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## Economy of Air Brakes

Air brakes have come naturally to be considered a necessity on heavy interurban cars. On single-truck city cars they have made very little headway. When it comes to double-truck city cars, however, there is a contested territory where there is considerable difference both in practice and opinion. Many companies are operating double-truck city cars with hand brakes, while others are using air brakes for the same weight of car. The question is, perhaps, too often considered simply as one of cost of brake maintenance. If that is the only thing to be considered there is no doubt that the hand brake is the most economical. Some managers object to the air brake because they say that with the additional complication it involves it is not, on the whole, as reliable as the hand brake, and that with the class of labor employed it is less likely to prove reliable. This, however, is simply another way of putting the

argument that the cost of maintenance of the air brake is greater than of the hand brake. It is known from experience with air brakes on heavy cars that they can be maintained so as to give good and reliable service if the proper attention is given to maintain them in reliable condition. It is, therefore, simply a question of cost of maintenance after all, as by spending enough money on maintenance the air brake can be made reliable. The whole thing simmers down, then, to whether it pays to spend this money in maintenance for the benefits received from the air brakes.

The greatest benefit which is supposed to be obtained from the use of air brakes is the reduction of accidents. That air brakes save some accidents there is no doubt, but like every other safety appliance their value in that respect, however great, is largely a matter of guess work. While this is important, it is not the only advantage of air brakes. There are other points to be gained by their use as compared to hand brakes, which are susceptible of fairly definite engineering determination, and it is to these points that we wish especially to call attention here in the hope that the city railways that are now adopting air brakes may be induced to determine for their own benefit, and that of the art in general, how much these points amount to.

It has been claimed that with cars operating over the same route on a given schedule less energy in kilowatt-hours per car mile will be required than with hand brakes. This would apparently be true for two reasons. Since the air brakes are applied more quickly and easily than the hand brakes, a motorman will naturally drift with current off more with the air brake than with the hand brake. When, with the air brake, he would apply the brake suddenly and make a quick stop, he would apply it slowly by hand, and hence could not coast as much to make the same schedule with the hand as with the air brake. Further than this a motorman is tempted to run with the brakes partly set, or at least with the slack all taken up when in a crowded street with a hand-braked car, because of the necessity of being prepared to stop quickly. We see here two reasons for increased economy with air brakes. Informal tests that we have heard of would seem to indicate that these things work out in practice as expected, but a determination of how much this saving of energy will amount to in a given case would be valuable.

Another point in favor of the air brake that has a commercial value aside from the saving of accidents is that they make possible a faster schedule without increased risk. We have in mind one case where the introduction of air brakes in city service had the effect of changing what was apparently a very fast schedule and one hard to maintain into one with which there was no trouble in being on time.

## Ventilation as an Asset

Within the last few years a great deal of stress has been laid by engineering salesmen upon ventilation as a strong point in the design of apparatus, and there has grown up a feeling among operating officials that unless a motor or a generator is pretty well perforated by air ducts and holes for disposing

of accumulated heat losses, the machine is likely to be incapable of operating efficiently. The pendulum has swung so far in this direction that it is time to call attention to the fact that while adequate ventilation is a valuable asset, in the make-up of any piece of electrical machinery, there are other features of design which have quite as much influence upon the efficiency curve. Like the hole in the doughnut, the ventilation duct is the least expensive part of the machine, and may be used to cover up a multitude of sins in the way of scamped copper and iron, joint forebears of excessive  $I^2R$  losses. Everyone knows that a motor with a fixed rating will carry heavy and sustained overloads without protection as long as it is run with the covers off and air blown through it by the motion of the cars or by a special fan. These points should be kept in mind in selecting equipment along with considerations of weight, speed, accessibility, reliability, momentary overload capacity, first cost, maintenance guarantees and experience obtained by other purchases with any given type of apparatus. It is more important to get an idea of the energy which is thrown away in heat losses than to appreciate the admirable arrangements for disposing of such wasted power after it is liberated in the regular operation of the machine.

### Car Signs

The proper labeling of routes and destinations upon street cars is a problem which dates back to the earliest days of horse traction, and the requirements of different transportation systems in this matter are as variable as the geography of the cities which they serve. The importance of equipping cars with plainly-printed, definite signs, has often been referred to in our columns, and there would be little need of calling attention to the subject at this time were it not for the lapses from good practice so frequently encountered in both city and cross-country operation.

