfactory efficiency. The curves of Fig. 13 show a typical run of the locomotive on direct current, the motors remaining always in series, while Fig. 14 shows a typical direct-current run with the motors operated in series-parallel.

The effect of shunting the field coils with the motors in series will be noted from the sudden increase in the amperes taken by the motors just before they begin to decrease in acceleration while operating without resistance. With the shunted field coils the series connection of the motors would allow a maximum speed of 45 miles per hour under the assumed load, while

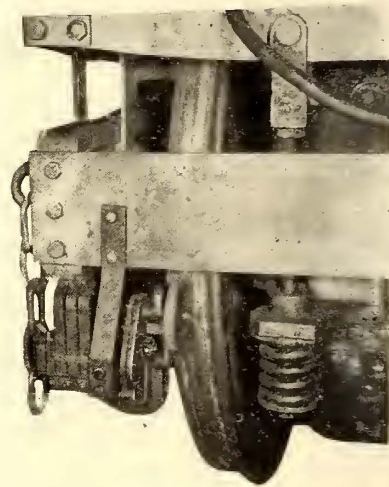


FIG. 16.—ELECTRIC SPEED RECORDER

with the motors in parallel without shunted field coils the maximum speed attained on a level track would be 64 miles per hour, as indicated in Fig. 14. The curves of Fig. 15 were obtained during an acceleration test of the locomotive on alternating current.

The current and power consumption correspond very closely to the predetermined values. The line upon which the locomotive has been tested is not well adapted to high-speed work on account of the numerous sharp curves which exist, but, in spite of these adverse conditions, the locomotive has been operated at speeds above 60 miles per hour without difficulty.

Fig. 16 shows an ingenious electrical speed recorder used during the tests on this locomotive at the Pittsburg works. It consists of a magneto whose driving wheel is pressed against the locomotive driver.

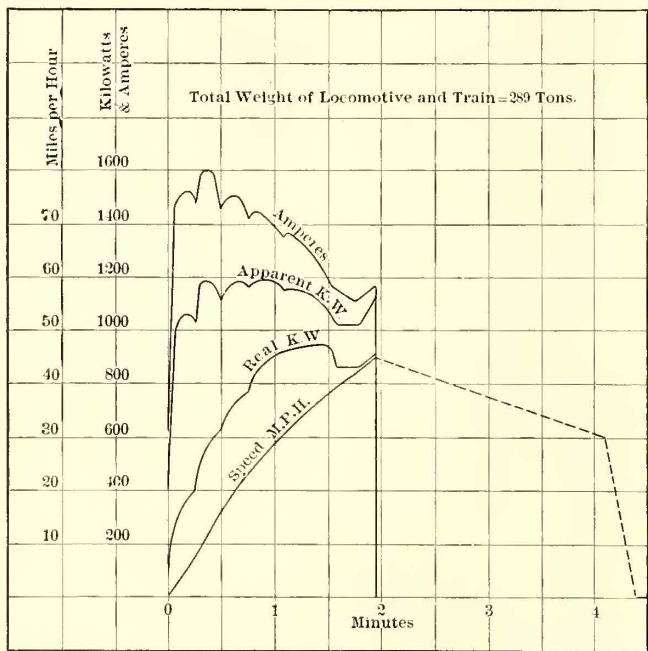
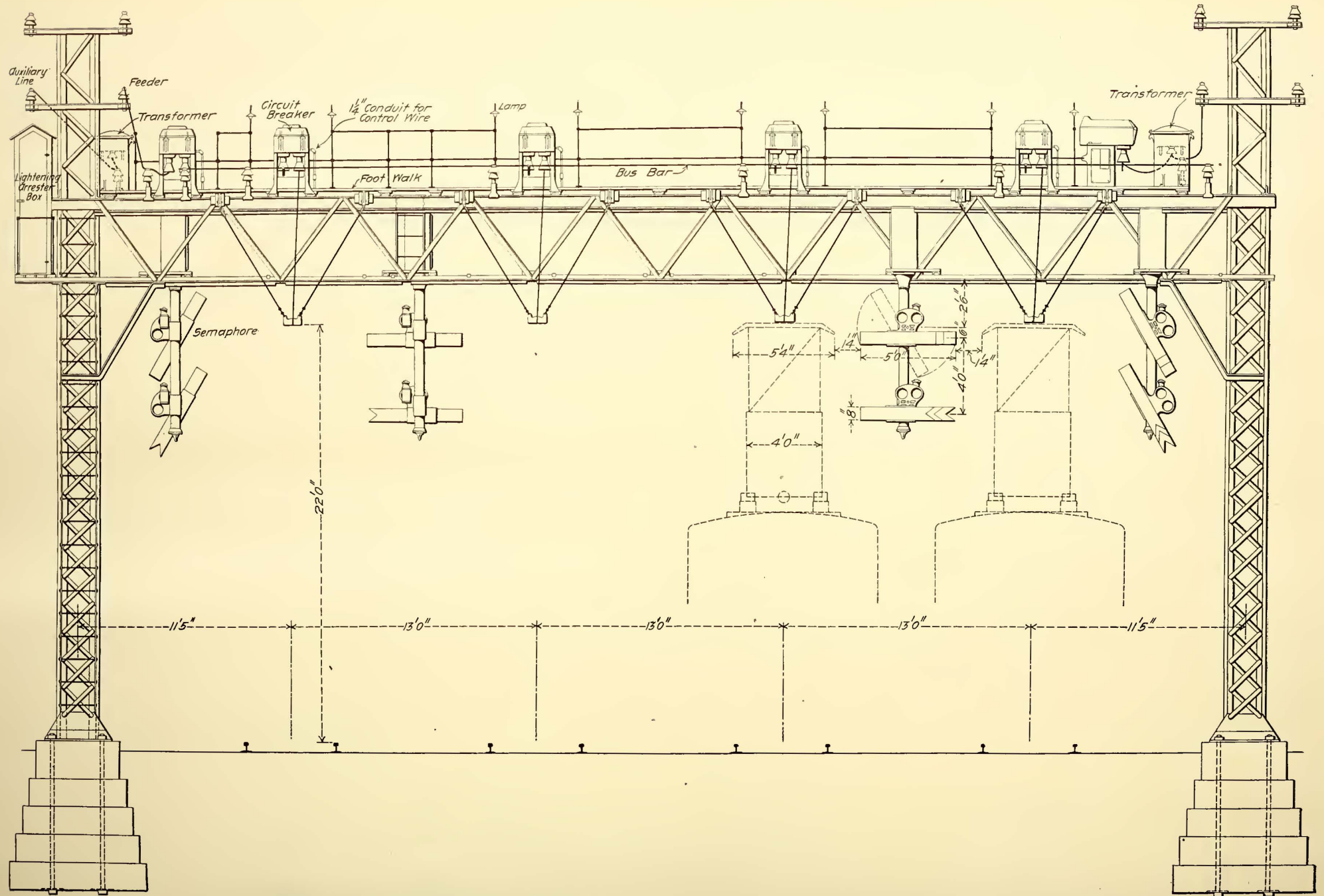


FIG. 15.—TYPICAL RUN OF LOCOMOTIVE ON ALTERNATING CURRENT

rail will be used over the high-potential portion of the route, and the projecting shoes in their normal position would be liable to strike any small obstruction along the side paths, a device will be used for lifting the contact shoes out of the way when the locomotive is using alternating current. This device will be operated electropneumatically, and will be automatic so that when the alternating-current circuit is completed the shoes will be lifted from the rails.

AUXILIARY APPARATUS

All of the controlling mechanism of the locomotive is placed within the cab, and no parts are carried below the floor except the electric cables and the air pipes. In addition to the various switch groups and the two main transformers referred to above, the cab contains an air compressor driven by a compensated motor of the same general type as the main driving motors. The circuits to this motor are controlled automatically by the pressure of the air in the receiver, which is also placed within the cab. The four main traction motors, the high-potential transformers and the main circuit rheostats are cooled by air furnished at low pressure by means of a motor-driven centrifugal blower, which obtains air from the inside of the cab itself. The low-pressure air has two paths. One path passes first through the transformer and then to the rheostat. The other path goes directly to the motors. It enters the armature near the shaft, passes around and between the armature laminations, flows outward through the ventilating ducts in the field cores and reaches the outer air through perforated caps on the frame of the motor. Since a considerable volume of air is required for each motor, and it is undesirable to cause the air to assume a high velocity, it was necessary to provide a large flexible conduit between the air passages on the cab



SIDE ELEVATION OF ANCHOR BRIDGE ON NEW HAVEN ROAD, SHOWING POSITION OF CIRCUIT BREAKERS AND SEMAPHORES

**ANCHOR BRIDGE FOR NEW HAVEN ELECTRIFICATION**

A view of the intermediate bridge used by the New York, New Haven & Hartford Railroad and particulars of its overhead catenary construction were presented in the issue of last week. The engraving on page 595 gives a side elevation of one of the company's anchor bridges, designed for four tracks. These bridges, it will be remembered, are located about every 2 miles on straight track and carry the circuit-breakers by which the trolley wires are divided into sections. As will be seen, the posts are 61 ft. 10 ins. apart on centers. The base is built up of plates and angles which rest on a concrete pedestal, to which they are attached by anchor bolts. The pedestal is 8 ft. deep, 4 ft. 6 ins. wide at the top and 7 ft. 2 ins. at the base. The lower chord of the connecting truss is 24 ft. above the head of the rail, and as the conductor is carried 2 ft. below the lower chord, there is a clear space of 22 ft. between the lower surface of the conductor and the head of the rail. An outline of the cars and collectors is given in dotted lines in the sketch.

The bridge carries semaphores for each track, and also, on the top chord, the oil circuit-breakers for 11,000 volts. A footwalk with railing is provided on the top of the truss, which is also furnished with a number of incandescent lamps. The bus-bar is carried on insulators outside the railing. The lightning arresters are located on a projection of the lower chord of the truss and outside one of the posts.

**NEW YORK CITY TRAFFIC STATISTICS**

An interesting pamphlet of statistics for 1904 and 1905, showing the operation of the surface, subway and elevated lines in New York City for that period, has recently been published by the Board of Railroad Commissioners of New York. Besides the annual figures, the pamphlet gives for all the systems, except the subway, the statistics by months for the last two years of the paid fares, transfers, greatest number of passengers carried in one day, car mileage and transfer points, also for each year the number of cars owned, cars in service, employees in operating department, power capacity and maximum power used. The subway traffic statistics are not given by months, as the subway is not under the control of the

TABLE I.—SHOWING TOTAL NUMBER OF PASSENGERS CARRIED AND CAR MILES RUN BY SURFACE, ELEVATED AND SUBWAY LINES IN NEW YORK CITY.

Boroughs,	Passengers Carried.						Car Miles.		
	Paid Fares.			Transfers.			1904.	1905.	Increase.
	1904.	1905.	Increase.	1904.	1905.	Increase.			
Manhattan	689,638,134	745,896,116	56,257,982	173,751,290	166,125,312	*7,625,978	126,186,232	149,334,212	23,147,980
Bronx	24,650,755	25,002,165	351,410	16,257,546	15,356,061	*901,485	7,492,269	6,403,478	*1,088,791
Brooklyn	338,963,835	372,584,004	33,620,169	69,547,584	85,225,129	15,677,545	61,742,825	67,943,149	6,200,324
Queens	16,800,353	19,493,173	2,692,820	3,029,120	3,695,954	666,834	3,900,025	4,244,982	344,957
Richmond	7,607,170	8,176,240	569,070	793,622	792,968	*654	2,263,561	2,323,634	60,073
Total	1,077,660,247	1,171,151,698	93,491,451	263,379,162	271,195,424	7,816,262	201,584,912	230,249,455	28,664,543

\* Decrease.

Railroad Commissioners, but under that of the Rapid Transit Commissioners.

The total figures of passengers carried on paid fares and transfers and the car miles run for the five boroughs for the two years are shown in Table I., which is taken from the report. The largest number of passengers carried in any one day is shown in Table II. Table III. shows for five of the companies given in Table II. the percentage which the traffic on the busiest day bore to the average day, also the two busiest consecutive months, and the percentage which the traffic during those two months is to the total.

An analysis of the traffic figures published by the Railroad Commissioners is interesting. Such an analysis to determine the average rate of fare, including transfers, the average rides per capita and the average receipts per capita, is given in Table IV. In this table the average rate of fare is determined by dividing the product of the paid-fare passengers and 5

TABLE II.—SHOWING GREATEST NUMBER OF PASSENGERS CARRIED IN ANY ONE DAY.

	1904.	1905.
N. Y. City Ry.....	1,800,873 in Oct.	1,911,065 in Mar.
Manhattan Elevated.....	1,065,762 in Apr.	948,901 in Jan.
Union Ry.....	99,051 in June	115,588 in May
Southern Boulevard.....	8,788 in June	7,458 in Sept.
Brooklyn Rapid Transit.....	1,666,684 in Dec.	1,818,133 in July
Brooklyn & Coney Island.....	189,755 in July	199,263 in June
N. Y. & Queens County.....	124,069 in June	137,603 in May
Long Island Electric.....	27,467 in July	29,320 in July
Richmond Lt. & Ry.....	30,607 in July	32,236 in July
S. I. Midland.....	190,275 in July	40,387 in July

TABLE III.—SHOWING PERCENTAGE OF TRAFFIC IN BUSIEST DAY OVER AVERAGE FOR YEAR, ALSO TWO HEAVIEST MONTHS AND PERCENTAGE THEY BEAR TO TOTAL FOR YEAR FOR FIVE COMPANIES FOR 1905.

NAME OF COMPANY.	Per Cent Busiest Day Over Average Day.	Two Busiest Months.	Percentage of Year.
New York City Ry.....	23	Sept. and Oct.	18
Manhattan Ry.....	37	March and April	18
Brooklyn Rapid Transit.....	59	June and July	19
Coney Island & Brooklyn.....	85	July and Aug.	23
Richmond Lt. & Ry.....	134	July and Aug.	23

cents by the total number of passengers carried, including transfers. In this table the subway and elevated divisions of the Interborough Rapid Transit Company are credited with fares of 5 cents each. This is not exactly correct, as the subway and elevated lines transferred to each other during the last part of the year at one point in the Bronx. The elevated lines also issued transfers throughout the year to a few of the surface lines in Manhattan and the Bronx for an extra fare of three cents. As no record of the number of these transfers which were issued appears in the report, they have been ignored. The number of transfers issued for this extra fare of 3 cents by the surface lines in the Bronx to the Manhattan elevated lines are given in the report. As stated in the footnote, they amounted to only a little over 4,900,000, so that they are not an important factor in the transportation system, and

as statistics of the division of fare are not published, they have also been omitted from Table IV.

As will be seen from the column of average rate of fare, the Bronx surface lines issued the greatest number of transfers in proportion to the number of cash fares, so that the average fare is only slightly over 3 cents. The Manhattan surface lines, i. e., the Metropolitan system, come next, with 3.47 cents. The Brooklyn lines are over 4 cents, and the lines in Queens and Richmond considerably higher. The final two columns in Table IV. are extremely interesting as showing averages rides per capita of 431 for the Borough of Manhat-

tan, and 359 for the entire city. The latter figure is more than 2½ times as large as that shown for London in the article by Mr. Dawson in the last issue of the STREET RAILWAY JOURNAL, and over 50 per cent larger than that shown for Berlin. As Table IV. is made up of the total number of passengers carried, and not of the fare passengers carried, the column "per cent of increase over 1904" is deceptive as far as it re-

TABLE IV.—SHOWING TOTAL PASSENGERS CARRIED IN 1905, PER CENT INCREASE OVER 1904, AVERAGE RATE OF FARE, POPULATION AND AVERAGE RECEIPTS AND RIDES PER CAPITA IN 1905.

BOROUGH.	Passengers Carried in 1905, Including Transfers.	Per Cent Increase over 1904.	Average Rate of Fare, Including Transfers.	Population, 1905.	Average Rides per Capita.	Average Receipts per Capita.
Manhattan surface lines . . .	545,846,949	d1.6	3.47	2,112,697	258	\$8.99
"    elevated . . .	249,965,166	d14.5	5		118	5.91
"    subway . . .	116,209,313	a	5		55	2.75
Total . . . . .	912,021,428	7.3	4.09		431	17.65
Bronx . . . . .	b 40,358,226	d1.3	3.09	271,629	149	4.60
Brooklyn . . . . .	457,809,133	12.7	4.07	1,358,891	337	13.71
Queens . . . . .	23,189,127	16.9	4.29	198,241	117	4.92
Richmond . . . . .	8,969,208	6.8	4.56	72,846	123	5.61
Total for city . . . . .	1,442,347,122	7.5	4.06	4,014,304	359	14.57

a The subway was put in operation Oct. 29, 1904, and carried only 16,241,869 people during 1904. The total increase of both subway and elevated travel in 1905 was 13.5 per cent. b Not including transfers from elevated for which an extra fare of 3 cents is charged. The transfers from these lines to the elevated in 1905 numbered 4,930,346. d decrease.

lates to receipts, for on many of the lines the transfers have not followed the same ratio of increase or decrease as the paid fares. For this reason Table V. is presented.

An analysis of the paid fares of several of the systems,

for instance, would show an increase of about 32 fares per day, or approximately 0.003 per cent, in spite of the fact that in 1904 the subway was in partial operation for only two months, whereas in 1905 it was in operation for twelve months, and a number of extensions were made to the subway system during that year.

An analysis of the traffic by months is also interesting, and this is shown on the accompanying diagram. In this diagram the traffic is plotted by average paid passengers per day for each month, instead of the total passengers during the month, to eliminate differences caused by the different number of days in each month, and different number of days in each

TABLE V.—SHOWING NUMBER OF FARES PAID ON PRINCIPAL SURFACE LINES IN NEW YORK CITY IN 1905.

	For the Year.	
	Paid Fares.	Increase in Per Cent over 1904.
Manhattan surface lines . . . . .	379,721,637	0.27d
Brooklyn Rapid Transit a . . . . .	337,679,930	11.1
Coney Island & Brooklyn . . . . .	33,123,716	0.6d
New York & Queens County . . . . .	15,945,796	13.1
Union & Southern Boulevard . . . . .	25,002,165	1.4

a Includes elevated lines in Brooklyn. d Decrease.

year. These traffic curves are also worthy of considerable study. Taking the Metropolitan curve, for instance, it will be seen that the highest peaks in both 1904 and 1905 are during the spring and fall months. The cause of this is undoubtedly

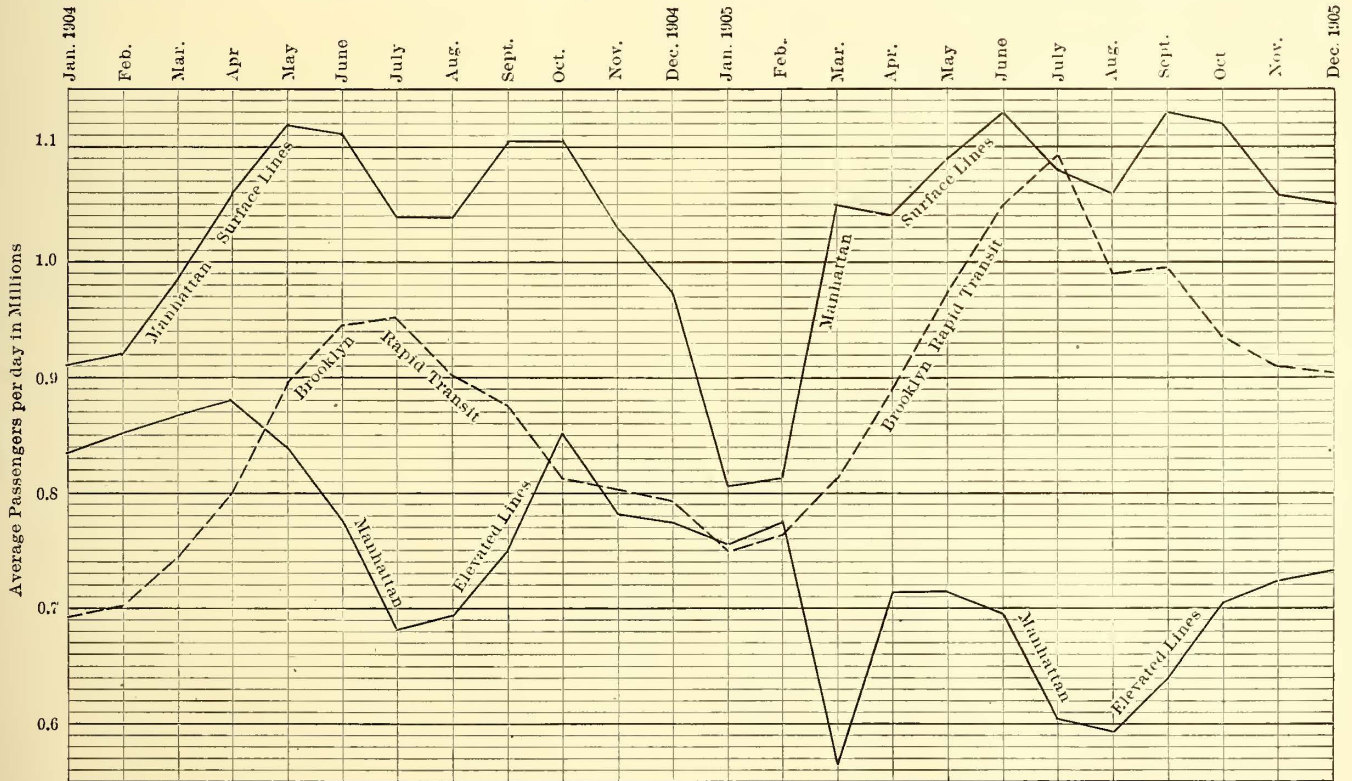


DIAGRAM SHOWING THE DISTRIBUTION OF TRAFFIC BY MONTHS DURING 1904 AND 1905 ON THE MANHATTAN AND BROOKLYN ELEVATED AND SURFACE LINES

given in Table V., is particularly interesting. It shows, for instance, that although the total number of passengers carried on the Metropolitan system (or Manhattan surface lines) shows a decrease in 1905 over 1904 of 1.6 per cent, the paid fares show a decrease of only about ¼ of 1 per cent. If, instead of comparing the total paid fares for each year, we compared the average paid fares per day for each year there would be a still further slight difference, as 1904 contained 366 days and 1905 365 days. Upon this basis the Metropolitan system,

the fact that the company has no special summer business, and its winter business has been seriously interfered with during the last two years by the severe weather. This was particularly the case in the winter of 1904-05, when the traffic during January and February, 1905, dropped to abnormal proportions. If these two months should be omitted from the comparison of the two years, the increase in paid fares between 1904 and 1905 rises from practically zero to 1.9 per cent. This increase in paid fares, with a decrease in passengers car-

ried, accompanies an increase in transfer stations, as shown in Table VI. It is undoubtedly due to the establishment of a number of through routes, and also to the fact that since the opening of the subway, the surface lines are doing more of a short-haul business, for which, of course, they are particularly adapted. Table VI. gives, therefore, a clue to the redistribution of traffic which has occurred from the opening of the

TABLE VI.—SHOWING NUMBER OF TRANSFER STATIONS (IN JULY) OF EACH YEAR AND PERCENTAGE OF TRANSFERS ISSUED TO PAID FARES.

