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Of this issue of the Street Railway Journal 8000 *copies are printed. Total circulation for* 1905 *to date,* 376,150 *copies, an average of* 8177 *copies per week.*

The Life of Ties

Among the subjects which could profitably be discussed at future convention sessions devoted to track matters is that of the life of various kinds of ties in different soil. This is something upon which there is very little more than a hearsay knowledge at present. We have in mind the experience of one manager who was religiously insisting that nothing but white oak ties be laid on his road. After he had gone for a number of years on this principle, he happened one day to take up some old track that had been laid on hemlock ties, the very kind that he and many others had been condemning as unfit to lay under any permanent track. Had anyone proposed laying them on this road he would not have listened to the proposition. Yet these hemlock ties were in better condition than the white oak or any other kind of ties laid in the same stretch of track at the same time. The manager referred to began to get interested and inquired among his friends as to the life of ties, but found their experiences very different. The hemlock ties which lasted so well were laid in blue clay and sand, and other roads which had tried them in black loam found them next to worthless. It would seem that certainly there should be a special investigation of the life of ties when they are completely buried, as they are in city streets, and in view of the amount of money that is spent in tie renewals each year by American electric railways, it is certainly worth attempting.

Telephones in Employees' Homes

The telephone is now such a valuable adjunct in the operation of a street railway that it is next to impossible to name a road which does not make use of it. Aside from its importance in the administrative departments and its usefulness in tying a system together for routine work, the telephone is a powerful factor in the relief of congestion and raising of blockades, and the practice of installing private instruments in suitable boxes or stores at important centers of traffic has resulted in great convenience when it has been necessary to summon emergency crews and divert cars to alternative routes in times of accident.

On the smaller roads the telephone is principally used for despatching cars, and its importance in the general transaction of business is naturally less apparent than in the case of the large city systems. As a road extends its territory, however, it becomes more and more essential that some means shall be available for immediately reaching the department heads in case of emergency, and there is no doubt that the installation of a telephone in the home of each important official solves the problem. Distances on a rural system are seldom short when a break-down occurs, and the ability to immediately get in touch with the officials needed in times of emergency far outweighs the $25 or $30 per year which the rental of a telephone requires. In many cases an employee's telephone can be purchased and installed on the company's own line for less than $15. Under the exacting conditions of operation common upon small roads, it is difficult for some of the more responsible employees to enjoy the privileges of home life to anything like the extent which obtains in urban work. The master mechanic, for example, is closely tied to the car house, and often cannot select an attractive home site simply because he must always be within immediate call of the shops and power house. Given a company telephone in the home of such an official, his work becomes much lightened; he can be reached at any hour of the night with ease, and can often prescribe remedies for troubles without a personal journey to the car house or station. In times of extreme emergency, the telephone-equipped officer can generally be reached instantly, and the delays due to the sending of foot messengers or the "harnessing up" of some old white horse across the road from the shop are eliminated,

The Mantle of Ananias

When the suburbanite or the cliff dweller of the metropolis gets out pencil and paper and begins solemnly to figure out how much he can save in car fares by purchasing an automobile, the end of that man is plainly to be seen. The microbe is getting in its work, and unless prompt remedies are applied, the victim will be wearing goggles to breakfast within thirty days. And if he picks up his morning paper and reads therein the fanciful tale of the alleged economy contest which has just been completed by a group of automobiles in New York State, he is surely doomed. Nothing short of trepanning can extract the wheels from his head. The contest has been a notable one, resulting in as fine a line of statistics as ever figured in a discussion of the tariff. To summarize it briefly, seven or eight cars, in magnitude varying from an omnibus to a runabout, have been scratching up the dust in various directions about the metropolis for four or five days, and up to a point near the end of the contest, had reported a running cost per passenger of about ½ cent per mile. This is altogether delightful, and it hardly needs the scare headlines to inform the reader that railroad fares are not in the game for a moment. We have no doubt that the report gave the presidents of most of our trunk lines cold chills, and we looked over the stock reports next day with the fond expectation of picking up some Pennsylvania or Central at about 30 cents per share, to meet, alas, with disappointment, as usual. The ferocious bulls that paw the pavement of the Street had evidently seen statistics before and remained unterrified.

The statistics in this case have a strangely familiar smell. We have caught the flavor time and again in Socialistic attacks on street railways, based on imaginary costs of operation, and a faint whiff of it rises above the other stenches from the Chicago municipal ownership platform. We have time and again roasted friends and enemies alike for putting out alleged costs bereft of maintenance and depreciation, and even of general expense. They may be on their face interesting to the bookkeeper, but they deceive the public and pave the way to insolvency. In this facetious economy run, the really deadly items of expense find no place. At the present prices of tires, the mere tire depreciation equals the entire costs reported, if any credence is to be given to the melancholy tales of the initiated. What maker will guarantee a set of tires on a touring car for an average of 5000 miles over country roads? And what is the practical life of the car as a whole? Where are now the cars of three or four years ago, unless they have gone to the land of lost needles and pins? Now and then one sees a scarred veteran of Model 1900 creaking along in the environs of Lonesomehurst, but its comrades have gone to that scrap heap from which no car returns, or, like the discarded horse cars, are stored in the back yard of nowhere. They are not even utilized for owl lunch carts. We believe in the future of the automobile as a useful permanent addition to the world's facilities for getting about, but to count on its economy as against railways, steam or electric, is mere badinage. What it does it may do well, and we appreciate its advantages, although deprecating the absurdity of these claims of economy. As a pleasure vehicle it is coming to be a distinguished success, and as a business vehicle it is making a good record. Why try to force it then into hopeless competition? As well try to exploit street cars as airships. The economy test which we would wish to see is a year's record of a much used car, owned by a private individual, with the total cyclometer record set against the total bills paid in its behalf, plus a proper proportion of the cost charged off against depreciation. As a matter of convenience, the record might be most admirable, but the actual expense per car-mile or passenger-mile would certainly not be a source of anxiety to railroad stockholders.

Hanging Apparatus Under the Car

As a general statement, we believe that resulting benefits would warrant more consideration being given to the disposition of the brake and other apparatus under the car. A car will, of course, operate no matter what the relative position of these parts may be, but the proper distribution of weight, accessibility of apparatus and neatness of appearance can often be improved upon with a little attention to this detail of car design.

So far as weight is concerned, the pump and brake cylinder under the car and the hot-water heater and controller, if the car has but one, are to be taken into account. When the heater and a heavy controller are on the same side, the pump and the brake cylinder must usually be placed on the opposite side to give the proper balance. Should the old type of panel rheostats be employed, their weight must also be taken into account in determining their location. The newly-adopted grid type of resistance, however, weighs only about 50 lbs. apiece, and its weight is consequently not such an important item.

To eliminate all guess work, it is a good plan to obtain the exact weight of each of the pieces of apparatus not located symmetrically on each side of the car, and then to do some preliminary locating on paper until an even distribution on each side of the center is obtained. Some may regard this as reducing the problem to an unnecessary nicety, but we believe it better to err on the right side rather than run the risk of having the springs settle unevenly, with the consequent listing of the car body to one side.

Two other considerations involving weight should be taken into account in addition to that of securing a balance. The nearer to the middle of the car the heavy parts are hung, the greater is the stress on the truss rods, and consequently the greater the tendency of the car body to sag down in the middle. To lessen this liability, the apparatus should be hung as near the trucks as clearance will permit. Again, a cross strain may be induced if the weighty parts are not placed directly opposite each other. This, however, is of minor importance.

The question of weight is the all-important one, but some consideration should be given the placing of the parts so they can be gotten at for inspection and when repairs are necessary. Periodic inspection of apparatus is a rather monotonous task, to say the least, and one may feel sure that the fewer facilities there are for inspecting the different parts the more likely is this very important work to be neglected. The pieces of apparatus should consequently be placed far enough apart to permit of access to those parts requiring inspection.

Much can be added to the appearance of the car by distributing the apparatus with this end in view. The consideration of appearance, however, is of minor importance as compared with those of distribution of weight and of accessibility of apparatus. So far as appearance alone is concerned, a good rule to follow is to place those parts which hang low—the pump, for example—as far from the sides as possible. The air tanks and resistances may be placed nearer the side sills. Increased ventilation for the resistances, moreover, is usually obtained by placing them under the side sills.

Emergency Brakes

What has become of the long list of emergency brakes which has accumulated ever since horse-car days? There is, happily, small need of such on many roads, but the inspired idiots who greased a steep grade on Halloween, in a neighboring city, and thereby nearly wrecked a carload of passengers, call to mind that there are occasions when drastic braking measures become very necessary. The point which we wish to bring to mind is the need of considering the factor of safety upon grades. In the very early days of electric railroading one of the chief "talking points" in favor of electric cars was their supposed ability to go up any kind of a grade. It was almost universally believed at one time that the passage of current between wheel and rail somehow gave the former a better grip upon the latter. While this idea was soon disproved, electric roads were still built upon the most break-neck grades, and even now are laid out frequently with reckless disregard of gravitation. An electric car with its entire weight upon the driven axles will undoubtedly climb terrific grades, limited only by the gearing of the motors and their grip upon the rails. Practically the attainable grade depends on the texture of wheels and rails and the sand available. Rails and wheels may vary in adhesive capacity from the friction determined by two smooth and somewhat lubricated surfaces to that of a gear and rack rail. On common track, as is well known, cars will take grades of 10 per cent comfortably, and so on up to 14 per cent or 15 per cent. With wheels not too smooth and over new and dry rails, the car can probably manage 2 per cent or 3 per cent more even than this, but it is close to the skidding point.

Now, one thing which should be determined for modern track and rolling stock is the variation in adhesion under different conditions of the track. Precious little numerically is known about this, though the facts are familiar in a very general way. The thing to be measured is the pull required to just skid the wheels under different conditions of track upon actual grades, and it could be found out without great labor by towing with a dynamometer. In the same way the capacity of the brakes could be tested, but as a matter of fact, if the brakes are in proper order, they will hold the wheels under almost any conditions. On some roads it would certainly be found that with a track in bad condition, skidding on grades is a contingency to be looked out for; in other words, the grades are such that there is an insufficient factor of safety, and it would then be the part of wisdom either to modify the grades or to try the virtue of track or roadway brakes. Of these, many forms have been devised, most of which have passed into innocuous desuetude. Nevertheless, there are times and places in which they would be useful. This matter of slippery track is important aside from grades. Every car carries in front a dangerous space—the distance within which the brakes will not bring it to rest—and the effect of a slippery track is considerably to lengthen this space. A knowledge of the real length of this dangerous space under different conditions of track and at various speeds is highly important in averting accidents, many of which have been caused by inadvertently trespassing upon the limit, particularly with high-speed cars. If on good track the brakes at a certain speed will stop the car in 50 yds., everything beyond that distance is safe so long as track and brakes are in normal condition, and no longer. It would be wise policy for operating companies to get a pretty clear idea of the dangerous space for each type of car used with various conditions of track. If the service is of a character to require running pretty close to the limits, from grades or any other cause, then emergency brakes are well worth consideration. They are certainly capable of getting a grip on the rails sufficient to stop the car even in situations of the most trying character.

Life of Brake-Shoes

The brake-shoe that has generally been considered most desirable for use in street railway service is the one which will give the longest life, irrespective of its other qualifications. Where light weight cars are used and there is an excess of braking power available, this opinion is undoubtedly correct, yet in considering the effect of the service upon the life of the shoe, there are many conditions which have an important bearing and should be carefully studied. For instance, the shoes which will unquestionably give the most satisfactory results in rapid retardation of cars are those of soft cast-iron body, while the harder and more durable shoes are much less effective in braking. Owing to the notoriously poor wearing qualities of the plain cast-iron shoes, the tendency in light electric railway service has been unmistakably toward the hard metal shoes or the soft cast-iron shoes with hard metal inserts.

There is, no doubt, much to be said in favor of the hard iron insert for service upon the average street railway system. While the highest efficiency of braking is not attained, there is still an ample margin in frictional qualities provided to enable quick stops to be made when desired, while the greatly increased life of the shoes is a matter of no small importance. With brake riggings proportioned properly for the insert shoes, no difficulty is experienced in making stops that are entirely satisfactory for the ordinary service. It is, in fact, often argued that there is advantage in having a tough, wear-resisting shoe, inasmuch as careless motormen often operate their cars through busy, crowded sections with their brakes partially set—to avoid the labor involved of continually setting and releasing the brakes. In such service a soft shoe will wear rapidly and prove uneconomical.

The character of the country operated through also has a marked effect upon the life of shoes, inasmuch as the dirt and dust disturbed by the car in its passage will inevitably get between the shoe and the wheel. Where sand or a pronounced grit is liable to be encountered, as in interurban service, a harder shoe, preferably a soft iron body with hard iron inserts, must be used in order to prevent excessive wear. Under the average conditions of city operation, however, this difficulty is rarely experienced, as the dirt usually encountered is of a nature conducive to slippage rather than productive of frictional qualities.

Much difficulty has been experienced in breakages of shoes when worn down rather thin, yet still thick enough to warrant their being retained in service. This may be effectually provided for by the use of one form of reinforcement or another, such as the inserted bundle of steel strips or the reinforcing steel back, which are now incorporated in standard makes of shoes now on the market. These systems add greatly to the life, giving full strength until the shoes are worn out and the reinforcing structure exposed. The strengthening features involved prevent the dangerous breakages due to shock, unequal heating, or other causes, with attendant danger of derailment which occur frequently in service with the old-style shoes. The importance of this innovation is being recognized by the largest systems and reinforced shoes are being adopted for standards.

THE STANDARD SURFACE CAR OF THE BROOKLYN RAPID TRANSIT COMPANY

The car recently adopted by the Brooklyn Rapid Transit Company as its standard for service on surface lines is a radical departure from the customary types of semi-convertible cars.

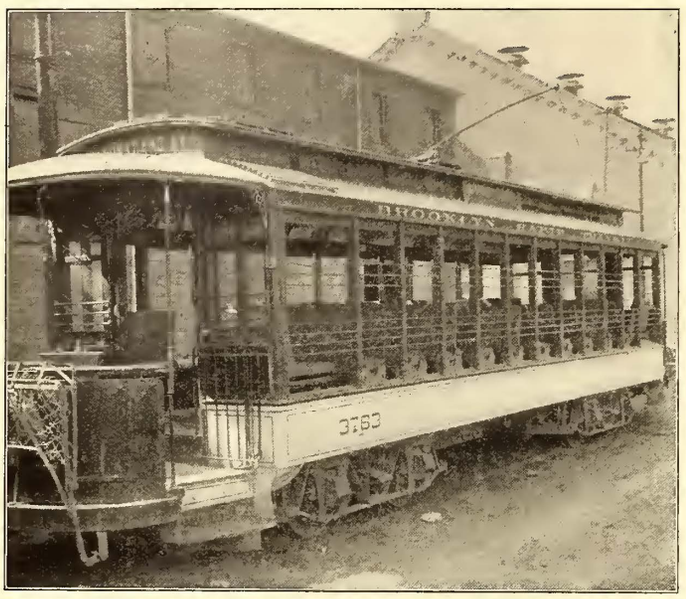


FIG. 1.—CAR OPEN FOR SUMMER SERVICE

When closed for winter service, in exterior appearance and in interior arrangement it differs very little from the usual closed car with cross seats. As an open car, on the other hand, it presents more the appearance of the usual type of open car than the ordinary semi-convertible type.

The change from a closed to an open car is accomplished by removing from between the side posts sash, containing the glass, and a panel, which corresponds in position to the con-

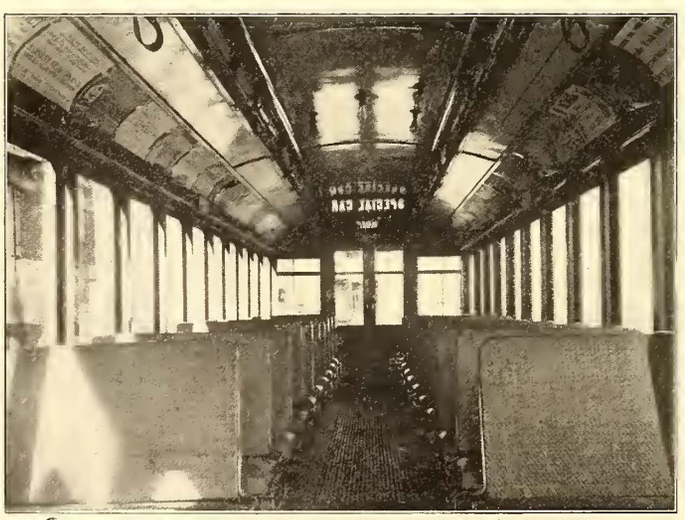


FIG. 3.—INTERIOR VIEW OF CAR

vex panel of the ordinary type of closed car. With these frames removed, the side of the car is completely open from the letter board to within 12 ins. of the floor.

A short description of the car was given in the issue of March 11, 1905, of the Street Railway Journal, at which time the first order for 200 was sent in. The cars received in the early part of the summer have been in operation during the past few months, and their adaptability to the service has been such that the company has just given a duplicate order for 150 additional cars. It is expected that in time this type will entirely supersede the ordinary side-entrance summer car on all the surface tracks of the company.

While the method of converting is its most prominent feature, the car is worthy of an extended description for an entirely different reason. It represents the most advanced ideas in surface car construction of one of the largest operating companies in the country. The construction of the car in general, the method of wiring and many other features are also peculiar to the practice of the Brooklyn Rapid Transit Company.

The general dimensions of the car are: Length of car body over corner posts, 31 ft. 5¼ ins.; length over bumpers, 42 ft.

FIG. 2.—A CAR BEING CHANGED OVER

6 ins.; extreme width, which is over water-drip rails, 8 ft. 2½ ins.; width over side sills, 8 ft.; height from under side of sill to top of trolley board, 8 ft. 11 ins.; height from floor to under side of upper deck headlining, 7 ft. 9¼ ins.; truck centers, 20 ft.

Probably the most noteworthy feature of the bottom framing

FIG. 4.—NEAR VIEW OF SIDE OF CAR, SHOWING RETAINER CASTINGS AND SASH

is the use of a steel plate, which is bolted to the outside of the side sill and extends around the corners of the car to the door posts at each end. The plate, which measures ⅜ in. x 17 ins., serves several purposes. In the first place, it ties the bottom framing firmly together and secures the side posts, to which it is bolted, to the side sill. Again, it trusses up the car body.

This latter is its chief purpose, and no other truss, either inside or under the car, is provided. Five cross sills, the bolsters and diagonal braces at the middle and across the corners of the framing, together with the strengthening effect of the double floor, insure the bottom framing against weakness at any point. The platform drops 9⅛ ins., and is supported entirely by two angle and two T-irons. All exposed wood surfaces of the bottom framing are covered with ¼-in. transite, as a protection against fire.

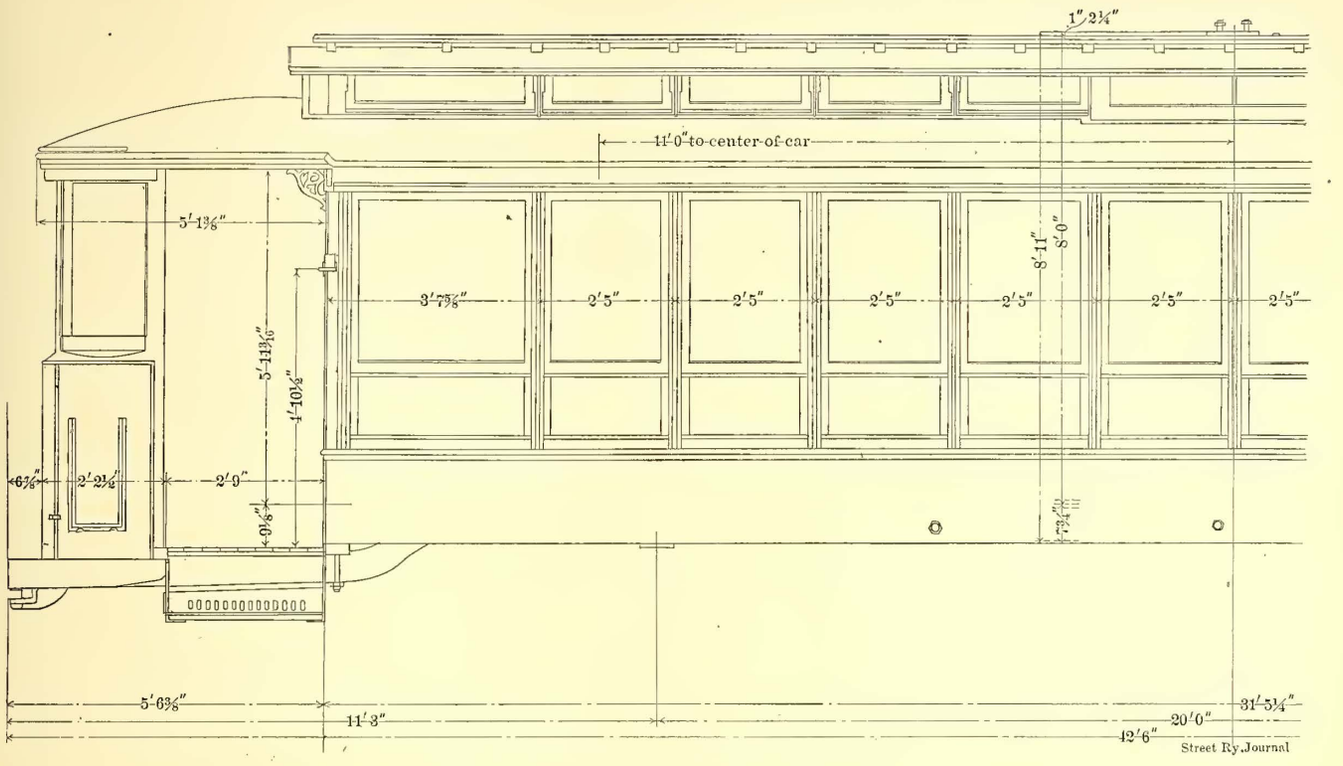


FIG. 5.—HALF SIDE ELEVATION OF CAR

The reproductions from photographs and the drawings show the construction of the removable sash and the window guards, as well as the method of fitting them in place. In the cross section of the posts, and shown in Fig. 8, may be seen the rabbets at the edge of the post into which the sash fit. When in position they are flush with the outside of the post proper, being held in place by retainer castings screwed to the the posts and extending the full distance between the belt and water-drip rails. The method of attaching these retainer castings may be observed in Fig. 7. Four round-head cap screws at intervals of 17 ins. extend through the posts from the inside and engage in threaded lugs in the retainer castings. These lugs in turn fit snugly in recesses in the posts, so that the castings always occupy the same position.

To prevent rattling, it is essential that the frames make a snug fit between the posts. This is facilitated by stamping them with the car number and the position to which they are fitted, so that they can be put back in the same place year after year.

The driving rains encountered in Brooklyn and the vicinity during the summer necessitate a curtain that will fit close against the posts and not be blown out of the groove intended for it. For this reason a special curtain fixture, which is of the pinch-handle type manufactured by the Curtain Supply Company, is used. A metal strip is screwed to the post, partly covering the curtain groove. A shoulder on the slide of the curtain fixture retains the fixture behind this strip, and the slide can only be removed when the curtain is completely raised. Stiffening rods placed at close intervals insure the upper portion of the pantasote curtain remaining in place.

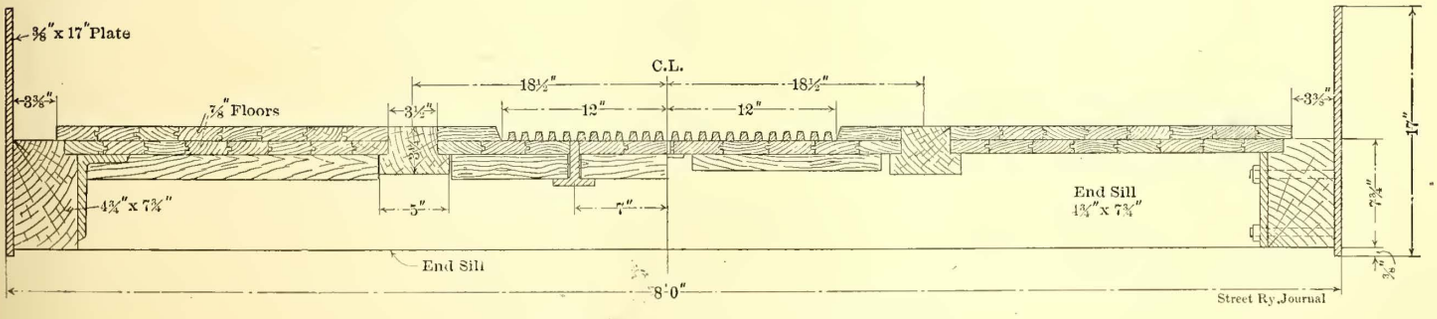


FIG. 6.—SECTION THROUGH UNDERFRAME

The roof is the usual design of monitor deck. Wood carlines are placed at intervals of about 9½ ins. Those over each side post are reinforced by carlines of 5-16-in. steel, the two carlines being bolted together at intervals of 11 ins. Roof mats are supplied at diagonal corners, and trolley boards extend the full length of the monitor deck. A novel method is employed in securing the trolley base block to the running boards. This is well shown in Fig. 10, showing the Milloy trolley stand in position. The advantage gained over the usual construction is the reduced height obtained.