Progressive officials are now unanimous in the opinion that some form of car sign is indispensable, even upon the shortest roads. It is now pretty well realized that every fare counts in the race of gross receipts against fixed charges and operating expenses toward the goal of dividends, and in these days of almost universal traveling, it is not enough that the inhabitants of a particular locality understand their car service. The stranger within the gates must have the way made plain to him also, if the cab driver and the steam railroad company are not to capture five or ten times the money which ought to go to the street railway.

It is a mistake to assume that a proper equipment of signs means that a car must in every case be as plastered with labels as the windows of a cut-rate drug store. In the vast majority of cases a destination sign at the front of the car, with a route sign at the side—painted upon the panel, over the windows, or affixed to the roof—answers all practical purposes. It is better practice to mark a definite terminal, "City Park," upon the front sign than to label it with the route name, "Main Street." The latter belongs at the side of the car, because of the over-balancing importance of the destination.

The adoption of different colored cars for the various routes is a convenience to the regular inhabitants of a city, but it is of little use to the stranger, and on medium or small-sized systems has the disadvantage of preventing the interchange or pooling of cars for service on different routes. In like manner, the use of colored lights at night is far less valuable to the visitor than the employment of a good illuminated sign above the motorman's head.

Failure to properly equip cars with signs may easily result

in increased wear and tear and power consumption of the car equipment, due to additional stops and starts made necessary by the inquiries of uncertain passengers. When these stops and starts are made upon heavy grades the strain upon the equipment and waste of energy is all the more needless. The would-be passenger has no other recourse than to stop the car in order to find out where it is going—if it is insufficiently labeled—and there is reason to believe that in the course of a year the cost of wasted power and extra depreciation of rolling stock due to this poverty in the use of signs amounts to considerably more than the expense of properly marking the cars.

Operating points of this character are small things in themselves, but their sum total often decides the profit and loss of a year's business. Interurban lines with established stations and printed time-tables are naturally less affected by the sign problem than city and suburban roads. In no business in the world is the old Scotch proverb, "Many a mickle makes a muckle," better illustrated than in street railway work, and there is no doubt that a little more care in the use of car signs will amply repay considerable trouble and expense in its resulting effect upon transient traffic on many modern electric railway systems.

### Sub-Station Wiring

Within the past few years the wiring of sub-stations has come to be regarded as one of the most important features of design. This is due in part to the increasing use of higher voltages upon the line side of the transformers, and in part to a growing appreciation of the value of continuous, reliable service. In the congested districts of large cities the value of real estate and fixity of established property lines do not permit that freedom of design which we find carried out in country or suburban sub-stations, so that much greater ingenuity is required in securing a good arrangement of apparatus.

The wiring problem is naturally conditioned by the design as a complete whole, and it generally follows that a simple, straightforward arrangement of apparatus means the avoidance of complication in the high and low-tension circuits. In the early days of alternating-current transmission little attention was paid to the systematic layout of sub-station wiring. The advent of potentials varying from 10,000 volts to 60,000 volts has changed all this, and the practice of simplifying the high-tension circuits in particular is rapidly being standardized. Even in modern designs, however, there are still many things to criticise in regard to the wiring arrangements. In a sub-station placed in operation but a few weeks ago, the high-tension wiring runs down a brick flue but 18 ins. wide and 5 ft. long, to the serious danger of any employee who attempts to repair any line trouble within the station, and the lightning arresters' bare terminals project from the wall within 2 ft. of the floor. Safety to employees is a fundamental requisite in sub-station design, and the growing practice of running the high-tension circuits in the open, where their course can be plainly followed from the wall bushings to the transformer primaries, deserves the utmost commendation.