	Number of Transfer Stations.		Percentage of Transfers Issued to Cash Fares.	
	1904.	1905.	1904.	1905.
Metropolitan System.....	463	514	45	43
Brooklyn Rapid Transit.....	342	448	21	23
Coney Island & Brooklyn.....	5	5	17	18
Van Brunt St. & Erie Basin.....	1	1	10	9
New York & Queens County.....	10	11	21	23
Union Ry Co.....	...	...	7	7
Southern Boulevard.....	...	...	6	8
Richmond Light & Railroad.....	...	...	10	9
Staten Island Midland.....	...	...	11	9

subway, as the Metropolitan system, which is the only one of the larger systems which has been affected by the subway, is the only one which shows a decrease in the ratio of transfer passengers to cash passengers.

Another interesting table, indicative of the character of traffic carried by the different companies, is Table VII., which shows the number of cars owned and employees per million car miles, as well as the average number of passengers per car mile. Statistics are not given in the Commissioners' report for all the companies as to the number of cars in service, and this would of course be a better figure than the number of cars owned. The large number of cars required by the companies which do a summer business is very strikingly shown. The figures for cars and employees are taken as the average between the highest and the lowest reported during the

TABLE VII.—SHOWING CARS AND EMPLOYEES PER 1,000,000 CAR MILES AND CARRIED PER 1,000,000 PASSENGERS AND PASSENGERS PER CAR MILE FOR 1905.

	Per 1,000,000 Car Miles.		Per 1,000,000 Passengers Carried.		Passengers Per Car Mile. (c)
	Cars.	Employees.	Cars.	Employees.	
New York City Ry.....	35	169	6.6	18	81
Manhattan Elevated b.....	26	104	6.2	22	41 (d)
Brooklyn Rapid Tran. b.....	60	200	8.7	29	65
Coney Island & B'klyn a.....	74	122	13	21	59
N. Y. & Queens Co. b.....	70	119	13	21	58
Union Railway & Southern Boulevard a.....	99	...	15	..	63
Richmond Lt. & Ry. a.....	94	159	22	39	44

a Cars and employees are those for January 1, 1906. b Average for highest and lowest months. c Average for subway division is 39.

year, where such figures are given in the report, otherwise they are taken as those of Jan. 1, 1906. The final column, that of passengers per car mile, is particularly interesting as showing the low ratio for the elevated and subway lines as compared with the surface lines. The elevated and subway cars are longer than those used on the surface, but the longer haul more than makes up for this difference in seating capacity.

It is understood that the Commission plans to continue the publication of similar statistical information at intervals.

General Manager F. L. Mowry, of the Stark Electric Railway, has adopted a watch inspection system for the road. Each motorman and conductor must have a watch that will keep accurate time and be up to a certain standard, and the watch must be inspected at frequent intervals by the company's inspector.

### THE CAPACITY OF SURFACE LOOPS FOR TRAFFIC AS INFLUENCED BY INTERSECTING LINES IN THE DOWNTOWN DISTRICT OF CHICAGO

BY W. A. BLANCK

Innumerable complaints of overcrowding and of an insufficient number of cars during the rush hours in the morning and evening hours, gave the city of Chicago cause recently to file suits in the circuit court against the Chicago Union Traction Company for \$1,500,000, and against the Chicago City Railway for \$500,000, for violation of the good service ordinance.

The traction companies commissioned the writer to make an independent investigation on the surface lines entering the downtown district of Chicago, so as to file a sworn statement setting forth the possible traffic on the existing lines under existing conditions. As a jury trial was imminent, the writer endeavored to put all statements in a very comprehensive form, and to make use of only the simplest and most direct methods in the analysis of the problem. An abstract of one of the cases, that relating to the Blue Island Avenue loop of

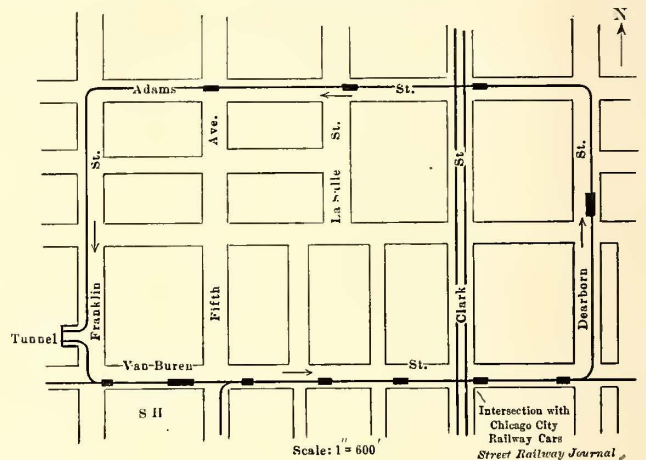


FIG. 1.—PLAN OF BLUE ISLAND AVENUE LOOP, CHICAGO

the Chicago Union Traction Company, might be of interest to the readers of the STREET RAILWAY JOURNAL.

Since the overcrowding of cars is only the natural sequence of not running a sufficient number of cars, the following investigation is limited to the determination of the smallest distance between two consecutive cars on the Blue Island Avenue loop contingent on the severe demands of the rush hour service. The Blue Island Avenue line is at present a cable line, connecting the west side of Chicago with the business district. Before entering the loop district (see Fig. 1) the line passes through a tunnel under the Chicago River. Although the service on the Blue Island Avenue line proper cannot be called very heavy, local conditions in the downtown district necessitates the passage of numerous electric and horse cars over part of the loop, so that the service for the rush hours under consideration would be the following:

Street	Car Line	Headway
Franklin St....	Blue Island Ave. (cable)	4.5 minutes.
Van Buren St..	Blue Island Ave. (cable)	4.5 minutes.
	Van Buren St. (electric)	1.5 minutes.
	Twelfth St. (electric)	1.5 minutes.
Dearborn St....	Blue Island Ave. (cable)	4.5 minutes.
	Sedgwick St. (horse)	9.0 minutes.
Adams St.....	Blue Island Ave. (cable)	4.5 minutes.
	Harrison St. (electric)	2.0 minutes.
	Fulton St. (electric)	10.0 minutes.

To show the above service in a comprehensive and graphi-

cal way, accurate observations were made as to the time required for a cable train to traverse the loop, and it was found that 13 minutes elapsed from the time the cable train leaves the tunnel at Franklin Street to the time it returns to the tunnel. As the length of the loop is 5078 ft., this corresponds to a schedule speed of 4.4 m. p. h.

As a basis for the graphical schedule it was taken as a fair assumption that the schedule speed of the cable cars is the

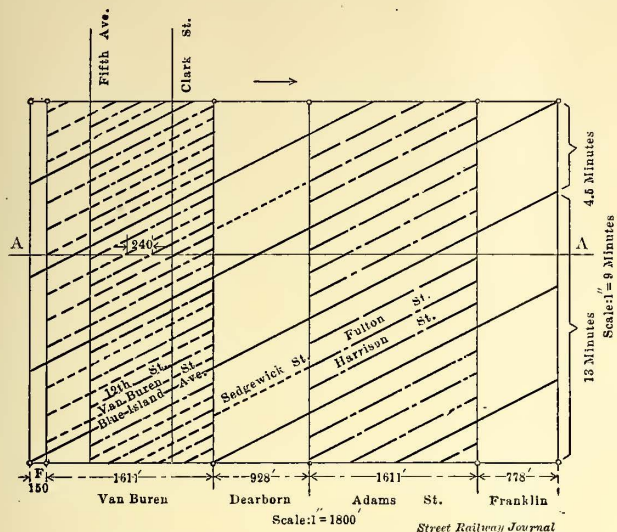


FIG. 2.—RUN SHEET FOR CARS ON BLUE ISLAND AVE. LOOP

limiting factor for all electric or horse cars interspaced between two cable trains, because the latter are dependent on the maximum rope speed (given by a city ordinance) and on the reduced rate of acceleration, due to the large inertia of the cable train and the limitations of the grip device. The run sheet is given in Fig. 2. The entrance of a Blue Island cable train into the loop is shown by points at the left of this diagram. The progress of the trains around the loop is assumed to be uniform, and is shown by lines which cut the right of the diagram at points higher than those at which they originate at the left of the diagram, by an amount representing 13 minutes, or the time required for the trip around the loop. In this particular case, as the speed of all cars shown is assumed to be uniform, all lines are parallel and inclined at an equal angle to the base of the diagram.

In glancing over the car service as given above, it will be self evident that the greatest congestion on the loop is on Van Buren Street, between Franklin Street and Dearborn Street, and since a congestion of traffic on one point of the loop system limits the amount of traffic on the entire loop, all further investigations will be confined to the Van Buren Street traffic.

To determine the distance between two cars on the most congested part of Van Buren Street, the time elapsing between the passage of two cars by one fixed point must be known. This is best derived by considering the number of cars for each line operated on Van Buren Street passing a point between the limits named in one minute. It is as follows:

Van Buren Street.....	1/1.5 = 0.66 cars per minute.
Twelfth Street .....	1/1.5 = 0.66 cars per minute.
Blue Island Avenue .....	1/4.5 = 0.22 cars per minute.
A total of.....	1.54 cars per minute.
Or time between cars.....	1/1.54 = 0.65 min. = 39 sec.

In distributing the cars on the graphical schedule with the above time interval, it will be seen that six electric trains are interspaced between two cable trains of the Blue Island Avenue line, and as a section A-A, parallel to the horizontal axis of the run sheet, represents to scale the distance around

the loop, it will readily be seen that the space between two intersections of the line A-A represents the center headway of two consecutive cars, which amounts in this case to about 240 ft.

Moreover, it is to be remembered that the car service on Van Buren Street encounters a large obstruction in crossing Clark Street, on which the Chicago City Railway maintains, during rush hours, a 20-sec. service on the north bound as well as on the south bound track. The distance between two consecutive cars will then be determined by two quantities, namely, A, space allowed for braking and, B, space allowed for cars on crossing lines.

A. Since the safe braking distance is proportional to the speed of the car, the maximum space allowed between the cable trains will be required when the latter run at rope speed or 6.6 m. p. h. Assuming a braking effort equal to a retardation of 0.75 m. p. h. per second, a space of approximately 45 ft., would be required to bring the cable train from maximum speed to rest. As, however, this maximum is very seldom obtained, and as the cars are generally well under control, the writer did not think it necessary to make allowance for this in determining the distances which it is practicable to maintain between trains. Although not definitely considered, this limitation still exists, and whatever value it may have will tend to increase the distance which may be permitted between trains.

B. The space allowance of the Union Traction car crossing the Clark Street service of the Chicago City Railway, or in other words, the distance travelled by a loop car during the interval the Chicago City Railway car obstructs the loop track, is found as follows:

- Average distance of car centers, as taken from the run sheet, 240 ft.
- Average length of train (one cable and six electric trains), 50 ft.
- Average distance between trains, 190 ft.
- Average time for Chicago City Railway cars crossing Van Buren Street, as determined by frequent stopwatch observations, 12 seconds.
- Average speed of loop car as mentioned before, 4.4 m. p. h., or 6.45 ft. per second.
- Average space allowance for the passing of one Chicago City Railway car,  $12 \times 6.45$ , 77 ft.
- Average space allowance for the passing of two Chicago City Railway cars interspaced between two consecutive cars of Chicago Union Traction Company's loop,  $2 \times 77$ , 154 ft.
- Distance of front end of next loop train from crossing as second Chicago City Railway car passes, 190-154, 36 ft.

In other words, the influence of the intersecting line has reduced the center headway of the loop cars, amounting to 240 ft., to a clearance of 36 ft., between the front end of a loop car and the rear end of a Chicago City Railway car passing the crossing.

This condition may also be considered on the time basis in the following way:

- Average time between trains as given before, 39 seconds.
- Average length of train, 50 ft.
- Average time required for the train to pass a given point or move its own length,  $50/6.45$ , 7.8 seconds.
- Average time elapsing from moment, when the rear end of one train passes a given point to the moment, when the front end of the next train arrives at this point,  $39-7.8$ , 31.2 seconds.
- Average time for Chicago City Railway cars passing Van Buren Street, 12 seconds; as two such crossings must be made between two consecutive loop cars the total time taken up by Chicago City Railway cars will be 24 seconds.
- Time interval between the front end of a loop car and the rear end of Chicago City Railway car passing the crossing,  $31.2-24$ , 7.2 seconds.

These results are obtained under the best conditions, assuming that north bound and south bound Chicago City Railway cars are crossing Van Buren Street simultaneously. But, considering the usual interference by passengers and freight

wagons on the street, this condition is not generally attained, with the result that a clearance of 36 ft. is seldom found to exist.

From the above, not taking in account the space required for braking, it is evident that it is impossible to operate more cars on the loop under consideration as long as the present schedule speed is maintained. An increase of the latter is, in the writer's opinion, entirely impracticable, as the interference due to the congested drayage conditions in this particular location makes it difficult to maintain even the present schedule speed during the rush hours in the evening.

#### REPORT OF CLEVELAND CHAMBER OF COMMERCE COMMITTEE AS TO BASIS FOR FRANCHISE RENEWAL IN CLEVELAND

The special committee of the Cleveland Chamber of Commerce, which was appointed, with the sanction of the Cleveland Electric Railway and the city administration, to investigate the street railway franchise question in Cleveland, and if possible to determine an equitable basis of settlement, has returned its report with recommendations, after some four months of investigation, during which more than forty sessions were held. The committee was composed of W. R. Warner, J. G. W. Cowles, W. H. Canniff, S. P. Fenn, J. G. Jennings, George T. McIntosh, and M. A. Marks, all men of highest standing in the Cleveland business world. While the contending parties are in no way bound to abide by the findings of the committee, its report will unquestionably prove of great value in helping to settle the questions at issue in Cleveland and be of great interest and value as a basis for settlements of similar situations in other cities. On presentation to the Chamber of Commerce the report was adopted almost unanimously, the only negatives votes being cast by Mayor Johnson and his associates.

In brief, the report condemned the plans for municipal ownership and of a holding company, as suggested by Mayor Johnson, and suggested a reduction of fares with shorter hauls. It advised the sale of three tickets for 10 cents, fifteen tickets for 50 cents, and thirty tickets for \$1, for straight fares without transfers; 5 cents for cash fare for a ride with a transfer, and the shortening of the length of haul as follows: The fare limit to be West Ninth Street for passengers from points east and southeast, and East Ninth Street for passengers from points west and southwest. This would allow passengers from the limits of the city to ride to the public square and a short distance beyond, in other words, cutting the longest possible hauls practically in two on the low-fare tickets, but allowing the long hauls and transfer on payment of 5 cents. Paving, cleaning and sprinkling ordinances are to stand, but the bridge taxes and car licenses are to be removed. In return for these concessions, the committee recommends the granting of a new twenty-five-year franchise for the entire system.

On the subject of municipal ownership, the committee said that, in the first place, the city is not legally authorized to operate street railway lines, and, if it were legally possible, the committee would hesitate to advocate such a step, as municipal ownership is untried in this country. In Europe there are many such systems, but investigation shows that the demands in the way of service and other conditions are different. In view of the unfavorable report made to Mayor Dunne, of Chicago, by Mr. Dalrymple, manager of the Glasgow system, the committee felt warranted in recommending that the experiment should not be tried in Cleveland.

On the second suggestion, the lease of the present property to a holding company, to be controlled by a committee as out-

lined by Mayor Johnson, it seemed evident that there would be no reduction of fare to the rider for several years to come. The main argument urged for this plan seemed to be that it would lead the way to municipal ownership and operation.

In outlining its reasons for suggesting a reduction of fare on the plan mentioned, the committee said that the situation in Cleveland was unique in many respects, and that the experiences in other cities could not be taken as a basis for Cleveland. After careful investigation it believed that the cost of carrying passengers on an average for the past thirteen years was 2.91 cents, not including interest on bonded or floating debt, and nothing for dividends. The committee was surprised to learn that the cost of carrying passengers was greater per passenger in 1905, when 110,000,000 passengers were carried, than in 1895, when only 53,000,000 passengers were carried. This was due, it believed, to the greater average length of ride, an increase of about 17 per cent on cost of wages, increased cost of supplies, fuel, etc.

About 33 per cent as many transfers as fares were collected in 1905. Nearly all testimony taken was in favor of something additional for a transfer, and the conclusion of the committee was to this effect. It was of the opinion that the unit of ticket purchase should be as low as possible, so as to benefit the poorer classes.

The committee endeavored to ascertain the actual investment of the company, and although afforded every facility, it was unable to arrive at satisfactory conclusions. During thirteen years the company expended in betterments and renewals more than \$10,000,000, of which \$4,500,000 were taken from surplus and the remainder from new capital. In 1905 the net, after paying interest, was \$1,600,000. It paid \$994,500 in dividends, and the surplus, \$624,000, went into betterments. If the company should continue to operate with the same rate of fare and, allowing for a 5 per cent annual increase, its net earnings in 1916 would be \$2,500,000. If, however, on the same basis of increase, the average fare be reduced from 4.7 cents to 3.76 cents, the saving to the public in 25 years would be \$54,000,000. Therefore, the plan mentioned above was suggested. The committee was of the opinion that this rate was as low as the company could successfully operate under and it admitted that it was not likely to produce unduly large returns in the future.

Attorney Johnson, who assisted the committee in preparing its statement, attempted to show what the company would get out of the terms. He took the company's report for 1905 for his basis. He said that the average fare was 4.7 cents, the operating cost 2.82 cents, and the actual cost, including interest, 3.27 cents. Various experts testified as to how many people who now take transfers would continue to do so under the new plan. One said 12 per cent of the 33 per cent now using them, and another said 15 per cent. It was estimated that probably 5 per cent of the passengers would pay cash 5-cent fare. Figuring that only 10 per cent would ask for transfers and 5 per cent pay a nickel, thus leaving 85 per cent who would buy tickets, it was figured that there would be \$287,000 left after paying interest. If 15 per cent asked for transfers the balance for dividends would be \$380,000. Allowing for growth of traffic from 5 per cent to 8 per cent, compounded annually, it was estimated that 200,000,000 would be carried in 1916. The net earnings would be \$1,466,000. Deducting interest paid by the company in 1905 this would leave a balance of \$1,020,000. This, however, would not be exactly fair, because the bonded indebtedness would increase.

Officials of the Cleveland Electric Railway Company decline to discuss the report of the committee. It will be considered by the Board of Directors of the company this week.



## SECOND QUARTERLY MEETING OF THE STREET RAILWAY ASSOCIATION OF THE STATE OF NEW YORK—II

In the last issue of the *STREET RAILWAY JOURNAL* was given an abstract of the proceedings at the morning session of the second quarterly meeting of the Street Railway Association of the State of New York, which was held at Elmira, March 29, for the discussion of transportation subjects. An abstract of the papers and discussions at the afternoon session is here given.

### AFTERNOON SESSION

After the luncheon recess, President Danforth introduced J. M. Connelly, president of the Elmira Chamber of Commerce, who outlined some of the methods by which the business men of Elmira are building up their community. Mr. Connelly stated that Elmira had been somewhat quiet for the last four years, but lately, with the assistance of such men as W. W. Cole, general manager of the Elmira Water, Light & Railroad Company, and other go-ahead business men of the city, the community has had an awakening. The Chamber of Commerce was organized, and by active efforts a fund of \$150,000 was collected from the business men of Elmira—a remarkable record for a city of this size. Mr. Connelly stated that Elmira had an excellent electric railway service, and went on to outline the important and useful part that an electric railway company plays in the building up and development of any community. He pointed out that recent development in transportation matters, such as improvements in the electric railway motor, progress in alternating-current work and in gasoline motor cars, would have an important bearing on the future growth and prosperity of the Empire State. He stated that Elmira had found it advantageous and to her own interests not to hamper the public service corporations, but to encourage them in their work; and he expressed the opinion that if the communities of the State would only lend the proper encouragement to their public service corporations, the interests of the public and of the communities would be far better served than by the adopting of a narrow-minded "dog-in-the-manger" policy. In Elmira the motto is "Everybody—together." Everybody pulls the same way, and then everybody participates in the general progress and prosperity that comes as the result of these united efforts.