A minor feature, yet one worthy of attention, is the design

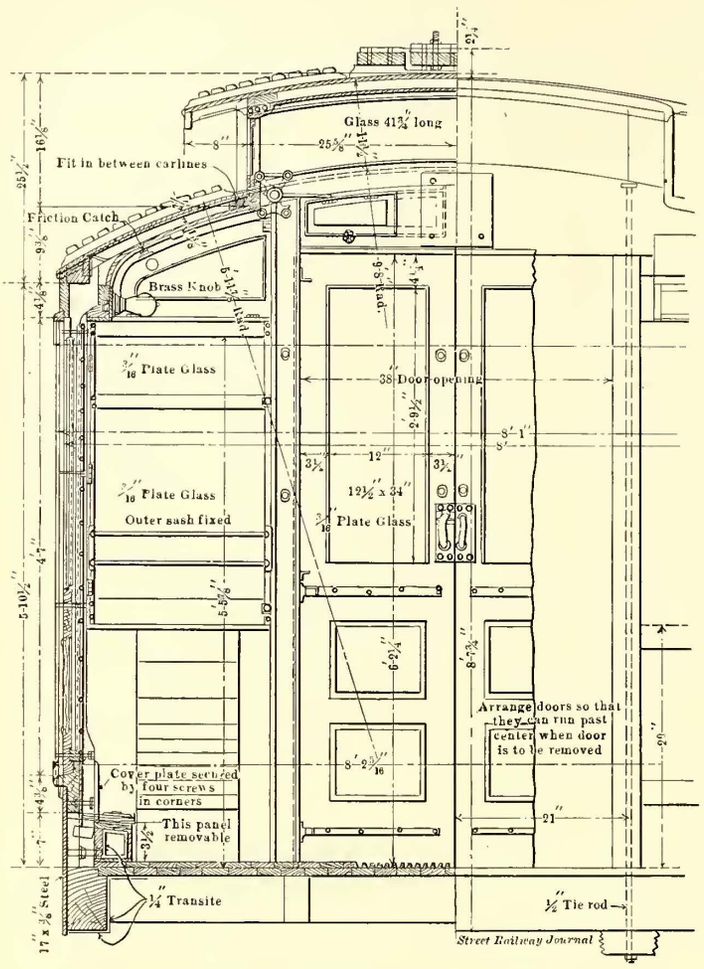


FIG. 7.—CROSS SECTION OF CAR BODY

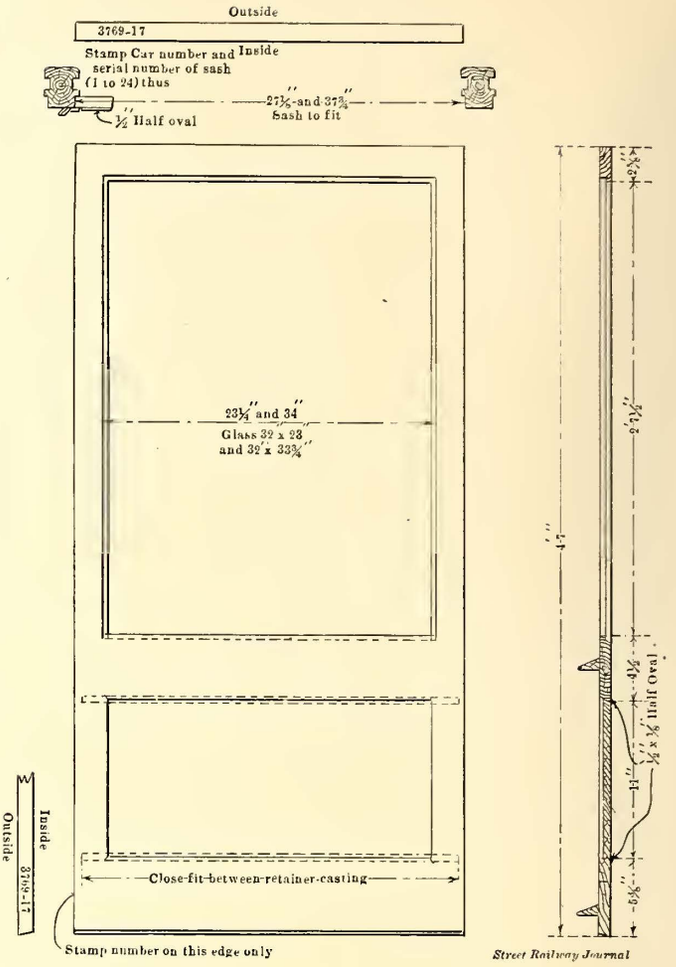


FIG. 8.—REMOVABLE SASH

of the corner post steps, which are used when ascending to the roof of the car. These steps serve as grab handles as well, as may be observed in Fig. 15.

The distinguishing features of the car wiring are the centralization of the several switches and the fact that as little as possible of the wiring is placed underneath the car. The under side of the framing between bolsters is practically clear of wiring. With the exception of the light wiring, all the wires which run the length of the car are carried in two cable ducts.

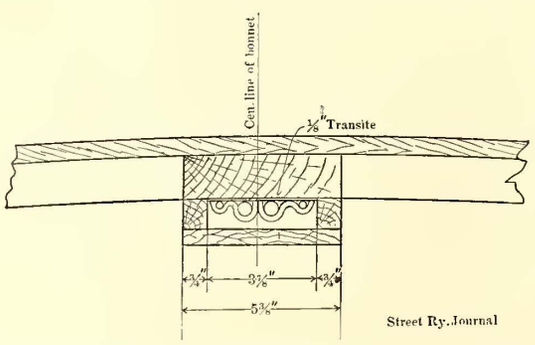


FIG. 9.—SECTION THROUGH BOX IN BONNET FOR WIRES TO CIRCUIT BREAKER AND BONNET SIGN

These ducts are built of wood and are lined with ¼-in. transite, and, as may be observed by reference to Fig. 7, they occupy the same position as do the radiating pipes in a car heated by hot water. To protect the ducts, cast-iron foot rests are screwed to the cover over the spaces between the seats. At the ends of the car the ducts terminate and the control wiring passes into similar cable boxes underneath the end sills where the boxes from the two sides of the car unite, and a single duct carries all the cables to the base of the controllers. All wires, with the exception of those in the cable duct, are carried either in loricated conduit or in electrobestos molding.

At each end of the car the trolley lead is carried down an upper deck corner post, and through the bulkhead into a wire box, to be described later, in loricated conduit. The conduit terminates here, the cable being carried in electrobestos molding, enclosed in a wooden box, along the under side of the hood to the automatic circuit breaker, placed immediately over the motorman's head. Returning from the circuit breaker, the cable passes back into the wire box, where iron conduit again receives it, then through the bulkhead and down a corner post to a fuse box underneath the car. Then it goes direct to the

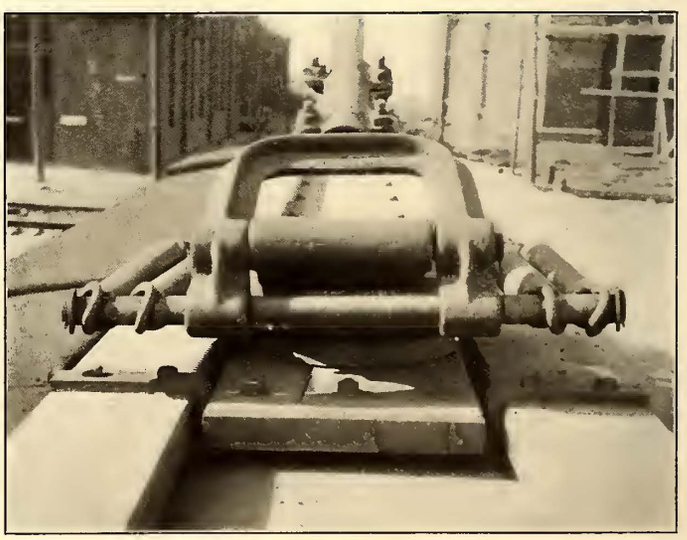


FIG. 10.—ROOF OF CAR, SHOWING METHOD OF SECURING TROLLEY BASE BLOCK TO RUNNING BOARDS

controller. The lead to the lightning arrester, which is tapped off the main cable in the wire box at the No. 1 end of the car, passes down a corner post to the arrester near the end sill.

With the exception of wires E_1, E_2 and R_5, all the motor and resistance leads are of No. 4 wire. The three wires mentioned are, for evident reasons, of larger size, No. 3 being used.

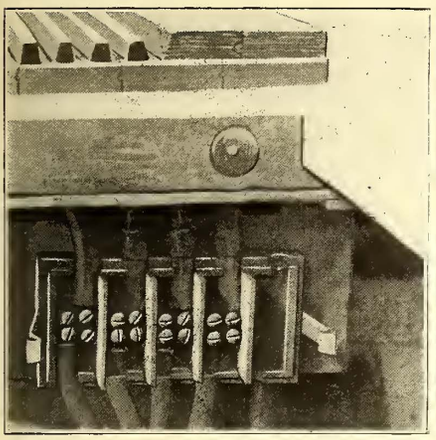


FIG. 11.—JUNCTION BOX FOR MOTOR LEADS

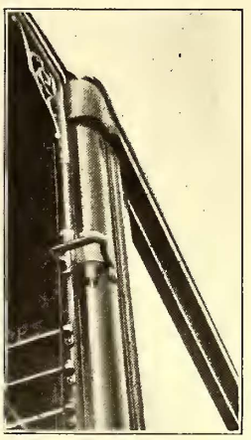


FIG. 15.—SHOWING STEP ON CAR POST

The manner in which the control leads are divided between the two cable ducts may be observed in Fig. 12. Electrobestos molding covers the resistance leads after they leave the cable ducts. Similar molding is used on the cable leads to the motors as they cross from the cable duct to the junction boxes of the

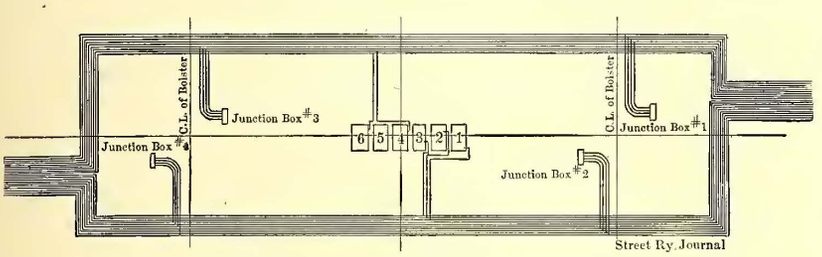


FIG. 12.—DIAGRAM OF WIRE IN CONTROL CABLE

motors. As these leads cross over alongside the bolsters, where dirt and water from the wheels might injure them, the electrobestos molding is protected by a cover of No. 22 galvanized iron. Fig. 13 shows this arrangement.

The junction box used solves in a very effective manner the

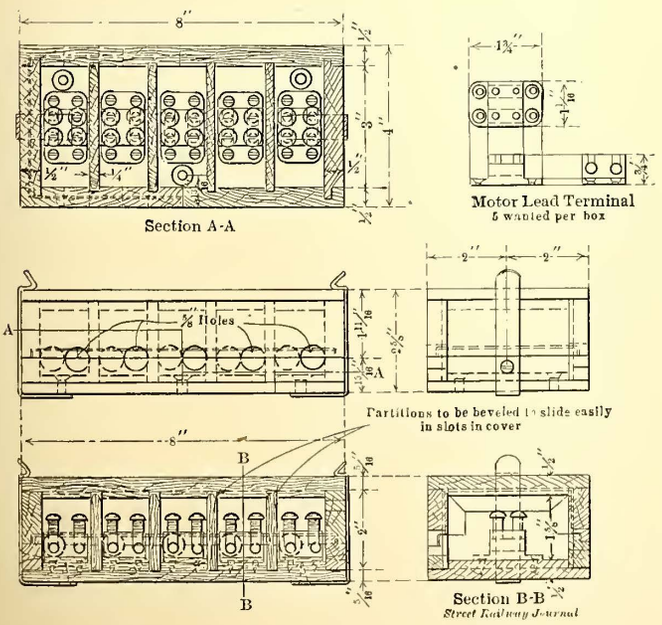


FIG. 14.—SECTIONS OF JUNCTION BOX FOR MOTOR LEADS

troublesome question of how leads from the cable and motor leads shall be connected. The design of this box may be understood from Fig. 14, while Fig. 11 shows it with cover removed in position under the car. The box, which is made of ash, measures 8 ins. long, 4 ins. broad and 2⅝ ins. deep. The removable cover is secured in place by spring clips. Wood separators divide the box into five compartments, each of which

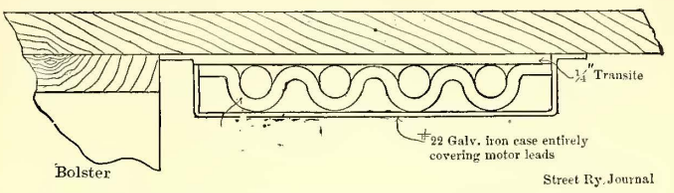


FIG. 13.—SECTION THROUGH CAR FLOOR, SHOWING METHOD OF CARRYING MOTOR WIRES TO JUNCTION BOX

contains a double terminal block. Leads from the cable pass through the top of the box, while the motor leads enter at the bottom. Some of the advantages to be derived from such a box are very evident. Where the ordinary two-way connector is employed instead, the tape used in a short time would go far toward paying the cost of constructing such a box. Moreover, the convenience and the rapidity with which motors may be connected and disconnected when the box is employed should not be overlooked.

A schematic diagram of the light, heater, pump and headlight circuits is shown in Fig. 16. With the exception of those for the headlight, the switches and fuses for all these circuits are on a slate board in a box, placed over the entrance door at the No. 1 end of the car. The box is lined with ¼-in. transite and is provided with a hinged cover. Its position and the relative location of the switches and fuses are shown in Figs. 17 and 18. In the former it may be observed that all the switches and fuses are lettered in such a manner that they may be recognized without first trying them.

The grouping of all the auxiliary switches of the car in one protecting box is a point worthy of special attention. It was the custom a few years ago to locate the switches and fuses for the lights, heaters and pumps at any convenient point on the car. When a fuse blows on such a car a new man is at a loss to know where to find the defect. Moreover, when scattered, the switches are usually unpro-

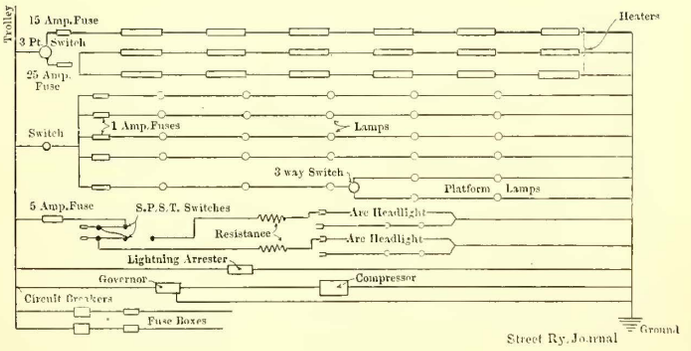


FIG. 16.—SCHEMATIC DIAGRAM OF CAR WIRING

tected and the repair bill is increased considerably over what it would be were the switches centralized and covered.

Immediately behind the switchboard on the No. 1 end, and in the corresponding position on the opposite end, are the wire boxes, to which reference has already been made. These project out from the bulkhead just underneath the hood, extending the full distance between the side plates, and contain all of the wires of the upper portion that pass across the car.

The wires in the box are all carried in electrobestos conduit. By reference to Fig. 18, the position of the boxes and the arrangement of the wiring in the one on the No. 1 end may be

FIG. 17.—SWITCH BOX OVER DOOR

observed. Each of the five lighting circuits employed contain a separate fuse, but all are controlled by one switch.

of these may be observed in the several photographs. A sign at the center of the car and the position of the lights behind it is well shown in Fig. 20.

The three-point heater switch controls two circuits, each protected by a separate fuse. One of these circuits further divides between two sets of heaters, as may be seen by reference to Figs. 16 and 21. The first point of the switch throws in the single circuit, which includes three heaters on each side of the car. On the second point current passes through six heaters on each side of the car, while the third point throws all the heaters in circuit. The heater leads are carried in the cable ducts with the motor and resistance leads. Through outlet castings in the top of the duct, the leads pass directly to the heaters under the seats. The outlets from the cable duct are but a fraction of an inch from the heater terminals, necessitating very short connecting wires.

At first thought it might be supposed that the car would require more heat than it would if permanently closed. It is believed, however, though no careful tests have been made, that by reason of the close fit of the removable sash, the car will be kept as warm with a given current consumption as would a closed car of equal size.

On No. 2 end of the car, in a position corresponding to that

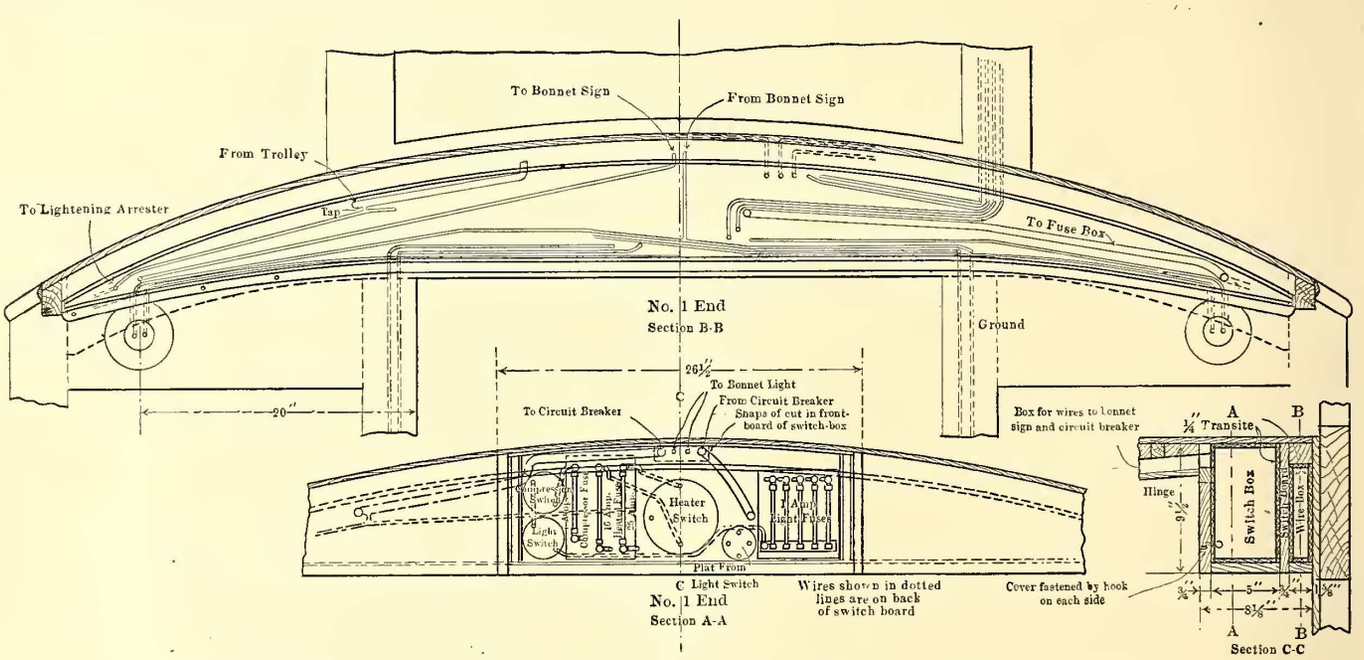


FIG. 18.—SECTIONS AT NO. 1 END OF CAR, SHOWING WIRING, SWITCH AND WIRE BOXES

Four of these circuits are straight five-light circuits. The remaining one, after passing through three of the lamps in the upper deck ceiling, returns to a three-point switch controlling

of the switch box on the No. 1 end, are located the two headlight switches. One of these controls the main circuit, while the other—a double-throw switch—shifts the current to either

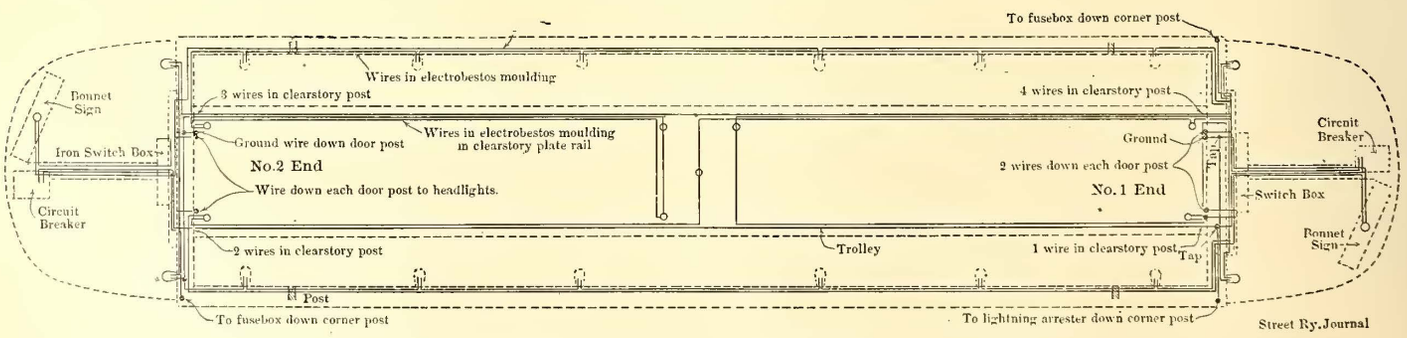


FIG. 19.—PLAN OF LIGHT WIRING

two platform lights on each bulkhead. The location of the lights and arrangements of the circuits are shown in Fig. 19. The nine lights in the upper deck are so placed as to best illuminate the signs under the monitor deck eaves. The position

end of the car. From the double-throw switch the current passes to one of the two headlight resistances under the car, and thence to the headlight. This is of the Rex combination arc and incandescent type manufactured by the United States

Headlight Company. A combination headlight is necessitated by the fact that the cars operate both on city lines and long suburban runs, such as that to Coney Island. The two-way switch leading to the two 32-cp 250-volt incandescent lamps in

FIG. 20.—SIGN, SHOWING POSITION OF LAMPS BEHIND IT

series or to the arc is located in the base of the headlight.

Of the 150 new cars of this type ordered, the John Stephenson Company will build 100 and the Laconia Car Company the remainder. Besides several other minor changes, the new cars will have vestibules on each end, as shown in the drawing. Vestibules are now being built on the cars in service, which

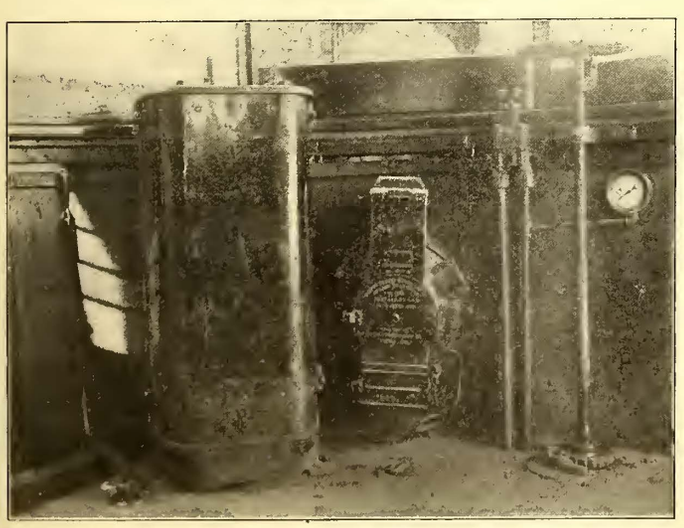


FIG. 22.—ARRANGEMENT OF CONTROLLER AND OTHER APPARATUS IN VESTIBULE

originally were constructed with open platforms, as may be seen in the half-tone reproductions.