Although wiring troubles are of infrequent occurrence in most modern sub-stations, there is always danger of at least a burn-out from lightning or from fire, caused by some high-tension cross between low and high-potential circuits in the system or its neighborhood. It is always vitally important to cut short every period of break-down as far as possible, and the sub-station which is wired in a simple, straightforward fashion, possesses no small advantage when anything goes wrong with its circuits. The use of polyphase instead of single-phase

transformers means greater simplicity in both high and low-tension wiring construction, in addition to an economy in space and weight which permits a highly desirable saving in the first cost of real estate and building construction. Thus, three 1000-kw three-phase transformers take the place of nine 333-kw single-phase units, with a marked saving in wiring complications and a reduction of 30 per cent in floor space. It is poor economy to use smaller insulators and less expensive insulation inside the sub-station building in the belief that the absence of exposure to the elements warrants this sort of laxity. Of course, insulation is a snare and a delusion upon circuits carrying much over 10,000 volts, and the best practice usually leaves the high-tension wires bare inside the building as well as without. It is likewise a mistake to fail to insulate properly the low-tension circuits, not so much on account of the danger to attendants as in the interests of safety against fires and crosses.

The keynote of simple sub-station design lies in the treatment of the apparatus arrangement from what we might call the manufacturing or industrial standpoint. That is, the process of transformation must be realized at every step in laying out the equipment, just as the sequence of operations in a factory determines the route of the raw material through the machinery to the product. From this viewpoint the high-tension entering current is the raw material, and the low-tension current the completed product. Just as in a modern factory the effort is made to carry every process ahead of its preceding operation in the shortest and most direct route, so is it desirable to follow the straight-line course in carrying electrical energy through a sub-station's wiring and equipment.

### The Future of Coal

Mr. Parker, of the United States Geological Survey, has recently predicted that another half century will see the practical end of the anthracite supply, and that from now on the bituminous coal will come steadily more and more into use. The fact is that the anthracite beds are very limited in extent, have been now hard-worked for a good many years, and there seems small prospect of finding new fields, at least within reach of any considerable extent. Aside from the Pennsylvania field there is practically no American source of anthracite, save one of minor consequence in Colorado. The specially significant fact which Mr. Parker brings out is that the anthracite production has already passed its maximum. For several years the annual output ranged around 70,000,000 tons, but in the past three years it has averaged less than 60,000,000. A decline in production so considerable as this is no accident—it means that the conditions of supply are such that the use of anthracite is on the decline, and that the growing industries of the country are depending, either by design or as an incident of situation, upon the bituminous supply. Confirmatory evidence is furnished by the fact that in the past three years the output of bituminous coal has considerably more than doubled, rising to the enormous figure of more than a quarter of a billion tons per year. Of course, in large industries, soft coal has been the staple for years, but it seems clear that in the future—and in the near future, at that—it will be the exclusive fuel for general manufacturing purposes. But, with the country growing, the immense output of soft coal must still rapidly increase, while that of anthracite falls off. It is probably not stating the case too strongly to say that in the lifetime of men now in active pursuits, anthracite coal will become as much of a luxury as cannel coal now is.

In other words, it is clear that within comparatively few years the shortened supply and increased difficulty of mining anthracite will put it practically out of the market. But what about the supply of soft coal? One can hardly expect the coal-using industry to decline, and at a very conservative estimate of growth one may soon expect to find the quarter billion tons become a half billion. At such a rate of dissipation, what is the outlook for the world's future coal supply. It is, perhaps, idle to speculate on the grand total of the world's resources, for Asia and Africa are yet to be exploited. That there is a great store of coal in these continents there is no reason to doubt. Whether it is, upon the whole, good coal, reasonably easy to mine, and within range of practicable transportation, is quite another matter. Much of our own soft coal is of rather low grade, and similar conditions may reasonably be expected elsewhere. Coal from Central Africa would mean serious freight charges, so serious as to tend to a shifting of the world's industrial center. Even now we see the effect of cheap coal in drawing our own industries southward, and it may be no idle dream to look forward to a day when the world's metropolis may be located in Rhodesia. Population and manufacture must inevitably shift away from regions of rigorous climate, when coupled with scant fuel supply. Fancy for a moment the anthracite supply exhausted and soft coal gone to the present price of anthracite, a condition which even some men now born may live to see. How long, for instance, could the American cotton manufacturer compete with mills in Egypt, with fuel sent down from the Nile.