President Danforth replied and said he believed the members would agree that Elmira had a progressive and liberal Chamber of Commerce, which was a credit to the community. He believed this city had struck the keynote of the situation. If the common good of the community is to be served best, co-operation and not petty restrictions must be the keynote, and Elmira offers indisputable evidence of what can be accomplished for the good of the community when this spirit of co-operation exists between the municipality and the public service companies.

President Danforth then called on E. J. Wilcoxon, superintendent of the Rochester & Sodus Bay Railway Company, to open the discussion on "Collection and Registration of Interurban Fares."

### FARE COLLECTION ON INTERURBAN CARS

Mr. Wilcoxon first explained the system now in force on the Sodus Bay division of the Rochester Railway Company. The line extends 40 miles, from Rochester to Sodus Point, and there are twelve distinct fare limits which do not overlap, and the Ohmer register is used. For purposes of fare collection the line is divided into two parts, namely, at the sixth-fare point, or half-way. Passengers leaving Rochester and going beyond that point, if they present a ticket, receive from the conductor a hat check, which has the station printed

beyond the half-way limit point; if a passenger pays cash and is going beyond the sixth point the conductor collects the cash through to destination and gives the passenger a hat check with the amount of money paid indicated by punch marks. When the car arrives at the sixth point the conductor collects from everybody on the car. If a cash check is presented going to stations beyond this limit, the conductor rings up 10 cents on the register for the amount punched on the hat check; for tickets he rings the same way. The company sells single and round-trip tickets, and has card passes and ticket-book passes. The passes are checked in the same way as the paid tickets. The dials on the Ohmer register are so arranged that the checking is made very easily, and an impression of the register record is taken at each 5-cent limit. His company has used the Ohmer register for about four years, and is fairly well satisfied with the results obtained.

C. Loomis Allen, of Utica, asked if with the Ohmer register it is possible for the company to ascertain what the amount of the business is between given points; that is, how many people ride through and how many ride between the different fare divisions.

D. A. Byrne, cashier of the Rochester Railway Company, replied that on the Sodus Bay line the printed slips made at each fare limit, showing the actual records as taken from the Ohmer register, are numbered 1, 2, 3, 4, 5, etc. Thus 1 to 2 is for the city division, 2 to 3 for the next division, and so on. From these it is possible to determine the number of people carried, the amount of cash taken in and the total number of fares between every limit. The day's receipts can be divided for every limit by the index system on the sheet taken from the register.

President Danforth said that the simplest proposition, of course, would be to collect the fare in each limit, as is done now in the East on some lines, and was done years ago on the Sodus Bay line. On the latter a through passenger's fare was registered thirteen times from the center of the city to Sodus Point. That method is annoying to the passengers and takes a good deal of the conductor's time. Where a road is carrying a large number of through passengers or long-distance riders, the steam railroad method seems to be the most practical. The trouble with that method is that no register is used. The steam railroad depends absolutely upon the conductor's report. There is nothing to check him in any way at the end of a half or full trip to see that he has the proper number of tickets and cash on hand. With the Ohmer register the company is able to account for varying rates of fare. It lessens the work of the conductor in some degree, but not as greatly as the use of cash duplicates. His objections to the system are, first, that the railway company cannot buy the registers, but has to pay an expensive rental; and second, it requires a considerable amount of office work to obtain the kind of information Mr. Allen inquired about, namely, the number of passengers riding between different points.

Mr. Pardee, of the Rochester & Eastern, said he was using practically the steam railroad system. The cash fares are based on 2 cents a mile, and all other fares are based on mileage instead of zones. Of the receipts, 87 per cent comes through the sale of tickets at ticket offices. The conductors register 5-cent cash fares on the plain register and cut duplicates for everything above that. With this method it is a very simple matter to obtain in the office all the information Mr. Allen desired. He determines very quickly the amount of business between any two points. Something must be turned in by the conductor for every passenger—for instance, a slip being given for passes. On the whole, he finds that this system works very satisfactorily.

Mr. Shannahan, of the Fonda, Johnstown & Gloversville, thought Mr. Pardee's statement that 87 per cent of his gross income is turned in by his ticket agents is a very gratifying and surprising showing. If it is assumed that conductors are short a certain percentage, say 10 per cent or 15 per cent of the 13 per cent transportation sold by them, the shortage, which must inevitably exist on all lines, is reduced to an absolute minimum.

Mr. Allen, in reply to a question, stated that on the Utica & Mohawk, 54 per cent of the receipts are in the form of tickets sold through conductors.

Mr. Ryon, of the Schenectady Railway, said that every conductor on the Schenectady system is a traveling ticket agent, and a very small proportion of the cash received on the system is turned in through the ticket offices. The local conductors sell interurban tickets, carrying at one time five kinds to seven kinds of tickets, averaging about \$35 worth. Of course, they replenish their stock, so that while the ticket

tickets. The ticket is divided into two halves. One part has printed in black face type the words "not good for passage." This half is detached and turned in by the conductor, and the other half is given to the passenger for the return trip. In this way it is possible to overcome the possibility of the conductor selling this half over again for the return trip, which may be done with the ordinary duplex ticket. By having the conductors sell tickets he expects to make the proportion between tickets and cash about 80 per cent. His company uses the Ohmer register, as it cannot get along with duplicates. For handling the matter of shortages, the speaker introduced a system of arriving at percentages of efficiency of the individual men by taking the number of daily mistakes, counting one for every 5 cents over or short, dividing the total for the month by the number of days and subtracting this from 100, to get the relative percentage of the employees. The percentages averaged as high as 98 per cent, and in one case as high as 99 per cent for one month.

President Danforth believed the form of ticket suggested by Mr. Stevens is a great improvement on the regulation duplex ticket, as it does away with the possibility of the conductor selling the going portion of the ticket to a passenger traveling in the opposite direction. It also has the advantage that it furnishes a round-trip rate to passengers boarding the car in any fare limit. On interurban lines there are many fare limits in towns where ticket agencies are not maintained. It would appear that the only other method is the use of a coupon book, as discussed at the morning session. The selling of these books will do away with a great deal of work on the part of the conductor, and in a measure will do away with the necessity of constantly checking the two portions of the ticket turned in to see that both parts are cut alike.

Mr. Allen asked how many forms of ticket must be carried by the conductor.

Mr. Stevens replied that only one form was necessary. One part is good for passage in the direction punched and the other has printed in black-face type "Not good for passage," and is detached and turned in by the conductor at the time the fare is paid. Only three punches are necessary. The conductor rings on the

register the amount of the fare at the time he issues the ticket, and he must account for the money indicated by the punch marks on the "not-good-for-passage" portion.

Mr. Fassett said he had been waiting very patiently to hear of something better than what he had. His company still retains the old bell punch system, the conductor registering the different kinds of fare by punching different colored slips. On his system they have 3 cents for a transfer, three different overlapping 5-cent fare limits, and 6-cent, 10-cent, 11-cent and 15-cent fares. While this is pretty complicated, the old punch does the business still.

Mr. Seixas, of St. Catharines, said he had used on a comparatively short line—15 miles—the regular duplex system. He discarded it for two reasons: First, the number of times the conductor had to punch, causing liability of mistake; and second, the difficulties of accounting after the tickets reached the counting department. His company devised a system consisting of a duplex book, each ticket lined up in 5-cent spaces, running from 5 cents to 50 cents. The conductor, on receiving fare, simply tears off at the line representing the fare collected. He hands in the stub of his book, and

<b>Niagara, St. Catharines &amp; Toronto Railway Company.</b>	
<b>ROUND TRIP CASH RECEIPT</b> Good for One Continuous Trip Between Stations and in direction Indicated by bottom line. To be shown to Conductor on demand. Subject to Rules of the Company.	
0006	
15c. Thorold and Canal Bridge to St. Catharines	
Town Line to Merrittion and Ball's Crossing	
Lobb's, Kaler's and Hutt's to Thorold and Canal Bridge	
Stamford to Lobb's and Kaler's	
Niagara Falls to Hutt's and Wright's	
25c. Town Line to St. Catharines	15
Lobb's, Kaler's and Hutt's to Merrittion and Ball's Crossing	
Wright's and Stamford to Thorold, Canal Bridge and Town Line	
Niagara Falls to Lobb's and Kaler's	
35c. Lobb's, Kaler's and Hutt's to St. Catharines	25
Wright's and Stamford to Merrittion and Ball's	
Niagara Falls to Thorold, Canal Bridge and Town Line	
45c. Stamford to St. Catharines	35
Niagara Falls to Merrittion and Ball's	
50c. Niagara Falls to St. Catharines	45
	50
<b>CONDUCTOR'S STUB</b> ISSUED GOING EAST Form D.	

RETURN-TRIP RECEIPT PRINTED ON BLUE PAPER—SOLD ON CARS GOING EAST

<b>Niagara, St. Catharines &amp; Toronto Railway Company.</b>	
<b>ROUND TRIP CASH RECEIPT</b> Good for One Continuous Trip Between Stations and in direction Indicated by bottom line. To be shown to Conductor on demand. Subject to Rules of the Company.	
0000	
15c. St. Catharines to Thorold and Canal Bridge	
Merrittion and Ball's Crossing to Town Line	
Thorold and Canal Bridge to Lobb's, Kaler's and Hutt's	
Lobb's and Kaler's to Stamford	
Hutt's and Wright's to Niagara Falls	
25c. St. Catharines to Town Line	15
Merrittion and Ball's Crossing to Lobb's, Kaler's and Hutt's	
Thorold, Canal Bridge and Town Line to Wright's and Stamford	
Lobb's and Kaler's to Niagara Falls	
35c. St. Catharines to Lobb's, Kaler's and Hutt's	25
Merrittion and Ball's to Wright's and Stamford	
Thorold, Canal Bridge and Town Line to Niagara Falls	
45c. St. Catharines to Stamford	35
Merrittion and Ball's to Niagara Falls	
50c. St. Catharines to Niagara Falls	45
	50
<b>CONDUCTOR'S STUB</b> ISSUED GOING WEST Form D.	

RETURN-TRIP RECEIPT PRINTED ON RED PAPER—SOLD ON CARS GOING WEST

<b>Niagara, St. Catharines &amp; Toronto Railway Company.</b>	
<b>ONE WAY CASH RECEIPT.</b> For this Date and Train Only. This Receipt for Fare Paid should be retained by passenger and shown to Conductor on demand.	
0000	
St. Catharines to Thorold	5
Merrittion and Ball's Crossing to Town Line	10
Thorold and Canal Bridge to Lobb's, Kaler's and Hutt's	15
Lobb's and Kaler's to Stamford	20
Hutt's and Wright's to Niagara Falls	25
Town Line to St. Catharines	10
Lobb's, Kaler's and Hutt's to Merrittion and Ball's Crossing	15
Wright's and Stamford to Thorold, Canal Bridge and Town Line	20
Niagara Falls to Lobb's and Kaler's	25
St. Catharines to Lobb's, Kaler's and Hutt's	10
Merrittion and Ball's to Wright's and Stamford	15
Thorold, Canal Bridge and Town Line to Niagara Falls	20
Lobb's and Kaler's to Niagara Falls	25
St. Catharines to Stamford	10
Merrittion and Ball's to Niagara Falls	15
St. Catharines to Niagara Falls	5
	30
	35
	40
	45
	50
<b>CONDUCTOR'S STUB</b> Form D.	

SINGLE - FARE RECEIPT PRINTED ON GREEN PAPER—SOLD ON CARS GOING IN EITHER DIRECTION

offices take in considerable money, most of the receipts come from the conductors' sales of tickets. The system is not altogether satisfactory. The speaker recommended about a year ago that the selling of tickets be taken out of the conductors' hands. He has found in his experience that the greater part of the troubles come either through errors of the conductors in handling the tickets, or through the fraudulent manipulation of tickets. Up to last year it was practically impossible to check the interurban divisions. The method of registration was changed, and the company is now using altogether the New Haven recording fare register. It is impossible on this road to use the zone system. The checking on the lines at the present time is remarkably satisfactory. It is found that with double registration it is possible for the men to collect all fares and check to a cent.

Mr. Stevens, of the Auburn & Syracuse, said that last May his ticket sales were 24 per cent of the receipts. By increasing the cash fare rate over the ticket rate, the percentage of ticket sales went up to 68 per cent of the gross receipts. He is planning to put into effect a form of ticket which he used on the Pacific Coast. With this all conductors sell round-trip

must turn in cash according to the torn off stubs. On the portion given to the passenger are shown the different stations, the rates of fare between two points and the cost of round trip. The cost of these tickets is only one-half that of the old duplex system, the ticket requires only one tearing-off, and it is a simple matter to determine from the stubs the amount the conductor should turn in.

The tickets are put up in books of 100, and are printed in three colors. The green one is issued as a receipt for single fare. The red one is issued on car going west and is redeemable on car going east, and the blue ticket is issued on car going east and is redeemable on car going west. Therefore the conductor has two books in use going in either direction. For tearing off the tickets the conductor uses a little silver plated slide, the width of the ticket, with about  $\frac{1}{8}$ -in. bevel on each side, so as to enable it to cling to the book. (Samples of these tickets are shown on page 602.)

President Danforth next asked Mr. Wilson, of Buffalo, to give the results of his investigation of the "Pay-as-you-enter" car, used in Montreal. (For description of the new Montreal car see STREET RAILWAY JOURNAL for Jan. 27, 1906.)

#### FARE COLLECTION ON CITY CARS

Mr. Wilson stated he had spent a day in Montreal and was most forcibly impressed with the operation of this type of car. The car is equipped with one entrance and two exits. The back platform is 7 ft. long, holding about 15 people. On the new cars this platform will be 9 ft. long. They have the "coffee-pot" system of collecting fares, and the people seem to be educated into having their fare ready before going on the car. The speaker made at least one hundred observations during his stay in Montreal, and found that it took about one second for a passenger to get on or off the car. In his judgment the idea is the best he knows of, but whether it can be adapted to American conditions and the American people is a question. His company, the International Railway Company, is building a sample "Pay-as-you-enter" car, which will be given a thorough trial in Buffalo. This is a double-end car and has a 32-ft. body with 7-ft. platforms. The successful operation of this type of car seems to depend on the size of the platform, and the number of passengers that can be accommodated on the rear platform, as the idea is to have the passengers all get on by the rear step when the car stops. As soon as all the passengers are aboard the car starts and the passengers pay their fare and pass into the car while it is moving. The platform should accommodate 25 people. The car that is being built for trial in Buffalo is designed so that the motorman's and conductor's ends can be interchanged. The idea is not at first to introduce the "coffee-pot" system, but to station the conductor in the place he is to occupy on the rear platform and have him collect the fares until the public becomes familiar with the operation of the system. If that works, the fare box can be introduced later. The theory of the "Pay-as-you-enter" car is a most attractive one and is worth a trial. The idea is to advertise thoroughly, giving the reasons for introducing the car. From the standpoint of the traveling public, there are a number of very important advantages to be gained, among which are the fact that the conductor does not have to push through a crowd to the inconvenience of passengers, and the conductor is in the proper position at the rear end to eliminate the jumping on and falling off the car—a class of accidents continually occurring at the rear platform. There will be an arrangement whereby the front door can be operated by the motorman to let people off that way, but they will not be allowed to enter by the front platform. Mr. MacDonald, general manager of the Montreal Street Railway, told the speaker that the new system

had increased their earnings on the line they put it on 10 per cent, and had decreased their accidents 25 per cent. If those results are possible it is certainly worth a trial, because the present method of collecting fares in this country is all wrong. The speaker believed the idea of having two thousand fiscal agents all over the system, composed of men not always of the best type, is entirely wrong. In Canada when they progressed beyond the horse car with its fare box, they retained the fare box and simply made it movable instead of fixed. One argument against this car is the possible reduction in speed that will be made, and the speaker rather thinks that the car will cut down the schedule, especially during the rush hours. However, it is worth a trial. In reply to a question about making change on this car, Mr. Wilson said that in Montreal they do not have any trouble about making change. The conductor carries \$20 in change in envelopes already made up.

Mr. Fassett asked what arrangement would be made for smokers standing on the rear platform.

Mr. Wilson, of Buffalo, replied that his idea was not to allow anyone to stand on the rear platform.

Mr. Wilson, traffic manager of the Toronto & York Radial Railway, outlined the fare-box system in Toronto. In that city it is almost compulsory for the company to use the fare box. As the earnings increased, the proportion of tickets increased from 30 to 70 per cent. The company does not object to the growth of the ticket system, but it would be impossible for the conductor to collect tickets without the fare box. There is very little trouble with bad coins in the accounting department. The fare box has a little window on each side which enables the conductor to inspect each fare that is deposited. A sheet is kept showing what spurious coins are coming in from each conductor, and if a man continues to turn in too many bad coins he is disciplined. The "Pay-as-you-enter" car with a straight 5-cent fare simplifies matters wonderfully. Where tickets are used, those tickets must be sold, and that takes time somewhere. In Montreal it is well understood that it is the selling of tickets which causes delay. Mr. MacDonald is well satisfied with the invention. The claim of 20 per cent is a very conservative estimate of the saving. In Toronto it is almost impossible to do without fare boxes. Instead of having the conductors handle the fares they each carry \$15 worth of tickets and \$10 in change, purchased from the car house or office at the end of the route. Except at certain rush hours, when they must provide tickets in advance, \$15 will carry them over for four or five trips. It has been found that it is hard for the conductors to do accounting work in keeping track of the different kinds of tickets. The Toronto companies tried doing without the box for awhile, but soon returned to it. A full account of the Toronto system of handling fares was published in the STREET RAILWAY JOURNAL for Jan. 27, 1906.

Mr. Fairchild said he had the pleasure of going over the Montreal system and watching the "pay-as-you-enter" car. Whatever the drawbacks of their method may be, they are getting all the fares. As Mr. Wilson has said, there is enough in the idea to warrant very serious consideration. As he has pointed out, the American roads, when they gave up the old fare box, went backward instead of forward. The Canadians kept the fare box, but gave it to the conductor to pass around. In this connection it had occurred to the speaker that one of the objections to this car, as in rainy or cold weather, would be that some of the passengers who had neglected to get their fares ready must stand around on the platform until they got at their money. This is particularly noticeable with a certain class of ladies who have a set of pocketbooks, one inside the other. The idea occurred to the speaker that it might be advisable to allow the passengers to enter the car at either end,

letting them pay their fare as they leave the car. The whole thing hinges on the design of the cars. If the rear platform is divided into three aisles, so the passengers coming in and leaving do not conflict, one of the serious delays at crowded points will be overcome. One objection to having passengers pay their fare as they leave the car would be the congestion at busy points. It might be necessary to hold the car until all the passengers had paid, but it would be possible to save the delay most roads now have due to incoming and outgoing passengers blocking the doorway, as the car would be loading at the same time it was unloading.

In reply to a question by Mr. Wilcoxon, Mr. Fairchild said in Montreal they issue transfers when the passenger pays his fare. The conductor has the transfers ready, and the person drops the fare in the box and calls for a transfer. The transfer could be given to passengers when they leave the car unless a road had a complex transfer system, but with simple transfers it would be easy to hand them to passengers when they leave the car.

Mr. Cole, of Elmira, thought in the collection of fares one of the most important points in the discussion of this car would be how much it would reduce the speed that could be maintained. In three cities he found that in increasing the speed of cars the earnings increased in proportion. In the collection of fares under this system it would seem that the cars could not make the same speed, as there would be delays at crowded points. Therefore, in studying the actual gains it is necessary to study the decrease in car operation, decrease in car miles run, and the extra number of cars required to do the same amount of work.

Mr. Seixas called attention to the fact that to anybody who has not operated in Canada it seems almost unbelievable, but the Canadian method of getting about is entirely different from that in the United States, and it is just as much different in England as in Canada. In England the people let the man in front stay in front and the man behind stays behind. Also, as Mr. Wilson said of the Canadians, they have an absolute respect for the law—the law of etiquette. In Canada that condition exists to a greater or less extent. The man in front stays in front, except when the Yankees go over there and “boost” him out of the way. On the success in educating the people in this country depends the success of the “pay-as-you-enter” system. It is a question whether the American people can be educated to allow the man in front to keep his place.

Mr. Wilson, of Buffalo, said as to the point about speed mentioned by Mr. Cole, he was surprised that the new cars in Montreal made better schedules than the old-type cars. The latter unload only at the rear entrance, while the former can unload at two places and take on passengers at the same time. So the new type really catches up with the old-time cars where they are operated on the same lines. It is not so long ago since the Buffalo company permitted passengers to leave by the front door. For years passengers have been loading and unloading from the same entrance. The company was accustomed to that method and it has been making money—and losing \$500 per day in knocked-down fares.

#### CITY SCHEDULES

President Danforth, in taking up the subject of “City Schedules,” said that the subject is a particularly broad one, and a matter in which those having charge of city operation are vitally interested, covering not only the making of the schedule but the data upon which that schedule is based; and after the schedule is made, the method of checking its results and providing for its proper revision. In most cities the time table good to-day is of no value to-morrow. It is hard

to realize that conditions are varying in one’s own city from day to day so rapidly, but careful analysis of the traffic will show that a city schedule must often be changed if the lines are to be operated to the best advantage.

Mr. Fassett said the conditions in Albany have changed comparatively recently. Up to last year the Albany system operated without transfers, operating instead by a system of inter-communicating lines. Albany is divided into practically two divisions. Some few people desired transfers, and in the end the transfer problem was thrust upon the company. By the system of inter-communicating lines the company had been distributing the traffic, but by introducing transfers it was concentrating the traffic all the while. It went through the hard experience of carrying many more passengers and taking in less money. New time tables are now being planned. The concentration in the center of the city became so bad that he has planned to avoid congestion by taking the cars a little to the north and south of the central points, and making the transfer points at the ends of the lines and not in the center of the city, that is, for the regular cars. This will have the advantages of separating the transfer passengers from the cash passengers in the rush hours, and it will take people away from the center of the city and limit the use of the stop-over privileges; and also by using during the rush hours short cars from the center of the system to the outskirts for short riders only, passengers can get on without being interfered with by transfer passengers later. By routing the cars to take passengers from the center of the city, trouble is avoided with the transfer privilege.