The end sash in the new cars will be made stationary, those of the old car being arranged to drop. Close-fitting curtains will be provided for the end sash and doors, for the convenience of the motorman. It is as yet undecided what type of motors, controllers, brakes and heaters will be used on the cars of the new order. Trucks of a special type, made by the Baldwin Locomotive Works after designs furnished by the company, will be used under the new cars.

The car contains twenty-four rattan seats of the Wheeler type. Ten on each side are placed opposite windows, 30 ins. apart. To give desired aisle room near the doors, the remaining four are set in the corners lengthwise of the car. No attempts have been made to ornament the interior of the car with moldings and panels. The inside finish, which is cherry, is comparatively plain. The dash and all that portion of the car body below the belt rail is painted a citron yellow. The panels, posts, letter board and trimmings are scarlet lake.

A BOLD CAR HOUSE ROBBERY IN SEATTLE

Two bandits held up the Madison Street cable house of the Seattle Electric Company at 3:30 o'clock Oct. 22, overpowered a night watchman and fireman, and, after breaking into the company's strong box, made off with over $500, mostly in small change. The men forced an entrance to the car house two hours after the last car had turned in and everybody but the watchman and a fireman was gone. The watchman was busy cleaning the lamps when the bandits found him. They overpowered and tied him to a street car. The fireman came out to investigate the noise and was immediately made fast to another car. With the only men at the car house out of the way, the bandits broke into the engineer's tool chest and then robbed the sheet-iron box, into which the money collected by the various conductors is dropped.

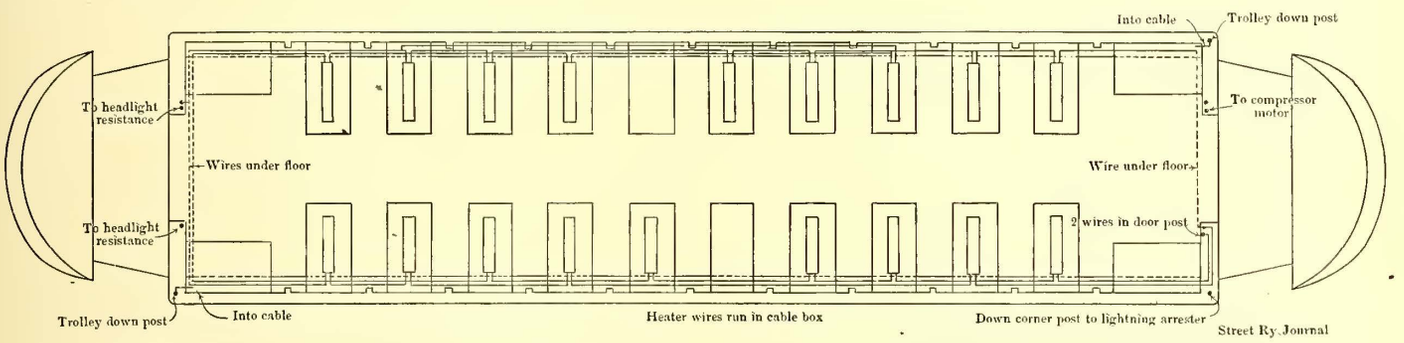


FIG. 21.—PLAN OF HEATER WIRING

THREE-WIRE SYSTEM TO BE TESTED ON THE VIENNA STADTBAHN

A test is to be made of the Krizik d. c. three-wire system on the Vienna Stadtbahn, which is at present operated by steam. This system was described in the STREET RAILWAY JOURNAL for Dec. 10, 1904, and a voltage of 2 × 1500 volts, or 3000 volts, between the outer wires will be used. The locomotive will contain four 200-hp motors, and the section to be equipped is that between Praterstern and Hauptzollamt, a distance of 1.4 km, or a little over 1 mile.

The Great Berlin Street Railway Company, owner of most of the surface lines in Berlin, Germany, has decided to increase its capital by $15,000,000 and construct underground lines under Potsdam, Leipsic and Unter den Linden Streets, provided, as seems probable, that a ninety-year concession can be obtained. Several minor street railways will unite with the Great Berlin Company in the project, the cost of which is likely to be two or three times $15,000,000.

BRAKE-SHOES AT ROCHESTER

Through the courtesy of R. E. Danforth, general manager of the Rochester Railway Company, the following statistics are published concerning the cost of brake-shoes on its city and suburban lines.

The company is now using a gray iron shoe having a slightly chilled face, and it is the practice, in so far as possible, to wear the shoes to about ½-in. thickness before they are removed. Some little difficulty has been experienced through uneven wear—that is, one end would wear almost through while there would be considerable metal left in the other end. This has now been remedied by a slight change in the brake rigging, and more nearly uniform results are being secured. The company is getting about 19,000 car-miles from the chilled iron shoes.

During a recent test a set of chilled iron shoes were put on an 8-wheeled car in comparison with a set of special shoes, and the car was kept in continuous service from May 7 to June 22, when the shoes were removed and weighed. The four special shoes weighed 92 lbs. when put in service and 50 lbs. when removed, the metal used amounting to 42 lbs., or a total cost of $1.36. This gave the following comparison with the iron shoe: The special shoe made 133 1-7 miles per lb. of metal, or 41 4-9 per $.01 of cost. The chilled iron shoe made 161 3-26 miles per lb., or 48 13-84 miles per $.01 of cost.

The following table gives data for seven months of 1905:

Month	Total Cost of Brake-Shoes	Cost of Brake-Shoes per 1000 Car-Miles
March	$321	.586
April	297	.575
May	253	.442
June	249	.420
July	205	.314
August	235	.362
September	233	.388

NEW TERMINAL DEPOT AND OFFICE BUILDING IN KALAMAZOO, MICH.

On account of the growth of interurban business, and the need of better facilities for handling the same, the old waiting room of the Michigan Traction Company in Kalamazoo, Mich., had become too small and cramped. The officials of the company therefore decided to build a new depot and office building. With this object in view, a large plot of ground was purchased on Portage Street, near Main Street, in the center of the business section of the city. The old buildings on the ground were razed and plans were drawn for the present building, which is built of red brick with red sandstone trimmings and steel girders.

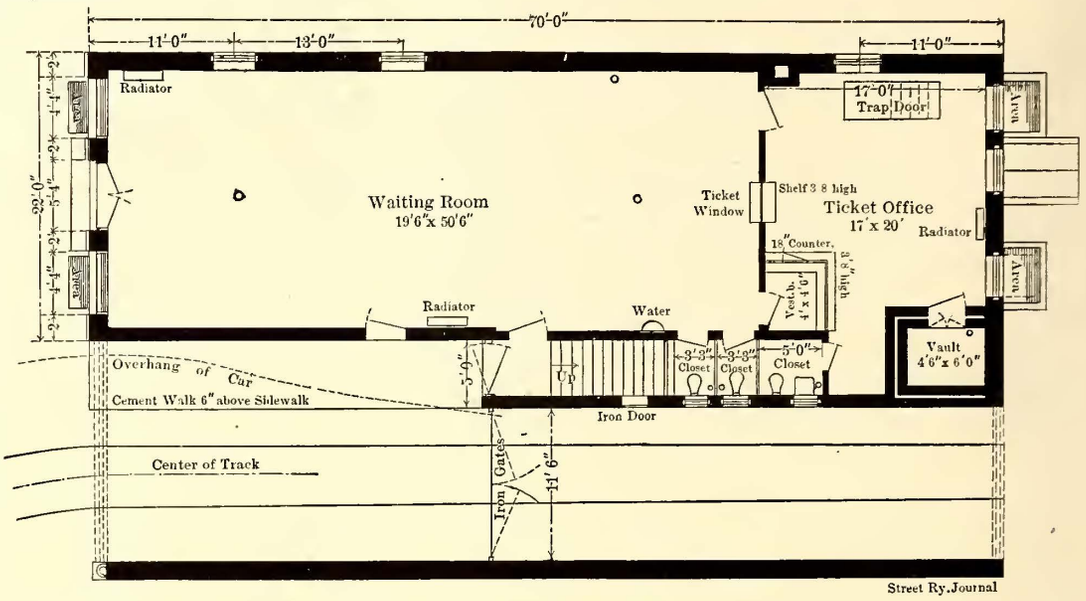


FIG. 1.—FIRST-FLOOR PLAN OF TERMINAL BUILDING, SHOWING WAITING ROOM, LOCATION OF TICKET OFFICE, ETC.

The first floor plan, which is reproduced herewith in Fig. 1, shows the arrangement of the waiting room and the ticket offices, with a track for loading and unloading cars. The track also leads to the freight house in the rear, and, as it is paved, is also used by wagons for a driveway to the freight house. The second floor plan (Fig. 2) shows the arrangement of the operating offices, also the employees' room.

The whole third floor is one large room, used for a hall and rented out for entertainments and receptions.

Fig. 3 shows the exterior of the terminal, with a car in the

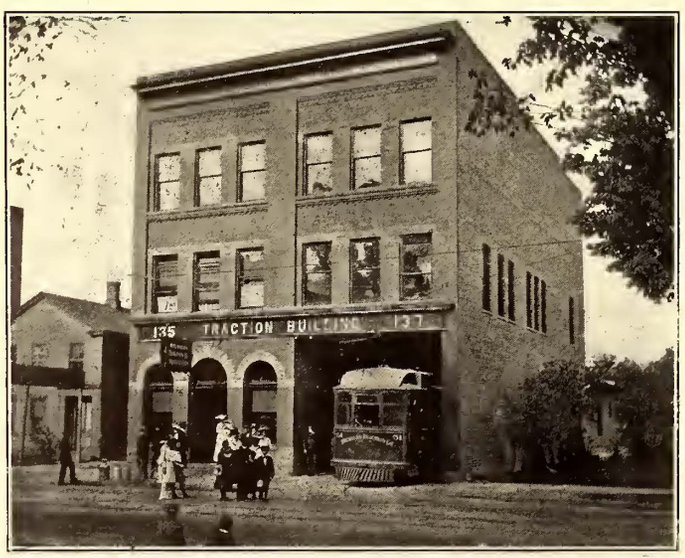


FIG. 3.—KALAMAZOO TERMINAL OF MICHIGAN TRACTION COMPANY

FIG. 4.—WAITING ROOM IN THE KALAMAZOO TERMINAL

train shed, and Fig. 4 the interior of the waiting room looking toward the front entrance.

This building was used for the first time on Sept. 15, 1905, and received high praise from the daily press and patrons of the road. The building was built under contract by local contractors, under the direct supervision of R. W. Harris, superintendent of the Michigan Traction Company, and D. A. Hegarty, general superintendent of the Railways Company General, which company owns and operates this property. At the rear of this building, at a distance of 40 ft., allowing space for teams to turn and back up to platform, is located the freight house, a substantial brick and steel structure.

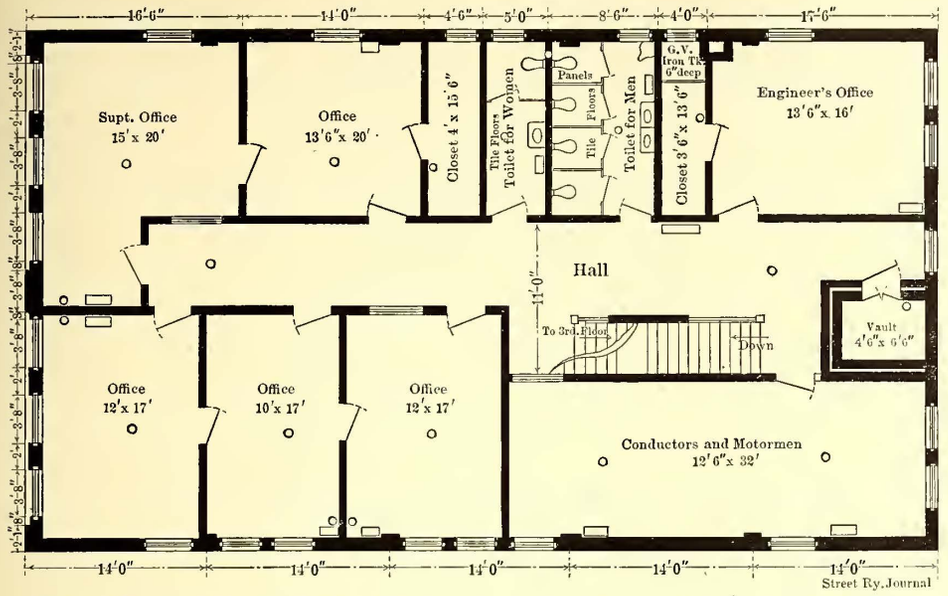


FIG. 2.—SECOND-FLOOR PLAN OF MICHIGAN TRACTION COMPANY'S KALAMAZOO TERMINAL BUILDING

BUILDING UP THEATER TRAFFIC ON INTERURBAN ROADS

During the past summer the Rochester & Eastern Rapid Railway Company, which operates a high-speed interurban electric railway between Geneva and Rochester, N. Y., has instituted a number of ways and means of increasing travel over its line, and several of these have been described in the columns of the STREET RAILWAY JOURNAL. J. H. Pardee, general manager of the property, is planning to continue through the fall and winter months the same policy of offering every possible inducement to residents along the line to use the electric road. As a single instance of what can be done in this direction, the company undertakes to secure reservations of seats in any of the Rochester theaters. Many people living along the interurban line some distance out from Rochester would frequently like to go into the city to attend the theater, but have been restrained from doing so owing to the inconvenience and expense of reserving seats in advance in person or by telephone, and the uncertainty as to whether the seats would be held until the parties reached the theater.

Under the arrangement devised by Mr. Pardee, people living anywhere within the district served by the electric road can now go to any of the company's station agents along the route and by leaving the amount of money equivalent to the price of the seats desired can receive an order for their seats. By special arrangement with the theaters, these orders will be exchanged at the theater box office for the seat coupons at any time. This insures that, although the parties may be delayed in reaching the theater for the desired performance, they can depend upon finding the seats ordered waiting for them.

This works out in practice as follows: When the company's agent receives a request to obtain theater tickets for a given performance, he first ascertains the price and location preferred and then telephones the order to the company's station agent at Rochester, using for the purpose the company's private telephone line. The Rochester agent then telephones the theater and reserves seats as near the desired location as possible and telephones the numbers of the seats back to the local agent. This agent then makes out an order and delivers it to the parties desiring the seats. The blank form used in the operation is reproduced in this connection. It consists of three perforated coupons. The long coupon at the right-hand end is the order and receipt which the local agent delivers to the party ordering the seats. The middle coupon or auditor's check is sent to the company's auditor for checking against the seat orders issued by the local agent when these orders are returned by the theaters. The left-hand coupon is the stub which remains in the local agent's book. The railway company has secured agreements from all the theaters in Rochester to enter into this arrangement, the only obligation being that the railway company agrees to hold itself liable for the price of all seats ordered by its agents whether the seats are used or not.

FORM O 6-2-06-1M-1M

ROCHESTER & EASTERN RAPID RY. CO.
THEATRE CHECK.

Date .....
Theatre .....
Seats .....
Performance EVENING MATINEE ..... 190....
Name .....
Amount $ .....

No. **1099**

ROCHESTER & EASTERN RAPID RY. CO.
THEATRE AUDITOR'S CHECK.

Date .....
Theatre .....
Seats .....
Performance EVENING MATINEE ..... 190....
Name .....
Amount $ .....

No. **1099**

ROCHESTER & EASTERN RAPID RY. CO.
INTERURBAN LINE.

Date ..... 190....
Good for ..... *Seats Nos.* .....
at the ....., *Rochester, N. Y.,*
for EVENING MATINEE *performance* ....., 190....
Issued to .....
Paid $ .....

No. **1099** *Agent.*

FORM USED IN HANDLING SALE OF SEATS FOR CITY THEATERS

The conveniences offered to the public by this system have resulted in building up the theater traffic into Rochester over the electric road from almost nothing to very satisfactory proportions, and it is now necessary to run regular theater cars every evening from as far away as Geneva, a distance of 40 miles, into Rochester, in order to accommodate this travel. Undoubtedly the progressive spirit exhibited in this connection by this company will be followed by other electric interurbans.

CORRESPONDENCE

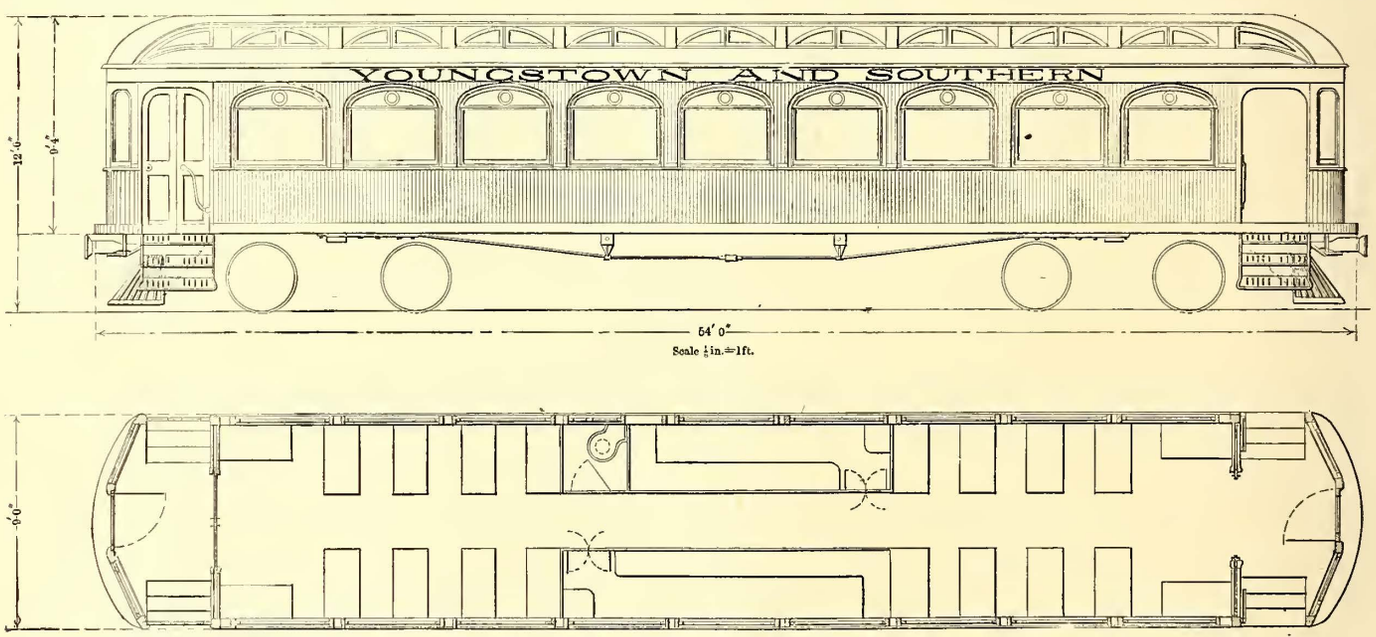
LOCATION OF TOILET AND SMOKING COMPARTMENTS ON INTERURBAN CARS

SHEBOYGAN LIGHT, POWER & RAILWAY COMPANY

Sheboygan, Wis., Oct. 31, 1905.

Editors Street Railway Journal:

Your editorial in the current issue of the Journal on the location of heaters and toilet rooms on interurban cars has proved very interesting to me. The problem which you mention is one which confronts all engineers who have to do with designing of rolling stock. You might with perfect propriety have included a few remarks on the location of smoking compartments of interurban cars. The major portion of your editorial refers to cars operated in one direction only. In the writer's experience this form of car has been the easiest type to design. There is no question whatever about the location of the smoking room, and on such a car the toilet room is, for obvious reasons, best located in the rear, with the heater opposite it. The only disadvantage to such an arrangement is, as you point out, that it reduces the available space at the door.



PLAN AND SIDE ELEVATION OF CAR DESIGNED FOR USE ON ELECTRIC INTERURBAN RAILWAYS AND FOR OPERATION IN EITHER DIRECTION

Whenever the designer undertakes to produce a car suitable for a modern interurban railway to be operated on the multiple-unit system, he has a more difficult problem to solve. The accompanying engraving shows a car which the writer designed for a proposed interurban railway in the State of Ohio. Owing to the fact that the road was completed and is operated as a steam railroad, the car shown here was never actually built, but it is possible that it may be constructed in the near future. On a railroad operated on the multiple-unit train control system, it is out of the question to have cars arranged for operation in one direction only. Cars must be so designed that they can be operated in any direction or sandwiched in among other cars in a train. The car here shown is, therefore, designed with end doors, so as to give connection the entire length of the train. It is designed with a steel frame running from end to end, with the platform an integral part of the floor framing. This construction necessitates one more step than is ordinarily provided, but such construction does not present any particular difficulties, nor work any hardship on passengers. No motormen's cabs are provided in any way, and the car is intended to have master controller and air-brake apparatus in the forward right-hand corner of each platform. The pilot or cow-catcher is hung from under the platform sufficiently far back to allow cars to be coupled together without interference from pilots. The body doors of cars are double sliding and the two end seats are placed longitudinally to give plenty of room near the doors.

The most unique feature of the cars is the location of the smoking room. Smoking rooms located at the end of the car have been a source of annoyance to passengers for a long time. Cars operated in either direction must on each alternate trip have the smoking room at the rear end, which makes it almost compulsory for passengers, including ladies and children, to pass through the smoker, with its usual collection of tobacco spitting humanity, puffing like volcanoes. How many fares interurban roads lose on this account it is, of course, impossible to estimate. It seems worth some effort to do away with these annoyances. Accordingly, the smoking compartment is placed in the middle of the car. In reality, there are two smoking rooms, partitioned off from the main body of the car with panel and glass partitions. The aisle is continuous throughout the length of the car, and the smoking rooms are one on each side of the aisle. The seats in these smoking rooms were arranged longitudinally with their backs toward the aisle, thus enabling the passengers to sit facing the window, which accomplishes two objects: one, that the occupants of the smoking rooms are so placed that they cannot stare and ogle at people passing through the aisle, and the other, that they can enjoy a view of the scenery along the route with the maximum of comfort. Each smoking room is provided with two independent ventilators. The toilet room is partitioned off, as shown, and is in an exceedingly convenient location. On account of the fact that the road on which these cars were to be operated is in a locality where coal could be obtained at about 75 cents per ton in the boiler room, it was intended to heat the cars electrically, but a smaller partition could very readily be arranged for a hot-water heater directly opposite the toilet room. The problem of carrying ashes through the car, it seems to me, you make too much of in your editorial. I wonder if it has ever occurred to the men who complain about ashes littering up the floor that there is only about 2 ins. of wood between the heater and all outdoors, and that by boring a hole in the floor immediately under or adjacent to the heater, the whole problem of ash disposal is solved.

I hope that you will find the design of this car of some interest, and beg to assure you that criticisms of it will not be resented.

Ernest Gonzenbach.

COST OF OILING CARS

THE RHODE ISLAND COMPANY

Providence, R. I., Nov. 10, 1905.

EDITORS STREET RAILWAY JOURNAL:

In relation to your editorial in the issue of Oct. 24 on the "Cost of Oiling Cars," and more particularly to that part which reads as follows: "The main thing with them is to get a cup which will feed no more than the necessary amount, and will, as far as possible, stop feeding when the car is standing still," I would like to add a few facts which have been proved conclusively on the various lines operated by the Rhode Island Company, of Providence, R. I., with oil cups of our own design.

The amount of oil necessary for proper lubrication is dependent upon the size of the bearing and the operating conditions under which the motor works. The cup is so designed that dust and dirt is prevented from reaching either the oil or the bearing. Some of our GE 57 motors have been running, and are still running, with an average of 2 ozs. of oil per bearing per 1000 miles. Similar tests show that the smaller bearings, such as are found on the GE 800 motors, require from 3 ozs. to 4 ozs. of oil per bearing per 1000 miles.

A good grade of oil for this work weighs about 116 ozs. per gallon. This cup is easily adjusted, so that more oil can be used if desired, but if a good grade is used, from 2 ozs. to 5 ozs. seems to be ample to meet any condition, which makes a very cheap and reliable lubrication. It also positively stops feeding when the car is not in motion, thus preventing all waste. If these features did not exist, the amount of oil necessary to be used could not be brought down to the figures above mentioned.