But the practical side of this very problem which confronts us to-day is the conservation of the fuel supply. The coal supply is a fixed quantity, even though large, and the present inroads upon the store are tremendous. What can be done to lessen them and so to preserve the status quo a century or two longer. Obviously, if manufacture grows, one of two things must happen—either fuel must be used up at a rapidly increasing rate, or it must be made to go further. The latter horn of the dilemma is the one which immediately concerns the engineer. If industry depended on the engines of seventy-five years, or even fifty years ago, the coal output would have already risen to a billion tons a year. What can be done in the next half century to make a ton of coal go further in industrial use? Improvement of our prime movers is clearly the first logical step. It does not seem a wild vision to imagine the coal consumption brought down, even with steam engines or turbines, to a pound per horse-power hour. In internal combustion engines there is hope for still greater reduction. In the best examples to-day nearly one-third of the heat is converted into work, about one-third is rejected in the water circulation and the last third is rejected in the exhaust. Clearly the lost heat can either be put to work or lessened in amount, for it is still at a relatively high temperature. If the consumption of fuel could be brought down to half a pound of coal, or its equivalent, per horse-power hour, the life of the coal supply would be greatly increased. And perhaps there are improvements now quite unthought of which will help out still more. The water powers, too, can be worked to their full value. At the present time they are only beginning to be utilized, but in the long run they must win out against a rising cost of fuel. Economy in the production of power is the watchword of the present. The whole trend of the situation indicates that as years go by the relative fixed charges in power production—the rate of interest—will steadily decrease and the fuel costs will go up. He will build wisely who bears this in mind.

THE SPRINGFIELD, TROY & PIQUA ELECTRIC RAILWAY

The majority of electric railway builders in Ohio have gone into territory already occupied by steam roads, and by reason of low rates and frequent service have succeeded in securing a profitable share of the short-haul freight and passenger business. In a few instances, electric roads have been built through districts which heretofore have had no rail transportation facilities of any kind, and in nearly all instances such roads have proven of inestimable value in developing territory that has practically been standing still for many years.

In Clarke and Miami counties, in Ohio, is a prosperous farm-

for its varied industries and for its public institutions, among them the Masonic Home and the K. of P. Home. The population of Springfield is 42,000. Troy is a seat of Miami County, and is a live manufacturing city; population, 6000. Christiansburg is the center of a large farming district, and heretofore it has had no railroad connection; population, 1100.

The Springfield, Troy & Piqua Railway was projected by the late General Asa S. Bushnell, former Governor of Ohio, a gentleman who had acquired a large fortune in the manufacture of agricultural implements at Springfield. Two years ago he sold out these interests to a combine, and he determined to promote the welfare of his home city by making it the center of



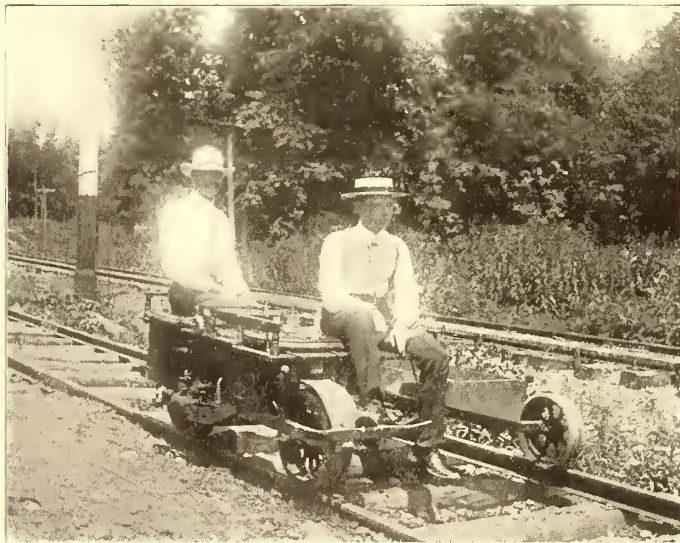
SPRINGFIELD, TROY & PIQUA RAILWAY AND SPRINGFIELD & XENIA RAILWAY TERMINALS ON SAME RIGHT OF WAY AS THE BIG FOUR (STEAM) RAILROAD