Mr. Ryon asked what the conductor does when a transfer is presented at a wrong transfer point.

Mr. Fassett replied that the passenger either pays his fare or is put off. There can be no question about that point, in view of the recent rulings that a company can make its own transfer points. Where a person has a mispunched transfer, it is another matter.

Mr. Ryon said in Schenectady the situation is this: There is a waiting room in the heart of the business district. The local riders will walk to that waiting room from two to three blocks around, thus congesting traffic. In working out transfer points the company prefers to keep passengers away from the downtown district. Recently he has been working on definite instructions to conductors on proper transfer points, and he attempted to lay out a plan to keep the passengers away from the waiting room. But the question of stormy weather comes up, as it recently did, when passengers cannot be expected to stand in the rain or snow four or five blocks from the waiting room. The only way of getting rid of that is to get rid of the waiting room. The idea is to get the station off the business street and stop the congestion and, of course, do away with the possibility of riding downtown and back on a transfer, which is sometimes done. The lines all come to a central point, and there are a couple of belt lines, so that a passenger can get on one line, get off at a neighboring transfer point, take a car at waiting room and go back.

Mr. Carver, general superintendent of the Rochester Railway, said his company believes the matter of city schedule is strictly a financial proposition. In the handling of traffic on steam roads, both freight and passenger, the theory is to charge all the traffic will bear, so that a ton of first-class goods, for instance, will bring in more than a ton of lumber. That can be reversed for city railways. It is possible to fix the amount of money that can be taken in on a certain line on a certain day of the month by keeping a daily check on what such line is doing. On one line it was necessary to show a certain percentage of increase. In comparing with March of last year on the same line, the earnings were \$9800 and last

year was taken on a basis of \$1.95 per car-hour. This year they tried for and secured an increase of 13½ per cent, but this was on the basis of \$1.92 per car hour. This is 3 cents per car hour less than last year, but they obtained the volume of money they wished that line to bring in from day to day. Considering the money taken in for a given day, the company knows how the receipts are divided and where the money comes from. They can check the receipts each day in less than a day, and after the money is taken in they can tell what it is costing to get it, what they are getting per car hour, and if they are not getting the increase they want they can change the schedules. On another line on Feb. 28, they had to change and run 550 car hours per month more. The first ten days or twelve days that this schedule ran it did not show up well as a business proposition, but it is now becoming a paying one. Should the tabulation show it was falling behind they would change the schedule right away. That is done on the principle that the prime object of a city schedule is to get the greatest number of conductors in the way of the greatest number of nickels at the smallest cost possible.

President Danforth said the keynote in the making of city schedule is to get all the passengers possible—keep the sidewalks empty.

Mr. Cole thought that in checking up city schedule work there are four essential conditions: First, the earnings per car mile; second, the earnings per car hour; third, non-revenue mileage, and fourth, the percentage of transfers to gross receipts. These four conditions are the ones that must be considered. In many cities where consolidation has taken place, it will be found that many lines still operate over their old routes. Lines will be found where ten passengers are transferred and only five or six go on for the rest of the trip. This should be reversed, and yet such conditions actually exist in many cities. The condition of non-revenue mileage exists, especially on the longer city lines. Up to the city limits a certain revenue per car mile is obtained. Beyond that this revenue increases until a non-revenue mileage is reached, so that instead of having every car go through, it is better to send only every other car through to the end of the line. The same conditions exist largely in most cities, that is, the cars are carried beyond the revenue point. Longer-riding passengers should be required to take the through cars.

President Danforth said there is one thing to be considered in the line of Mr. Cole's remarks, and that is the local condition. Each line must be considered separately and according to its own needs. As he said before, a company wants all the people to ride from whom it can obtain a profitable revenue. For that reason it is desirable to go a step beyond the actual needs of the service, and give a certain amount of extra accommodation as a matter of advertising. It pays to do this up to a certain point. As Mr. Cole says, the routeing of cars must be carefully laid out and cars must not be run beyond a reasonable point. It very often pays to route trippers over parts of two lines to avoid excessive transfers. There is another phase of this subject, and that is in the methods used by various companies in making up their time tables, the division of the time tables into runs, and the assignment of such runs to the train crews. There is quite a diversity of methods. In Rochester it is the practice not to run a large number of trippers, as compared with Buffalo and other systems. This makes a great difference in the division of the work. The conditions in Rochester are more like those in smaller cities. The average rider does not go over 1½ miles from the center, but a great many ride through the center of the city. The cars carry practically two loads each trip, in spite of the large number riding through the center.

Mr. Carver, in further explanation of the Rochester sys-

tem, said every car carries a train number and runs according to schedule. They do not run many extras. When trippers go out, the office knows pretty nearly what they are going to do. Personally, he thought it is better to have the tripper on time. As an instance, recently they had quite a storm and there were many extras out without being on time. There was one case where a tripper should have gone out at 5:50 p. m., but did not go until 6. This tripper would have had too large a load and the next car would have been underloaded. Most extras should run on schedule and carry regular train numbers. After a schedule is made up and the proper amount of car mileage figured to produce the result desired, then the run is divided up and the run number is different from the train number. The Rochester Company has a system of seniority. The oldest man on the line has the pick of any run, the next oldest the second choice, etc.

Mr. Duffy, general superintendent of the Syracuse Rapid Transit Railway, believes that local conditions must govern in making up a schedule. In his city, on the main line, there are three divisions which must be taken into consideration in making up the schedule. He runs a tripper service in the direction of greatest travel. Most of the tripper service is on that particular line, and from a point where two or three large factories are situated. From these lines the passengers go to the center of the city and transfer. But he has found that with one factory employing 2000 people it is more economical to run direct to the southern part of the city without transferring at the center. In making up the schedules the men are satisfied with ten hours a day, so he subdivides the schedules accordingly. He has also a seniority rule, but that does not give the oldest man the right to select his run. For instance, such a man might pick out a run which the superintendent does not believe him to be capable of handling and, therefore, the superintendent reserves the right to change the men. He finds that he can get men on the extra list 7½ hours or eight hours six days in the week and take chances for Sunday. If less, it means new men on the run every night.

President Danforth then announced that a letter had been received from W. Caryl Ely, president of the American Street & Interurban Railway Association, expressing his regret that he could not be present at the meeting.

J. DuBois, division superintendent of the Fonda, Johnstown & Gloversville Railroad, then read the following paper on "Methods of Discipline:"

#### METHODS OF DISCIPLINE

In order properly to take up this subject, it might be well to follow the case of any transportation employee from the time of his entering the service, and note the general policy of his training. We will find, on any street railway system, a number of regular conductors and motormen and a greater or less number of "extra" men. Each of these men have been carefully selected. He has been recommended by his previous employers, his habits and moral character have been vouched for as good, and he has passed the necessary physical examination. He has practiced for a sufficient length of time under the supervision of a competent instructor, and has been "turned in" as thoroughly posted. A book of instructions and the current time tables have been issued to him, and he has been examined as to his familiarity with the rules and schedules. If the applicant is a motorman, he has spent a specified time in the shops and has been instructed in the details of the equipment and the best methods of making slight repairs on the road.

The main idea of the training of these men is instruction, and the method of discipline should correspond with and bear out this idea. The province of discipline begins when an em-

ployee enters the service, and its object is to keep the service at the highest point of efficiency. It should encourage all employees to use care and good judgment, and discourage them from being careless and slovenly in their work. Discipline may consist of commendation, reprimand, suspension or discharge. Commendations or reprimands may be verbal or by letter. Suspension may be for one day, two days, fifteen days, thirty days or more. Discharge is final.

The method of discipline by suspension is gradually losing in favor. The objections to it are well founded. The suspended employee, being deprived of his usual employment, finds that time hangs heavily on his hands and is apt to spend too much of it in saloons. The temptation is to drink too much, to spend too much money and to tell all his friends how it happened, and how badly he has been used by the railway company. By the time he is to resume work, his earnings have been cut into and his frame of mind is apt to be decidedly disloyal. The persons who suffer most by the suspension are the wife and children of the suspended employee. The household expenses, such as rent, coal, grocer's bill, etc., go on, while there is no wage coming in from the bread winner.

The practice of the Fonda, Johnstown & Gloversville Railroad has been to follow the Brown system of discipline by record, modified somewhat to meet our local conditions. The method is comparatively simple. A record blank is kept for each employee. This blank gives his name, badge number, date of entering service, date of assignment to a regular run, and all information regarding the man in question. From time to time entries are made on this blank, such as commendations, reprimands, accidents, promotions, missed runs, flat-tired wheels, etc.

Each employee is free to inspect his own record blank on application to the office, and is informed of each entry made upon it. In case of the investigation of an accident a man's record is taken into consideration, and should largely influence the decision. With a man's record are filed all papers concerning him, such as his application blank, physical examination, etc. By looking at the record blank, one can tell at a glance whether the man is an efficient employee or not. When it becomes evident that any man is a detriment to the service, he is dismissed. One of the chief merits of this system is that it enables the superintendent of transportation to differentiate the men, and helps him to know the men whose violations of the rules are due to carelessness, and those whose offenses are wilful. After the superintendent has called the attention of the former to their irregularities, they become more careful and pay stricter attention to their work. In the case of the latter, whose repeated violations of the rules show that they are not accepting the reprimands and adverse criticism of their chief in the proper spirit, it is made sufficiently plain to the official in charge that they are not the sort of men whom it is desired to keep in the service of the company.

Mr. Duffy believed that the efficiency of any method of discipline lies largely in the executive ability of the man placed in charge of such matters. Discipline should begin when the man first commences work with the company. It is largely a work of education to discipline properly any class of men. The Syracuse company requires an application to be signed by two reputable citizens and the prospective employee is required to pass a physical examination. In the case of a conductor, he is given a book of rules and is placed on the car and kept with the first conductor about six days. He then spends one or two days with different conductors. He is then turned over to the foreman or chief despatcher and is examined as to his knowledge of the rules. He is then sent to the superintendent and receives his badge and punch. In the

case of a motorman, he is put on a car to learn. After six days, if thought competent, he is turned in. Each instructor signs a blank, saying that he believes the applicant capable of performing his duties. The motorman takes a little longer to learn, that is, fourteen days for the conductor and twenty-one days for the motorman. The last three days are spent in the shop learning about the electric appliances on the cars. After getting through the shop the applicant becomes a motorman. A printed form for questions and answers is given each man when he enters the shop, and he is instructed by the master mechanic or his clerk as to the meaning of these instructions. The applicant is given a written examination and then goes to the superintendent and gets the rules. No set system of discipline, like the Brown or other system, is followed out. If a man is reported for infraction of rules, which seems due to carelessness, he is sent to the superintendent for conference. It has been the speaker's experience that a personal talk between an employee and the superintendent does a great deal more good than when the disciplining is left to a subordinate officer. On his system he is able to see the larger number of the men, but on larger systems that would not be possible. There are three or four things that require and should merit instant dismissal, drink, entering saloons, dishonesty and disobedience to the orders of a superior officer. In almost all cases the latter has meant dismissal, although at times the officer placed in charge of men does not use the proper methods in handling them. While it is hard for the superintendent when a man has had a difference with his superior, to bring them both to the superintendent's office to decide which is right, the speaker believes that the employee of any company should have the right to appeal to the managing superintendent. He thinks that fact should be made known to the employees at all times, and if they have a real or alleged grievance they should have this right of going before the highest authority.

Mr. Ryon explained the method he is using in Schenectady in training motormen. Recently he has made a change which he thinks is bringing about very desirable results. He has a general barn foreman, a part of whose duties is to lecture the motorman. The railway company has a skeleton car which the General Electric Company originally exhibited at St. Louis. This car has been set up in one of the houses. Formerly his company put the motorman on the car for practice before putting him through the mechanical features of his training in the car house. About one and a half years ago, it was decided to pay a man while going through the shop \$1 a day, not to exceed seven days. It was thought by doing that the men could be induced to take more interest in this part of their instruction. This scheme of payment was discontinued because it was decided to be a mechanical charge against the master mechanic. The question came up again recently, and it was decided to start that plan again, but instead of putting the motorman upon a car to practice first, he is sent to the barn foreman, who stays with him a full half day on the instruction car, after which the applicant goes into the barn. He is really turned in by the barn foreman before he practices on the cars. It is believed the instruction the men are getting and the experience in the barn is helping them on the road, because they know the equipment better. About the time this plan was started the superintendent also selected one of the most competent motormen to act as instructor. As the new men finish their course in the shop the instructor takes them in hand, watches them and reports to the transportation department as to their familiarity with the equipment and ability to handle the car. These records are filed and kept, with the idea that if something happens with the man on the line he cannot plead ignorance. He has been

turned in as competent, and if he abuses the equipment the superintendent feels that he has wilfully violated the rules, and that he is a dangerous man to continue in the service.

Mr. Wilson, of Toronto, said in his city they have a system of roadmasters. (This system was described in the *STREET RAILWAY JOURNAL* for Dec. 30, 1905. The company selects a motorman who has shown good service, and has the ability to handle men to a certain extent, and gives him a roadmaster's cap. His duties are particularly those of an inspector. The company was able to cut the force of inspectors' staff in half when it put on the roadmasters. There are two shifts, one for regular and one for relief. The roadmasters are scheduled for runs, and act as motormen, receiving a little additional to the regular motorman's salary. The roadmaster is permitted to change from car to car. If a roadmaster meets on a run a man who is not doing well, he exchanges cars to see what is the matter. If anything is wrong with the car he sends it to the shop, unless he can fix it, and thus keep the car on the road. New men are trained by these roadmasters. All of these roadmasters are non-union men and so new men are not installed with union ideas when being trained. Another feature is that this system keeps the company in touch with the conditions on the different lines. If the roadmaster thinks changes are beneficial, he makes suggestions to the superintendent. He is the first man to finish work at night and the last man on in the morning, so he is able to check men coming and going into the houses. The mechanical department feels that the roadmaster system has been a great help to it in reducing shop repairs.

Mr. Fairchild said the main point of the Toronto roadmasters' system is that while serving as inspectors these inspectors are also acting as regular motormen. He asked Mr. Wilson, of Toronto, if they do not find sometimes, in case of trouble, that the roadmaster happens to be at the other end of the line and it is necessary to wait until he comes around?

Mr. Wilson replied that they have two or three lines duplicating parts of the same trip, and they have very little trouble in that way, for if one roadmaster is not near another one is.

Mr. Fassett asked if the roadmasters make a daily report.

Mr. Wilson replied that they do. The roadmasters are continually changing cars, and this tends to make the other employees do right for fear that a roadmaster may show up on the next car.

Mr. Allen asked how many roadmasters were maintained.

Mr. Wilson said they had 34 roadmasters for 350 cars on an 18-hour basis. They also have six inspectors, who do not ride on cars, but confine themselves during the rush hours to intersections at busy points.

Mr. Fassett said the United Traction Company, of Albany, spends considerable money in maintaining on its system thirty-eight inspectors on eighty miles of track for 175 cars. The inspectors are perfectly competent to make light repairs, carrying rubber gloves, tools, etc. They look out for the maintenance of schedules and see that the rules of the road are obeyed. The idea that they are simply checkers is erroneous. Another duty covered is in accidents. The inspector immediately goes to the place of the accident and endeavors to get the names of witnesses, and he telephones headquarters about the accident. The chief inspector, if the accident is serious, or if necessary to close the matter up at once, gets in touch with other inspectors, gives the names and addresses of the witnesses, and the inspectors go to the persons and get their statements of the accident. So that by 9 o'clock next morning, when the reports are made, all the statements of witnesses are in the possession of the superintendent, to be turned over to the claim department for proper action. The speaker is satisfied that this inspection system pays. He has

discouraged the idea of motormen tinkering with the car at all, except perhaps to cut out a damaged motor. The instructions are to report to the inspector and have him decide. Another thing in the case of blockades, which sometimes occur in cities, the motormen and conductors do not seem to care to get back to their own schedules, unless it is relieving time or off for the night. They would rather run in groups than any other way. The inspector is more particular and knows where each car should be at a given time. In case of a stoppage or blockade the cars are sent out by the nearest inspector, who gives the motormen instructions as to what to do to maintain the service. This, of course, also tends to keep down the number of accidents.

Mr. Cole thought that one of the chief troubles is that some conductors are apt to remember all the things that help them, but not the company. The motorman, too, has had his course of instruction, but he has much more to learn. It is a good thing to have a staff of inspectors to keep motormen and conductors in touch with the latest developments in order to maintain the highest efficiency of the service.

Mr. Ryon said his company had a rather peculiar situation at Schenectady in that the heaviest travel is away out on the outskirts of the town, as it must take a great many people to and from the General Electric Works, and it has to move the entire population of the city in one direction at one time. In the morning he puts out sixty-four cars, which go to the General Electric Works before 7 o'clock. If a man is late a minute he loses an hour. The inspectors are stationed throughout the congested part of the system and at junction points to the main line, to take care of troubles that might arise from cars running on close headway. If a train was delayed a few minutes it might mean an hour each to 5000 men—a very serious matter. In the evening the conditions are just reversed. There are a string of cars from the General Electric Works all the way uptown until they begin to divide at the different routes. The inspectors are always on the spot to break blockades. If a car breaks down it is taken off the main line as soon as possible.

President Danforth, in taking up the question of station rules, said it seemed to him that if the companies adopt a standard system of rules covering employees' operation of cars, they should also adopt a system of rules covering employees when entering and leaving car houses.

Mr. Ryan said he had found, upon the examination of rule books, that many roads place power station rules under what he would call station rules. In the old rule book of his road the station rules were included in the general rules.

Mr. Ryon then read the following paper:

#### STATION RULES

This subject, while secondary to rules for the safe running and proper conduct of cars in operation, is, in the writer's opinion, of much more importance to a perfect organization of train service employees, than may appear without giving the subject careful study. Discipline is the fundamental principle of organization, in the absence of which there can be no system. While system is synonymous with method or rule, as coördinate with organization, we will assume that it is rather a plan of organization. Discipline is the result of a rule, and hence rules are necessary for the maintenance of discipline; discipline is necessary to perfect organization; and system or method is the result of organization, all of which are essential to the successful manipulation of large properties and the handling of a large body of men.

The child is first taught punctuality and to obey the unwrit-

ten laws of instinct for self-preservation, before venturing beyond the threshold. Why then should not our employees be taught that punctuality and observance of written laws or rules governing their conduct before leaving our threshold is essential and necessary before giving to them the responsibility of human lives and the collection of our revenues. Discipline begins at the station, and we must therefore have rules, for without rules we have no discipline.

Station rules are, therefore, necessary. Assuming that this conclusion is undisputed, we have then to treat of the subjects to be covered by such rules; the method of placing them before the train men, and the method of enforcing them.

The term "station rules" does not appear to be understood by some companies. "Car house" seems to be a more definite term as a distinction from a "power station," which is generally called a "station." In view of this fact, if it is the sense of this association that "car houses" should be termed "stations" the writer is of the opinion that this association should go on record as to the definition of the term "station," in order that it may be generally understood that "station rules" are "car house rules." After receiving a request to prepare a paper on this subject for discussion at this meeting, the author wrote to a dozen or more of the large street railway systems in neighboring states, requesting a copy of their station rules. With one exception, all replies indicated that the railroads replying did not know just what was wanted. A second letter, explaining fully, did not bring any results. One road sent a printed copy of rules governing power stations, and others, who had the impression that power station rules was wanted, said they did not have any set rules.

Until Jan. 1, of this year, the station rules of the Schenectady Railway Company were embodied in the book of rules under the title of general rules. The present book of rules was worked out last year, and closely followed the street railway standard, except that we followed the steam road standard to a large extent on the interurban rules. Station rules were eliminated from this rule book.

The author found on examination of rule books of some large systems that some rules of a general nature which might properly come under the head of station rules are classified under general rules.

As station rules have been divorced from rules governing trainmen, and the subject does not appear to have received the attention which it merits, the author does not hesitate in expressing his opinion that the executive committee of the New York State Association displayed excellent judgment in bringing the matter to the attention of this association. In the adoption of the standard rules, there seems to have been a desire on the part of the committee to simplify and adopt only such rules as are proper and necessary. This was commendable, and the same course should be pursued in promulgating a set of station rules which will receive the approval of this association. In the writer's opinion, all rules applicable to trainmen, whether in the stations or on the road, should be under one cover. However, the station rules should be properly classified under that title.

The author would recommend the standardizing of station rules, for the information and enlightenment of street car men.

As conditions are not identical on all roads, modifications of discipline could be arranged to suit the conditions of labor or other exigencies. The subjects to be covered by station rules are particularly those which concern the report of behavior and discipline of trainmen at the stations and the care of rolling stock in the car house.

A copy of these regulations should be placed in the hands of every trainman, and a copy should be placed in a conspicuous place in the station. The moral effect of the law staring

the men in the face is a constant admonition to "saw wood," and the penalty of missing out may ever be a constant reminder that the "early bird catches the worm." As the Schenectady Railway is the market for station rules of approved form, the author is not prepared to place before this meeting any originality on this subject for discussion. The station rules of our old rule book are still in force, and are similar to those in effect on such roads as have a system or method in their work. The writer is quite well satisfied with the station rules of the International Railway and the Rochester Railway, which are practically identical, and for the purpose of opening the discussion on this subject, the author has prepared a copy of these rules, making such changes as are necessary to meet the requirements in Schenectady.