There is no felt or wicking used in connection with the feeding apparatus, and the construction is so plain that there is no possibility of clogging on account of dust or dirt.

W. D. WRIGHT, Superintendent of Equipment.

HIGH FREQUENCY FOR SINGLE-PHASE RAILWAYS

ALLGEMEINE ELEKTRICITATS-GESELLSCHAFT

Berlin, Oct. 31, 1905.

EDITORS STREET RAILWAY JOURNAL:

Referring to the paper by C. F. Scott on "The Single-Phase Railway System," presented before the Philadelphia convention of the American Street and Interurban Railway Association, and published in the STREET RAILWAY JOURNAL of Sept. 30, 1905, we note that on page 606, under the heading "Source of Power," the assertion is made that "The standard frequency for the single-phase motor is 25 cycles. * * * If power is to be taken from a power house which generates a higher frequency, it cannot be applied directly, but must be changed to 25 cycles. This may be effected by a motor-generator set."

It may be of general interest to know that this limiting condition does not apply to the Winter-Eichberg motor, for without any changes in construction this motor is capable of operating up to 50 cycles. This company has already installed two large systems, namely, the Stubaitalbahn in Innsbruck, Austria, and the Borinage in Belgium, the first of which uses 42-cycle motors and the second 40-cycle motors. Despite the difficulties presented by the peculiar local conditions, the motors have been operating very satisfactorily.

The direct use of high-frequency single-phase current naturally brings with it the great advantage that the same power station generators can be employed for supplying both the lighting and the railway circuits. This makes it possible either to divide the normal lighting and railway circuits, in which case the reserve machinery is equally good for both branches of the business (as is the case in the Borinage), or one and the same machine can be used simultaneously for lighting and railway work (as is the case on the Stubaitalbahn). The latter arrangement is particularly valuable for small installations whose power requirements form a relatively small part of the total capacity of the power station.

In the above-mentioned paper by Mr. Scott a list is given of the railway installations which the Westinghouse Company had in hand at that time. In connection with this it may be of especial interest to note the following work which has been carried out or is being carried out by this company:

Spindlersfeld, five 110-hp motors, total 550 hp; Swedish State Railways, five 110-hp motors, total 550 hp; Hamburg City & Interurban Railway, 161 115-hp motors, total 18,515 hp; compressor motors for the foregoing installations, fifty-seven 3-hp motors, total 171 hp; Stubaitalbahn, twenty 40-hp motors, total 800 hp; Borinage, forty 40-hp motors, total 1600 hp; mining locomotives for the Menzel shaft, three 40-hp motors, total 120 hp; making a grand total of 22,306 hp in single-phase motors. ALLGEMEINE ELEKTRICITATS-GESELLSCHAFT.

THE NEW YORK CENTRAL-NEW HAVEN SITUATION

In view of the attention which is being given to the proposed electrification of the New Haven road, and the communications which have appeared in previous issues on this subject, the following statement from Wm. S. Murray, electrical engineer for the New York, New Haven & Hartford Railroad, is of interest:

Concerning the proposed method of electrification it is interesting to note the unsolicited general concordance of opinion on the part of certain engineers, and gratifying in the main to note a temerity in expressing a concrete opinion of our decision.

Without a full appreciation of the relevant factors in the case one could hardly view with a more kindly eye a hearty endorsement of our conclusion than a condemnation of it. Certainly the first indication of a real engineer is his reservation of an opinion until all these relevant factors have, in the full knowledge of their true bearing, been assembled. To-day a conclusion is worth nothing that is not a compromise. A compromise is the true algebraic sum of all the relevant factors.

After six months' careful study of the possible methods of electrification a conclusion has been reached. The work has been too initiative, the ground too new and the opportunity too exceptional not to have kept an accurate log upon the method of procedure. Were it possible to devote time to things other than an expeditious and careful continuance of the work begun we would gladly segregate this conclusion into its relevant factors and discuss it with those engineers who, by the reservation of their concrete opinion, have shown a silent wish to later agree or disagree with its plans.

To the two great electrical manufacturing companies who have placed the genius of their engineering in our hands for consideration we have nothing but the highest tribute to pay. It has been no mean privilege to make a minute study of their individual viewpoint of the problem. It is true their analysis of the situation has dictated widely separated conclusions, and those engineers who appreciate the trust imposed in this decision for the New Haven road can readily understand that the divergence of opinion has served only to double the responsibility of the conclusion, but by which the engineers for the New Haven road are in no way disturbed.

To those minds prone to a conclusion without the assistance of the relevant factors it may be a helping thought to say that throughout the study of the New Haven's electrification the Central's plans have been a constant and most relevant factor. The conditions of the New Haven problem, however, are widely different. It has been deemed that alternating current is pertinent to their proper fulfillment. Because the New Haven locomotives will be operative either on direct or alternating current in no way emphasizes the importance of their interchangeability. The condition imposed in effect makes valuable the double characteristic. A criticism of the Central's plans is irrelevant and unnecessary; direct-current propulsion is the judgment of their engineers. Our concern is its effect upon us, and it is read in the direct-current characteristic of our locomotive.

The officers of the East St. Louis & Suburban Electric Railway Company, accompanied by section foremen of all divisions, inspected the road Nov. 2. Two prizes of $50 each will be awarded to the foremen whose sections have been kept in the best condition at the least cost.

NEW YORK CENTRAL ELECTRIFICATION

An extended description of the new electric power stations now being built by the New York Central & Hudson River Railway Company for its electric zone in New York City was published in the last issue of the Street Railway Journal, and in the previous issue an account was given of the new steel cars of the company. It is proposed in this issue to describe the improvements which are being carried on in the

PART OF THE EXCAVATION FOR NEW GRAND CENTRAL STATION, LOOKING NORTH FROM FORTY-FIFTH STREET

Forty-Second Street terminal to accommodate electric trains, and also to describe the transmission system and sub-stations.

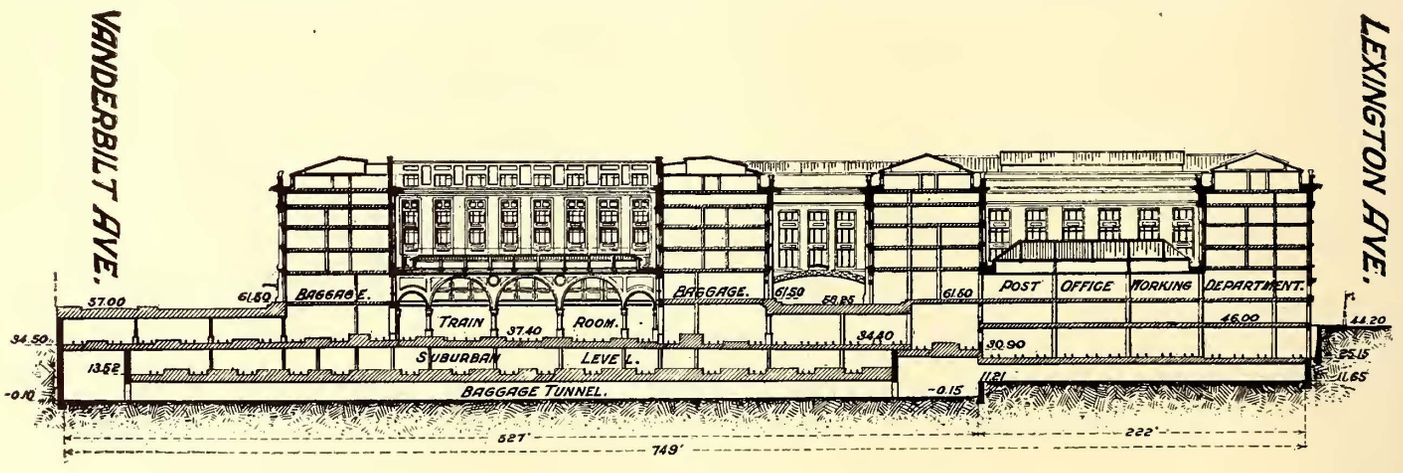
The changes to be made at the Grand Central Station involve a demolition of the present building and the construction of a new terminal station which will undoubtedly be the largest and most complete in its appointment of any railroad terminal in the world. It will be unique in a great many ways, but notably in the fact that it will be designed entirely for electric railway operation. This permits the use of two train levels, both below the level of the street, while the ticket offices, waiting room, baggage rooms, etc., are on a third level, accessible directly from the streets on either side. This arrangement would not have been possible except in a station devoted entirely to electric trains, hence this station establishes a new standard in terminal station design. The advantage of employing several tiers in terminal station construction in a city and district in which real estate is so expensive as it is in New York are obvious. Instead of being obliged to secure additional track accommodation by spreading out laterally, the additional space is gained by expanding vertically. The new station and switch yard will occupy considerably more space than the old station and switch yard, and by the use of different tiers the company has been able to reclaim for railroad purposes about 40 acres of land which would not have been available with the use of steam locomotives. It is not the intention in this article to describe the architectural features of the new station, but to confine the description to the arrangement of the tracks and its effect on the capacity of the station.

The lower deck, or the suburban track level, is on practically the same grade as the New York Subway. The arrangement of tracks in this terminal is shown on the opposite page. All trains running into this station will be multiple-unit trains, and, as will be seen, separate platforms are used for inbound and outbound passengers. Each passenger track extends between two platforms. In this way trains can discharge passengers on one platform and immediately receive passengers from the platform on the opposite side of the train. The station can be used as a stub-track terminal and the trains can be immediately despatched out of the station; or if preferred, the train, after discharging the passengers, can continue around the loop and receive passengers from any one of the outbound platforms on the other side of the station. This level, as shown in the plan herewith, is designed to have a physical connection with the subway, although the actual construction of this connection has not been definitely decided upon. Underneath the station is a baggage tunnel through which baggage can be conveyed from Lexington Avenue to Vanderbilt Avenue.

The express level, which is at a height of 20.98 ft. above the suburban level, is designed for through trains and electric locomotive operation. As will be seen, there are forty-seven stub-tracks on this level, with special platforms for United States mail, Adams Express and American Express.

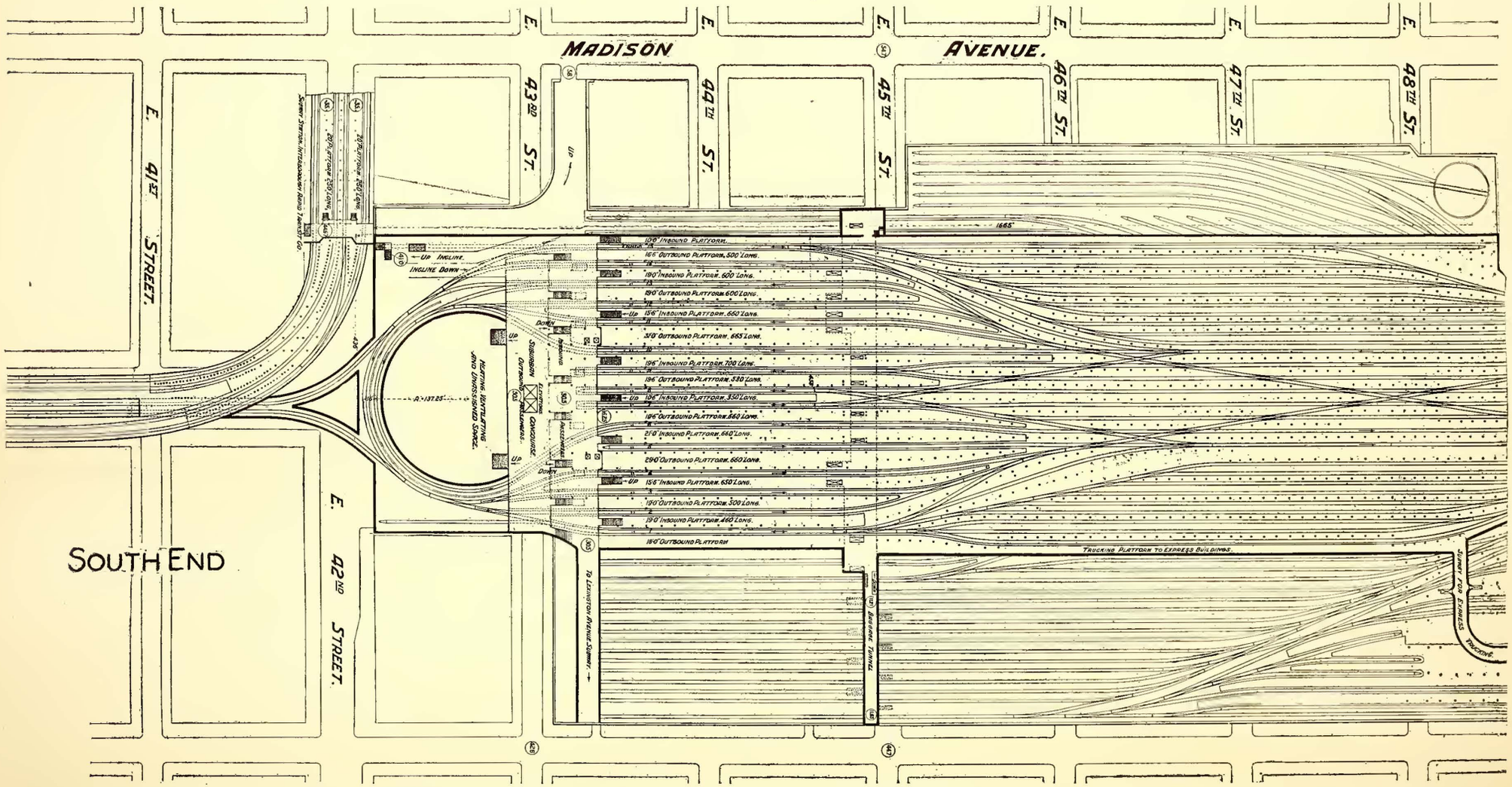
The ticket office, waiting rooms and baggage rooms are practically on the Vanderbilt Avenue and Forty-Second Street street level, and are 27 ft. above the express level. Adjoining the new station on the Lexington Avenue side will be the Post-office Building, which will be connected with the station by an underground passage.

Before the commencement of the terminal improvements all

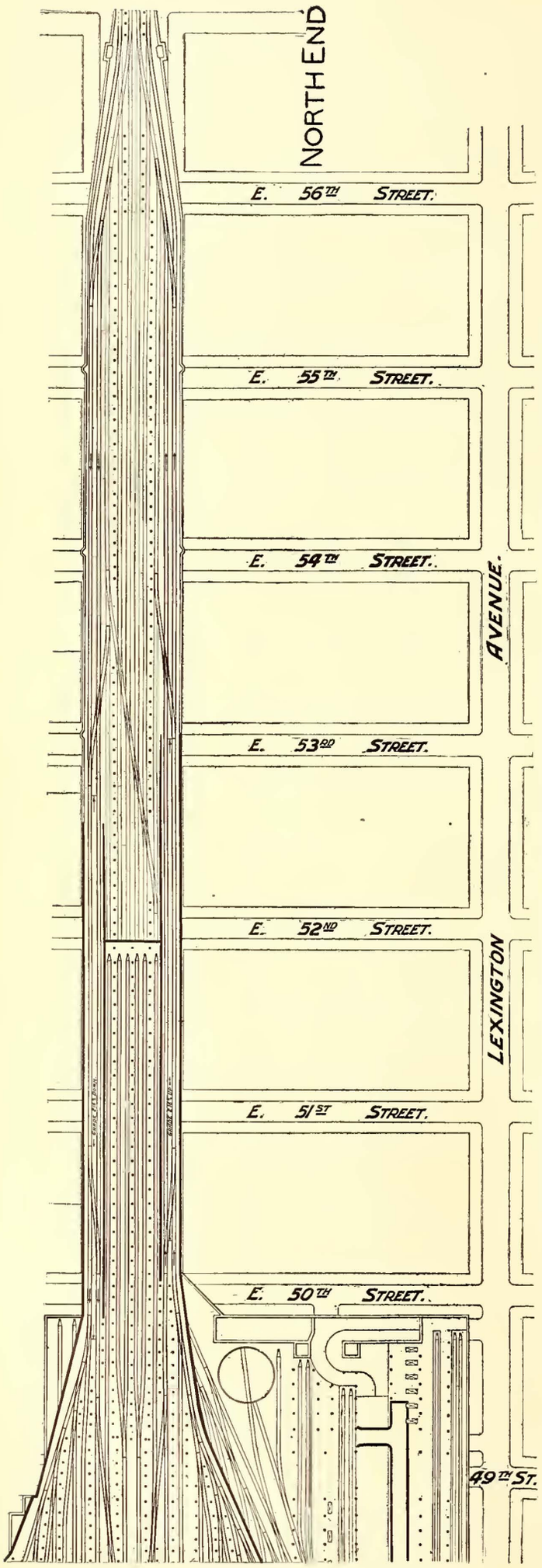


SECTION OF NEW GRAND CENTRAL STATION THROUGH TRAIN ROOM

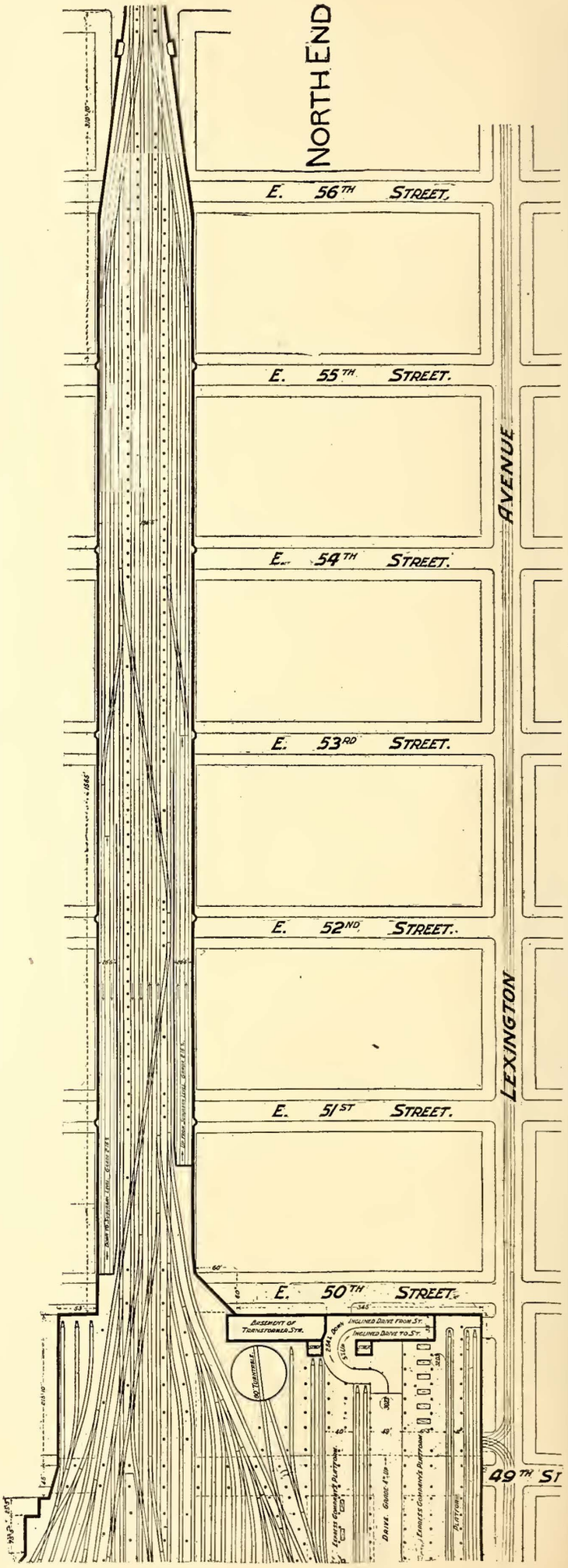
trains entered the Grand Central Station at Forty-Second Street, New York, through the four-track masonry tunnel in Park Avenue, which terminated at Fifty-Sixth Street. Thence to Forty-Ninth Street the tracks ascended 17 ft. in an open cut and entered an open yard, descending 3 ft. to street level at the station. The yard had an irregular area about two blocks in width and seven blocks in length, and covered 23 acres with its 11.3 miles of tracks and several buildings for freight, express operations and storage purposes. North of Forty-Ninth Street vehicular traffic was maintained on both sides of Park Avenue, the tracks occupying the center of the street only; between Forty-Ninth and Forty-Second Streets



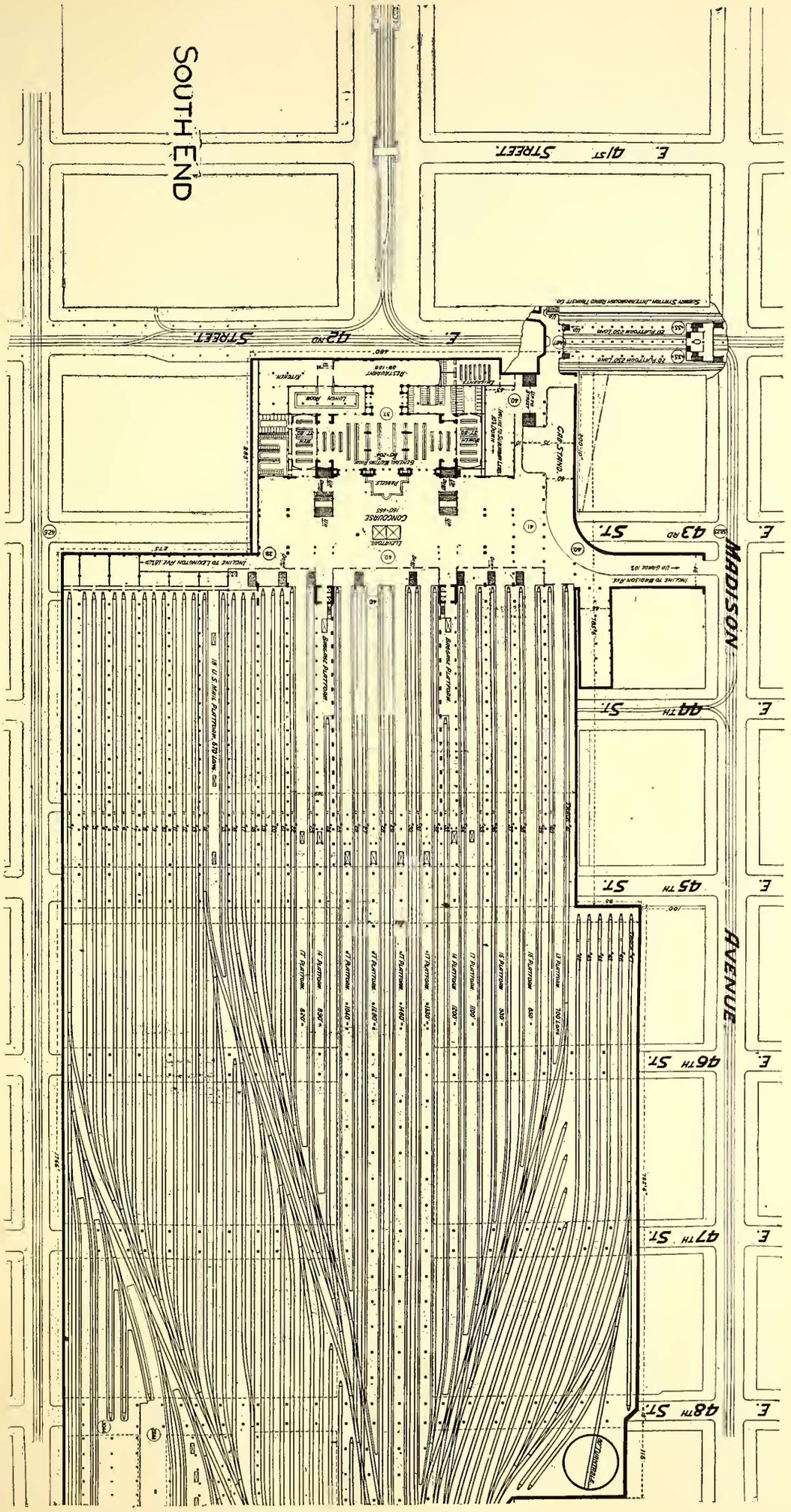
PLAN OF TRACKS ON SUBURBAN LEVEL, NEW GRAND CENTRAL STATION, NEW YORK, OF THE NEW YORK CENTRAL & HUDSON RIVER RAILWAY COMPANY, SHOWING INBOUND AND OUTBOUND PLATFORMS FOR MULTIPLE-UNIT ELECTRIC TRAINS, LOOP, POSSIBLE CONNECTION WITH THE SUBWAY AND STEPS AND ELEVATORS LEADING TO EXPRESS LEVEL ABOVE



PLAN OF SUBURBAN LEVEL OF THE NEW GRAND CENTRAL STATION FROM FORTY-NINTH STREET TO FIFTY-SEVENTH STREET



PLAN OF EXPRESS LEVEL, NEW GRAND CENTRAL STATION FROM FORTY-NINTH STREET TO FIFTY-SEVENTH STREET



PLAN OF TRACKS ON EXPRESS LEVEL, NEW GRAND CENTRAL STATION, NEW YORK, OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD COMPANY, SHOWING STUB-END TRACKS, CONCOURSE, RESTAURANT, ETC., AND STEPS LEADING DOWN FROM TICKET OFFICE ON STREET LEVEL ABOVE.

the tracks occupied the full width of the roadway, so that no portion of it was available for traffic. Street traffic was carried across the yard by inclines with a long-span truss bridge on the center line of Forty-Eighth Street and by a girder bridge over the cut in Park Avenue, between Fifty-First and Fifty-Second Streets. Foot bridges crossed the yard at Forty-Seventh and Forty-Ninth Streets, and crossed the cut at Fiftieth, Fifty-Third, Fifty-Fourth and Fifty-Fifth Streets. These were elevated above the street level and approached by stairs and, at the east end of Forty-Seventh Street, by an incline.