SPRINGFIELD, TROY & PIQUA RAILWAY AND DETROIT SOUTHERN (STEAM) RAILROAD ON SAME RIGHT OF WAY

ing district, dotted by a number of small villages, which will shortly hail with delight the first through cars on the Springfield, Troy & Piqua Railway, a modern high-speed interurban road, designed for handling freight as well as passengers, which has been built through the center of this district. The road is practically completed between Springfield and Troy, a distance of 29.6 miles, passing through the villages of Maitland, Lawrenceville, North Hampton, Dialton, Thackray, Christiansburg

an extensive system of interurban roads. With his immediate associates he purchased a controlling interest in the Springfield & Xenia Traction Company, operating a line to Xenia, the seat of Green County, a city of 9000 inhabitants, located 25 miles south of Springfield. Work on the Springfield, Troy & Piqua Railway was started in the spring of 1903, and another road was projected to open up territory southeast from Springfield. General Bushnell did not live to see his plans consum-



GASOLENE INSPECTION CAR



A HEAVY CUT ON THE SPRINGFIELD, TROY & PIQUA RAILWAY

and Casstown, and a right of way has been secured for a spur line from a point near Casstown to Piqua, affording a direct route between Piqua and Springfield, and providing a shorter all-electric route between Lima, Springfield and Columbus. The population on the present route is estimated at 1980 per mile of track, including terminal cities. Springfield is one of the best known manufacturing cities in the Central West; noted

mated, as he died in January of this year. In the construction of the Springfield, Troy & Piqua, General Bushnell secured the assistance of F. J. Green, who had been identified with the building and management of several of the leading traction properties in Central Ohio. D. H. Ullery, formerly chief electrician for the Appleyard syndicate, was secured to supervise the installation of power equipment. The Champion Construc-

tion Company was formed for the purpose of building this and other roads, and with ample financial backing, with the personal supervision of their own engineers and construction forces, and without the usual contractor's profit, the road has been equipped with the best of material and built on an economical basis.

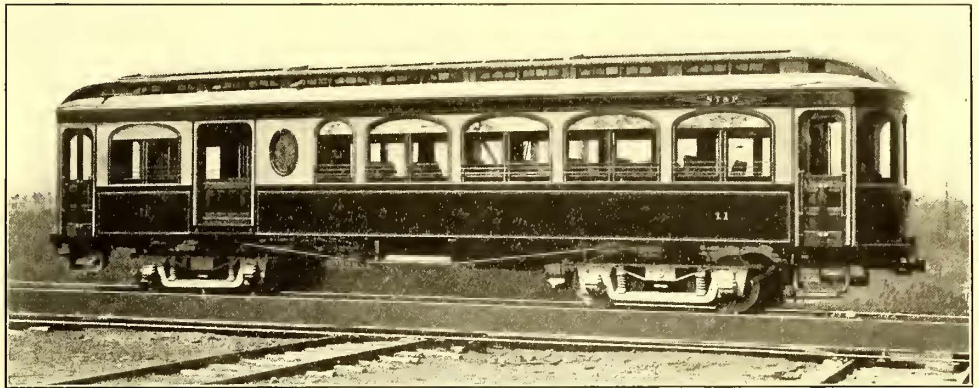
Few roads have such advantageous terminal facilities as the Springfield, Troy & Piqua. In entering Springfield it would have been possible to make a traffic arrangement with another company operating into the city from the west, but General Bushnell preferred an independent entrance. This was secured by leasing for ninety-nine years half of the double-track right of way of the Detroit Southern Railroad (steam), thus bringing the electric line to within a quarter of a mile of the center of the city. The company built its car house and freight terminal at the end of this private right of way, giving it a most advantageous location for handling package as well as bulk freight. Passenger cars operate to the Esplanade in the center of the city by way of Grant Street, Yellow Springs Street and Washington Street. Washington Street is also occupied by the tracks of the Big Four Railroad (steam), and passengers are landed within a stone's throw of the Union Passenger Station. Direct connection is also made with electric cars to Columbus, Urbana, Dayton and Xenia. Entering Troy the company built its own track to the center of the town, where connection is made with the Dayton & Troy Railway for Dayton, Piqua and Lima.

In two instances the road runs around the centers of small towns on private right of way, with 6-deg. curves, while in other villages the line takes the center of the street.