These rules are submitted for the consideration of the association:

#### SCHENECTADY RAILWAY COMPANY STATION RULES FOR TRAINMEN

1. Appointment.—All trainmen, after having been appointed, will practice as students until their instructor has certified as to their competency to perform the work, after which they will be examined by assistant superintendent.

At this examination they must be familiar with the running time, streets along the route, and all other rules and regulations pertaining to the running of a car.

After this examination has been passed satisfactorily the employee's name will then be placed on the extra list for work.

Extra trainmen will be rated and be assigned to work in the order of dates of appointment.

2. Addresses.—Trainmen must keep the station master at their respective stations advised of their correct addresses, promptly reporting any change in same.

3. Obey Those in Authority.—Trainmen will hold themselves in readiness at all times to promptly and cheerfully obey all orders of those in authority. Disrespect to officials, either in manner, speech or otherwise, will not be tolerated.

4. Temporary Assignment of Runs.—When a regular run becomes vacant it will be assigned to the first extra, to be retained by him until the next general listing. When regular man is off on sick leave and does not report for duty by the first of the following month, his run will be assigned to the first extra on the list, who will hold such run until regular man reports for duty. All runs, except those designated on time card by "EX," will be considered regular runs. Extra men securing runs do not lose their standing for work on the following day unless there is a relief in such run, in which case it will be considered a day's work.

5. Listing Up.—When occasion requires, all regular runs will be listed up and given to regular trainmen by order of seniority, except when the best interests of the company require assignments to be made otherwise.

6. Wages.—Wages are allowed for "platform time," services rendered while actually employed on the company's cars, except for "watch duty," as shown in Rule No. 14.

(Assignment of Wages).—Employees must not make any assignment of wages due or to become due.

7. Suspension.—Trainmen will receive no compensation for time lost while under suspension.

8. Promotion.—To obtain promotion, capacity must be shown for greater responsibility.

9. Daily Bulletin Book.—A book known as "Daily Bulletin Book" will be posted in a conspicuous place in each station, not later than 5 P. M., which will show the names of all extra men assigned to duty for the following day; also the names of all regular men or extras on absentee or sick list. In addition to the bulletin book an "extra car service" sheet will be posted, showing the names of all men assigned to extra cars for morning service, and again in the afternoon for evening service.

Extra men and regular men serving on the extra list must frequently examine the "bulletin book" and also the "extra car service" sheet, as one man's name may appear several times on either sheet.

In assigning crews for extras, station clerk will call men from the bottom of the extra list, working upwards.

10. Report for Duty.—Regular trainmen, or extra trainmen, assigned to regular runs, also extra trainmen bulletined for extra cars, will report at the station at least 10 minutes before such car is due to leave the station or relief point, will go to station



clerk's window and announce their name and run number and will not leave window until station clerk has acknowledged receipt of their report by checking their names off on train book.

Extra men bulletined to report at "regular show up" will be in the assembly room in advance of specified time, and remain there until after roll call; failure to answer a roll call will be considered a miss, for which no excuse will be accepted. Extra men desiring to lay off for the day must make their request known to station clerk at close of roll call, who may, at his discretion, grant such permission; it being understood that extra men so excused will be last for work on reporting for duty. Extra men on duty until 12 o'clock midnight, or later, may, on application to station master or station clerk, be excused until second "show up" on the following day, providing they can be spared.

11. Standard Time.—Standard clocks are provided at all stations. Trainmen are required to provide themselves with a standard watch and keep it correct, comparing time with station clock daily before going on duty.

12. Order Board.—After reporting for duty, and before taking car out, trainmen must examine "order board" and sign the receipt book for such orders as may appear thereon. Failure to do so will be a sufficient reason for removal from car and service on extra list for the day.

13. Relieving at Points Away from Station.—When assigned to take car at a point away from the station, trainmen must be at such point ready to take car at its schedule time. In case of relief, trainmen failing to be at relief point on time, crew operating car will continue run until relieved, but must report the failure to be relieved from first company's 'phone.

14. Watch Duty.—The first crew for work after all vacancies have been filled will remain on watch at the station, receiving half time therefor until ordered out or excused. Men on watch will be expected to keep the assembly room neat and clean, and will do such errands as inspector or station master may request.

15. Leave of Absence.—Station master will, at his discretion, grant leave of absence for any period not to exceed five days. Absentee cards for a longer period than five days must be approved by the superintendent. Trainmen must secure an absentee card whenever excused from duty for more than one day. Trainmen will, under no circumstances, be granted leave of absence for more than thirty days at any one time. Requests for permission to be absent must be made in person or in writing. Telephone requests will not be considered. No employee will be excused from duty to engage in any other occupation or business, nor will his position be held for him while so engaged.

16. Sickness.—After requesting to be relieved from duty on account of sickness, trainmen will, when able to resume work, report at the station in full uniform by 4 P. M., so as to be marked for work on the following day. Should the station master request men to perform extra work, by running trippers, they will be obliged to do so.

Trainmen who are excused from duty on account of sickness must report at the expiration of thirty days, either in person or in writing, and failure to do so will result in dismissal.

Trainmen when on sick leave must not leave the city without first notifying the station master, and turning over to him badge, etc., for safe keeping.

17. Sick Notice.—Should trainmen be unable to report, written notice, signed by trainmen or attending physician, will be accepted, providing it is received by the station master or clerk 10 minutes previous to the time trainman takes his run, unless assigned to duty at a point away from the station, in which event written notice must be received at least 30 minutes before time due to take car.

18. Absent Without Leave.—Failure to report at proper time, as provided for in station rules Nos. 10 and 13, unless written sick notice has been received, will subject men to discipline as follows: Regular trainmen failing to report 10 minutes before car is due to leave station or failing to be at relief point in time to take car on its schedule time, will be subjected to discipline as follows: For the first offense, five days at the foot of the extra list; for the second offense within six months, ten days at the foot of the extra list; for the third offense within six months, station master will suspend trainman, instruct him to report to superintendent transportation, forwarding a written report giving the dates of previous misses and stating what disciplinary action was taken.

Extra trainmen failing to answer roll call, or failing to be at relief point on time, unless written sick notice has been received, as provided for in station rules Nos. 16 and 17, will be dropped to the foot of the extra list; all other extra men being advanced in turn. Extra men missing too frequently will, in addition to being

dropped to the foot of the extra list, be reported to superintendent of transportation, who will take such action as the findings warrant.

Regular or extra trainmen who absent themselves from duty for five days or more without leave will be considered dismissed from the service.

19. Trainmen's Duty Before Taking Car.—Conductor, after reporting for duty, will provide himself with lost article slips; day sheets, envelopes and a supply of transfer tickets, also such change and tickets as may be allowed. He will then see that the commencing number of transfer pad is correctly noted on front of day sheet, and that they are the proper transfers for the line to which he is assigned. He will then take register readings on the car which he is to operate; will go to the station clerk's window and compare register readings with the station clerk's record of same, except at stations where there is a register clerk with whom register readings must be compared. In addition to this he will see that car is clean and fit for service; that it is provided with broom and proper signs, and that a crippled car card, detention slips and witness slips are in the box provided for that purpose.

Motorman will, after reporting for duty, provide himself with a switch-iron and three extra fuses; will examine car and see that fuse-box contains regular ampere fuse provided by the company; that car is provided with darw-bar and pin; that sand-boxes are filled and in working order, and will test brakes and controllers. If any part of the car is found to be defective it must not be run out of the station, but report of its condition must at once be made to the station master or his representative.

Motormen must never move a car until certain that no one is working over, under or about it.

20. How Cars Are to Be Left in Station.—Before turning car into station conductor will set registers at zero, sweep car out thoroughly, and, if box-car, will raise all windows; in case it is a summer car he will, in wet weather, lower curtains, that they may dry during the night. He will remove trolley from wire and also change trolley when required.

Motorman will set up hand-brake, throw switch to "off," and remove controller handles, placing them on top of controller.

21. Going Off Duty.—Before going off duty, conductor will note closing number of transfer pad, take register readings, totalize day sheet so as to give number of passengers carried and make full settlement for the day.

An accounting of all fares collected, transfers and cash-fare receipts issued or spoiled, as well as those remaining unused, must be made at the station daily, at hours specified by the station master. Cripple car report, detention report and a complete report of any accident or altercation which may have occurred on the car during the day must be made out on the proper blanks, signed by both the conductor and motorman, and delivered by conductor to station master or clerk before leaving station.

Motorman and conductor are forbidden to leave the station until such reports have been approved by inspector, station master or clerk.

Motormen, before going off duty, will report condition of their cars on the sheet provided for that purpose at the station.

22. Removing Parts of Car.—Trainmen are forbidden to enter any car in the station other than the one to which they have been assigned, or to remove switch-iron, controller-handles, sand or bell punches, broom, or any part of the car equipment.

23. Uniforms, Neatness, Etc.—Trainmen must be provided with uniform cap, badge and complete working outfit before taking charge of car. When on duty, trainmen must wear the prescribed uniform, which must be kept neat and clean. The official badge must be worn in plain sight on the cap, and cap must be worn squarely on the head. Uniform buttons will be furnished by the company, which, together with badge, book of rules and all other property of the company must be surrendered when trainmen leave the service.

Exchanging badges, punches, or duties, is positively forbidden. Under no circumstances must an employee loan his badge or his punch to any person, and when excused for sickness, or when on leave of absence for seven or more consecutive days, badges must be surrendered. The loss of a badge or punch must be reported immediately to station master.

Trainmen must always keep themselves neat and clean, clothes brushed and shoes shined, and also assist in keeping the assembly room and other parts of the station neat and tidy.

24. Deportment While in or Around Station.—Trainmen, while in or around station, must not use profane or obscene language, or spit on the floor. Conversation must be carried on in a moderate tone of voice. Boisterous conduct will not be tolerated.

25. Contributions.—Soliciting contributions or selling tickets on behalf of any employee or employees of this company is prohibited, except on account of the benefit association.

26. Employees Leaving the Service.—Trainmen will be required to give at least three days' notice of their intention to leave the service before final settlement is made, and must, upon request, make affidavit containing a full and true statement of any accident, delay, blockade, mishap or altercation of which they have knowledge, and will turn in all the company's property with which they have been intrusted, if a clear record card is desired.

27. Refusing Work.—Trainmen will be required to perform such duties as may be required of them by inspector, station master or station clerk, and failure so to do, or refusing work of any kind, will be followed by forfeiture of badge and other company property, it being understood that when a trainman refuses work he severs his connection with the company.

28. Snowstorm.—All regular men who are laying off and all extra men who have been excused are required to report at stations immediately in case of snow or sleet storm.

Trainmen failing to comply with the above will be subject to discipline.

Mr. Ryon added to his paper the remark that on his cars a suggestion box is placed, in which the crew can drop suggestions regarding car defects noticed by them.

After an informal discussion on station rules, the meeting adjourned.

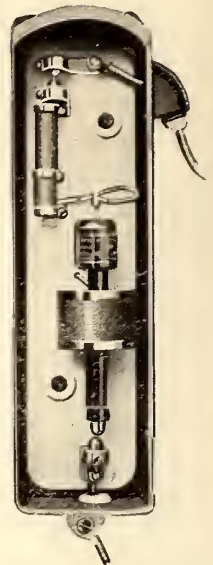
### NEW ROLLING STOCK FOR JACKSON

The Jackson Electric Railway, Light & Power Company, of Jackson, Miss., has recently received eight new cars from the American Car Company, of St. Louis, Mo. Jackson is the capital of Mississippi, famous for its great cotton industry, and is an important railway and manufacturing center. Its street car system operates principally within the city and has an extension to an amusement park. The same car company was also the builders of the very handsome and unique car shipped to this same company about a year ago, which was originally intended for special service to be mounted on double trucks; ultimately the car was equipped with the Brill single No. 21-E truck and put into regular service. The eight new cars shipped are of the Brill semi-convertible type, this construction being so well known as to need little comment here, the characteristic feature being that both upper and lower sash automatically slide into the roof, affording greater aisle space and longer seats, due to the omission of the usual pockets framed between the posts. The sub-tropical climate of Jackson demands a well-ventilated car in the summer season, and the cars now shipped admirably meet this condition, affording as they do the maximum window space for the free ventilation of air.

The length of the car body is 20 ft. 8 ins., and over the vestibules, 30 ft. 8 ins.; width over the sills and panels, 7 ft. 9½ ins., and over the posts at the belt 9 ft.; distance between the center of the side posts, 2 ft. 5 ins.; height from the floor to the ceiling, 8 ft. 4⅞ ins.; height from the rail to the side sills, 2 ft. 6⅞ ins.; height from the sills over the trolley board, 9 ft. 1½ ins. The platform steps are 1 ft. 3 7-16 ins. from the rails; length of the seats, 35 ins.; width of the aisle, 22 ins. The inside finish is of ash and the ceilings of plain birch. The car is finished with transverse seats of spring rattan, with corner grab handles; sand boxes, "Dedenda" gong, angle iron bumpers, "Retriever" signal bell. The portable vestibules are fitted with folding gates. The trucks are of the No. 21-E pattern and carry 25-hp. motors.

### POLE ARRESTER FOR ALTERNATING-CURRENT CIRCUITS

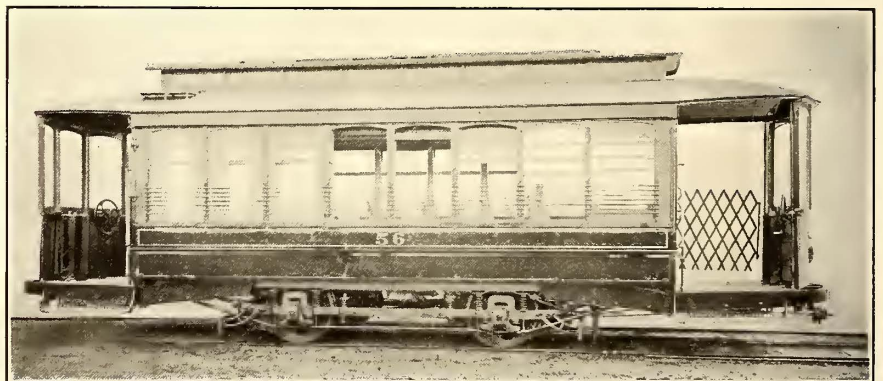
In the accompanying illustration is shown one of the new arresters for alternating-current service brought out by the Garton-Daniels Company, of Keokuk, Iowa. This is a pole arrester designed for potentials from 1200 volts to 2500 volts. It is placed in either iron or wooden waterproof covers, and has a dipped metal finish; in other respects it is the same as the station type of this arrester, which was described in the *STREET RAILWAY JOURNAL* for Feb. 3, on page 205. The cover is fitted with insulating bushings for the leading-in wires and the arrester is carefully insulated from the cover. The total air-gap distance in this arrester is 3-32 in. The series resistance averages 250 ohms. If an iron-covered arrester is employed, the net weight is 21 lbs., and the dimensions are 16⅞ ins. x 6 ins. x 5 ins., while the respective data for the wooden-covered style are 72½ lbs., and 19 ins. x 7½ ins. x 7¼ ins.



POLE ARRESTER FOR ALTERNATING-CURRENT CIRCUITS

### NEW STEEL CAR DEPARTMENT OF THE ST. LOUIS CAR COMPANY

The St. Louis Car Company has added a new department to its organization. It is known as the steel car department and will occupy two new buildings, one of which has already been constructed, and another now being erected. One of the buildings will be equipped with punches, shears, and other necessary machinery, while the newer one will be used exclusively as an erecting shop. The steel cars, after being erected, will be painted and finished in the department where similar work is done on cars of semi-steel and wood construction. The all-steel-bottom framing of the St. Louis Car Company, which might be said to have been the first step towards the construction of steel cars by the company, is now generally



SINGLE-TRUCK, DOUBLE-VESTIBULE CAR FOR JACKSON, MISS.

used on all the company's cars of wood body construction. After proving the merits of this steel-bottom framing, the company began the manufacture of cars of semi-steel construction, and the creation of the new steel car department is the result of a determined effort on the part of the St. Louis Car Company to lead in the construction of all-steel cars for both electric and steam service. In view of the favorable experience gained thus far with steel cars built for subway service, it is likely that they will soon find a wider field.

## FINANCIAL INTELLIGENCE

### The Money Market

There has been no improvement in the monetary situation during the week. On the contrary, the market has worked firmer, if anything, despite the liquidation in the stock market, and heavy offerings of funds by foreign bankers against exchange transactions. Money on call in the open market has ranged between 6 and 30 per cent, while the interest charges for loans for all fixed periods have ruled higher than those for any like period for several years. Sixty-day loans commanded 8 per cent, and was paid, while for sixty and ninety days 6 per cent was freely bid, with little offered under 7 per cent; four to six months' accommodations were obtainable at 6 per cent. The high rate prevailing in the local market was reflected in a sharp break in the rates for sterling exchanges, prime demand bills declining to 4.8295, a net loss for the week of nearly 2½ cents on the pound sterling, and the lowest rate recorded since November, 1903. Under ordinary conditions such a sharp break in exchange would have resulted in heavy importation of gold from Europe, but up to this time our bankers have not been able to secure any substantial amount of the yellow metal in the European market for shipment to the United States, owing to the tactics employed by foreign bankers to keep their gold supply intact. Just now there exists a heavy demand for gold in Europe, in anticipation of the flotation of a new Russian and other Government loans, so that local bankers must depend entirely upon the supply of bar gold in the open market, which has not been very large of late. However, it is considered only a question of a short time when the Bank of England will have to part with some of her gold. Rates of exchange are at a point where it is possible to import English sovereigns, and sooner than to lose a round amount of coin the authorities of that institution are likely to remove the restrictions recently placed upon the market for gold bars. At the close cable advices are to the effect that \$6,100,000 gold, has been engaged for shipment to New York, and other similar engagements are expected. France is also in the market for gold, and is competing with the United States for a round amount of gold bars expected to arrive in London from South Africa early next week. It is probable, however, that the gold will be secured for New York bankers. A new Russian loan has been practically decided upon, and according to present plans the loan will be for £92,000,000 (\$460,000,000), and will bear 5 per cent interest, and will be issued at 85. At the close, there was a sharp break in call money to 2 per cent.

The bank statement, published last Saturday, was decidedly unfavorable. Cash decreased \$7,904,200, and as the reserve required was only \$212,300 less than last week, the surplus reserve was entirely wiped out, and a deficit of \$2,560,625 created instead.

### The Stock Market

Speculation in the stock market has been dominated by conditions in the money market. A period in which call money rules at from 20 to 30 per cent cannot fail to be a strong argument in favor of conservatism in speculative operations, and this has been demonstrated by the decrease in the volume of business on the Stock Exchange during the past week. The coal labor situation has ceased to be a factor, and all other general conditions are practically ignored in the consideration which is given to the money market. The sharp break in sterling exchange to the lowest point of the year would ordinarily have acted as an offset to the high money rates, but in this instance it failed in this respect owing to the absence of any gold engagement of importance. It had been expected that a substantial amount of gold would have been obtained for shipment to this side, but the bringing out of the Russian and other Government loans influenced the foreign banks to place obstacles in the way of gold exports to the United States, although these cannot long continue under existing conditions. The stock market held remarkably well under unfavorable influences until the publication of the bank statement, which had a depressing effect upon sentiment and influenced considerable selling. In the closing days of the week the market was under considerable pressure. The liquidation in the active stocks, and especially in the shares in which the pools have

recently been active, has been beneficial, and as a result of the week's operation the technical position of the market is much improved. Stocks have passed from weak to strong hands, and with an improvement in monetary conditions, which is expected after the middle of the month, there should also be a rather decided improvement in the stock market. It was expected that the Government crop report on winter wheat would have a favorable influence, but it failed to influence any buying. Interest centered in Union Pacific, which has shown pronounced weakness, and in the anthracite coal shares, which have acted much better than other stocks. The steel stocks have not suffered to any great extent, and conditions in the trade would appear to justify confidence in these shares. Amalgamated Copper showed pronounced strength early in the week, but later the stock declined with the rest of the list, notwithstanding the strong position of the copper metal trade and the talk of an increased dividend at the directors meeting next week.

About the only interest in the traction stocks was in Brooklyn Rapid Transit, and while this stock displayed a fair amount of strength the greater part of the week, it broke sharply at the close, and it looked as if a big line of speculative stock came upon the market. Everything in connection with the property is favorable, and the earnings for the second half of the fiscal year promise to make a new high record. Metropolitan has been practically neglected. Metropolitan securities declined rather sharply, quite a little of the stock coming out on the decline.

### Philadelphia

Less interest was manifested in the local traction shares during the past week. Trading was considerably less animated than in the previous week, and although prices reflected the weakness prevailing in the general securities market, the net changes were, in most instances, confined to the fractions. An exceptionally strong feature was American Railways, which scored a net gain of a point on transactions amounting to about 700 shares. Philadelphia Rapid Transit was about the only issue to develop activity, upwards of 6500 shares being dealt in during the week. At the beginning there was some pressure to sell on rumors of increased competition, the price declining from 29 to 28¾. At the low figure there was some good buying, which resulted in a recovery to within ⅛ of the high, but at the close there was another reaction to 27½. Philadelphia Companies issues were comparatively dull and slightly lower. The free common sold to the extent of about 700 shares, at from 50½ to 50, while the receipts, representing about 1700 shares of deposited stock, sold at from 54 to 55 and back to 54¼. The free preferred brought 49¾ and 58 for small amounts. Philadelphia Traction ran off from 99¾ to 99, on the exchange of about 200 shares. Other transactions included Consolidated Traction of New Jersey, at 80¾, Union Traction at 62, Fairmount Park Transportation at 17¾ and 18, Fort Worth & Wabash Traction at 28, and Railways General at 6⅞.