The improvements now in progress will keep the entrance of the tunnel as before at Fifty-Sixth Street, but will depress the tracks at that point and provide for ten tracks instead of four, as formerly; the yard will be depressed to a level about 15 ft. lower than before, and will be extended to a maximum width of about 135 ft. on both sides for a length of 3400 ft. from the end of the tunnel to the new terminal building. About 17.5 miles of new and rearranged old tracks will be laid in the 43-acre yard; a yard 300 ft. wide and 6.2 miles of track will be constructed about 22 ft. below the main yard on the center line of Park Avenue, and will extend from Fifty-Third Street to and through the new station. A steel plate girder viaduct extending longitudinally through the center of the yard will carry the full width of Park Avenue from Fifty-Sixth Street to the new station at Forty-Fifth Street, and thirteen plate girder viaducts from about 45 ft. to 63 ft. wide and 50 ft. to 950 ft. long will carry all intersecting transverse streets across the yards. The cross streets will be graded up to the ends of these viaducts. A new terminal station will be constructed with connections to the Rapid Transit Subway at the level of the suburban train platform, and uninterrupted and increased train service during the execution of these improvements will be facilitated by the construction of a large temporary passenger station on the east side of the new yard and by the transfer of the engineering and other offices to a new building at Madison Avenue and Forty-Fourth Street. The important results attained by these improvements are given in the accompanying table.

The design and execution of the terminal improvement work described above is under the direction of a special engineering corps of the New York Central & Hudson River Railroad Company, under W. J. Wilgus, vice-president. A. B. Corthell is terminal engineer; G. A. Harwood, designing engineer; W. F. Jordan, resident engineer in charge of general field work and supervisor of details; and W. L. Morse, assistant engineer in charge of the execution of plans and structural engineering.

TABLE SHOWING FACILITIES AT GRAND CENTRAL TERMINAL BEFORE AND AFTER IMPROVEMENTS.

Subject	Present Amount			Proposed Amount				Increase Per Cent.
	Mott Haven	Grand Central Station	Total	Suburban Level	Express Level	Street Level and Above	Total	
Terminal area, acres	.....	23.24	23.24	24.22	40.32	.....	64.54	178
Tracks, platform, miles	.....	2.91	2.91	2.07	3.70	.....	5.77	98
Storage, miles	.....	1.54	1.54	2.94	5.57	.....	8.51	453
Express, miles	.....	0.35	0.35	.....	0.86	.....	0.86	146
Mail, miles	.....	0.16	0.16	.....	0.20	.....	0.20	25
Other, miles	.....	5.88	5.88	5.58	6.25	.....	11.83	101
Total, miles	.....	10.84	10.84	10.59	16.58	.....	27.17	151
Tracks, car capacity (*a*).								
Platform	.....	214	214	177	273	.....	450	110
Storage	525	115	640	249	394	.....	643	0.5 (*b*)
Express	.....	26	26	.....	61	.....	61	135
Mail	.....	11	11	.....	15	.....	15	36
Total	525	366	891	426	743	.....	1,169	31
Tracks, platform, number	.....	19	19	15	20	.....	35	84
Ground area, building, acres	.....	5.90	5.90	.....	.....	8.10	8.10	37
Offices, sq. ft.	.....	129,500	129,500	.....	.....	426,694	426,694	229
Post Office, sq. ft.	.....	33,000	33,000	.....	.....	104,577	104,577	217
Waiting rooms, sq. ft.	.....	12,443	12,443	.....	24,697	.....	24,697	98
Retiring rooms and toilet, sq. ft.	.....	1,391	1,391	.....	9,080	.....	9,080	553
Restaurant and accessories, sq. ft.	.....	2,647	2,647	.....	16,454	.....	16,454	522
Ticket offices, sq. ft.	.....	1,444	1,444	.....	2,295	.....	2,295	58
Parcel stand, sq. ft.	.....	507	507	.....	1,320	.....	1,320	161
Baggage rooms, sq. ft.	.....	33,315	33,315	.....	60,800	.....	62,940	88
Concourses, sq. ft.	.....	14,814	14,814	53,750	67,200	.....	120,950	717
Ticket lobby, sq. ft.	.....	1,490	1,490	.....	.....	18,298	18,298	1,128
Cab stands, sq. ft.	.....	2,952	2,952	.....	11,535	28,105	39.640	1,243
Cab curbs, lin. ft.	.....	125	125	.....	275	580	855	584 (*c*)
Office corridors, sq. ft.	.....	18,210	18,210	.....	.....	120,222	120,222	560
Office toilets, sq. ft.	.....	2,482	2,482	.....	.....	15,920	15,920	541
Steel viaducts, sq. ft.	.....	.....	.....	.....	.....	569,780	569,780	0

(*a*) In measuring the car capacity of the tracks, 60 ft. is allowed in the suburban station and 70 ft. in the express station. (*b*) Considering the storage tracks at the Grand Central Station only, there has been an increase of 528 cars or 459 per cent. (*c*) These figures are independent of public street curb.

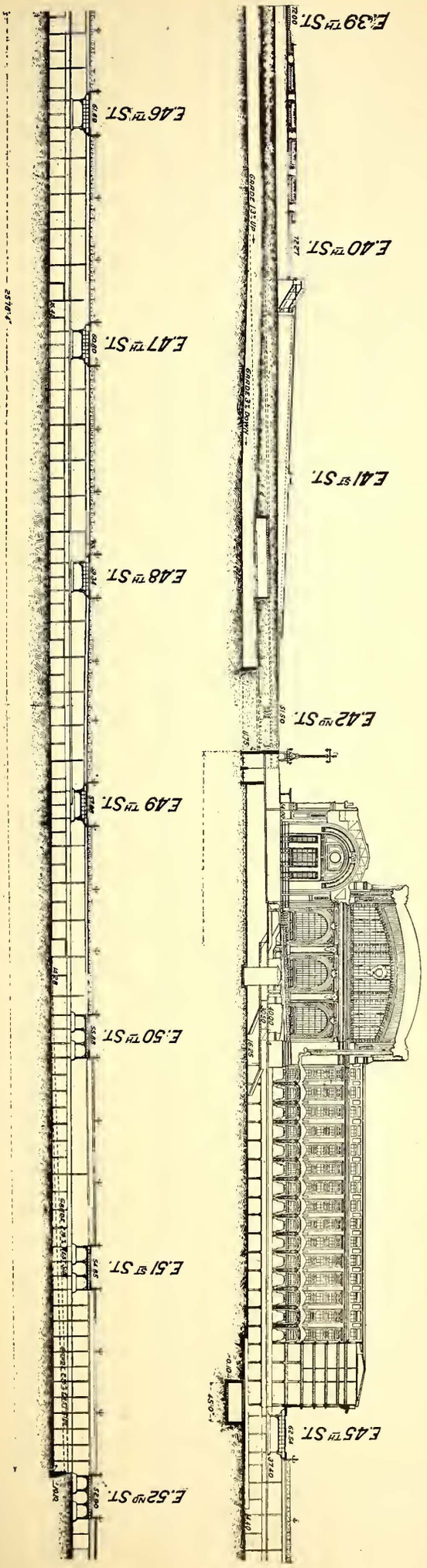
THE TRANSMISSION LINES AND SUB-STATIONS OF THE NEW YORK SUBURBAN DISTRICT OF THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD COMPANY

In the Nov. 11 issue of the Street Railway Journal an account was published of the two main power stations of the New York Central & Hudson River Railroad Company at Port Morris and Yonkers. In that same issue a cross section of a typical sub-station was published. The current generated at these two power stations is transmitted as three-phase, 25-cycle, 11,000-volt alternating current to eight sub-stations located as follows: No. 1, Fiftieth Street and Lexington Avenue, Grand Central terminal, New York; No. 2, Mott Haven; No. 3, Kingsbridge; No. 4, Yonkers; No. 5, Irvington; No. 6, Ossining; No. 7, Bronx Park; No. 8, Scarsdale.

TRANSMISSION LINES

The transmission lines are partly overhead and partly underground. The system is designed to give the greatest protection against interruptions of all kinds. Each sub-station may be fed from either power station, and the lines are so disposed that no ordinary accident could cut off a sub-station from its power supply.

All overhead transmission lines are supported by latticed steel poles set in concrete foundations. Conductors will be of



LONGITUDINAL SECTION ON PARK AVENUE, FROM THIRTY-NINTH STREET TO FIFTY-SECOND STREET, OF NEW GRAND CENTRAL STATION

either 0000 bare stranded wire cable or of aluminum stranded cable, spaced 36 ins. apart on the cross-arms. Cross-arms will be of yellow pine. The insulators will be supported by steel pins. Poles will be spaced 150 ft. apart on tangent and closer on curves as existing conditions demand. An experimental line has been erected by the company so that its engineers may develop the installation to the fullest degree. A plan and elevation of the standard pole adopted by the company is shown on page 922.

All overhead lines are protected by the latest form of lightning arresters, and details of the overhead construction have been considered so minutely that the success of the system is assured.

Underground cables have three conductors of 0000 stranded copper, with paper insulation and lead sheathing. Duct lines are of vitrified tile covered with waterproofing and laid in concrete. The manholes placed at stated intervals on the lines are designed for arrangement of cables with regard to the best manner of handling and supporting them when they are installed. Each cable lies on a shelving of concrete supported on iron pins. These shelves can be removed when necessary, and are designed to facilitate the easy handling of cables as well as protection to sheathing and splicing. Manholes are roomy and are laid out to permit the bending of cables in easy curves. Much ingenuity has been used in the construction of these underground lines and manholes, and many of the ideas developed are novel.

Through the Park Avenue tunnel and along the viaduct, and also through the Harlem division depression, the conductors will be carried in 3½-in. steel pipes supported by brackets, and in crossing the Harlem River the conductors will be in a submarine cable laid in a dredged trench in the bed of the river, back-filled with gravel.

At points where the lines change from overhead to underground construction, cable towers of attractive architectural design will enclose the connections, together with lightning arresters and disconnecting switches.

SUB-STATIONS

At the sub-stations the high-tension current is stepped down to direct current at 666 volts for delivery to the third rail. The main equipment of each sub-station consists of three rotary converters and their accompanying transformers and subsidiary apparatus. The arrangements provide for a future installation of five rotary converters. The relative locations and capacity of the sub-stations are as shown in the following table:

Sub-Sta. No.	Location	Area or Main Floor, sq. ft.	Miles from Grand Central Station	Present Installation of Rotary Converters	Future Installation of Rotary Converters
1	Grand Central terminal.	4,796.6	.36	3 of 1500 kw	5 of 1500 kw
2	Mott Haven	3,845.27	*5.47 †5.49	3 of 1500 kw	5 of 1500 kw
3	Kingsbridge	3,845.27	9.44	3 of 1000 kw	5 of 1000 kw
4	Yonkers	3,639.33	15.64	3 of 1000 kw	3 of 1500 kw
5	Irvington	3,845.27	22.11	3 of 1000 kw	5 of 1000 kw
6	Ossining	3,845.26	30.31	3 of 1000 kw	5 of 1000 kw
7	Bronx Park	3,845.27	9.30	3 of 1000 kw	5 of 1000 kw
8	Scarsdale	3,845.27	19.02	3 of 1000 kw	5 of 1000 kw

* Hudson division.
† Harlem division.

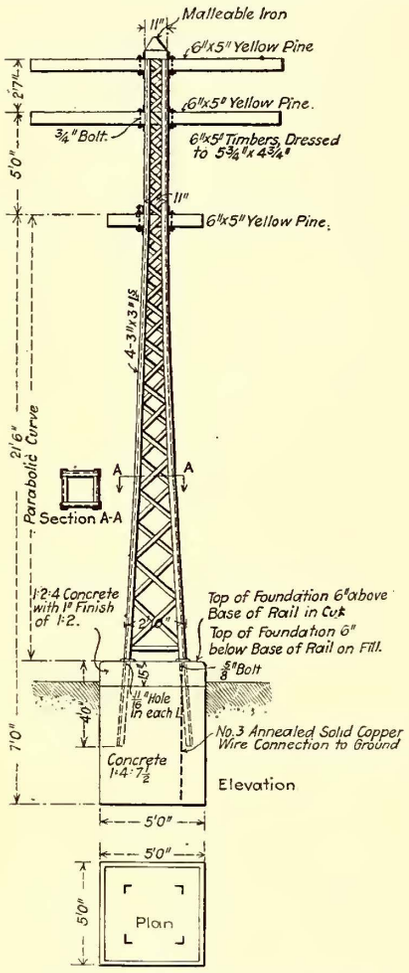
Each sub-station is provided with a battery equipment, described below, and provision is made for any extensions that may be expected from increase of traffic.

DESIGN OF SUB-STATIONS

The following general principles were adopted in the design of the sub-stations: (1) The path of the energy to be as direct and as short as possible from the high-tension transmission lines to the d. c. feeders; (2) the wiring to be as little exposed as possible, and yet to be readily accessible; (3) all machinery to be on the same floor as the operating boards; (4) the princi-

pal apparatus to be under the direct control of the operator while standing at the operating boards; (5) all apparatus and machinery to be so arranged that the effects of an accident will be confined to the place where it occurs; (6) the risk of accident to the operator to be as slight as possible; and (7) stations to be fireproof.

In pursuance of the first idea, the apparatus is arranged in the following order across the station: Entrance of high-tension lines, high-tension switching apparatus, transformers, rotary converters, direct-current switching apparatus. Along the station there is a succession of complete units, such as that described above, the controlling apparatus being located at the center. The second requirement necessitated the use of wall chases for the high-tension lines, and determined the use of transformers having both high-tension and low-tension terminals underneath the main floor. The third requirement determined the omission of galleries except for lightning arresters. The fourth requirement introduced the use of electrically-operated switches and circuit breakers for both the high-tension alternating current and the low-tension direct current. All of these switches and circuit breakers are operated from the control boards. The fifth requirement settled the ample spacing of the machinery and introduced a very complete system of barriers for the protection of live conductors, an arrangement which is of great service in protecting the operators from danger.



PLAN, ELEVATION AND SECTIONS OF STANDARD POLE FOR TRANSMISSION LINES

ENTRANCE OF HIGH-TENSION LINES

The underground lines enter the basement through ducts and are terminated at end bells, where they divide into three separate conductors running to three series transformers which supply current to the measuring instruments. The scheme adopted for the entrance of overhead lines was settled after a careful examination of all systems in use, and is believed to afford the best possible protection against rain and snow, not only to the incoming line, but also to the apparatus in the building.

LIGHTNING ARRESTERS

The design of the lightning arresters was made with the view of separating the phases as much as possible and to make all parts accessible. The groups of arresters are mounted in such a way that a complete set may be taken out and replaced with the greatest facility, a feature which is believed to be original with this installation.

All overhead lines are provided with knife switches to disconnect them from the sub-station apparatus.

HIGH-TENSION WIRING AND OIL SWITCHES

The high-tension bus compartment is of concrete, and is provided with concrete barriers to separate the lines connected to the busses. The series transformers for the measuring instruments pertaining to lines and machines are suspended from the ceiling in a row near the bus compartment, and are separated by barriers. In order to obtain this uniform arrangement, and yet leave the front terminals of the oil switch dead when not in use, the high-tension lines between the series transformers and the power transformers are looped under the bus compartment, an arrangement which affords a very neat and practical way of combining two advantages which hitherto have not been jointly obtained.

The wiring where bare is of copper tubing, which gives an excellent mechanical construction, a feature of special importance for the delta arrangement of the power transformers. The high-tension bus-bars are supported rigidly, but nevertheless in such a way as to take care of expansion and contraction. All openings in the bus compartment are protected by fireproof doors.

The oil switches are electrically operated, and are designed to carry a substantial overload. They are provided with pilot lamps to indicate at the control board whether they are open or closed, and the lamp circuits are so arranged that there is no indication unless the plungers complete their stroke without rebounding. The compartments are of brick, which matches the interior of the sub-stations, the barriers between phases being soapstone.

TRANSFORMERS AND ROTARY CONVERTERS

Two sub-stations are equipped with single-phase 550-kw transformers to supply the 1500-kw converters, whereas the stations with 1000-kw converters have 375-kw transformers. These have a normal ratio of 11,000 volts to 460 volts, and are provided with extra taps for varying the voltage according to the drop in the transmission lines, or according to the distribution of load among the sub-stations. They are of the air-cooled type, with terminals underneath. The air is supplied by two induction-motor-driven blowers, one of which suffices to supply the station.

The rotary converters are of the sextuple connection three-phase type, which combines the advantages of the ordinary three-phase and six-phase type. They convert the alternating current at 460 volts into direct current at 666 volts.

DIRECT-CURRENT SWITCHBOARDS

These will have motor-operated switches and circuit breakers, controlled from the boards at the center of the station. The design of these switches and breakers insures a certainty, rapidity and safety of action hitherto unknown with this type of apparatus. A spare panel and auxiliary bus are provided, to which any feeder or machine may be connected pending repairs on its proper panel. All connections are made with copper bars, thereby insuring a neat and effective construction.

The positive feeders after leaving the switchboards are provided with end bells, which terminate the lead sheathing of the cables which run out to the third rail in underground ducts.

The negative leads from the converters run through the foundations and connect to an ammeter shunt which carries the entire station output. The negative feeders are bare 2,000,000-circ.-mil cables, which run out directly to the tracks in pipes.

There are two controlling boards situated at a part of the station which will be the center when the station is extended to its final limits. There is a bench board which carries the principal instruments and control apparatus, whereas an upright board carries the auxiliary control apparatus for lighting, etc. All panels are of natural slate, with black finish, the instrument cases being black oxidized.

CRANES

Each sub-station is provided with an electric traveling crane, which is also supplied with arrangements for hand operation.

STORAGE BATTERY EQUIPMENT

The electric storage battery equipment is believed to be the largest railway battery installation in the world. It not only takes care of load fluctuations, but it is sufficiently large to operate the entire system under normal conditions for a period of one hour, in case of failure of generating apparatus. Five of the batteries have an output each of 2250 amps. for one hour, and the others give 3000 amps., 3750 amps. and 4020 amps., respectively.

The batteries are located in buildings adjoining the sub-stations, and are operated in connection with boosters and switching apparatus in the sub-station.

The discharge is governed by a carbon regulator working in connection with exciters and boosters, the effect of which is to make the batteries discharge when there is heavy demand for current and to charge when the demand is light.

The battery houses are of the most modern construction and have acidproof floors of vitrified brick. The heating and ventilating systems are of the most approved type and are well protected against acid fumes.

STARTING CONVERTERS

Converters may be started either from the direct-current or alternating-current side. In the latter case a gradual application of voltage is insured by taking current from several taps in the secondaries of the power transformers. Starting from the direct-current bus, the machine is started as a direct-current motor through a rheostat. When a speed above synchronism is reached, the direct circuits, including the shunt field, are opened, and the machine runs by its momentum only. The alternating current is then put on by closing the oil switch, and the machine runs as a synchronous motor. It is then only necessary to close the shunt-field circuit to put the machine in synchronism. These operations are made to follow each other rapidly, and are effected by the use of a special combination switch.

LIGHTING

Sub-station lighting is done with incandescent lamps operated by alternating current at 120 volts. The current is taken from the 460-volt power circuits and the voltage reduced by special transformers. The lights are distributed so as to illuminate all apparatus, and at the same time give a good general illumination. All wiring is in conduit, and circuits are controlled from standard panel boxes set in the walls. The lighting of battery rooms has been developed with a view to protection from acid fumes, all wiring in these rooms being lead covered and all sockets of porcelain. Emergency lighting current may be taken from the control battery or charging set.

D. C. FEEDER SYSTEM

The direct-current feeder system is designed to give a duplicate path for the current from the sub-station to the third rail. It is also designed so as to confine any trouble which may occur to one track only, thereby making any interruption of traffic as slight as possible. Switches are provided at the third rail to disconnect all feeders at that point in case of a ground between the rail and the station. A train length section of third rail is separately fed from the sub-station, and is designed to prevent trains bridging between sections. All direct-current cables are installed in tile conduits close to the tracks, except the auxiliary feeders which join the sub-station busses and supplement the conductivity of the third rails. These are, in some localities, run overhead on the transmission poles.

The four third rails and auxiliary feeder are joined together through circuit breakers situated in small houses at intervals along the line, thereby increasing the effective conductivity.

THIRD RAIL

The under-contact third rail, described in the STREET RAILWAY JOURNAL for Sept. 2, will be used. The rail, as previously stated, is of special bull-head section, 70 lbs. to the yard, with high electrical conductivity. It is supported by cast-iron brackets bolted to long ties, spaced 11 ft. centers. Insulators fit loosely over the top and web of the rail, thus allowing some vertical play. A clamp fits around the side and top of the insulator and is bolted to the bracket. The top and sides of the third rail will be covered with insulating material to give thorough protection against accidental contact.

ENGINEERS AND CONTRACTORS

The work outlined is under the charge of W. J. Wilgus, vice-president. The details described in this article have been worked out under the direction of E. B. Katte, electrical engineer. Reed & Stem are the architects for the sub-stations.

The following is a list of the principal contractors:

Transmission line poles, McClintic-Marshall Construction Company.

Rotary converters for eight sub-stations, Westinghouse Electric & Manufacturing Company.

Storage batteries for eight sub-stations, Electric Storage Battery Company.

Sub-station No. 1, Butler Brothers Construction Company.

Sub-stations Nos. 2, 3 and 7, Butler Brothers Construction Company.

Lighting and power equipments for the two power stations and sub-station No. 4, Thompson-Starrett Company.

Eight 15-ton traveling cranes for the eight sub-stations, Alfred Box & Company.

Exciter storage batteries for eight sub-stations, Electric Storage Battery Company.

Pintsch gas equipment for the steel suburban cars, Safety Car Heating & Lighting Company.

REPORTS ON BRAKES PRESENTED AT THE TENTH ANNUAL MEETING OF THE VEREIN DEUTSCHER STRASSENBAHN UND KLEINBAHN VERWALTUNGEN

At the tenth annual meeting of the Verein Deutscher Strassenbahn und Kleinbahn Verwaltungen (German Street and Interurban Railway Association) two papers on the subject of brakes were submitted by Messrs. Scholtes and Bjorkegren, respectively. Mr. Scholtes, who is the manager of the Nürnberg Street Railway system, advocated the use of electric brakes, while Mr. Bjorkegren, who is an engineer of the Grosse Berliner Strassenbahn, expressed himself as preferring air brakes.

SUMMARY OF MR. SCHOLTES' PAPER

In selecting a braking system, reliability is the first and cost the second point to be considered. The hand brake cannot satisfy all modern requirements, and the main question has been as to whether the electric brake or the air brake was the better. So long as no definite costs were known, a decision on this point was difficult, but now, after several years' experience, it is possible to reach some definite conclusions.

The following statistics cover all street railway companies in Germany which have adopted the hand, air or electric brake as standard on their lines. In almost every case where either the electric or air brake had been so standardized, the railway companies have expressed their intention to add new equipments of the type already in use.

It will be seen that in number of cars equipped the electric brake leads, with the hand brake and air brake following second and third, respectively. The hand brake is used mainly for light cars on small railways. It appears undesirable for cars over 12 tons in weight where the grades are as high as 10 per cent.