But a trifle over one mile of the entire road is on highway or streets, and T-rail is used exclusively. In Springfield and Troy this is paved with a special beveled brick known as the Hocking paving brick. Through the country the road is on private right of way, a short portion being at the side of the highway, while the balance is cross-country, following a sec-

view of this piece of work is presented. There are but two grade crossings on the line; one at Troy is protected by a derailer, while the other, two miles west of Springfield, is in conjunction with the crossing of the Erie and Detroit Southern steam roads, and the crossing is protected by semaphores and interlocker system operated from a tower; a view of this crossing is also presented. The only bridge on the line is a 360-ft. double-deck timber trestle resting on concrete foundations.

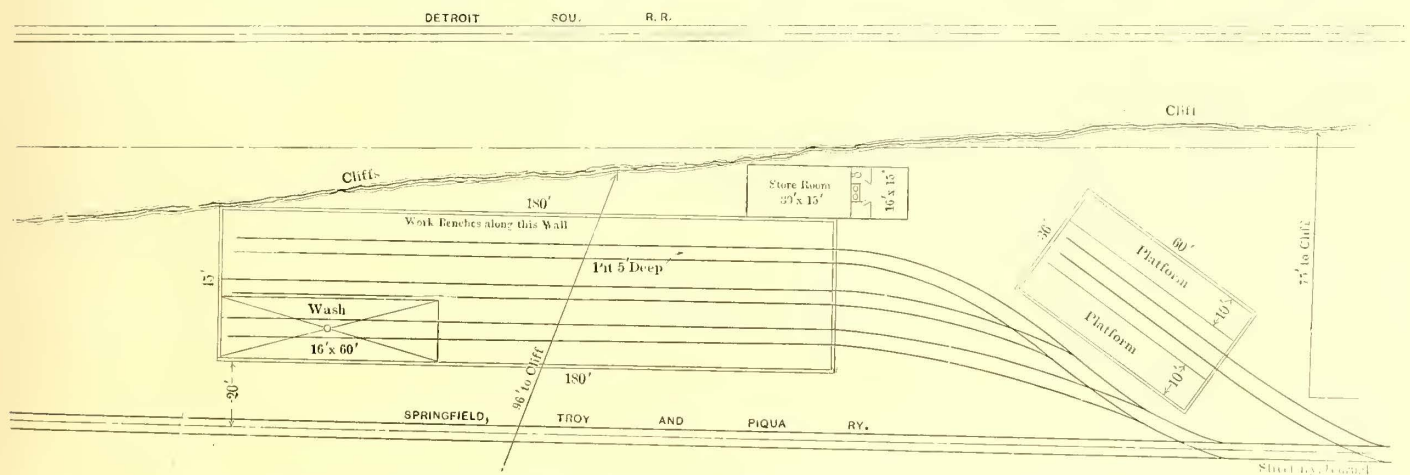
Sixty-pound standard T-rail is used through the country and



STANDARD INTERURBAN CAR USED ON THE SPRINGFIELD, TROY & PIQUA RAILWAY

70-lb. T-rails in cities and villages. Four-bolt and six-bolt fish-plates are used. Concealed bonds are employed in the city and Ohio Brass Company's outside soldered bonds in the country. The track is cross-bonded every 500 ft. The ties are standard size and spacing.

The poles are 35 ft., spaced 100 ft. apart, are all perfectly straight and have 8-in. tops. The brackets are of the Richmond flexible type, 10 ft. long, of 1½-in. pipe. There are three cross arms, the two upper being designed to carry two sets of three-phase high-tension lines, although at present only one set is installed. The upper arm carries one 12¾-in. pin, while the lower has a pin on either end, so that the scheme of an equilateral triangle will not be carried out until another set of lines is installed. The arms are supported by wood braces, the pins are soaked in paraffine; the insulators are 7-in. double-petticoat chocolate-colored porcelain, tested for 40,000 volts, while the three high-phase high-tension wires are No. 4 copper.



CAR HOUSE AND FREIGHT TERMINAL OF THE SPRINGFIELD, TROY & PIQUA RAILWAY

tion line with the highways half a mile on either side; right of way ranging from 40 to 60 feet. The track bed is graded 12 ft. wide on a level and 14 ft. on the cuts.

The heaviest cut on the line is 38 ft. deep at one point and about 80,000 yards were taken out and filled nearby. At this point on the line there is a grade of 2.6 per cent, nearly a half mile long, which is practically the only grade on the road. This cut was made nearly 40 ft. wide to avoid cave-ins, and a

The trolley wire is two 0000 grooved wire, dispensing with the use of d. c. feeders.