### Chicago

Trading in the street railway issues in the Chicago market was less active and price fluctuations were comparatively narrow. Chicago Union Traction was the feature, both as regards activity and weakness, about 1200 shares of the common selling from 7 to 5⅞, in sympathy with the decline in the stock in the New York market. The preferred sold at 21 for 300 shares. Chicago City Railway brought 155 for a lot of twenty-five shares, and 130 shares of North Chicago sold at 35. West Chicago made a new low record at 23. Other transactions included Metropolitan Elevated, at 26 and 26½, the preferred at 68; Chicago & Oak Park at 6⅞, South Side Elevated at 93 and 94, and Northwest Elevated at 25½ and 26.

### Other Traction Securities

Trading at Baltimore was extremely dull. United Railway 4s sold at 92½ and 92⅞ for about \$35,000, while about \$80,000 of the free incomes brought prices ranging from 74⅞ to 73¾, the final transaction taking place at 74. The pooled incomes declined from 74 to 73, but later recovered to 73¼, on dealings aggregating about \$60,000 bonds. About 300 shares of the pooled stock sold at 18⅞ to 18¼. Norfolk Railway & Light 5s were fairly active

and firm, upwards of \$40,000 changing hands at 100¼ and 100½. Other sales were: Lexington Street Railway 5s at 104½, Virginia Railway & Development 5s at 100, Baltimore City Passenger 5s at 106, North Baltimore 5s at 120, and Macon Railway & Light 5s at 100. The feature of the Boston market was the pronounced strength in Boston Elevated, which rose from 155½ to 157½ on the purchase of about 350 shares. Boston & Worcester issues also displayed considerable activity and strength, the common advancing from 36½ to 39, on transactions aggregating 1000 shares, while the preferred moved up from 86 to 90, on the purchase of 700 shares. Boston & Suburban sold at 22¼ and 22 for small lots. Massachusetts Electric common and preferred ruled quiet, the common moving between 19½ and 19, and the preferred between 68½ and 67½, the final transactions taking place at 67½. West End common 99¾ and 100, and the preferred sold at 116 and 116½. West End 4s of 1915 brought 102 for \$5,000 bonds. The New York curb market was unusually dull, trading being confined almost exclusively to the Interborough-Metropolitan issues. About 10,000 shares of the common changed hands at from 54¾ to 52¼, while upwards of 5000 shares of the preferred sold at prices ranging from 90¼ to 89¾. The new 4½ per cent bonds sold at from 92¼ to 90½, and closed at 91¼, about \$500,000 changing hands. Interborough Rapid Transit receipts sold at 233 for 200, and 100 New Orleans Railway common brought 34½. Public Service 5 per cent notes sold at 95½ and interest for a block of \$25,000.

Cincinnati, Newport & Covington common was the most active issue in Cincinnati last week, and it made a fractional advance from 52¾ to 53. The preferred declined from 98 to 96¾ during the week. Cincinnati Street Railway sold at 145¾ to 146 for a few small lots. Aurora, Elgin & Chicago preferred sold at 92¼. Toledo Railways & Light at 35, and Detroit United at par. Reports of greatly improved earnings for Toledo & Western caused an advance from 16½ to 18¾ in the stock of that company. The supply was all cleaned up at these prices. Cleveland Electric was very active in Cleveland. It opened the week at 79, and advanced a point during the week, owing to the adjournment of the Legislature. Aurora, Elgin & Chicago common declined from 34 to 33¾, and the preferred from 93½ to 92½. Northern Ohio Traction & Light sold at from 31¾ to 31½, Lake Shore Electric, old preferred, sold at 70½, Western Ohio bonds sold at 85¼, and Muncie, Hartford & Ft. Wayne bonds at 95.

### Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	April 4	April 11
American Railways .....	52	52¾
Boston Elevated .....	155½	156¾
Brooklyn Rapid Transit .....	87½	84½
Chicago City .....	150	150
Chicago Union Traction (common) .....	6½	5½
Chicago Union Traction (preferred).....	21½	21½
Cleveland Electric .....	81	—
Consolidated Traction of New Jersey.....	80	80
Detroit United .....	99	98¾
Interborough Rapid Transit .....	232	225
Interborough-Metropolitan Co. (common), W. I.....	54¼	52¼
Interborough-Metropolitan Co. (preferred), W. I.....	90¾	88¾
Interborough-Metropolitan Co. 4½s, W. I.....	91½	90¼
International Traction (common).....	—	38
International Traction (preferred), 4s.....	—	71
Manhattan Railway .....	156	155
Massachusetts Elec. Cos. (common).....	19½	19
Massachusetts Elec. Cos. (preferred).....	67½	67
Metropolitan Elevated, Chicago (common).....	26½	26½
Metropolitan Elevated, Chicago (preferred).....	68	68
Metropolitan Street .....	116½	113
Metropolitan Securities .....	74¼	72
New Orleans Railways (common).....	34½	34
New Orleans Railways (preferred).....	81½	81
New Orleans Railways, 4½s.....	—	—
North American .....	100¾	98½
North Jersey Street Railway .....	27	27
Philadelphia Company (common) .....	50¼	50¼
Philadelphia Rapid Transit .....	28½	27
Philadelphia Traction .....	99¼	98¾
Public Service Corporation 5 per cent notes.....	94½	94
Public Service Corporation certificates.....	73¼	72½

	April 4	April 11
South Side Elevated (Chicago).....	94	—
Third Avenue .....	135	132
Twin City, Minneapolis (common) .....	119½	118½
Union Traction (Philadelphia) .....	61¾	62
West End (common) .....	99	99
West End (preferred) .....	114½	114½

W. I., when issued.

### Metals

The production of pig iron during the month of March exceeded all previous records. Figures compiled by the "Iron Age" show that the output was 2,165,632 tons, exclusive of charcoal iron. The production of charcoal pig iron for March was 35,000 tons, bringing the total production up to 2,200,000 tons. The stocks of pig iron of the United States Steel Corporation at the end of March amounted to 110,000 tons, the lowest figure in the history of the company. The shipment of material by the company for March was 998,000 tons, the largest on record. Copper metal continues strong and prices are unchanged, as follows: Lake, spot, 18½ and 18¾c.; electrolytic, 18¼ and 18½c.; castings, 18 and 18¾c.

## THE CHATTANOOGA CONSOLIDATION

Graham & Company, of Philadelphia, have purchased all the street railways of Chattanooga, Tenn., including the Chattanooga Electric Railway and the Chattanooga Rapid Transit Company, and will merge them under the title of the Chattanooga Railway Company. A considerable sum has been provided for extensions and improvements. The capitalization of the consolidated companies comprises a slight reduction in fixed charges, and is based on conservative lines, details of which will be announced later.

## YORK, PA., SYSTEMS SOLD

The franchises and property of the York Street Railway Company have been sold to Brown Brothers, bankers, of Philadelphia. It is said that there is little York capital in the new ownership of the road, as only two of the directors—Ex-Judge W. F. Bay Stewart and Grier Hersh—are interested financially in the new company. It is rumored that the road will be operated by a syndicate. Under the new ownership the electric railway system will be extended throughout York County, connecting all the towns, boroughs and villages of any importance. Previous to the sale of the road the York County Traction Company owned and controlled all the lines of street railway in this city, together with the suburban lines to Dallastown, Red Line and Windsor, a distance of about 11 miles; the York & Dover Electric Railway, which passes through Brookside Park, which is owned by the company; the York Haven Street Railway Company, running to the town of New Haven, a distance of 11 miles, and the York & Wrightsville Street Railway Company, connecting Wrightsville, on the Susquehanna River, with York, a distance of 12 miles.

## NEW COMPANY AT NORFOLK

An announcement has been made regarding the Norfolk situation, to which reference was made in the STREET RAILWAY JOURNAL of April 7. It is that the name of the merger of the electrical, traction and lighting properties in the vicinity of Norfolk, is to be the Norfolk & Portsmouth Traction Company. The capitalization is \$6,000,000 stock and \$8,000,000 bonds. There will be an immediate issue of \$3,500,000 of bonds and \$5,000,000 of stock. R. Lancaster Williams, now president of the Norfolk Railway & Lighting Company, which owns the largest properties absorbed, is to be the president of the new company, and E. C. Hathaway, general manager of the Norfolk Company, is to be general manager. The new company will build an interurban line from Portsmouth to Suffolk and Smithfield, Va., and will control new lines to be extended to the Jamestown Exposition grounds. Interests identified with the United Gas & Improvement Company, of Philadelphia, are connected with the project.

**AFFAIRS IN CHICAGO**

There is nothing of very great import to record of Chicago during the week just ended. True, the text of the Supreme Court decision in the 99-year case was made available; but the ruling, as given in abstract, was so complete as to make the original, as the "Economist" put it, only worthy of the study of lawyers and laymen as a document showing clear statement, close reasoning and logical conclusion. In this connection another decision of the Supreme Court, just made, is of interest. In it are directly concerned the West Chicago Street Railway and the city, and the finding is in favor of the city. The question involved was that of bearing the expense of lowering the tunnel under the Chicago River. Still another legal case remains to be mentioned. This is the answer of the Union Traction Company filed in the Federal Court April 6, to the bill of its underlying companies attacking the Consolidated Traction Company. The complaint was mainly that the Consolidated Company was built by the credit and with the cash of the North and West Chicago companies at the time Mr. Yerkes had control of them, and the property, instead of being taken by him, should have been turned over to them. The answer in effect says that so far as the Union Traction Company knows the financial methods of Charles T. Yerkes were correct. The Union Traction admits that it gave Mr. Yerkes bonds of the Consolidated in exchange for his stock in the latter company at the rate of \$45 in bonds to \$100 in stock, but says it was necessary for it to get control of the property, and it was protecting the stockholders in the underlying companies when it did it. It denies that it entered into the trade with Mr. Yerkes whereby he got control of the underlying and formed the Union Traction Company. The claim is made that the matter was investigated thoroughly, and Mr. Yerkes was forced to make good doubtful securities amounting to \$1,563,200 before the bargain finally was struck.

Affecting the elevated companies came a decision to demand a general increase in wages for every employee of the elevated railways. The wage scale per hour that will be presented to the officials of the various roads follows:

Motormen, now getting 25 and 28½ cents an hour, 27½ and 30 cents an hour.

Conductors, now getting 21 cents an hour, 25 cents an hour.

Gate-men, now getting 18¼ cents an hour, 20 cents an hour.

Platform men, now getting \$1.70 a day (twelve hours), \$2.40 a day.

Ticket agents, now getting \$1.50 to \$1.70 a day (twelve hours), same pay for eight hours.

The agreements on all roads except the Metropolitan and the loop expire May 1; on these May 31. The platform men, who work twelve hours for \$1.70 a day, say that theirs is the hardest work of the service. The scale committee for the South Side street railway employees met Superintendent Mason B. Starring, of the Chicago City Railway, during the week, and set forth the reason why the men who operate the street cars believe that they should have higher wages.

The following table shows the daily average number of passengers carried by the elevated roads in March, with comparisons:

METROPOLITAN				
	1906	1905	Inc.	P. C.
January .....	129,720	116,013	13,707	11.81
February .....	135,570	121,177	14,393	11.09
March .....	138,169	124,853	13,316	10.70
SOUTH SIDE				
January .....	92,406	84,569	7,837	9.15
February .....	95,077	88,173	6,900	7.83
March .....	95,466	91,384	4,082	4.47
NORTHWESTERN				
January .....	81,191	73,728	7,463	10.12
February .....	83,572	78,773	4,799	6.09
March .....	85,154	80,500	4,654	5.78
CHICAGO & OAK PARK				
January .....	47,921	44,668	3,253	7.28
February .....	48,920	47,149	1,771	3.75
March .....	49,542	48,167	1,375	2.85

Elsewhere in this issue will be found the report of the Metropolitan West Side Elevated for the year ended March 28, which was formally made public last Wednesday.

**REPORTED SALE OF MEXICO PROPERTIES**

It is stated that arrangements have been made for the sale of the Mexico City Tramways Company, Ltd., to McKenzie & Mann, of Montreal, who are largely interested in street railway and power development in Mexico. Wernher, Beit & Company, of London, England, are the owners of the system in Mexico, and it is understood that the deal was concluded in London by representatives of the syndicate in Europe at this time.

**CITY BLAMED FOR FAILURE TO CARRY OUT RECOMMENDATION OF RAILROAD COMMISSION FOR BROOKLYN**

In a report on the transportation conditions in Brooklyn, issued by the State Railroad Commission, the city authorities are sharply blamed for neglecting to make municipal improvements recommended. The Commission confesses the congestion during the rush hours on the Brooklyn lines, and admits that there is some overcrowding during other hours, but says that the condition of the surface and elevated travel during the non-rush hours is better than it has been for a number of years. The report contains some new figures on Brooklyn traffic, showing that the number of passengers on both elevated and surface systems in January, 1906, was 34,377,752, an increase of 6,121,547 over January, 1905, or 21.63 per cent. The report says that the company has complied with eight specific recommendations for increasing the service on its elevated lines, resulting in an increase of 7184 car miles daily, and has complied with nineteen recommendations for improving the service on its surface lines, increasing its schedules so that 1320 cars were operated on the surface lines in January, 1906, against 1220 in January, 1905. It says that 201 double-truck cars, each seating forty-eight, were put in service in place of 101 single-truck cars, seating only thirty, and 92 cars were added to the elevated equipment. In dealing with the city's responsibility for the congestion of the rush hours, the Commission cites its recommendations of a year ago, and says:

"No contracts have as yet been executed for any additional tunnels under the East River.

"No action has been taken by the local authorities to bring about the construction of an elevated structure connecting the Brooklyn and Williamsburg Bridges.

"No work on erecting the Manhattan Bridge has been done.

"No change in the Manhattan terminal of the Brooklyn Bridge which would relieve present conditions has been made.

"The city has not constructed loops and shelter stations at the Manhattan terminal of the Williamsburg Bridge.

"The city has not extended Flatbush Avenue to provide an additional artery through the business portion of Brooklyn to the Brooklyn Bridge.

"The police force for regulating vehicle traffic and expediting cars has not been increased, but has been reduced."

The Commission's recommendations of a year ago for the improvement of Brooklyn's elevated system are recited with these comments:

"The Brooklyn Heights Railroad has not complied with this board's recommendation that an additional track be constructed on all its elevated lines.

"It has complied with the recommendation to lengthen its platforms, except on the Broadway line from the ferry to East New York, and on the Ridgewood line from Vanderbilt and Knickerbocker Avenues.

"It has not complied with the recommendation that ash cars be operated only at night."

The company has ordered 100 additional elevated cars and 150 more surface cars, which are to be delivered this month, and will order 150 more surface cars for delivery in the fall, which will give the company all the cars that it can operate with its present track facilities. The board finds that the maximum number of surface cars run over the Brooklyn Bridge in the rush hours varies from 280, the limit set by the Bridge Department, to 316 an hour. On the Williamsburg Bridge the number varies from 145 to 166 an hour. As regards the additional track on the elevated lines, this improvement could only be carried out after the structure had been greatly strengthened and many of the island stations displaced. On one line, the Lexington Avenue division, a considerable portion of the property would have to be entirely reconstructed, as the structure is erected on pillars in the center of the street, the devil strip being very narrow. The repairs now being made to the elevated structure were referred to in an illustrated article published in this paper for Dec. 24, 1904.

## NEW JERSEY FREIGHT BILL SIGNED

Governor Stokes, of New Jersey, has affixed his signature to Senator Wakelee's freight bill. It authorizes electric railway companies to carry freight through such municipalities as, by ordinance, grant them permission, subject to such restrictions and limitations as the traversed cities, towns, boroughs and other municipalities may require. Several years have elapsed since this question was raised in New Jersey. The first bill to allow trolley companies to carry freight was fought and defeated by the railroad corporations, notwithstanding the pleas of the Monmouth County farmers, who were greatly interested in it.

## REPORT OF THE METROPOLITAN WEST SIDE OF CHICAGO

The report of the Metropolitan West Side Elevated, of Chicago, for the fiscal year ended Feb. 28, 1906, was formally made public Wednesday, April 5. Net earnings were \$241,425, being equal to 2.77 per cent on the outstanding preferred capital stock. This result, however, was reached after charging to income \$65,115 interest, which previously had been charged to capital account. Gross business from passenger earnings increased 11.8 per cent over the previous year. In the fiscal year the company reduced its floating debt carried in the balance sheet "as collateral trust notes," \$300,000. On April 1 the company paid an additional \$200,000, reducing this indebtedness to \$600,000. It is evidently the policy of the new management to liquidate its floating obligations and take care of new expenditures before concerning itself with any material distribution on the preferred stock. The annual report, as submitted by President H. G. Hetzler, indicates that the company is in the best position it has ever enjoyed, although not paying dividends. The comparative statement of earnings, expenses and income makes the following exhibit:

## EARNINGS

	1906	1905
Total passenger earnings .....	\$2,360,256	\$2,080,937
Advertising earnings .....	60,955	40,854
Rent earnings .....	14,419	11,580
Miscellaneous earnings .....	16,695	20,225
Gross earnings .....	\$2,452,327	\$2,153,597

## EXPENSES

	1906	1905
Maintenance of way and structure....	\$114,963	\$98,725
Maintenance of equipment.....	202,220	163,528
Conducting transportation .....	692,316	638,507
General expenses .....	76,690	92,002
Loop expenses .....	86,239	64,551
Total operating expenses .....	\$1,172,430	\$1,057,316
Net earnings from operation.....	1,279,896	1,096,281
Proportion of operating expenses to gross earnings, loop expenses excluded .....	44.29	46.09
Proportion of total operating expenses to gross earnings.....	47.81	49.04
Proportion of total operating expenses and taxes to gross earnings .....	54.12	54.98

## INCOME

	1906	1905
Net earnings from operation as above.	\$1,279,896	\$1,096,281
Interest and exchange.....	4,998	4,566
Rental of outside property.....	3,108	987
Other income .....	4,530	.....
Gross income .....	\$1,292,533	\$1,101,834
Interest on first mortgage bonds....	392,150	392,320
Interest extension mortgage bonds...	120,000	98,349
Interest on collateral loan.....	43,635	.....
Rental, Illinois Trust & Savings Bank, trustee .....	4,797	1,998
Rental, Pennsylvania Company.....	11,900	11,900
Rental, Union Consolidated Elevated Railroad .....	20,351	20,351
Rental, Union Elevated Railroad (loop) .....	222,277	208,846
Taxes, car licenses and special assessments .....	154,790	126,643
Total charges .....	\$969,901	\$860,409
Surplus .....	322,631	241,425

## COMPARATIVE BALANCE SHEET

## ASSETS

	1906	1905
Cost of road, equipment and property.	\$29,845,258	\$30,029,607
Construction advances .....	831,709	432,915
Capital stock in treasury, preferred..	292,000	291,900
Capital stock in treasury, common....	35,800	.....
First mortgage bonds in treasury....	164,000	192,000
Extension mortgage bonds in treasury	1,500,000	1,500,000
Cash on hand and in banks.....	213,340	222,044
Northern Trust Company, trustee....	.....	135,331
Material and supplies.....	48,221	49,794
Accounts receivable .....	18,667	24,250
Prepaid insurance .....	19,639	25,604
Advances, Union Consolidated Elevated Railroad .....	43,559	43,559
Unadjusted accounts .....	12,730	26,609
Totals .....	\$33,024,937	\$32,973,616

## LIABILITIES

	1906	1905
Capital stock, preferred.....	\$9,000,000	\$9,000,000
Capital stock, common .....	7,500,000	7,500,000
First mortgage bonds, 4 per cent....	10,000,000	10,000,000
Extension mortgage bonds, 4 per cent	4,500,000	4,500,000
Collateral trust notes.....	800,000	1,100,000
Unpaid vouchers, pay rolls and accounts .....	107,959	97,733
Interest coupons due and not presented .....	26,820	84,300
Interest accrued, not due.....	67,783	52,693
Rentals accrued, not due.....	8,308	7,775
Taxes accrued, not due.....	130,638	105,501
Depreciation reserve .....	92,413	57,230
Balance surplus .....	791,013	468,382
Totals .....	\$33,024,937	\$32,973,616

President Hetzler, in his report, notes that the location of a number of large establishments, such as Sears, Roebuck & Company, Winslow Bros. Company, and the Western Electric Company, at points near the Metropolitan "L's" lines, has given increased traffic in a direction opposite to that of the company's heavy morning and evening business. There has been a considerable increase in traffic from the Aurora, Elgin & Chicago also. The company was compelled to elevate its tracks over the Chicago & Northwestern at Kinzie Street, and there must be a similar elevation over the Chicago, Burlington & Quincy tracks on the Douglas Park branch. A number of improvements were made, after noting which Mr. Hetzler says that in order to provide for the increase in traffic orders have been placed for fifty-two new motors of 160-hp capacity and fifty new motor cars. The report continues:

"The total assessed value of the railroad property, including capital stock, for taxation for the year 1905 is \$1,874,915, as compared with \$1,656,567 for 1904, an increase in assessed valuation of \$218,348.

The tax rates are also higher, the rate for the west town for 1905 being 6.983, as against 6.591 for 1904, and for the south town 6.796 for 1905, as against 6.391 for 1904.

"The total tax for 1905, exclusive of car licenses and special assessments, amounts to \$130,638, as compared with \$107,837 for the year 1904, an increase in general taxes of \$22,801. The total taxes for the fiscal year, including car licenses and special assessments, in the sum of \$154,790, compared with \$126,643 for the previous fiscal year.