TABLE SHOWING TYPES OF BRAKES USED IN GERMANY

Braking System	No. of Cars and Weight of Car in Tons (Metric)									No. of Cars		No. of Companies	
	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 to 11	11 to 12	12 to 13	13 to 14	Total	%	Total	%
Hand	201	431	812	296	520	4	3	42	7	2,316	31	46	49
Electric	7	360	773	1,510	626	103	103	181	10	3,673	49	45	47
Air	21	286	270	175	313	24	422	1	...	1,512	20	4*	4*
										7,501	100	95	100

* On railways like those in Great Berlin, Crefeld, Hannover and Nürnberg, where several systems are used, the most important is taken as a basis.

About twenty railways expressed themselves as opposed to electric brakes, claiming that they cause burn-outs in the motors, controllers and resistance, and that the gearing wears out faster when they are employed. The only point brought out by these objections is that the electrical equipments of these railways are not suited for electric braking. Such troubles can be avoided by selecting apparatus of larger capacity. Another objection raised was that stops were made by jerks when electric brakes were used. This trouble is probably due to an improper gradation of the braking resistances or an improper manipulation of the controller handle. If the brakes are not properly applied, a jerky stop will be made, no matter what system is employed.

Only eleven companies have conducted any braking tests. This small number is probably due to the difficulty of obtaining exact measurements. All of these experiments were with electric brakes, and showed that this system is not surpassed by any other.

Aside from the high first cost and maintenance of the air brake, the objection is made that it fails in cold weather, particularly in new installations. The greater complication of the air-brake apparatus requires also a higher degree of expert attendance. In addition to these factors, another must be considered, namely, the extra current required to compress the air. Only the companies reporting accurately on this last point are given in the following table:

Berlin 40 watt hours per car km for a single truck motor car weighing 8 to 9 tons.

Berlin 67.5 watt hours per car km for a double truck motor car weighing 12 to 13 tons.

Leipzig 40 watt hours per car km for a single truck motor car weighing 7 to 8 tons.

Nürnberg 31.5 watt hours per car km for a double truck motor car weighing 11 to 12 tons.

The calculated cost for compressing air is shown in the following table:

Company	Motor Car Km. in 1904	Additional Power and Cost Due to Air Braking	
		Kw. Hours	Cost
Grosse Berliner Street Railway	55,110,000	2,204,400	$52,905
Grosse Leipziger Street Railway	12,622,000	504,880	12,117
Hanover Street Railway	9,004,000	361,800	8,683
München Tramways	8,004,000	320,160	7,684
Nürnberg-Fürther Street Railway	5,094,000	203,760	4,890
Crefeld Street Railway	2,265,000	90,600	2,174

The above figures are based on the assumption that all motor cars are equipped with air brakes. The average additional power per car-kilometer was taken as 40 watt-hours and the price as 10 pfenings (2.4 cents) per kw-hour. The requirements for trailers are not included.

The average first cost and maintenance charges of the three brake systems are given in the following table:

Braking System	First Cost		Maintenance Charges	
	For Motor Car	For Trail Car	Per Car per Year	Per Car Km.
Hand	Cost included in the price of the complete car		$21.12	$.000504
Electric	$69.60	$90.00	12.48	.000336
Air	288.00	45.60	49.44*	.000792*

* Add to this $.001 per car-km as cost of power per motor car.

It will be seen from the foregoing that the first cost of the electric brake is less than that of the air brake, and that its maintenance cost is lower than even the hand brake. This is due to the less wear of the brake-shoes, which are used only after the car has already been braked electrically. Electric braking requires simply a somewhat larger controller and more closely graduated resistances. The average additional cost for this purpose is $69.60 for the motor cars and $90 for the trailers. The replies show that on trail cars the solenoid brake is now considered preferable to the disc type. The cost of $288 represents an average, but some of the latest installations have not cost more than $228. The trailer air-brake equipments average $45.60 each, but it is not stated whether they will operate automatically in case a train breaks.

Most of the brakes used on the Breslau, Leipzig and München tramways are Böker air brakes. The same brake is also used on some cars in Berlin, Crefeld and Nürnberg, the other cars having either hand or electric brakes. In Hannover the Karpenter-Shultz brake is employed.

SUMMARY OF MR. BJORKEGREN'S PAPER

Mr. Bjorkegren stated that the modern engineer must consider not only the efficiency of a given apparatus, but also whether the benefit gained justifies the cost. In braking, the important factors are reliability and cost, both of which should be carefully considered in their relation to each other. It seemed to him that Mr. Scholtes had laid too much emphasis on the cost factor, and had therefore reached conclusions which he could not wholly approve. He agreed with Mr. Scholtes' statement of the proper field for hand brakes, but not on the comparative merits of air and electric brakes. He thought that the replies received were not definite enough to form accurate conclusions, nor was anything gained by soliciting expressions of opinions from the railway companies, as most of the latter have had experience with only one kind of mechanical brake. Neither would it be fair to say that one system was better than the other because it is more widely used, as most of the brakes now in use were installed without careful study. He would therefore devote most of his paper to a discussion of the experiences which his company, the Grosse Berliner Strassenbahn, had had with different braking systems.

According to the latest figures, the equipment for short-circuiting electric brakes on a two-axle car cost over $72, without considering the possible necessity of using larger motors. The Grosse Berliner Strassenbahn uses two electromagnetic brakes per car, even on single-truck cars. These brakes cost about $96, making the total cost per car $168. The same equipment can be used on a double-truck car by supplying brakes to half of the axles. If all of the axles are equipped, the extra cost would be $102, plus the labor of installation. The price of an air-brake equipment, including the eccentric type of compressor, is about $240, and the cost for the trailer equipment mounted, $48. For a double-truck car, the cost is $252.

According to these figures, the equipment of a train of one double-truck motor car and one single-truck trailer is $270 for electric brakes and $288 for air brakes. This shows that the Berlin company does not find any considerable difference in the first cost of either system. Of course, if the magnetic brakes are omitted, the difference in favor of electric braking

is considerably greater, but the Berlin operating conditions are such that the motors would be badly overloaded if short-circuiting brakes were used.

If instead of the eccentric compressor an axle-driven geared compressor is used, the additional cost would be about $72.

Taking all in all, it is plain that the first cost of air brakes is higher. The difference in cost, however, is too small to be considered seriously when equipping a new motor car, but the cost of maintenance is of more importance. Unfortunately, there are very few statistics on that point, but Mr. Bjorkegren hoped that more careful attention would be given to it during the coming year so that the report at the next convention would be more conclusive. The data compiled by the Grosse Berliner Strassenbahn show the annual maintenance cost of the electromagnetic-brake equipment (used in connection with hand brakes) to be $16.80 for motor cars and $10.80, while the respective figures for air braking are $36 and $6. The cost for the maintenance of the electric system does not include extra wear of motors, controllers and resistances, but even if such figures were obtainable it is not likely that the total would be as high as the air brake. Solenoid electric brakes seem to cost less for maintenance than the disc type, although the former are harder on the brake-shoes. The larger part of the maintenance cost of the air-brake system is due to the renewal of the brake-shoes.

To secure accurate knowledge of the maintenance expense of the air-brake system, including shoes and labor as well as compressor-lubrication, the Grosse Berliner Strassenbahn made an arrangement in October, 1904, to have the manufacturer's employees look after this work at a certain car shop, the railway paying for the labor and furnishing the material. The result showed that this method of organization effected a saving in repair parts and led to the cure of many defects found in the air hose. The monthly maintenance costs for air brakes looked after in this car house were as follows:

October	$3,744
November	3,740
December	4,272
January	4,128
February	4,276
March	5,136
April	3,360
May	3,408
June	3,024
July	3,240

It will be seen from the above that the cost decreased from March to July. A further reduction Mr. Bjorkegren did not consider possible, bearing in mind the fact that the cars on this railway are used to the utmost. The motor cars carrying the above equipments ran about 150 km (90 miles) per diem. In any event, it can be seen that the maintenance cost of air brakes is more than that of electric brakes.

As to the additional current used for the air brake, a number of measurements were made with a special car, as a result of which it was found that with two brake applications per kilometer, the Sperry or disc electric brake required 22 watt-hours and the air brake 36.3 watt-hours. This difference the speaker did not consider very important. Of course, with a short-circuiting brake no extra current is used.

If now the total costs of each system as a whole be compared, it is evident that the air brake is the more expensive. From this it follows that the electric brake is preferable when the question is simply that of cost. Reliability, however, as Mr. Scholtes admitted, is the prime consideration, and hence it is necessary to make a comparison of both systems in this respect.

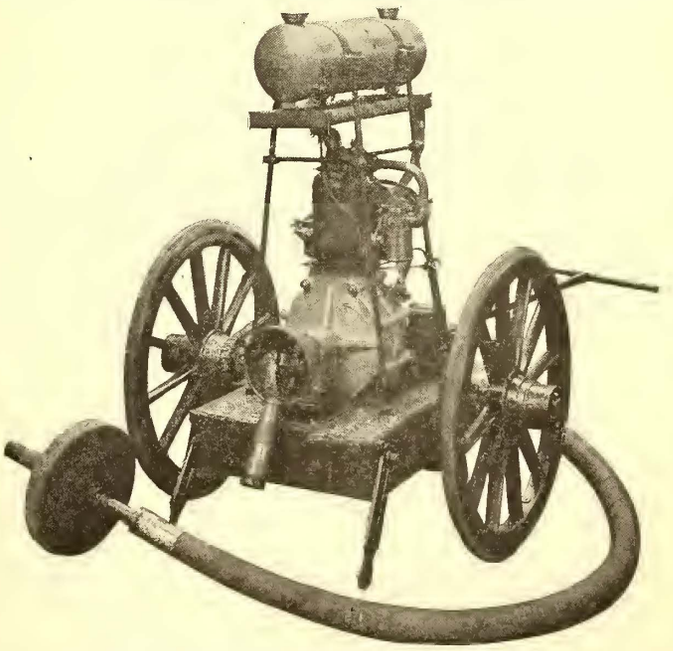
Considered from a purely theoretical standpoint, Mr. Bjorkegren preferred the air brake, because it responded more quickly and could be operated by inexperienced men with less jerking than an electric brake in the same hands. Theorizing alone cannot determine this question, but since the practical determining factor is reliability, it is necessary to study accident statistics. These statistics showed that both systems were equally reliable. It would seem that when the motorman knows that he has a good, reliable brake he is liable to run faster and take more chances than otherwise. However, should the brakes fail or delay action, owing to slippery rails and the like, collisions take place that more cautious running would have avoided.

Against the electric brake it may be said that it is slower to respond; even a delay of less than a second is enough to cause uneasiness to the motorman. Aside from this, the air brake is so much more convenient that the Berlin Company's motormen have asked the management for its general installation. The operation of the electric brake is and must remain largely a matter of "feeling." The motorman must have a certain "feeling" regarding the manner in which he will handle the brakes for various speeds. The proper operation of the electric brake, therefore, demands a certain degree of skill. The air brake has given the better results on low city speeds and the electric brake on high city speeds. It appears also that the air stops are smoother and the jolts less marked than with the electric brake.

Judging from the experience on the Berlin railway, Mr. Bjorkegren asserted that on similar systems either brake was equally reliable, as proved from the collision statistics. It was his opinion, however, that for lines with long, severe grades, electric brakes should not be recommended, owing to the severe strain put upon the apparatus in trying to stop a runaway car. The use of air brakes on such lines also makes it possible to have independent braking for the trailers. Air brakes should also be preferred on high-speed interurban runs with heavy cars. Consequently it may be concluded with regard to reliability that the air brake satisfies all operating conditions and the electric brake only a limited set of conditions.

GASOLINE RAIL GRINDER AND DRILL

Hadfield's Steel Foundry Company, of Sheffield, Eng., the large manufacturer of special work, has recently brought out a novel portable gasoline rail grinder, which is illustrated here-

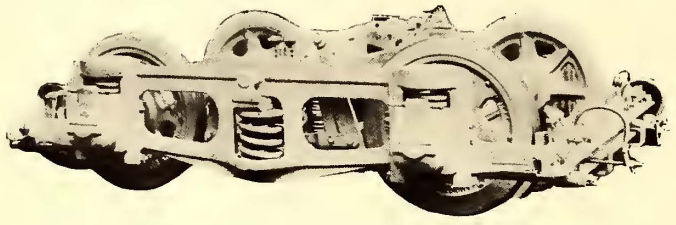


GASOLINE RAIL GRINDER AND DRILL

with. It contains a 4½-hp gasoline motor with water-cooled head, reservoirs for the gasoline and water flexible shaft, etc., and a sheet-iron case which covers the working parts of the motor when not in use and protects them from injury. The motor requires only about 1½ gals. of gasoline per day when in continual use, and can easily be moved from place to place by two men. It is provided with a drilling attachment, which can be used instead of the emery wheel when desired.

CONSTRUCTION CARS FOR MEXICO CITY USING NEW TYPE OF TRUCK

The Mexican Electric Tramways, Ltd., has lately put in commission the four gondola motor cars shown in the lower cut, which was made from a photograph taken while the cars were waiting for shipment at the plant of the builder, the American Car Company. The cars are to be used in the important construction work being carried on in and around the City of Mexico. In little more than two years upward of 200 miles of track in the city and suburbs has been built. The completely enclosed cabs at each end of the cars provide protection for the crew during the rainy season, which constitutes



NEW TYPE OF TRUCK ADOPTED FOR MEXICO CITY CONSTRUCTION CARS

the winter of that part of Mexico. A window in the rear of each cab is an unusual feature in this style car, and is intended for the use of the motorman to see what is going on at the rear without leaving his controller. The bottom framing is unusually powerful, and includes side sills 5¾ ins. x 11¾ ins. and end sills 5¾ ins. x 8 ins. The sides of the cars are strongly hinged to the sills, and when raised are secured by wrought-iron clamps which extend from one side over the other.

The cars are mounted on the Brill No. 23 truck, to which several excellent features have recently been added. The truck is worthy of description, as this is the first time it has been shown in these pages, and there is constant demand at present for motor trucks for fast freight and heavy freight service. The form of the cast-steel side frames evidences enormous strength for the load and also for resisting lateral strains. The truss form of bolster rests at either end on double coil springs of large diameter, and is centered by small spirals in castings which are secured to the ends of the bolster which bear against the outside of the side frames. The bolster, instead of having a filler of oak, has a spacing casting with an adjustable plate at either side, which takes all the wear of the rubbing against the transoms. Double coil journal springs are also used.

The American Car Company and the J. G. Brill Company have supplied a large part of the equipment of the Mexico city lines. The Street Railway Journal of July 30, 1904, contains an article on passenger cars built for the Mexico Electric Tramways, Ltd., by the former company.

The Brooklyn Heights Railway Company has recently placed an order with the Westinghouse Electric & Manufacturing Company for a substantial addition to its present equipment, consisting of 300 No. 101-B Westinghouse d. c. railway motors and 150 sets of controllers. The order for motors is in addition to one placed some months ago for 600 similar motors.

SHORT STORY CONTEST IN DETROIT

Responsive to hundreds of requests, the time limit for those wanting to participate in the short-story contest of the Detroit United Railways Company has been extended to Dec. 16 at 6 p. m. This is only fair because so many of the children were away for pleasure, rest and health when the original announcement was made. Now they are in the harness again and want a try for the prizes, which run $25, $15 and $10.

STANDARD DIMENSIONS AND SEATING PLANS OF BRILL SEMI-CONVERTIBLE CARS

In the Aug. 5 issue of the Street Railway Journal an illustrated article was published on the sash mechanism of the improved semi-convertible car built by the J. G. Brill Company and allied companies. The size and importance of orders for cars of the grooveless-post semi-convertible type, so called because of the avoidance of grooves or runways for conducting the sashes into the roof pockets, has caused frequent references to be made of late in these pages. The manufacturer of this type states that orders for twenty-six different companies, aggregating 767 cars, with the grooveless-post semi-convertible window system, are being built at the present time. Standardization of dimensions for certain forms of service naturally follows in a type so largely used as this. These standards are the result of the experience of the managers of a large number of important systems in all parts of the country, and are based on the carefully estimated value of the factors which, combined, produce maximum earning power.

The four sizes of this type of car, shown in the accompanying diagrams, are those which are in largest use. Fig. 1 shows a 20-ft. 8-in. body mounted on a single truck with 7-ft. wheel base. The step heights, 15¼ ins. from track to tread of step, 13 ins. from step to platform and 6⅜ ins. from platform to car

A TRAIN OF CONSTRUCTION CARS READY FOR SHIPMENT TO THE MEXICAN ELECTRIC TRAMWAYS, MEXICO CITY

floor, are the measurements with the car mounted on a No. 21-E truck, which the builder states is a reduction of 2 ins. from the height of the car as carried by other designs of single trucks. The length of the platforms, it will be noticed, is the same as in the longer cars, which measurement should not be exceeded in a single-truck car of this length. It will also be noticed that the centers of posts are 2 ft. 5 ins. apart, while in the longer cars they are spaced 2 ft. 8 ins. apart. This, of course, is to increase the seating capacity for the length of the body, and although it is usual to have the seat cushions 16 ins. wide, it is feasible, and not a few consider it advisable, to use the same width of cushion as is employed in the longer cars, namely, 17½ ins.

Fig. 2 shows the double-truck car most largely used in city

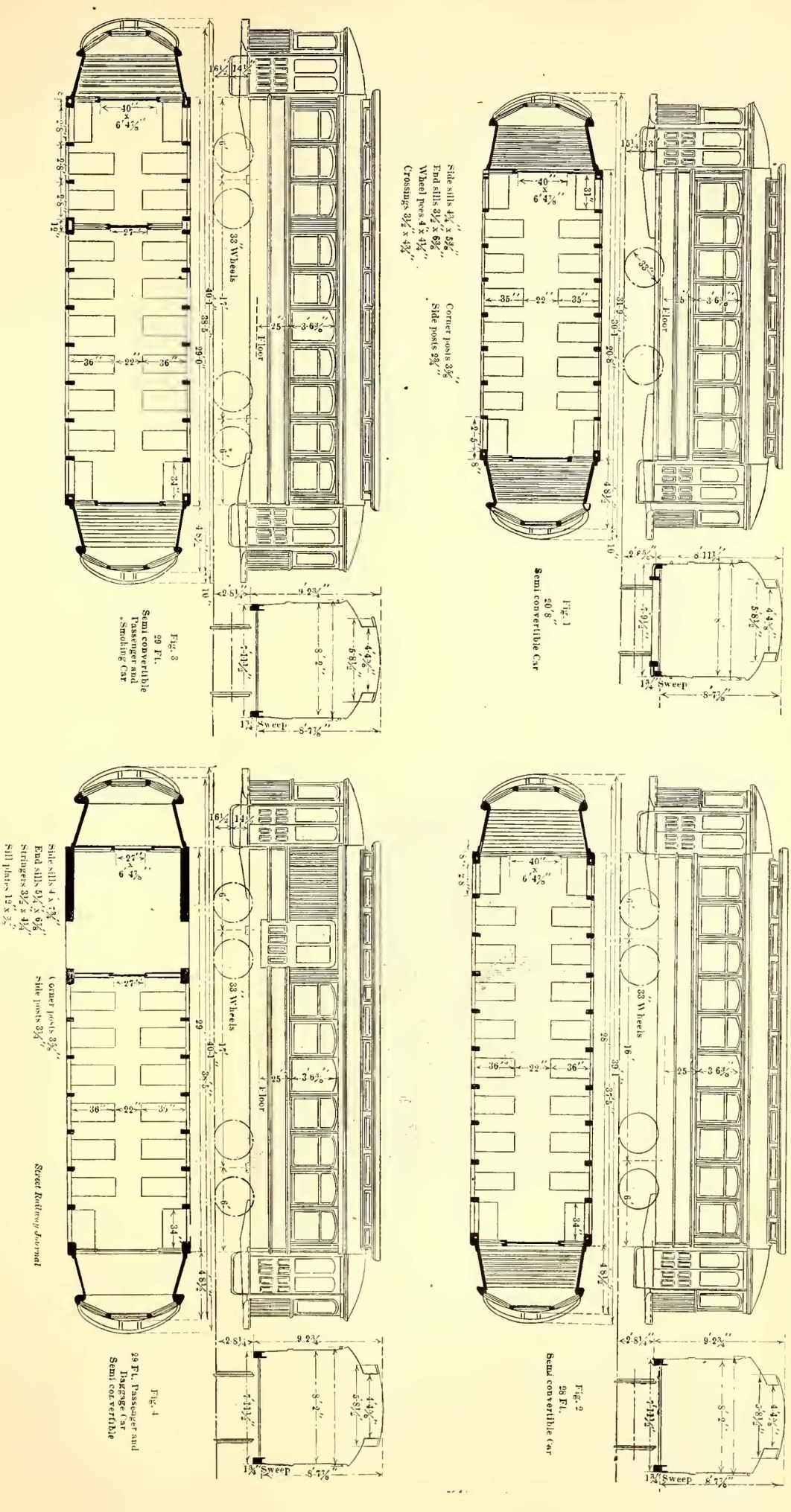
practice. The step heights on this car and the cars shown in Figs. 3 and 4 are figured on the cars being mounted on No. 27-G trucks; the height from platform to car floor in each case is 8 ins. The bottom framing of the larger cars invariably include 12-in. x ⅜-in. sill plates, which take the place of inside and under trusses. The wide sill plates not only do away with the necessity of inside trusses, but, by securing the bases of the posts to the plate, add considerably to the firmness of the posts.

The sides are but 2 ins. thick, and the seat ends, being brought between the posts and against the side linings, make it possible to use seats of a proper length and still have the aisle wide enough for two persons to pass each other comfortably. The increased width of the aisle not only adds to the standing space of the car and enables the conductor to work more freely, but very materially reduces the time consumed by the movement of passengers in and out.

Fig. 3 shows a car with 29-ft. body, having a smoking compartment at one end. For city service, where the majority of passengers are carried for short distances, it is customary to use longitudinal seats in the smoking compartment to increase the capacity. The combination passenger and baggage car, shown in Fig. 4, is a suitable type for interurban service, where the stops are frequent, and it is desirable to carry the car body low on short base trucks. The baggage compartment may be used for smokers, and is generally provided with folding seats.

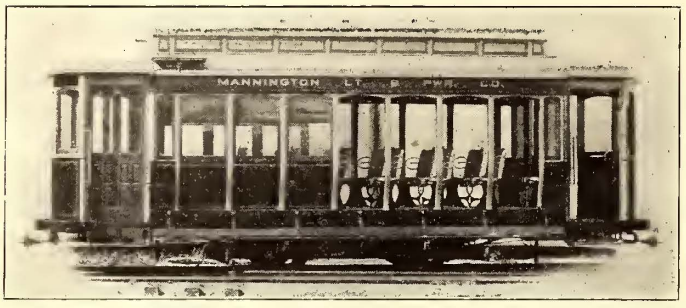
Attention is directed in all of the cars shown to the low window sill and the usually high window opening.

GROUP DRAWING, SHOWING THE PLANS AND ELEVATIONS OF FOUR TYPES OF SEMI-CONVERTIBLE CARS



EQUIPMENT FOR THE MANNINGTON RAILWAY, W. VA.

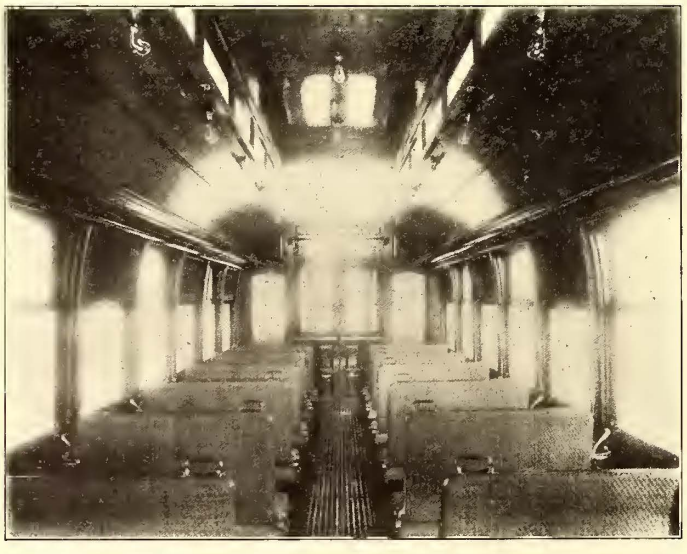
The Mannington Light & Power Company, of Mannington, W. Va., placed in operation on Oct. 1 the type of convertible car shown in the illustrations, built by the G. C. Kuhlman Car Company. Mannington is in the northern part of the State, close to the "Panhandle," and in this section are Wellsburg, New Martinsville and Wheeling, where convertible cars of the same type (Brill) are operated. As this section is mountainous, the altitude of the towns is considerable, so that while the



A VIEW OF THE MANNINGTON LIGHT & POWER COMPANY'S CONVERTIBLE CAR, SHOWING PART OF THE PANELS REMOVED

climate is equable, the changes are sufficient to require cars of this type. The cool mornings and evenings for a long period during spring and fall make it necessary to give more protection to passengers than is afforded by the ordinary type of open car, while in the middle of the day it becomes warm and open cars are desirable; therefore the convertible car is especially well adapted to the conditions.