The company decided it would be advisable to use combination cars exclusively. This enables traveling men to carry their trunks with them, and makes every run an express run. There are four of these cars, built by the John Stephenson Company. The general dimensions are: Length of body over corner posts, 40 ft.; length over bumpers, 50 ft. 1 in.; width

over sills, 8 ft. 6 in.; height from top of floor to under side of head lining, 8 ft. 6 in.; weight of body, 26,000 lbs. The cars are steam-coach type, with vertical sides, and have 12 double sash windows on each side, monitor roof, drop platforms, round front three-window vestibules, and Stanwood steps, with double folding-step doors, which must be raised before door can be opened. The side sills are one continuous piece of  $4\frac{3}{4}$ -in. x  $7\frac{3}{4}$ -in. yellow pine. The sub-sills are  $3\frac{1}{2}$  ins. x  $5\frac{3}{4}$  ins., with  $\frac{5}{8}$ -in. x 7-in. steel plates bolted between, running the full length of sills. The end sills are  $4\frac{3}{4}$ -in. x  $7\frac{3}{4}$ -in. white oak, with  $\frac{5}{8}$ -in. x 6-in. steel plates running between the width of framing and returning on each end about 8 ins., forming right angles where the end and side sills are joined with tenon and lap joint. The platforms are supported by two 4-in. x 5-in. tees and four  $\frac{1}{2}$ -in. x 5-in. steel plates. The bumpers are 3-in. white oak,

bottom sash raises 22 ins. Window heads are oval and have art glass. The interior finish is all cherry. The window shades are pantasote, with Forsythe spring rollers. The seats are the Hale & Kilburn walk-over pattern, upholstered with black pantasote. The heaters are Consolidated Electric. Nichols-Lintern air-sanders, Wagenhal's headlights, Eclipse car-fenders and Van Dorn couplers are other items of equipment. The cars are mounted on Peckham M. C. B. No. 40 trucks, and are equipped with four G. E. No. 57 motors. They are operated by the G. E. Type M. multiple control system, and have Westinghouse air brakes.

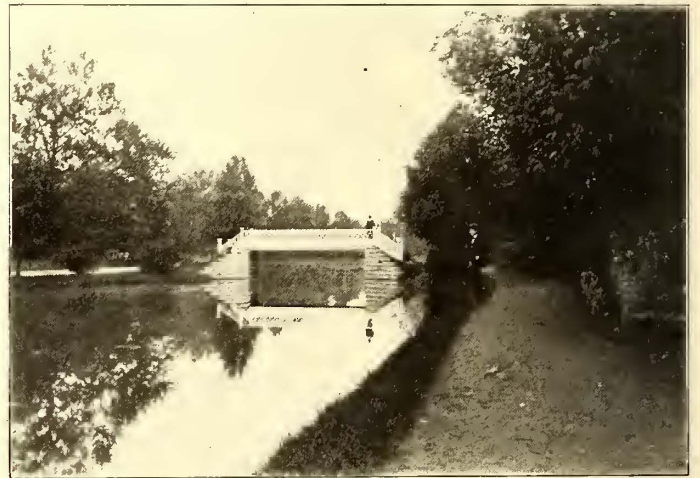
The company has one 50-ft. express car, which is fitted with 75 hp motors, and has unusually low gear, as it is the intention to use it as a locomotive and haul standard steam freight cars. A feature of the car is the fact that it is fitted with special ice-



INTERLOCKER AT ERIE CROSSING, WITH POWER HOUSE IN THE BACKGROUND



A VIEW IN SNYDER PARK



BRIDGE IN SNYDER PARK

capped with 7-in. x  $3\frac{1}{2}$ -in. x 7-16-in. steel angles. The flooring is double, with building paper between. The side posts are  $2\frac{1}{2}$ -in. x 4-in. ash, and the corner posts are 4 ins. x  $4\frac{1}{2}$  ins. The cars are thoroughly trussed.