"The income account was charged this year for interest, \$65,115. A similar charge of \$2,798 was made for rental paid to Illinois Trust & Savings Bank, trustee. These amounts, if added to our surplus for the year to place same on a parity of last year, would make \$390,545, or an increase of \$140,120.

"In order to maintain your structure and equipment in good condition, it was necessary to expend for maintenance of way and structure, and for maintenance of equipment, \$54,928 more than the year previous.

"In the expenditure for maintenance, etc., is included a monthly allowance for depreciation and renewal, which account now shows a balance of \$92,413, or an increase of \$35,182 since the last annual report."

In the election of directors, Nathan Allan and Moses J. Wentworth were chosen to succeed John P. Wilson and George Higginson, Jr. The other two retiring directors were re-elected.

## NEW YORK, NEW HAVEN & HARTFORD AFTER RHODE ISLAND CORPORATION

The report is current that the New York, New Haven & Hartford Railroad is now seeking to secure control of the Rhode Island Securities Company, controlling the street railway lines in Providence and those throughout the State. While the Providence "Journal" quotes Marsden J. Perry, president of the Rhode Island Company, to the effect that he does not believe arrangements are being made for disposing of the property, it said on April 8: "It is estimated that fully 7500 shares of Rhode Island Securities stock have changed hands in the Providence market during the past week or two, out of a total of about 20,000 shares held here. Several important brokerage houses have been identified with the buying and selling of this stock, but, ultimately, the greater part of the shares traded in have, it is understood, reached the office of Richardson & Clark. The low price of the week on Securities was 31½, and the high price was 50, so far as has been positively learned. Since the sale at 50 there have been sales at 39½ and also at varying prices up to 44½, transactions made on the same days showing rather wide variations. The later demand has been less urgent. Whatever the actual source of the local buying of Securities shares, the total amount involved, even at 40 a share, would be \$300,000 for 7500 shares, but the recent average price would exceed 40. What the present week will reflect as to the price fluctuations in this stock, which is the key to the Rhode Island Company's entire traction system, is difficult to forecast. But there is great interest in the community, and the popular theory still is that New Haven buying of the minority stock put up the price in this market."

## PROGRAMME OF THE IOWA ASSOCIATION

The programme has been announced in detail of the third annual meeting of the Iowa Street and Interurban Railway Association, to be held at the Kirkwood House, Des Moines, Thursday and Friday, April 19 and 20. The meeting will convene at 10 a. m. Thursday, with an address of welcome by H. H. Polk. Following this will come the address of President Hippee, of the association, which will be followed by such general business as the reading of the minutes and the presentation of the report of the secretary and treasurer. The morning session will close with a paper by John F. Ohmer, of Dayton, entitled "Transfers—Their Use and Abuse." In the afternoon delegates will attend in a body the session of the Iowa Electrical Association in Elks' Hall, at which Hon. L. Y. Sherman, Lieutenant-Governor of Illinois, will read a paper entitled "Limits of Governmental Activity." On the return of the party to the Kirkwood, Roger W. Conant, of Cambridge, Mass., will present the paper, "Rail-Bond—Field and Armature Testing." At the session on Friday morning the papers, "The Adoption of Gasoline Motors for Street and Interurban Service," by F. W. Hild, of Chicago, and "The Standard Car Body and Truck for Both City and Interurban Service," by George H. Tontrup, of St. Louis, Mo., will be read. The closing session will be held Friday afternoon. Two papers are to be read, "Discipline of Car Service Employees," by J. G. Huntoon, of Davenport, and "Mutuality of Interests of the Operator and the Supply Man," by W. R. Garton, of Chicago. The executive session will then be held and the officers elected. The officers of the association are: George B. Hippee, of Des Moines, president; James F. Lardner, of Davenport, vice-president; L. D. Mathes, Dubuque, secretary and treasurer.

## SUPREME COURT DECISION IN FAVOR OF CLEVELAND COMPANY

The Cleveland Electric Railway Company gained an important victory over the city in a decision rendered last Monday by the United States Supreme Court. The case involved the right of the city to grant a charter to a new street railway company to operate a line in Woodland Avenue in the face of the contention of the old company that its charter had not expired. The case presented a phase of the effort to force three-cent fares on the street railways in Cleveland by the city administration. The city claimed that the franchise of the company on this street expired last year, and called for bids and granted a franchise to the Forest City Street Railway Company, the so-called three-cent fare company supposed to be backed by Mayor Johnson. The Cleveland Electric brought suit to annul this grant on the ground that its franchise had been extended at the time the road was equipped

with electricity, and that its grant on that street would not expire until 1908. The Circuit Court rendered a verdict in favor of the company, and by mutual consent the case was carried to the Supreme Court.

It is the general opinion that the same arguments apply to the Central Avenue franchise, the city having made a similar grant on this street to the Forest City Company. This being true, the operations of the low-fare company, for the present, at least, will be limited to the West Side streets, upon which it obtained franchises in open bidding. The decision also makes the position of the old company much stronger as to the value of its unexpired franchises in case Mayor Johnson's leasing plan should be seriously considered by the company.

## PUBLIC SERVICE OFFICERS RE-ELECTED—FINANCIAL PLAN ANNOUNCED

At the annual meeting of the directors of the Public Service Corporation of New Jersey, held Tuesday, April 10, the officers were re-elected and the plan approved for floating additional stock. In substitution for the plan of financing as proposed by Morgan & Co., it is now planned to offer to the shareholders the 5 per cent gold notes of the company to the amount of \$6,250,000, falling due Nov. 1, 1909, convertible May 1, 1909, at the option of the holder into the stock of the company at par. Robert Winthrop & Company, bankers, of New York City, and the United Gas & Improvement Company have agreed to underwrite upon exactly the same terms offered to the stockholders so much of the issue of the convertible notes as may not be subscribed for by stockholders. The plan provides for all financing for the years 1906 and 1907. The notes will be issued from time to time during the next two years, as the needs of the company require. President McCarter concludes his report by saying that the increases in the business of the company are so large that the officers feel that it will be consistent with business prudence for the company to commence the payment of dividends in the near future.

Thomas N. McCarter was re-elected president; A. B. Carlton, John J. Burleigh and Charles A. Sterling, vice-presidents; James P. Dusenbury, treasurer; R. D. Miller, assistant treasurer; Frederick Evans, secretary; E. W. Hine, assistant secretary, and P. S. Young, controller. In the last issue of the STREET RAILWAY JOURNAL mention was made of the election of J. P. Dusenbury to succeed United States Senator J. F. Dryden as a director, and the names were published of the seven directors re-elected. The directorate now is composed of Samuel T. Bodine, Thomas C. Barr, David Baird, J. J. Burleigh, A. B. Carlton, Walton Clark, Mark T. Cox, J. P. Dusenbury, Thomas Dolan, George R. Gray, Hugh H. Hamill, William C. Heppenheimer, A. R. Kuser, Louis Lillie, Randall Morgan, Thomas N. McCarter, Uzal H. McCarter, F. W. Roebing, John F. Shanley, Charles A. Sterling, Leslie D. Ward, P. F. Wanser, John I. Waterbury and E. F. C. Young.

## MR. MELLEN QUOTED AS REGARDS NEW YORK—BOSTON ELECTRIC SERVICE—WORCESTER DEAL ANNOUNCEMENT

In speaking of the work now being done on the New York, New Haven & Hartford Railroad, between New Haven and Willimantic and Willimantic and Boston, on Tuesday, April 10, President Mellen, of the company, is quoted as having said:

"The revision of the Boston & New York Air Line between New Haven and Willimantic and the New England Railroad between Willimantic and Boston, will make a line approximately 200 miles in length between New York and Boston, upon which trains can be easily run in 4 hours by steam and in less time by electricity, and at as low a fare as upon any other road in existence, or proposed, or even theorized about.

"Such a line the New Haven management has in contemplation, the engineers are now at work upon it, the financing of the same has been provided for, and the line itself will be available for use before a charter even can be obtained for such a line as has been petitioned for before the Massachusetts Legislature."

In this connection the announcement is of interest that Mackay & Company have purchased more than a majority of the shares of the Worcester Railways & Investment Company, which stock has been transferred to their names. What will be done with the stock is not yet disclosed. It will be recalled that several weeks ago mention was made in the STREET RAILWAY JOURNAL of the rumor to the effect that the stock was being sought by the New York, New Haven & Hartford Company.

## LEGISLATION IN IOWA

The Thirty-First General Assembly, of Iowa, adjourned sine die April 6. The body passed two measures of importance to the railroads of the State. One provides that one railroad company may charge the same passenger and freight rates between two points in the State as a competitor, although the competing line or lines may be many miles shorter. The bill is known as the long and short haul measure. The Governor recommended the passage of such a measure as applying to passenger rates alone, and it was thought at the time that it was intended to give the steam railroads of the State an opportunity to compete with the interurban lines. One of the first amendments adopted was one specifying that the act should not apply to interurban lines; in other words, the competition must be confined to steam roads alone. The author of the act included freight rates as well as passenger rates, and it is believed now that this provision was incorporated with the idea of undermining the freight rates of Iowa, and practically nullifying the work of the Railroad Commissioners of this State. It is also generally understood that the Governor will now veto the act, on the ground that the act as passed would give the railroads absolute control of the freight rate situation in Iowa, which is now somewhat controlled by the Railroad Commissioners. The other act passed is known as the anti-pass law, and applies to steam and interurban railways alike. It prohibits the issuance of free transportation to State, county and city officials, with certain qualifications.

## THE PURPOSE OF THE NEW AURORA, ELGIN & CHICAGO ISSUE

The seemingly authoritative report to the effect that the contemplated increase of the bonded indebtedness of the Aurora, Elgin & Chicago Railroad to \$25,000,000, noted in the STREET RAILWAY JOURNAL last week, was for the purpose of acquiring a network of lines covering Northern Illinois and Southern Wisconsin is declared to be untrue by H. C. Lang, of Cleveland, secretary of the company. Mr. Lang states that this will simply be the authorized bond issue, and the amount actually issued will be \$5,050,000 to retire an equal amount of underlying bonds of the companies recently consolidated. Mr. Lang says that under the laws of Illinois it is necessary to name a specific amount as the maximum for the mortgage. The directors therefore thought it would be better to be a figure that would take care of all possible needs of the company during its lifetime. Under this arrangement it will probably never be necessary to issue second mortgages and the interests of the stockholders will be safeguarded all the better in consequence. One of the terms of the new mortgage will be that no additional bonds can be sold until the net earnings of the company have borne a certain relation to the outstanding, and the proposed issue; in other words, until the net earnings are more than capable of taking care of the interest on that portion of the authorized issue which it was proposed to sell.

## TRANSFERS ON TRANSFERS IN BROOKLYN—AN EXPLANATION

The Brooklyn Rapid Transit Company has recently returned to the practice of issuing a transfer on a transfer, and in explanation says this recession of the rule whereby a transfer was issued only for a cash fare, is intended to increase, and, so far as possible, equalize transportation facilities in all sections of the boroughs of Brooklyn and Queens.

The application of this rule in December, 1903, that a transfer should only be issued for a cash fare, was an effort to correct the abuses of the transfer privilege. In 1902, the year before this order was issued, 57,000,000 transfers were issued, and a total of 340,000,000 passengers carried. In other words, every sixth passenger who paid a cash fare left the car on which that fare was paid and completed his journey on another car, or cars, by the aid of transfers. But the rule of 1903, while doubtless reducing the abuse of the transfer privilege, did not, as might have been expected, materially lessen the proportionate number of transfers to passengers carried. On the contrary, the record for that year shows that one-sixth of the 365,000,000 passengers carried asked for and received transfers.

In 1905, the proportion of cash fares to transfers still remained at six to one. In January of the present year the number of transfer passengers had increased so that one in every five pas-

sengers carried availed himself of the privilege. With the recent increase of transfer facilities in effect, or about to be made effective, the proportion of transfers to passengers carried will doubtless greatly increase and the cash return for each passenger's ride will be reduced.

In 1904 a comparison of the number of passengers carried, and the total receipts received in cash fares, showed the actual value to the companies for a single ride for each paying passenger to be \$0.409. Last year by the same means, the actual value of a single cash fare was found to be \$0.399 plus. This reduction resulted, despite the enormous increase of traffic, from the fact that the increase in transfers more than kept pace with the growth of traffic. A comparison of the figures for January this year shows the actual cash value of a fare for that month, owing to the still greater increase in the proportion of transfers, to be \$0.393 plus.

When the transfer arrangements recently determined upon have been perfected, there will be in effect transfer privileges at over 600 intersections of lines comprising companies included in the Brooklyn Rapid Transit system.

## THE FALL RIVER FREIGHT DECISION

The Massachusetts Railroad Commissioners have decided relative to the order of the Board of Aldermen of Fall River, giving the Old Colony Street Railway Company the right to carry baggage and freight over certain lines of its railway in that city. The order in question appeared objectionable to the Commissioners on the ground that it made the privilege subject to several unwise conditions.

"One of these," the decision says, "is the provision that the sale or lease of the railway shall work an immediate forfeiture of the right to carry freight. It is unsafe to prejudice a question of the future in this way, for a change in the control of a railway need not necessarily be inimical to the public interests."

As regards the right to revoke the privilege the decision says: "We only suggest that the right to revoke cannot be left to the independent action of the local board."

In regard to the clearing of the streets the Commissioners hold that: "The paragraph in these orders which relates to the removal of snow presents no plan for doing the work, and if literally obeyed is rather a hindrance than an aid to any practical arrangement between the parties."

"To the claim of the company that the limitation of the freight privilege to a term of years is contrary to the policy of the law, it is enough to say that during the experimental period in this class of service the limitation seems wise."

"The petition will be approved whenever action shall have been taken by the Board of Aldermen to meet the suggestions above made and the regular schedule shall have been filed."

## MINNESOTA RAILROAD COMMISSION HAS NO JURISDICTION OVER ELECTRICS

Attorney-General E. T. Young, of Minnesota, has reaffirmed the opinion given two years ago by former Attorney-General W. B. Douglas, that street railway lines, even if built outside the limits of any city, do not come under the jurisdiction of the State Railway Commission, and that it has no power to receive complaints or make orders regarding service and charges. He bases his opinion on the law creating the Commission, which in the new code reads that "the general supervision of railroads and express companies doing business as common carriers," shall be vested in the board. Whether the street railway running between two cities is a common carrier does not enter into the question, according to the Attorney-General, but it depends upon whether they are "railroads and express companies." The Attorney-General holds that they are not, and therefore the Commission has no jurisdiction over them.

The question was put up to the Attorney-General two years ago in connection with the St. Paul and Stillwater line. It was argued that because the line runs across the country and enters into competition with the steam railroads it ought to come under the jurisdiction of the Railroad Commission, but Attorney-General Douglas held that it did not. The question came up again in regard to the new Excelsior line from Minneapolis. The City Councils of Minneapolis and Excelsior found they had no jurisdiction over the service and charges on the line, because part of the line was outside the limits of both cities. The matter was referred to the Commission, and they asked the Attorney-General for a ruling on the point.



**FRANCHISE VALUATIONS INCREASED IN NEW YORK**

The final valuation for the current year of special franchises operated in this city, as announced by the State Board of Tax Commissioners, shows an increase of \$59,301,250, equal to approximately 20 per cent over the valuation of the year previous. The total valuation is placed at \$361,479,300, against \$302,178,050 for 1905.

The valuations of the franchises of the companies entering into the Interborough-Metropolitan Company, as placed by the board, as compared with 1905, are as follows:

	1906	1905
New York City Railway system.....	\$79,470,000	\$79,233,000
Manhattan Railway Company.....	62,700,000	59,700,000
Interborough Rapid Transit system...	18,000,000	9,000,000
<b>Total .....</b>	<b>\$160,170,000</b>	<b>\$147,933,000</b>

The total percentage of increase is 8.26 per cent.

The valuations of franchises of other of the large corporations compare as follows:

	1906	1905
Brooklyn Rapid Transit system.....	\$38,479,000	\$29,560,000
Consolidated Gas Company.....	82,921,000	69,710,000
Brooklyn United Gas Company.....	16,495,000	13,194,500
New York Telephone Company.....	17,078,000	6,610,000

**NEW TRANSFER SYSTEM FOR NEW YORK**

Announcement was made Monday, April 9, by the Interborough Company, of a new transfer system for Manhattan and the Bronx on the subway, elevated and surface lines. Three-cent transfers may be purchased between Bronx surface lines and eight subway stations on the Broadway and Lenox Avenue branches above 145th Street and West Farms. One of these lines, to which a franchise must be granted, will after May 1 connect the subway station at 181st Street with the Bronx Zoological Garden, the Southern Boulevard, and Third Avenue. Free transfers to and from the subway and Manhattan elevated roads will be given at seven points on the Aqueduct Avenue, Fordham Road and Third Avenue lines of the Union Railway.

**ELECTRIC RAILWAY ENGINEERING AT THE WORCESTER POLYTECHNIC INSTITUTE**

Brief mention was recently made in these columns of the decision of the trustees of the Worcester Polytechnic Institute to erect a new building for the use of the department of electrical engineering. As the plans for the building are nearing completion it may be well to mention some of the features connected with the railway engineering department. A notable one will be the electric railway engineering laboratory, a part of the equipment for which will be a 25-ton, double-truck, four-motor electric car. The exterior will closely resemble an ordinary interurban car, but instead of seats the interior will be occupied by automatic recording instruments, for the purpose of indicating not only the performance of the car in operation, but also the electrical and physical conditions of the track and electrical circuits over which it is operated. Double doors at one end of the building and two tracks connecting with the local electric railway system will afford an entrance for this or other cars into the laboratory. Inside the building, one of these tracks will be over a pit for inspection and repair purposes, while the other will terminate in a testing stand, arranged for the reception of the institute car or any other car. While on the testing stand, the car will rest on supporting wheels, which, as they revolve, will give the effect of a moving track, the car being held in a stationary position. Suitable arrangements have been designed for applying a load to the supporting wheels in such a way as perfectly to imitate the losses in rolling friction, wind resistance, etc., as well as the acceleration and retardation momentum of the equipment under test. The power consumed by the car during any given run will be measured by the power input, and by the power absorbed in the loading apparatus, as well as by a traction dynamometer, all of the instruments being autographic. A complete equipment of the various forms of controlling, braking, heating, signalling and other accessory electric railway apparatus will be installed, as well as both alternating and direct-current railway motors for "stand tests."

**NEW LINE OUT OF SCRANTON**

Work is now under way in Scranton on an electric railway that is to be built jointly by the Northern Electric Street Railway Company and the Dalton Street Railway Company to connect Scranton and Lake Winola, extending through Clark's Summit, Glentown, Dalton, La Plume and Factoryville. From Providence Square to the city line of Scranton, along West Market Street, or the old Abington turnpike, the franchise is held by the Northern Electric Street Railway Company, and from that point the remainder of the road will be built by the Dalton Street Railway Company. The Northern Electric Street Railway Company now owns the Abington turnpike and will have full control over the highway. From Providence Square to the city line, the road will pass along the highway, and from the city line it will be built on a private right of way. About 13 miles of private right of way has been secured. The plans have been definitely arranged for the construction of the road as far as Dalton, but it is stated that the directors are seriously considering the advisability of changing the route to Lake Winola by building a branch from Clark's Summit, by way of the Hillside Home and Gravel pond. The power house will probably be at Dalton. The officers of the Northern Electric Street Railway Company are: Dr. A. J. Connell, president; Colonel E. H. Ripple, secretary and treasury; K. W. Day, general manager. The entire route has been surveyed by Messrs. Stevenson and Knight, while the construction work is in charge of Sherman A. Dillely, the chief engineer and superintendent of construction.

**SAN FRANCISCO RAILWAY SITUATION**

President Calhoun of the United Railroads, of San Francisco, states that he has no intention of building a subway under Market Street. With a good electric service, he says, he can take care of the traffic for fifteen years to come, and he expects San Francisco to have a million population within twenty years, at that. Ford, Bacon & Davis, who have prepared the plan, declare that the company will spend nearer \$10,000,000 than \$8,000,000 in carrying them out. While these plans have not yet been made public, they include tracks, car houses, necessary extensions to districts not now served and shops. The company bought a tract about a year ago for these shops. Thornwell Mullally, assistant to President Calhoun, and Chief Engineer W. C. Lane recently visited the site, preparatory to the final adoption of the car house plans. Meantime, there is an order in the St. Louis shops for 100 modern cars to cost \$7,000 each. They will be especially designed for local needs. The shops will give employment to 400 men, and will cost \$360,000. Seneca Avenue, which crosses the site, has been closed by the Supervisors, a spur track has been built and part of the sewer in Ocean avenue provided for in the bond issue has been ordered built. The loop at the foot of Market Street, for which application has been made to the Harbor Commission, will cost \$100,000. New cars figured on will cost \$1,000,000. About 600 men are engaged on paving work and about 550 on track laying.

Rudolph Spreckels has announced that the street railway system which was planned by himself and his father, Claus Spreckels, to force the United Railroads to grant concessions in the way of bettering the service, will be constructed whether or not the United Railroads decides to give Sutter Street a conduit line. The articles of incorporation have been drawn up, but, pending a decision regarding the probable length of the road and the approximate amount of capital required, they will not be filed. These and other details will be determined on in the course of a few days. Most of the work of preparing the engineering plans will be done in the Sheldon building, at 421 Market Street, where Rudolph Spreckels has his office, and notice has been given to all other tenants on his floor to vacate. According to Rudolph Spreckels, offers have been made to substitute for the bonds of the new road, and the entire amount of capital required is in sight. One of the propositions that has been under consideration by the promoters of the opposition street railway system involves the acquisition of the California Street railroad.

A Havana despatch says that a general strike in support of the striking employees of the Havana Electric Railway has been called, but it is doubtful whether the call will be heartily responded to. The electric cars are being run fairly regularly by new hands.