The length over the end panels is 20 ft. 7 ins., and the length over the vestibule sheathing, 30 ft.; width over the sills, 7 ft. 2¼ ins., and over posts above the belt rail, 8 ft. The doors at



LIGHTING AND SEATING ARRANGEMENT OF THE MANNINGTON (VA.) CONVERTIBLE CARS

the body ends are of the mutually operating double type, and the folding doors at the vestibule entrances have the Brill controlling device. All three sashes in the vestibule drop into pockets in the wainscoting. The seats, which are also of Brill manufacture, are 34 ins. long, leaving the aisle 20½ ins. wide. These seats have push-over backs, with double reversing levers at the aisle end and a single lever at the post end of the cushion. The seat back at the post end is strengthened by a bracket, which also serves the purpose as a grab handle. Though having the appearance of light construction, the seat in its mechanism and back support has a wide margin of strength over the maximum pressure which may be exerted upon it. The seats at the car corners accommodate one person each, and two of the seats at diagonally opposite corners have removable cushions, under which are the hoppers of the sand boxes. The bottom framing includes 5¼-in. x 6-in. side sills plated on the outside with steel for the full width of the sill and reinforced on the bottom and outside by angle iron. The end sills are 4¼ ins. x 6 ins., and the center cross joists, 3½ ins. x 4½ ins. The corner posts are 3¾ ins. thick, and the side posts, 3⅜ ins.; sweep of posts, 5 ins. The interior finish consists of cherry in natural color, with ceilings of birch veneer, neatly decorated. The well-known No. 21-E type of truck is used, having 7-ft. wheel base and 33-in. wheels. The weight of the car and the truck without the motors is 15,500 lbs.

CYLINDER GLASS FOR CAR WINDOWS

It would be difficult to find situations where glass is subject to more breakage than in car window service. Considering the enormous amount of this material used by railway companies, it is not strange that various attempts have been made to produce a grade possessing the strength of plate glass, but of lower cost than the latter. As a result of researches along this line, Semon Bache & Company, of New York, brought out some time ago a special cylinder glass which they manufacture in thicknesses of 5-32 in. and 3-16 in.

This glass is an intermediate grade between common sheet glass and polished plate, in many respects combining the advantages of both. It is much heavier than sheet glass, and also superior in quality. Experience has demonstrated that on account of the superior strength and durability of this glass, it pays for itself after being in use for a short time by reason of the saving in breakage as against sheet glass. As compared with plate glass, the principal advantage is the economy effected by its use, as it is very much cheaper and also obtainable in any quantity desired, whereas thin plate glass is frequently out of the market. There is, however, an additional advantage in the fact that the No. 532 (5-32 in.) glass is very uniform in thickness, which is a matter of considerable importance in view of the light sash used for car windows.

A number of car builders and railway companies are large users of this glass. The Hartford (Conn.) & Springfield Street Railway Company, in particular, has given this material a thorough trial and has found it to give good results under trying circumstances.

EARNINGS OF THE MANILA ELECTRIC RAILROAD & LIGHTING CORPORATION

The first annual statement of the Manila Electric Railroad & Lighting Corporation for the year ending Sept. 1, 1905, is as follows: Net earnings, $273,580; interest charges, $123,028; surplus, $150,552. J. G. White & Company, who built and operate the plant, say in connection with this report, that while it is an annual one, the earnings up to April 10 were only from the sale of current for power and lighting purposes, as it was not until that date that the street railway was opened to the public. There is still considerable work to do before the railway and lighting system will attain its maximum efficiency, and up to the present time the full mileage of the railway lines is not in operation.

In the description of the high-speed carborundum grinder, which was published in the Street Railway Journal for Nov. 11, on page 896, an error occurred in giving the address of the manufacturer. This popular grinder is made by the Royal Manufacturing Company, of Lancaster, Pa., and not Lancashire, Pa., as first printed.

FINANCIAL INTELLIGENCE

WALL STREET, NOV. 15, 1905.

The Money Market

There has been a decided change in the monetary situation this week. The unusually heavy shipments of funds for this season of the year to the West and South for crop moving and general trade purposes, not only wiped out the surplus of the clearing house banks, but created a substantial deficit instead, while rates for all classes of accommodations reached the highest points reported since the autumn of 1902. Early in the week call loan accommodations were obtainable in quantity at rates ranging from 8 to 12 per cent, but toward the close there were heavy calling and shifting of loans by the banks to strengthen their reserves, which sent the rate to 25 per cent. Time loans also rose sharply, transactions in sixty and ninety-day funds being made as high as 8½ per cent, while the longer periods commanded 6 per cent. As a result of the higher rates for money, considerable amounts were received from out-of-town sources, to be loaned at prevailing quotations. About $1,000,000 was received from as far West as Omaha, while a like amount of American gold coin was received from Canada. Considerable amounts were also placed by foreign bankers against exchange transactions. The influx of these funds created a decidedly easier market at the end of the week, but there is still some apprehension as to the immediate future of the market. Funds continue to be shipped to interior points in moderate amounts, while the banks thus far this week have lost $1,400,000 in the transactions with the sub-treasury. Sterling exchange has declined sharply as a result of the heavy sales of finance bills, but the rate has not yet receded to a point where gold can be drawn from Europe. It is generally believed, however, that relief will be obtained from that source. There is also some talk that the Secretary of the Treasury will relieve the situation by depositing a round amount in depository banks at the interior points and thus stop the outflow of funds from this city. A feature of the week has been the sharp advance in the price of silver bullion, the price at London rising to 29¼d., while the local quotation advanced to 63⅛ cents per ounce, these being the highest prices attained since Jan., 1901. The present high prices are the direct result of the heavy demand for the metal at India, Russia and other foreign countries, and indications are that the present prices will be maintained for some time. The foreign markets have been firm during the week, but money and discount rates have not materially changed. The bank statement published last Saturday made a very unsatisfactory exhibit. The decrease of $15,948,600 in loans was a disappointment. The loss in cash of $10,898,000 was larger than expected. The reserve required was $6,114,925 less than in the previous week, which deducted from the loss in cash reduced the surplus by $4,783,075. The deficit was $2,428,800, and compared with a surplus in the previous week of $2,354,275, $8,894,550 in the corresponding week of 1904, $6,138,525 in 1903, $18,238,350 in 1902, $10,104,825 in 1901, and $7,667,775 in 1900.

The Stock Market

The stock market has been very much unsettled during the past week, and until the close on Monday it was under considerable selling pressure and general liquidation, influenced by the developments in the money market, the deficit reported by the clearing house banks and the advance in call money to 25 per cent. This movement in both the stock and money market has been clearly foreshadowed by a prominent banking official in a recent public address at Washington, D. C., and the liquidation in the stock market was only a natural result of the high rates for money coincident with firm money markets abroad and continued shipments of currency to the West and South. Secretary Shaw announced that there was nothing in the general business situation or the supply of money for strictly legitimate purposes that would justify any action on the part of the Treasury looking to the relief of the local money market, as a temporary stringency therein was due to speculative excesses, and the remedy could be found in speculative liquidation. At the close of the week it was intimated that the Secretary would deposit public funds in national banks in the West and Southwest, in order to prevent any stringency so far as the business interests of the country were concerned. Prices for stocks suffered material declines until Tuesday, when intimation of favorable treasury action influenced active short covering, under which prices recovered a good part of the previous decline, and at the end of the week the market was strong, with an upward movement in progress in a number of industrials, the Kansas and Texas issues, Gould stocks and Hocking Valley. The large improvement in the latter has been on buying caused by reports that the preferred stock will be retired at par, and that the common will be placed upon a 5 per cent dividend basis. There has been some division of opinion among important banking interests, one section working for the curtailment of speculative activity, and forced liquidation on the part of many pools actively operating in the market, but chiefly against the pool in Reading stock, the price of which declined 10 points, and later recovered about half the loss. Aside from the monetary situation there has been no development that could be regarded as adverse to the market, but the point is made by conservative banking interests that money conditions do not justify activity in speculation, and that the latter should be restricted until the return movement of currency from the interior is fairly well under way. The banks are below the legal limit, with a largely expanded loan account, and while there has been some improvement in the situation, it has not been sufficient to warrant any resumption of activity on the buying side of the stock market.

The local traction stocks declined very sharply following the election, the selling of Metropolitan having been on the theory that the defeat of Tammany might prove prejudicial to the Metropolitan in the matter of contracts for the construction of new subways.

Philadelphia

Considerable activity developed in the local traction shares during the week, but the dealings were accompanied by a more or less irregular price movement. In the early trading prices generally displayed an upward movement under the lead of Philadelphia common, but toward the close there were sharp recession, in sympathy with the weakness prevailing in other quarters of the market. Interest centered largely in Philadelphia Company common, which furnished fully two-thirds of the total transactions. From 53 at the opening the stock rose on heavy purchases, said to be for local and New York interests, to 55¼, the highest price at which the stock has ever sold. Later there was a reaction of more than 4 points, in sympathy with the decline in the general market, but at the close there was a rally to 53¼ on renewed buying. Upwards of 55,000 shares were traded in. It is said that official announcement of the plan whereby new interests are to take over a majority of the stock will be made soon. The preferred stock was almost entirely neglected, only 78 shares changing hands at prices ranging from 50¾ to 50¼. Philadelphia Rapid Transit displayed considerable activity, but was under pressure the greater part of the week. Opening at 28½ the price ran off to 26¾, and after a feeble rally it declined further to 26, and closed near the lowest. Upwards of 8000 shares changed hands. Union Traction, after an early show of strength, ran off from 63¼ to 62½ on the exchange of about 1000 shares. In the lower price issues Railways General was conspicuously strong, the price rising from 5 to 6 on the purchase of nearly 2000 shares, and retaining nearly all of the gain. American Railways was also active, about 800 shares selling at from 53⅜ to 53. Other transactions included 350 Consolidated Traction of New Jersey, at from 82 to 81, 197 Philadelphia Traction at 100½ to 101, 100 United Railway & Investment preferred at 91⅞, 100 Fairmount Park Transportation at 17¼ to 16, 200 United Railway of Pittsburg at 50, and 50 Rochester Railway & Light preferred at 105.

Baltimore

Very little interest was manifest in the traction issues the past week. Dealings were considerably smaller than in the preceding week, and with the exception of one or two of the investment issues prices displayed a declining tendency. The United Railway issues, which heretofore have furnished the bulk of the trading, were extremely quiet. Of the 4 per cent bonds only $37,000 were traded in, at prices ranging from 92⅝ to 92¼, the latter figure representing a substantial decline as compared with the previous week's close. The income bonds also were unusually quiet, the transactions aggregating only $34,000, at from 66⅝ to 65⅝. Of the stock 165 shares sold at 10 and 15¾. Norfolk Railway & Light 5s lost a point, $8,000 selling at from 97 to 96. Other transactions included $3,000 Newport News Railway 5s at 96, $2,000

Central Railway 5s at 116 and 116¼, $3,000 Baltimore City Passenger 4½s at 101½, $7,000 North Baltimore Railway 5s at 12, $1,000 Virginia Railway & Development 5s at 99¾, and $1,000 Indianapolis Street Railway 4s at 88¾.

Other Traction Securities

Trading in the Chicago market was extremely dull and without noteworthy feature. West Chicago sold at 60 for twenty shares, while the first mortgage 5 per cent bonds brought 101. Metropolitan Elevated held firm, about 300 shares changing hands at 28. South Side Elevated sold at 97¼ for 200 shares, and subsequently a small lot sold at 96½. Fifty shares of Northwestern Elevated brought 23, and the 4 per cent bonds brought 94¼. Chicago & Oak Park was strong, 220 shares selling at 6¼ and 6¾. The Boston market was quiet but steady. Massachusetts Electric common held firm at 13 and 13¼, while transactions in the preferred took place at 55 and 55½. Boston Elevated, after selling at 153¾ early in the week, ran off to 153. Boston & Suburban common brought 19, while the preferred sold at 63. Boston & Worcester preferred lost ½ from 73 to 72½ on the exchange of 250 shares. West End common was firm at 99½. In the New York curb market, Interborough Rapid Transit ruled fairly active, but very erratic. From 210 the price ran off sharply to 204, but later rallied to 208½, in sympathy with the late strength in the other tractions in the general market. About 5000 shares were dealt in. Other sales included 15 shares of American Light & Traction preferred at 106 and 105, $15,000 New Orleans Railway 4½s at 91¾ and 91¼, and $25,000 Public Service Corporation certificates at 61.

Cincinnati, Newport & Covington common continues to be the most active issue at Cincinnati. During the week it made a gain of 1½ points, closing at 49, a new high record. While there is no offical announcement, there are persistent rumors that the stock will soon pay a dividend. The preferred sold at 95⅛ to 95½. Cincinnati Street Railway declined a point to 146; Cincinnati, Dayton & Toledo Traction sold at 26½, a fractional decline, and the 5 per cent bonds sold at 98¾. Toledo Railways & Light sold at 33 and Detroit United at 94½, a 3-point advance from last sale.

Politics played havoc with several issues on the Cleveland board. The re-election of Mayor Tom L. Johnson caused a slump in Cleveland Electric, and it sold down to 78¾ the day after election. There were numerous transactions at these prices, and by Tuesday of this week it had advanced to 80½. The defeat of Governor Herrick will doubtless prove a death-knell for all plans of rejuvenating and putting through the Miami & Erie Canal Traction scheme, and nothing is left for the property but the sale of the material as scrap. Aurora, Elgin & Chicago declined from 32 to 28½. Several lots of the 5 per cent bonds sold at 98, a fractional decline. Northern Ohio Traction declined from 27¼ to 26⅝ and is now offered at 26½. Lake Shore Electric issues shared in the decline; the common dropped from 15¼ to 13¼ on Tuesday of this week. The old preferred sold at 65, a 5-point decline. Muncie, Hartford & Fort Wayne bonds sold at 95¼, and Northern Ohio 5s at 90.

Security Quotations

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

	Nov. 8	Nov. 15
American Railways	52	53
Boston Elevated	153	152
Brooklyn Rapid Transit	75⅜	76¼
Chicago City	200	200
Chicago Union Traction (common)	11¼	10½
Chicago Union Traction (preferred)	—	—
Cleveland Electric	—	81
Consolidated Traction of New Jersey	82	81
Consolidated Traction of New Jersey 5s	108½	109
Detroit United	92	93¾
Interborough Rapid Transit	210	207
International Traction (common)	36½	35½
International Traction (preferred) 4s	76½	75⅞
Manhattan Railway	165	164
Massachusetts Electric Cos. (common)	13	13¼
Massachusetts Electric Cos. (preferred)	55½	56
Metropolitan Elevated, Chicago (common)	28	27½
Metropolitan Elevated, Chicago (preferred)	71	71
Metropolitan Street	121	117½
Metropolitan Securities	77	72¾
New Orleans Railways (common), W. I.	37	37
New Orleans Railways (preferred), W. I.	83⅞	82¾
New Orleans Railways, 4½s	91½	91
North American	96½	97¼
North Jersey Street Railway	28	27
Philadelphia Company (common)	52⅞	53
Philadelphia Rapid Transit	27⅝	26¼
Philadelphia Traction	100	100¾
Public Service Corporation 5 per cent notes	96	95
Public Service Corporation certificates	64	62
South Side Elevated (Chicago)	97¼	96
Third Avenue	123½	121
Twin City, Minneapolis (common)	115½	114¾
Union Traction (Philadelphia)	63	62½
West End (common)	99½	a99
West End (preferred)	114	113½

a Asked. W. I., when issued.

Iron and Steel

The "Iron Age" says there continues to pour in, from all quarters, evidence of the enormous current consumption of iron and steel, with ample proof in the form of fresh orders that there will be an unabated strain upon our productive facilities for many months to come. Contracts for steel rails closed during the week aggregate 100,000 tons. Pressure for structural material continues unabated, and the plate mills are swamped with orders.

JERSEY CITY ATTACKS CONSTITUTIONALITY OF ACT PASSED BY LEGISLATURE IN 1876

George L. Record, Corporation Counsel of New Jersey, appearing as counsel for the Mayor and Aldermen of Jersey City before the main division of the Supreme Court of New Jersey last Friday in an ejectment proceedings against the North Jersey Street Railway Company, raised a novel point touching the question of the granting of limited franchise to public utility companies.

Jersey City is attempting to eject the street railway company from Montgomery Street on the ground that its twenty-five-year charter, secured by special legislation, expired in 1884. In 1894 the North Jersey Street Railway Company leased its property and franchise to the Consolidated Traction Company. The road is now being operated by the Public Service Corporation.

The defendant contends that its franchise was extended under an act passed by the Legislature in 1876, providing that any corporation created by virtue of the laws of this State might have its corporate existence extended for any period not exceeding fifty years by filing an amended certificate to its charter to that effect. On this ground, it is claimed that the franchise was extant in 1894 and still exists.

The argument was heard by Chief Justice Gummere and Justices Hendrickson and Pitney sitting as the main court. Mr. Record attacked the act of 1876 and held it to be altogether nugatory on the ground that it conflicts with the State Constitution as amended in 1875. The last clause of paragraph 11 of section 7 of article 4 of the constitution says: "The Legislature shall pass no special act conferring corporate powers, but it shall pass general laws under which corporations may be organized and corporate powers of every nature obtained, subject, nevertheless, to repeal or alteration at the will of the Legislature."

In his argument Mr. Record maintained that at the first session after the adoption of this amendment, the Legislature, while obeying, as to many classes of corporate powers, the constitutional mandate to pass general laws, yielded to the desire of those interested to preserve official powers about to expire and disregarded the constitutional prohibition against special laws conferring powers by passing the act referred to.

The defendants claimed that the act referred to is not an act conferring corporate powers, but aims simply to enlarge the time for which corporate existence may continue. They hold, also, that as the act is one conferring corporate powers, it is not a special but a general law. Their last argument was that the plaintiff is estopped to deny the corporate existence for corporate powers of the defendant company on the ground that for nearly twenty years Jersey City has dealt with the company and its successors continuously upon the basis of the continuance of its corporate powers.

In answer to this last point the plaintiffs argued that they tried hard enough, without avail, to get the Attorney-General of the State some time ago to test the question of quo warranto proceedings. Because the Attorney-General refused to do what was claimed to be his plain duty, Mr. Record insisted, should not leave the plaintiffs without remedy. Former Judge Gilbert Collins was associated with Mr. Record in the case.

The court gave counsel ten days in which to file briefs and took ten days additional in which to decide the case.

SUITS FOLLOW DISCRIMINATION OF STEAM ROAD IN IOWA

Two indictments were returned by the grand jury of Linn County, Iowa, last week, against the Chicago, Rock Island & Pacific Railroad Company, growing out of its recent cut rate competition against the interurban line between Cedar Rapids and Iowa City. One indictment charges that the company is guilty of receiving a greater compensation for transporting a passenger over its lines in Iowa for a shorter haul than for a longer one. The specific charge is that the company received $1.32 for a round-trip ticket from Cedar Rapids to Iowa City and return, a total distance of 64 miles, and that it received the same rate for a round-trip ticket from Cedar Rapids to Elmira, total distance 46 miles. In other words, the company charged 3 cents a mile straight for 46 miles, and a trifle over 2 cents a mile for the greater distance of 64 miles. The indictment also sets forth that these respective rates were charged for a period of several months, and that the cheaper rate for the longer distance was not an excursion rate, because it was maintained from day to day for a long duration. The other indictment charges the company with failure to prepare, keep and fix uniform proportionate passenger rates.

AN ARMISTICE IN LOS ANGELES CONTROVERSY

An armistice has been declared in the war between the Los Angeles Street Railway Company and the city over the question of the validity of the South Park Avenue line in that city. This incident was referred to briefly in the STREET RAILWAY JOURNAL of Nov. 4, 1905, under the caption "Municipal Endeavor Misdirected." The whole thing is to be regretted, and the dispute could have been settled just as it now will be, in the courts, without any display of violence on the part of the city authorities. It seems that the Los Angeles Railway Company, in building the South Park line, finished only a little more than 1 mile of the road before the expiration of the time limit set by the ordinance for the completion of the entire line. The company was, however, permitted to complete the line without interference from the authorities. Then of a sudden a move was made by the city against the company. At this stage the company secured an injunction to restrain the city from interfering with the conduct of its business. This injunction was dissolved Oct. 12. Immediately the guardians of the public welfare proceeded to demolish enough of the property to prevent the company from operating cars over the line. The residents of the district, deprived of the service which was especially easy of access, became thoroughly aroused and demanded of the Mayor that the privileges be restored of which they had been deprived. As a result, the city has agreed to let the company operate the lines at a nominal rental of $10 a month until the case shall have been finally settled in the courts.

REPORT OF NEW YORK SUBWAY INVESTIGATION

Dr. George A. Soper, the expert chemist employed by Engineer Rice, of the Rapid Transit Commission of New York, to make an examination of the atmospheric conditions existing in the subway, has reported to the board. His report covers conditions, cause, effect and the remedy.

The average temperature in the subway last summer was 78.8 degs., while on the street the average temperature was 72.8 degs., making a difference of exactly 6 degs. He said the high temperature was due largely to the high rate of speed at which the trains are run, as the quick stopping causes much friction on the brake-shoe, and this friction generates heat. He suggested that less speed would remedy this condition to a great extent.

It has been pointed out that a lot of iron dust exists in the subway, which is held together to a great extent by oil. President Orr said he had been informed that the consumption of iron on the brake-shoes alone amounts to a ton per mile each month. Dr. Stoker says there is 1 per cent of oil in the iron dust. Much of this oily dust is retained by the rock ballast on the tracks and, when the train passes over the tracks at a high rate of speed, the dust is stirred.

Three remedies were suggested by Dr. Soper. He said the ballast should be frequently removed and new ballast put down, or else the present ballast be removed entirely and replaced by a concrete surface. He said the toilet rooms in the stations should be better ventilated.

Dr. Soper will file a more complete report, in the near future, making further suggestions and the result of chemical analysis he makes of the air and sanitary conditions, after which the Commission will take steps to have the Interborough Rapid Transit Company adopt some of the suggestions.

NEW HAVEN THIRD-RAIL LITIGATION

The New York, New Haven & Hartford Railroad Company has filed in the Hartford County Superior Court an answer to the action of the city of New Britain to compel the discontinuance of the third-rail electric system within the limits of that city. The complaint set forth that the third rail constituted a nuisance on account of the danger which it created, and that consequently it should be discontinued.

In its reply the company contends that it is authorized by law to operate its railroad by electricity; that the State has never forbidden the operation of the third-rail system; that it does not appear from the complaint that there is any danger from the system except on the defendant's own property, and that even then there is no danger to persons coming on the premises by the railroad's invitation; that there is no danger to any except trespassers; and that the city of New Britain is not a competent party to maintain an action for the abatement of the third rail.

The city of New Britain sought to have the recent Legislature take action to compel the railroad company either to discontinue the system or else take proper steps to erect adequate safeguards around the electrically charged rail. The lawmakers declined to interfere.

BALL OF BROOKLYN EMPLOYEES

The annual ball of the Brooklyn Rapid Transit Employees' Benefit Association, the third event of the kind, was held last Wednesday evening in Clermont Avenue Rink, Brooklyn, and was largely attended. The interior of the rink was prettily decorated and brilliantly illuminated. The dancing was preceded by a concert, consisting of four numbers, by the Brooklyn Rapid Transit Band, which is composed exclusively of employees of the Brooklyn Rapid Transit Company who are members of the benefit association. The dance programme consisted of sixteen well-selected numbers. Many of the officials of the company, heads of departments, all of the division superintendents, operating division and engineering departments were represented among the attendants, while Division Superintendent W. N. Boland, of the Public Service Corporation, of New Jersey, formerly of the Brooklyn Rapid Transit Company, was among the guests, with some of his associates from New Jersey. The officers and trustees of the association are: D. S. Smith, president; G. F. Wolfram, vice-president; C. D. Meneely, treasurer; G. W. Edwards, secretary; H. E. Tiffany, assistant secretary; C. E. Roehl, John Stoll, W. C. Wood, Sanford Dyer, E. C. Shaler, Ernest Wenzel.

THE ELECTIONS

The most significant feature of last week's municipal and State elections was the tendency toward radicalism. This was instanced strikingly in New York, Cleveland, Toledo, Boston and San Francisco, in all of which, with the exception of New York, the candidates who assailed vested interests were successful. Even in the exception noted, the margin of defeat was very small. In Cleveland Mayor Johnson has been returned to office on a platform of 3-cent fares and a State law to permit the city to own and operate street railways. In Toledo was witnessed the election to the office of Mayor of Brand Whitlock, protégé of "Golden Rule" Jones. In Boston John B. Moran, a pronounced lawyer-agitator, as the New York "World" put it, was elected district attorney of Suffolk County. In San Francisco Mayor Schmitz, representing the labor interests, was re-elected, despite the fusion of the Republican and the Democratic organizations against him. Naturally the press have tried to explain this pronounced trend toward radicalism. Some of the conservative papers are appalled that candidates advocating measures doomed to failure should have received endorsement at the polls. Others, like "The Wall Street Journal," take the view that the cure for the epidemic lies in the application of the principles advocated to some particular case at the expense of the community in which the experiment is tried, but to the enlightenment of the entire country. For instance, "The Wall Street Journal," discussing the issue of municipal ownership, says:

"It would perhaps be, on the whole, a good thing for the nation if a practical experiment in public ownership was undertaken by some leading American municipality even under prevailing conditions. The experiment would be a costly one, no doubt, but as it would demonstrate how dangerous and bad municipal ownership would be when coupled with bossism and graft, the effect upon public opinion throughout the country might operate to check for many years to come any tendencies toward State socialism. It would be an object lesson, expensive indeed for the city in which it should be tried, but in the end, perhaps, valuable to the whole country."

INTERURBAN PROGRESS IN IOWA

Despite the statement made public a few weeks ago by H. H. Polk, president of the Interurban Railway Company, of Des Moines, that his company would not do anything in the way of constructing extensions, with the exception of the Woodward and Perry lines, until after the suit brought by the Civic League of Des Moines attacking the franchise rights of the Des Moines City Railway and the Interurban Railway was settled definitely in favor of the companies, the Interurban Company is going ahead with the preliminary work of surveying routes and buying right of way for several other prospective lines. The company has a surveying gang at work on a line between Woodward, the terminus of the Des Moines-Woodward line, now almost completed, and Boone, and also has a gang at work running a line south from the terminus of the Army Post line in the direction of Indianola. The report comes from Boone that A. P. Chamberlain, right of way agent for the Interurban Railway Company, has been in Boone figuring on the purchase of the right of way from Boone west to the Des Moines River. While in Boone Mr. Chamberlain stated to several parties that he had already secured a large part of the right of way from Woodward to the river, and that the only thing that would stand in the way of the construction of the proposed extension would be the excessive cost of the right of way from the river to Boone. It seems that the company has completed the preliminary survey of the route for this extension and that the surveyors now in the field are making the location, or final survey.

News also comes from Newton that the Interurban Railway Company has recently closed a contract with the Newton & Northwestern Railway Company, whereby the former will secure the use of the tracks of the latter from Goddard to Newton for a certain number of years. The Interurban Company is obligated to construct an extension from Colfax to Goddard, a distance of 3 miles, and is to equip the line of the Newton & Northwestern for operation by electricity. A station is to be erected at Goddard to supply power for the extension and enable the cars to make the continuous trip from Des Moines to Newton on power supplied from the central station at Des Moines. The company has already commenced the construction of the 3-mile connecting link between Colfax and Goddard. The grading has been under way for several days. All the material for the bridges and tracks has been assembled and will be put in position as fast as the grading is completed. The company expects to complete the construction of the 3-mile strip and the erection of the transmission station and the equipment of the 11 miles of track between Goddard and Newton for electric car service by April 1, 1906. The Newton & Northwestern will operate switching engines on the interurban track between Goddard and Colfax, the latter place being the center of quite a coal mining district. This extension will give the Interurban a continuous line between Des Moines and Newton about 32 miles in length. The company will maintain hourly service into Newton, where there is a population of 5000, made up very largely of employees in the agricultural implement factories there and those dependent upon them. The population to be served by this line will practically be doubled, three new towns being reached, Goddard, Metz and Newton, and connections being made at Newton with the Iowa Central Railroad.

Since the Rock Island Railroad took off the extra trains operated between Des Moines and Indianola during the summer months, and discontinued the sale of commuters' tickets, the citizens and business men of Indianola have been talking of an interurban electric line to connect the two cities. At a meeting of the City Council of Indianola, held last week, representatives of two interurban projects appeared before the Council and asked for franchises for entering the city with interurban lines from Des Moines. One company was represented by William Wilcoxen, an attorney of Des Moines. This company is called the Indianola Interurban Company. The other is backed by some of the wealthiest citizens of Indianola and has not yet been christened. The Des Moines company, that is, the Indianola Interurban Company, through its representative, agrees, if given a franchise, to have its line constructed and in operation within a year. On the other hand, the Indianola parties agree to have their line constructed within two years. The Indianola citizens backing the latter company are: H. P. Shepard, F. S. Burberry, F. C. Sigler, J. M. Harlan, J. M. Sampson, William Buxton, Jr., and H. E. Hopper. The requests for the franchises were referred to the judiciary committee of the Council, with instructions to refer them back to the Council at its next meeting with their recommendations thereon.

No one at Des Moines seems to be able to throw any light on the question as to who is backing the Indianola Interurban Company. All that Mr. Wilcoxen will say on the subject is that his company has plenty of means to construct the line and is able to complete and equip it within the year's time asked.

Since the meeting of the Council it has developed that several other interurban projects are under consideration, all having Indianola as the objective point. The Interurban Railway Company of Des Moines, as previously stated, has recently put a corps of surveyors in the field running a line south from the Army Post line toward Indianola. This company would only have to construct 15 miles of road to enter Indianola, the Army Post line extending about 4 miles south from Des Moines in the direction of Indianola. This company may conclude to construct the line without requesting a franchise, if the Council grants a franchise to some other company, as under the new laws interurban railroads can condemn property for a right of way. It is also announced by A. A. McGarry, of Indianola, that he represents an interurban company which is proposing to build a line from Ottumwa via Knoxville and Indianola to Des Moines. And on top of all these comes the report from Des Moines that the Rock Island, which abandoned its interurban service between Des Moines and Indianola, on account of suits brought against the company for like service in other parts of the State, is considering the project of leasing the Des Moines Indianola-Winterset branch to another company, made up of some Rock Island officials, and permitting this company to equip and operate the branch lines as an electric interurban road. The Rock Island profited by the establishment of the interurban service over the line to Indianola and is anxious to retain this field. If the officials find that they can get around the law in this way, it will be done. With four different companies figuring on constructing an interurban line between Des Moines and Indianola, and the Rock Island figuring on re-establishing its interurban service under a different plan and name, it seems certain that Indianola will secure connections with Des Moines.

MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The fifty-second meeting of the American Society of Mechanical Engineers will be held in New York City during the first week in December. The headquarters, instead of being at the Society House, 12 West Thirty-First Street, as in previous years, will be at the Edison Building, 44 West Twenty-Seventh Street, the two upper floors being used. The opening session, at which President John R. Freeman will present the annual address, will be on Tuesday evening, Dec. 5. The second, or business session, will be held Wednesday morning in the main saloon of the steamship "Amerika," at the docks of the Hamburg-American Line, at Hoboken, N. J. Following this session a special train will take those desiring to make the excursion to the new Henry R. Worthington Hydraulic Works, at Harrison, N. J. Wednesday evening there will be an illustrated lecture at the Edison Building by Prof. R. W. Wood, of Johns Hopkins University, on "Photography of Invisible Phenomena." The third session will be on Thursday morning at the Edison Building, and besides the presentation of professional papers there will be a discussion on the subject of bearings. Thursday afternoon there will be a reception at the New York School of Automobile Engineers, 146 West Fifty-Sixth Street. The usual reception at Sherry's will occur on Thursday evening. The closing session will be at the Edison Building on Friday morning, and will be devoted to the presentation of professional papers.

NEW ENGLISH RAILWAY SUPPLY COMPANY

The Consolidated Supply Company, Ltd., with headquarters at Northampton Park, Canonbury, London, has recently been organized with a capital of £50,000, divided into 25,000 preference shares and 25,000 ordinary shares, registration being effected on Sept. 14. This company has acquired the business and patents, etc., of A. K. Baylor; also the works, plant, patents, etc., of the Consolidated Electrical Company, Ltd., at Northampton Grove, Canonbury. The directors are: A. K. Baylor, chairman and managing director; Montagu Pearse and J. H. S. Thomson. As will be remembered by all in the electrical traction business, Mr. Baylor has been prominently and well known in this country for several years in various electrical enterprises, being at one time connected with the British Thomson-Houston Company, and more recently with the British Electric Car Company, Ltd., of Manchester. When that company was recently absorbed, Mr. Baylor proceeded with the business which he had developed for many years in the nature of various tramway supplies, more particularly in destination indicators, and for the past year or so had made arrangements with the Consolidated Electrical Company for their manufacture. The new company is now the outcome of this, and it commences with an already established business to which Mr. Baylor will devote the whole of his time, and will doubtless build up a successful business in the many tramway accessories in which he is interested.

SANDERSON & PORTER ENTERTAIN AT NEW ORLEANS

On Nov. 7, Sanderson & Porter, contracting engineers of New York, entertained their friends and engineers at a banquet at the St. Charles Hotel, New Orleans, followed by a theater party at the Tulane Theater. The firm are consulting engineers for the New Orleans Railway & Light Company and constructing engineers and contractors for the company's numerous improvements and extensions, and several members of the firm were present, together with some of the officials of the New Orleans Railway & Light Company, including President Foster and Vice-President Jos. H. DeGrange. Mr. Blossom represented Sanderson & Porter and acted as host and toastmaster. He stated in his address that the dinner was given in testimony of the loyalty and devotion of the employees of the firm in the accomplishment of the work on hand during the prevalence of yellow fever in New Orleans, as many of them were from other States and not immune. Speeches were made by Mr. Blossom, Colonel DeGrange, Mr. Haller and Mr. Foster, who complimented Sanderson & Porter on the successful issue of the work undertaken, and the starting of the new underground lighting system of more than 2700 new arc lamps, and putting into operation the new power station at Market Street. Toasts were offered to "New Orleans"; New Orleans Railway & Light Company"; "Sanderson & Porter," and "The Absent Ones."

EARNINGS OF THE MILWAUKEE COMPANY

The statement of earnings of the Milwaukee Electric Railway & Light Company for October and for the ten months ended Oct. 31, and of the Milwaukee Light, Heat & Traction Company for similar periods has been made public. The earnings compare as follows:

Milwaukee Electric Railway & Light Company

Oct. 31—	1905	1904
Total gross earnings	$280,535	$280,386
Operating expenses	128,763	130,197
Net earnings	151,772	150,188
Deductions from income	80,075	78,790
Net income	$71,697	$71,398
Ten months ending Oct. 31—		
Total gross earnings	$2,669,332	$2,656,480
Operating expenses	1,285,404	1,323,306
Net earnings	1,383,928	1,333,174
Deductions from income	769,217	756,734
Net income	$614,710	$576,440

Milwaukee Light, Heat & Traction Company

Oct. 31—	1905	1904
Total gross earnings	$50,474	$38,726
Operating expenses	19,845	17,154
Net earnings	30,629	21,571
Deductions from income	21,330	17,670
Net income	$9,298	$3,901
Ten months ending Oct. 31—		
Total gross earnings	$514,701	$387,461
Operating expenses	214,139	183,041
Net earnings	300,561	204,420
Deductions from income	210,097	168,016
Net income	$90,464	$36,404

The gross earnings of the Milwaukee Electric Railway & Light Company in September showed an increase amounting to only .18 per cent, but as operating expenses were cut down during the month to the extent of $6,204 the increase in net was proportionately greater than that of gross, and amounted to 4.4 per cent. Other income and charges increased slightly, and the net result was that the September surplus showed an increase of $5,593 as against Sept., 1904. For the nine months of the current fiscal year only a slight increase was shown in gross earnings, but as expenses were reduced by $36,466 with other modifications, the income account shows an increase available for dividends amounting to $37,972, and a total surplus for the nine months of $543,011. Last year the company paid the full dividend on the preferred stock of 6 per cent, making a disbursement of $270,000, and 5 per cent was paid on the common stock which required $400,675. This left a surplus of $105,829 on the operations of the year.

In connection with these statements of earnings it is important to call attention to the reason that the receipts of the company have been about stationary as compared with last year. This is the fact that on Jan. 1 last the company began to honor commutation tickets (twenty-five for $1.00, six for 25 cents) all day long, whereas for five years previous tickets had only been good during 2 hours in the morning and 1½ hours in the evening. President Beggs, of the company, says the use of tickets averages from 110,000 to 120,000 daily. This means that about 80 per cent of those riding on the cars now use tickets. In spite of this reduction in fare the increase in traffic has prevented any reduction in gross receipts. The operating expenses have also been kept down in spite of this increase in traffic.

CHANGES IN THE TAYLOR IRON & STEEL COMPANY

At a meeting of the directors of the Taylor Iron & Steel Company, held in New York City on Oct. 31, several changes were made among the executive officers of the company. Lewis H. Taylor resigned as president and was succeeded by Robert E. Jennings, of Jersey City, N. J., who has been vice-president of the company since it was organized in 1891. Percival Chrystie was elected vice-president to succeed Mr. Jennings. Knox Taylor was elected general manager. The officers at present are as follows: President, Robert E. Jennings; vice-presidents, Percival Chrystie and Dr. Henry M. Howe; secretary and treasurer, T. F. Budlong; general manager, Knox Taylor.

Lewis H. Taylor has been president and director of the Taylor Iron Works and the Taylor Iron & Steel Company since the former company was organized in May, 1868. For several years he has been anxious to relinquish the presidency, but the directors were unwilling to have him do so until the present time, when Mr. Taylor insisted that his age was such that he should be relieved of all care and anxiety in business matters. In accepting Mr. Taylor's resignation the board unanimously elected him honorary president.

Robert E. Jennings has been well and favorably known in iron and steel circles for a great many years, having been formerly connected with the Spaulding & Jennings Company, of Jersey City, N. J., later with the Crucible Steel Company of America and still later as receiver of the Carpenter Steel Company, of Reading, Pa. Upon reorganization of the latter company some months ago, Mr. Jennings was elected its president, which office he now holds.

Percival Chrystie has been connected with the Taylor Iron Works and the Taylor Iron & Steel Company in various capacities since 1887, and Knox Taylor has been with the company for the past four years. Mr. Chrystie and Knox Taylor make the fifth generation of the Taylor family who have been interested in the manufacture of iron and steel in Hunterdon County.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED NOV. 7, 1905

803,614. Car Brake; Ernest H. Miller, Lancaster, Pa. App. filed Nov. 26, 1904. Improved brake mechanism for equalizing the "pull" or force exerted upon the brakes by an electromagnet or solenoid or other suitable brake-cylinder having oppositely movable pistons therein for applying the brakes.

803,806. Trolley Wheel; Emily Brossy, West Hoboken, N. J. App. filed July 20, 1904. A spherical trolley wheel provided with an annular groove for the reception of the conductor.

803,874. Brake Beam; Herry C. Buhoup and Gilbert P. Ritter, Chicago, Ill. App. filed Jan. 10, 1905. A brake head having inclines upon the rear face thereof extending laterally in a direction transverse to the shoe-receiving face of said head.

807,917. Brake Apparatus for Railway Vehicles; Charles Luyers, Vilvorde, Belgium. App. filed June 29, 1905. A friction pulley fixed on the axle of the vehicle is divided up into a number of recessed or perforated elements connected together by ribs, brake-blocks adapted to act upon each element, and means for operating the brake-blocks. The object of the invention is to insure rapid dissipation of heat generated by the friction.

803,935. Track Sanding Device; Homer Stokes, West Bridgewater, Pa. App. filed Aug. 22, 1905. Two sand-containing receptacles arranged one above the other, the upper receptacle being stationary and the lower receptacle being movable so that holes in the top and bottom thereof will register respectively with a hole in the bottom of the upper receptacle and a discharge opening in the bottom of the car. The lower receptacle is normally held out of registering relation by springs.

803,962. Car Seat; Joseph Applin, Philadelphia, Pa. App. filed Sept. 20, 1904. Car seat mechanism of the "walk-over" type wherein the reversing movement of the back will transmit corresponding movement to a shifting and canting seat cushion and at the same time correspondingly reverse the position of a swinging foot-rest, so as to adapt the same for the use of the occupant of the next seat in the rear.

803,963. Car Seat; Joseph Applin, Philadelphia, Pa. App. filed Sept. 20, 1904. A seat of the "walk-over" type in which the back-supporting arms are pivoted near the lower portion of the frame, a rock-shaft extends between the members of the frame and carries a shifting foot-rest and levers outside the side members of the frame, the lower ends of the levers being bifurcate and the bifurcation coacting with egg-shaped lugs carried by the back arms.

804,000. Switching Attachment for Railway Cars; Herman Fenske, St. Louis, Mo. App. filed Feb. 18, 1905. Comprises a bracket mounted to a truck frame between the axles, a bifurcated bar supported in the bracket, a disk carried between the bifurcations, toggle arms, bell-crank levers connected to the toggle arms, cables connected to the bell-crank levers, and an air system for tightening the cables to manipulate the device and bring the disks in contact with the outer surface of the rail to convey the car to the track desired.

804,001. Switching Attachment for Railway Cars; Herrman Fenske, St. Louis, Mo. App. filed June 26, 1905. A device whereby the trucks are operated laterally by a lever mechanism operated by compressed air, the trucks being so manipulated for rounding a curve without the use of rail-switches.

804,150. Safety Device for Car Brakes; Ernest H. Miller, Lancaster, Pa. App. filed April 25, 1904. Consists in combination with a car brake, of a controller wherethrough said brake may be operated, a lever for operating the controller, a brake staff, a draw-bar connection between the draw-bar and the controller-operating lever.

804,156. System of Electric Motor Control; Charles A. Mudge, New York. App. filed March 2, 1905. Consists of a main controller, one or more motors, a master controller and a main operating device having hydraulic means for governing its operation through successive steps.

PERSONAL MENTION

MR. CHARLES T. YERKES, of the London Underground Railway Company, was a passenger on the Crown Prince Wilhelm which arrived at New York from Bremen on Tuesday, Nov. 14.

MR. S. K. PATTESON has resigned as manager of the Alabama City, Gadsden & Attalla Railway Company, his resignation to take effect Dec. 1. Mr. Patteson has decided to return to Philadelphia, where he has business connections.

MR. R. E. DANFORTH, general manager of the Rochester Railway Company, and Mr. Frank Silliman, Jr., general manager of the Scranton Railway Company, together are on a tour of inspection of the street railway properties of the Middle West.

MR. MATTHEW C. BRUSH has been elected vice-president of the Newton Street Railway Company, Newton & Boston Street Railway Company and Lexington & Boston Street Railway Company, and will, in the absence of the president, perform the duties usually delegated to that official.

MR. A. J. PURINGTON, of Springfield, Mass., has been elected general manager of the Fairmont & Clarksburg Traction Company, of Fairmont, W. Va., to succeed Mr. A. L. Linn, who has become connected with the accounting department of the New York Central Railway Company, in New York.

MR. WILLIAM L. SHIPP, auditor of the Indianapolis Traction & Terminal Company, died in Fort Garland, Col., a few days ago, from the effects of pneumonia. Mr. Shipp had been auditor of the Indianapolis Company for nearly two years, and was also an extensive stockholder in several Indiana electric railway companies. Mr. Shipp is survived by a widow and three sons.

MR. ROBERT T. IVORY, for several years manager of the Youngstown Park & Falls Railway Company, of Youngstown, Ohio, has resigned on account of ill health. He will recuperate this winter and next spring will supervise the building of a new road in Pennsylvania. Mr. E. J. Kane, who has succeeded Mr. Ivory, has been assistant manager of the company.

MR. H. W. WOODCOCK, Jun. Am. Soc. C. E., resigned his position as assistant general superintendent of the Brooklyn Grade Crossing Commission on Nov. 1, 1905. He has entered in partnership with Mr. E. C. Swezey, C. E., under the firm name of Swezey & Woodcock, and will engage in a general civil engineering and surveying practice, with offices in Brooklyn, N. Y.

MR. W. H. FORSE, for the past two years general bookkeeper for the Indiana Union Traction Company, of Anderson, Ind., has been promoted to the position of auditor of the company, succeeding largely to the work of Mr. Isaac McQuilkin, whose resignation from the company to become connected with the Clinchfield Corporation was noted in the last issue of the Street Railway Journal.

MR. A. E. STONE, who has been auditor of the Boston & Worcester Street Railway since operation was first begun, has been appointed general passenger and ticket agent of the company. His headquarters will be, as formerly, at the general offices, South Framingham, Mass. Mr. Herbert Linwood Hanlon has been appointed press representative of the company and will make his headquarters in Worcester.

MR. C. F. SWIGERT, vice-president of the Portland Consolidated Railway Company, of Portland, Ore., and Mr. H. C. Campbell, of the same company, who retired when the property passed to Eastern interests recently, are on a tour abroad that will take almost a year to complete. They are now in the Mediterranean, where they propose to spend about three months. Later they will visit Egypt and the Holy Land.

MR. G. W. CHANCE has resigned his position as general manager of the Traction Company of America, with headquarters in the Drexel Building, Philadelphia. Mr. Chance was for a number of years manager of the Trans-St. Mary's Traction Company, of Sault Ste. Marie, and has also had an extended steam and electric railway experience with the Norfolk & Western Railway, the Chicago & Northwestern Railway and other companies.

MR. BERNARD V. SWENSON, secretary and treasurer of the American Street & Interurban Railway Association, has returned to New York from Madison, Wis., where he went to complete arrangements preparatory to taking up permanent residence in New York City. Mr. Swenson has succeeded in securing desirable offices at 60 Wall Street, New York, which will be the headquarters of the association, where a library will be established and records filed.

MR. GEORGE W. VOIGHT, who for the past few months has been master mechanic of the Danville, Urbana & Champaign Electric Railway, has been made general superintendent of motive power of the Illinois Traction Company's system. Mr. Voight was for seven years with the Chicago Union Traction Company as master mechanic, and for five years with the National Electric Company as general salesman. Mr. Voight's ability is solely responsible for his promotion. He assumed his new charge on Nov. 15.

MR. E. P. BURCH, consulting electrical engineer, is giving a course of four lectures on "Heavy Electric Railroad Work," before the senior engineers at the University of Minnesota. The subjects of the individual lectures are: "The Physical and Financial Advantages of Electric Traction for Heavy Railway Work," "The Speed-Torque Characteristics of Steam Locomotives," "The Speed-Torque Characteristics of Electric Locomotives," and "The Physical Data for the Electrical Equipment for Operating a Division of a Transcontinental Railway."

MR. C. B. SMITH, chairman of the Temiskaming & Northern Ontario Railway Commission, who is also expert engineer to the Hydropower Commission, has returned from a visit to the Continent and England. He went abroad to study the electrical railway systems which operate with high-voltage alternating currents. His report will reinforce the recommendation of the Commission that the first 100 miles of the Temiskaming & Northern Ontario Railway from North Bay to New Liskeard should be operated by electricity. There are good water-powers all along the line. Plans and specifications of the work and its cost will shortly be laid before the government. Mr. Smith visited Belgium, Germany, Austria, Italy, Switzerland, France and England.

MR. G. E. PELLISSIER, for some time chief engineer of the Holyoke Street Railway Company, of Holyoke, Mass., has resigned from that company to enter the employ of the Goldschmidt Thermit Company, of New York, in the interest of which he will travel in the West as far as the Pacific Coast. Mr. Pellissier took up railway work with the Holyoke company in 1898 as a conductor and motorman, and also worked in the repair shop at Holyoke. Later he entered the Worcester Polytechnic Institute and was graduated in 1904 from the civil engineering course with the degree of Bachelor of Science. During his course there he gave special attention to the study of maintenance of way on electric railroads. He then went back to Holyoke and was placed in charge of track construction and maintenance of way for the Holyoke company. This company was the first to use Thermit joints in this country, and installed 172 of these joints in Holyoke in July, 1904.