## A NEW ENGINEERING COMPANY

The American Engineering & Construction Company has just been incorporated, with headquarters in the Eagle Building, Brooklyn, N. Y., by R. C. Taylor, Edward Taylor and J. J. Sides. Realizing the importance to the managers of electrical railways of having qualified experts in the various departments ready to handle any technical or practical propositions that may be causing them annoyance or expense in the economical operation of their roads, or problems continually arising which may be beyond the scope of their regular organization, the new company has included in its regular staff of engineers men of wide experience in the operation of electric railways, and is prepared to handle any class of mechanical, electrical and construction work.

The company will also act as consulting engineers in drawing up or reviewing designs and specifications of complete plants, or apparatus to fulfil standard or special requirements. Through a corps of engineers it will undertake the testing of complete power plants, distribution and transmission lines, rail returns and bonding, characteristics of motors, economy and efficiency of braking systems and all other electrical and mechanical devices or constructions used in passenger or freight traction systems. Expert testimony in accident litigation will also be taken up.

The three members of the firm have been identified with the largest operating companies in this country, and are well known in electric railway and engineering circles. R. C. Taylor, the president of the new company, served his apprenticeship as a machinist in Scotland, and is a graduate of the South Kensington Science and Art School, London, England. Among the more important positions he has held were those of master mechanic and chief engineer of the West Superior Iron & Steel Company; mechanical engineer for Robinson & Cary Company, of St. Paul, Minn.; master mechanic and chief engineer of the Twin City Rapid Transit Company, Minneapolis, Minn.; mechanical engineer of the Brooklyn Rapid Transit Company. J. J. Sides, who is the secretary and treasurer, started as chief clerk for the West End Street Railway Company, of Boston, during the installation of the first electric equipment, and later was superintendent of construction on underground trolley systems for the Metropolitan Street Railway Company, of New York; superintendent of construction of the Central Power Station, Boston, and the Ninety-Sixth Street Power Station, New York City, also the Rockingham Light & Power Company's Station at Portsmouth, N. H., and recently with the engineering department of the New York Edison Company. Edward Taylor was in the electrical engineering department of the Twin City Rapid Transit Company, and the Fort Wayne Electric Company. Later he became chief electrician of the American Tin Plate Company, Pittsburg, assistant to the master mechanic of the Buffalo Street Railway, and has recently been engineer of experimental work, testing equipment on the Brooklyn Rapid Transit system.

The company has already secured a number of contracts, among them being the installation of two 500-hp boilers for the East River tunnel, and six boilers for the South Jersey division of the Public Service Corporation of New Jersey.

## PROGRAMME OF FIFTY-THIRD MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The programme for the fifty-third meeting of the American Society of Mechanical Engineers, to be held at Chattanooga, Tenn., May 1 to 4, has been announced. The headquarters throughout the entire meeting will be at the Read House, and will be opened Tuesday, May 1, at 12 m. The professional sessions on Tuesday and Wednesday evenings, and Wednesday and Thursday mornings, will be held in the Assembly Hall of the Read House. Tuesday afternoon, May 1, has been left free for assembly of members and for visits to points of interest throughout the city. The opening session will be held Tuesday evening, May 1, at 9 o'clock, in the Assembly Hall of the Read House. The address of welcome will be delivered by Mayor W. L. Frierison, to whom Fred W. Taylor, president of the society, will respond. This session will give an opportunity for members to meet each other, to renew old acquaintances and to form new ones. It will be an informal gathering, at which the ladies will be welcome. The second session will be held Wednesday morning, May 2, in the Assembly Hall. This will be a business session for the report of tellers, and committees and general business. Until the hour of adjournment after the executive business

has been concluded, the following papers will be presented: No. 085. "Report of Committee on Standard Proportions for Machine Screws." No. 092. "Report of Committee Co-operating on Pennsylvania Railroad Locomotive Tests." No. 096. A. W. Mosley and J. L. Bacon, "Effect of a Blow."

At 1 o'clock Wednesday afternoon, May 2, members and ladies will take trolley cars at the corner of Market and Ninth Streets for the Chickamauga-Chattanooga National Military Park on Chickamauga battlefield and United States army post. A carriage drive will be taken over the battlefield and park, where hundreds of monuments and historic tablets will be seen. Afterward the Twelfth United States Cavalry will give a regimental drill in honor of the visitors. At the third session, on Wednesday evening, May 2, professional papers will be presented as follows: No. 090. William H. Bristol, "Low Resistance Thermo-Electric Pyrometer and Compensator." No. 089. Henry D. Hibbard, "Manganese Steel." No. 094. James M. Dodge, "A History of the Introduction of a System of Shop Management." No. 091. R. T. Stewart, "Collapsing Pressure of Bessemer Steel Lap-Welded Tubes." No. 093. George B. Willcox, "New Liquid Measuring Apparatus." The closing session will be held Thursday morning, May 3. "Water-Wheel Governing" is the subject which will be the principal matter of discussion at this session, and a number of short papers will be presented, to be followed by general discussion. Among those who will present papers on this subject are: Messrs. Mark A. Repogle, George A. Buvinger, John Sturgess, George J. Henry, Jr. A number of others have also signified their intention of discussing this subject orally. The following professional papers will then be presented: No. 088. William O. Webber, "Efficiency Tests of Turbine Water-Wheels." No. 097. Thomas E. Murray, "The Improvement of the Tennessee River and Power Installation of the Chattanooga and Tennessee River Power Company," at Hale's Bar, Tenn.

On Thursday afternoon, May 3, at 2 o'clock, there will be an excursion to Lookout Mountain by trolley and incline, from which will be viewed the city of Chattanooga, the windings of the Tennessee River, the Cumberland Mountains, the Blue Ridge Mountains, the battlefields, and the whole historic panorama. The local members of the American Engineering Societies, together with other citizens of Chattanooga, will tender a reception to the officers, members and ladies of the society, at the Read House, Thursday evening, May 3. Friday morning will also be devoted to social features, several excursions being planned.

The annual meeting of the society will be held in New York, N. Y., Dec. 4 to 7, 1906.

## STREET RAILWAY PATENTS

[This department is conducted by Rosenbaum & Stockbridge, patent attorneys, 140 Nassau Street, New York.]

### UNITED STATES PATENTS ISSUED APRIL 3, 1906

816,571. Flexible Connection and Suspension Means for Gearless Motors; Karl F. Elers, Pittsburg, Pa. App. filed April 3, 1905. A truck axle and a wheel having an annular series of chambers in one side and coil springs in the chambers, an electric motor, a sleeve or quill for the motor armature having substantially radial arms, each of which has rigidly supported heads that project into adjacent wheel chambers and have seats for the ends of the springs.

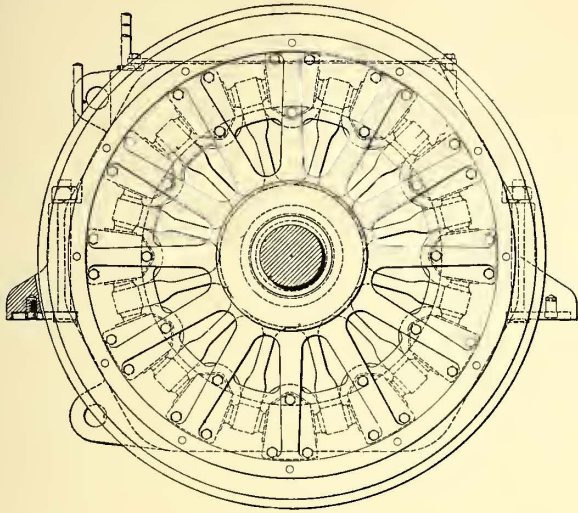
816,600. Suspension Means for Electric Railway Motors; Charles A. Psilander, Pittsburg, Pa. App. filed April 3, 1905. An electric motor having its armature loosely sleeved upon one of the axles and leaf springs connected at their middle points to the middle points of the sides of the motor field magnets and at their ends to the truck frame.

816,610. Flexible Connection for Gearless Motors; Robert Siegfried, Pittsburg, Pa. App. filed May 22, 1905. A truck wheel having a cylindrical chamber or opening and a set of yielding, resilient rings arranged side by side in the opening, an electric motor and a sleeve or quill for the motor armature having a boss that projects through the set of rings in the wheel chamber.

816,611. Flexible Connection and Suspension Device for Gearless Motors; Robert Siegfried, Pittsburg, Pa. App. filed May 22, 1905. Consists of a truck axle and a wheel therefor provided with a cylindrical chamber, the axis of which is substantially parallel to the axis of the wheel, a motor armature having a quill or sleeve provided with a boss that projects into the wheel chamber, and compressible, resilient means interposed between the bosses and the circumferential wall of its chamber.

816,612. Flexible Connection for Gearless Motors; Robert Siegfried, Pittsburg, Pa. App. filed Dec. 18, 1905. Comprises an axle having a wheel provided with a set of chambers, a quill or sleeve surrounding the axle and provided with bosses that project into the chamber, resilient cushioning means that surround the bosses within the chambers and resilient cushioning means between the ends of the bosses and the wheel. See illustration on page 590 of this issue.

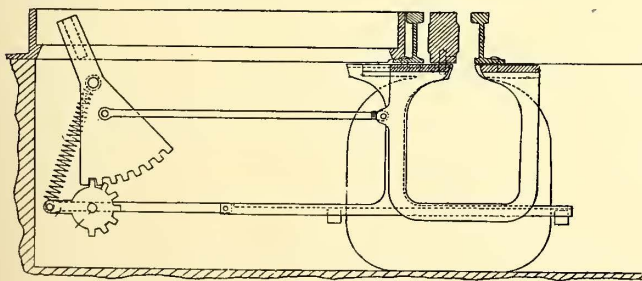
816,617. Beamless Car Brake; George W. Swisher, Clifton Forge, Va. App. filed Aug. 17, 1905. A beamless brake employing oppositely sliding plungers and a lever working between said plungers for spreading the same, longitudinal sliding bearings for the plungers and a transverse slot in the plane of the plunger bearings to admit a controlling lever, and a vertical elongated pin opening intersecting both the longitudinal slideway and the transverse slot.



PATENT NO. 816,571

816,646. Point or Switch for Electric Tramways Working Upon the Slot Conduit System; Albert N. Connett, London, England. App. filed Aug. 24, 1905. Two tongues are provided, arranged one above the other, the lower tongue being broader than the upper tongue at its free end, means for supporting the lower tongue at both sides of the point, means connecting the lower tongue to the upper, such that when the lower tongue is moved across the slot in either direction, the upper tongue is moved across the slot through a lesser distance.

816,647. Point or Switch for Electric Tramways Working Upon the Slot Conduit System; Albert N. Connett, London, England. App. filed Aug. 24, 1905. For supporting an upper tongue in both of its positions, two lower tongues are provided, and means whereby the lower tongues are moved in the opposite direction to the upper tongues in reversing the point.



PATENT NO. 816,647

816,762. Apparatus for Controlling the Passage of Cars or Vehicles Along a Railway; Louis H. Thullen, Edgewood, Pa. App. filed Jan. 18, 1905. The switch point is connected to a continuously rotating motor through a magnetic clutch, which is normally inoperative, but which can be energized by the signal or pilot circuit. Interlocking means provided for ensuring a proper setting of the signals determined by the movement of the switch point.

816,774. Iron-Framed Wood Pad for Track Rails; Giuseppe Borini, Reggio Emilia, Italy. App. filed Oct. 26, 1905. A metallic frame for wood pads.

816,812. Switch Mechanism; William C. Mortensen and George M. Themm, Salt Lake City, Utah. App. filed Oct. 2, 1905. A vertical lever on the car is depressed by the motorman to engage the switch point.

816,875. Trolley Harp; Barney Murphy, New Haven, Conn. App. filed Aug. 24, 1905. The trolley harp is swivelled to the pole in such manner as to provide a vertical axis. A projecting bail engages a hook on the pole to limit the movement.

816,913. Switch-Throwing Device; Georg W. Hercules and Thomas J. Martin, Berver, Pa. App. filed July 13, 1905. A shoe on the car engages a lever in the roadbed, which has suitable connection with the switch point.

817,031. Controller; Thorsten von Zweigbergk, Preston, England. App. filed May 15, 1903. A motor starting device having a rheostat arm moved over contacts by a Geneva stop-motion, which is driven by an electric motor, differentially wound with shunt and series coils.

817,036. Automatic Block-Signal System; Abram L. Bower, Boyertown, Pa. App. filed Jan. 31, 1903. Disks at the various stations have spaced contacts therein and are stepped around by pawl and ratchet devices so as to alternately illuminate and extinguish certain signal circuits.

817,131. Automatic Railway Signal; John Neumaier, Milwaukee, Wis. App. filed July 8, 1905. A metallic box in the roadbed had an upwardly projecting finger in the path of the wheel flanges of the train. The finger completes special alarm circuits, and is adapted to be reset after depression by a train by means of an electromagnet within the box.

## PERSONAL MENTION

GENERAL EUGENE GRIFFIN, first vice-president of the General Electric Company, sailed for Europe on April 10.

MR. JAMES RAWLE, of Bryn Mawr, Pa., has been elected president of the J. G. Brill Company to succeed the late Mr. G. Martin Brill.

MR. AUGUSTUS SPIES, president of the Menominee & Marinette Light & Traction Company, of Menominee, Mich., has been elected Mayor of Menominee.

MR. PETER LINDEMAN has resigned from the Interborough Rapid Transit Company, of New York, after four years' service, to become connected with the Indiana Union Traction Company in charge of the rolling stock and equipment. Mr. Lindeman formerly was with the New York City Railway Company.

MR. T. J. NICHOLL has been elected general manager of the Hudson Valley Railway, of Glens Falls, N. Y., and assumes his new duties at once. He has been general manager and engineer in charge of several large roads in the West, and for seven years was vice-president, general manager and chief engineer of the Rochester Railway Company.

MR. F. D. NORVEIL has been appointed by Mr. D. G. Edwards, chief traffic manager of the merged Dolan-McGowan lines, to the position of assistant traffic and freight manager of the merger lines in Indiana, including the Ft. Wayne, Van Wert & Lima Traction Company. All passenger and freight agents will report to him and receive instructions and tariffs from his office in the Terminal Building, Indianapolis.

MR. EDWARD T. WALSH, who has for five years past been connected with the Interborough Rapid Transit Company, of New York, in the general design of the Fifty-Ninth Street power plant of the subway division, has resigned to accept the position of assistant engineer of construction of the National Cash Register Company, Dayton, Ohio. Mr. Walsh has had an extensive experience in power plant and structural steel design. His early experience consisted of a number of years upon the cable railway system of the Brooklyn Bridge, during which he secured his education at Pratt Institute. Subsequently he was employed three years by the Atlas Portland Cement Company in power plant and building design, from which position he came to the Rapid Transit Subway Construction Company.

MR. J. C. BRACKENRIDGE has been appointed consulting engineer by the New York Central Railroad, to serve in connection with the electrification of that company's lines within what is known as the "electric zone." This area includes all of that part of the New York Central lines extending from the Forty-Second Street terminal to Yonkers. Mr. Brackenridge worked out and installed electricity on the Brooklyn Union Elevated line, which, up to that time, covered the heaviest electric traction installation attempted. At the same time, Mr. Brackenridge's gen-

eral railroad knowledge gives him a command of practical traction requirements that are of inestimable value in the successful working out of the problems that will inevitably be met in connection with the work in which he has been retained. Mr. Brackenridge will continue as president of the Rossiter-MacGovern Company, of New York, which office he assumed last January.

MR. ALSON H. POMEROY, of Berea, Ohio, formerly president of the Cleveland & Southwestern Traction Company and prominent in the operations of the Pomeroy-Mandelbaum syndicate of Cleveland, died at his home last week. Three years ago Mr. Pomeroy was stricken with apoplexy, and at that time he retired from active business, and was succeeded as president of the Cleveland & Southwestern by his son, Mr. F. T. Pomeroy. Mr. Pomeroy was one of the pioneer street railway men of Ohio, and is credited by many with having built the first suburban road in the State. He entered the business in the 70's, when he built a horse car line in Berea, his home town. Later he built horse car lines at Mt. Clemens, Mich., and at Sandusky, Ohio. In 1893 he conceived the idea of building a suburban line to connect Berea with Cleveland. For a time this was operated with the storage battery system then being tested by Washburn, in Cleveland. This proved a failure and the line was equipped with the trolley, being the first suburban line to enter Cleveland. Two years later the line was extended to Elyria, and the system has since been extended until it now embraces about 150 miles. Mr. Pomeroy was interested in all the so-called Pomeroy-Mandelbaum properties, which include about 600 miles of roads. The burial was at Lake View Cemetery, Cleveland.



A. H. POMEROY

AT A MEETING of the board of directors of the Westinghouse Electric & Manufacturing Company, held Tuesday, April 10, Mr. L. A. Osborne, formerly third vice-president of the company, was elected second vice-president to succeed Mr. Frank H. Taylor, resigned. Mr. Taylor, who is also a director of the company, will retain his seat on the board. Mr. Osborne's duties as third vice-president comprise the direction of the engineering and manufacturing activities of the company. As second vice-president he will assume the direction of the commercial branch while retaining those of the engineering department. The new second vice-president is a graduate of Cornell University, and entered the employ of the Westinghouse Electric & Manufacturing Company in 1891. He has successively held the positions of assistant superintendent, assistant to the vice-president, manager of works, fourth vice-president and third vice-president.

THE RESIGNATION of Mr. R. D. Schindler, for two years general manager of the Pacific Electric Railway Company, of Los Angeles, and the Los Angeles Interurban Railway Company, who sometime ago announced his determination to leave the service of the Huntington-Harriman syndicate, became effective April 1. With his retirement a circular was issued announcing that the office of general manager would be abolished. Within forty-eight hours of this announcement there went forth a circular from the president, effective April 2, announcing that Mr. J. McMillan had been appointed acting superintendent of transportation of both companies. He will perform the duties of this office in connection with his duties as traffic manager. Superintendents and other transportation officials are ordered to report to him. Thus Mr. McMillan practically becomes general manager of these corporations without carrying the title. Mr. McMillan came to Los Angeles from Texas several years ago at the solicitation of Mr. Epes Randolph, who is now the personal representative of Mr. E. H. Harriman in Southwestern America and Mexico. At first he was assistant to Mr. Randolph, when the latter was general manager of the Pacific Electric Railway Company. Afterward he was made traffic manager and has held that position for about two years.

MR. JOSEPH L. BREEN, general manager of the People's Railway Company, of Dayton, met with a shocking death while in the performance of his duties a few days ago. The recent high waters in that district had caused Mr. Breen considerable anxiety over the safety of a temporary bridge over the Miami

River, crossed by his line, and he had been riding back and forth on the rear platform of a car watching the driftwood which lodged against the piles of the structure. Leaning out to take a last look, he was struck in the head by a pole placed on the bridge by a telephone company and was knocked into the river. Although his head appeared to have been badly cut, he made a desperate effort to swim to the shore. For several hundred feet he was seen to fight for his life, and then he disappeared after a boat had put out for him. A peculiar circumstance was that he had just ordered posted in car houses and on cars, a warning, indicating the danger of leaning from a car while crossing this bridge. Mr. Breen was forty-one years of age, married, and had eight children, the oldest fifteen. He entered the street railway business in 1892 with the Union Traction Company, of Philadelphia, remaining with that company seven years. He then entered the service of the American Railways Company and superintended the construction of the Chicago & Joliet Railway. On his completion of this task, he was appointed general manager of the People's Company, which is owned by the American Railways Company.

IN VIEW of the recent formation of the Electric Service Supplies Company, it may be interesting to give some facts regarding Messrs. Porter and Berg, who enter the new firm. Mr. J. W. Porter first entered electrical work in the construction department of the Edison General Electric Company. While with that company, in 1889-90, he was engaged in the construction and operation of the electric road which was then being built in Fort Scott, Kan. He later served in the same capacity in the electrifying of the Grand Rapids Street Railway, and also in the building of the Norfolk (Neb.) Street Railway. Upon the consolidation of the Edison General Electric Company with the Thomson-Houston Electric Company he resigned his position to accept one in the sales department of the Ansonia Electric Company, of Chicago, where he remained until 1893. Mr. Porter later engaged in the electric lighting business, building and operating the Dearborn Lighting Company, a central station furnishing current for lighting and power in the downtown district in Chicago. Mr. Porter was manager of this company's business until 1899, when he engaged in the supply



J. W. PORTER



MAX A. BERG

business which has become so well known under the firm name of Porter & Berg. Mr. Porter will be first vice-president as well as one of the directors of the Electric Service Supplies Company. Mr. Porter's old associate, Mr. Max A. Berg, entered the electrical field in 1889, at which time he accepted a position with the Electrical Supply Company, Chicago, which later changed its name to that of the Ansonia Electric Company. In 1892, the Ansonia Electric Company organized a railway department, and entered into the manufacture of overhead material. Mr. Berg taking charge of that department. This was at a time when the Chicago roads began electrifying preparatory to handling the large number of people expected to visit the World's Fair the following year. Mr. Berg later became the secretary of the Wallace Electric Company, Chicago, and after having resigned his position with them was appointed the Chicago representative for the Ohio Brass Company, of Mansfield, Ohio. After a period of four years in Mansfield with the Ohio Brass Company he came to Chicago, and became a member of the firm of McGill, Porter & Berg, which company in 1900 was incorporated under the name of Porter & Berg, the present offices occupying the entire second floor of the Plymouth Building, Nos. 303-305 Dearborn Street. Mr. Berg will be the secretary as well as a director of the Electric Service Supplies Company, whose organization was mentioned in the STREET RAILWAY JOURNAL of March 31.