The cars are designed to run double-end, and to obviate the possibility of passengers interfering with the controlling apparatus there is a cab at each end provided with double folding doors, which partitions off the controlling mechanism and at the same time leaves both doors of the rear end open for passengers. The sashes in the upper portion of outside door of cab are hinged and secured by a spring catch so that the motorman may look out of the window without opening the entire door. The baggage compartment is combined with the smoking compartment, and has seats arranged to fold against the ends and side of cars when not in use. Six camp stools are also carried on hooks from the roof. The windows have two sashes and

racks, so that the drip will not injure the woodwork and wiring. The company expects to handle considerable ice from a lake on its line, and it will also haul considerable produce and dressed meat that will be benefited by the refrigerator feature. The company has an arrangement with the Detroit Southern Railway (steam) for handling its freight cars, and it hopes to make similar arrangements with other steam roads in this vicinity. At Maitland the company has track connection with the Detroit Southern and the Erie roads, and at Troy with the Cincinnati, Hamilton & Dayton Railway. The prospects for car-load freight business are very promising. At Christiansburg and Casstown the advent of the road has induced the erection of grain elevators and warehouses for coal, lime and lumber, and the company has placed connecting tracks to these establishments. Freight and ticket offices will be maintained in these towns. The freight house at Springfield is a brick

building 36 ft. x 60 ft., with track through the center and one at the side. There is an office and two 10-ft. platforms extending the length of the building, with large double doors on both sides. The property at this point provides ample space for a freight yard.

The car houses adjoining the freight station is 45 ft. x 180 ft., built of brick, with steel-supported slate roof. There is a wing containing a stock room, dispatcher's office, reading room, bath



THE CASCADE IN NEFF PARK

room and shower bath for employees. There are three tracks in the house. A portion of one is fitted with drains and cement floors for washing cars, while the third extends over a pit 5 ft. deep and 15 ft. wide. In this pit is the machine shop, the tools being arranged along the outside wall and including a wheel press, wheel lathe, planer, lathe and drill press. A 5-ton chain hoist covers the entire pit and track. There is a screw-jack on a truck below the track, and the advantage claimed for this



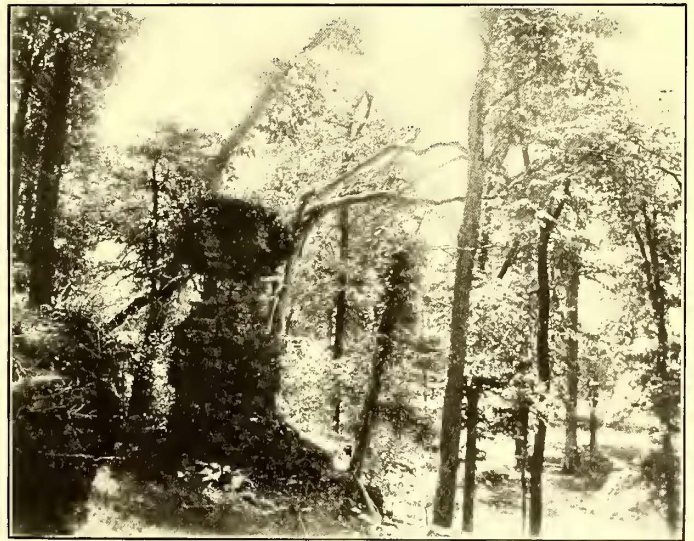
CASCADE CREEK IN NEFF PARK

shop arrangement is that practically all the repair work can be done without leaving the pit. All the floors in the building are concrete and the tracks are supported on concrete piers. The building is well lighted and, as it stands on the edge of a cliff, the drainage is excellent. The tracks in the house have an elevation of one-half of 1 per cent, so that cars will run out as a protection against fire. The house is fitted with three Kinneer rolling steel shutters. The special work at this point, as well as other special work, was furnished by the Indianapolis Switch & Crossing Company, of Springfield.

The company expects to derive considerable traffic through excursion business. Four miles from Springfield, a large base-

ball park, with covered grand stand, has been erected by the company, and regular scheduled games will be played during the balance of the season. The park was opened June 26, and the company handled a very large crowd with the first passenger cars to operate on the line. Two miles west of the business section of Springfield lies Snyder Park, a magnificent city park, upon which the municipality has expended large sums in beautifying and improving. Two views in this park are presented. The electric line extends the full length of the park, a distance of more than a mile, and three waiting rooms have been erected. Pioneer Woods and Echoltz Park are popular picnic grounds, while Lost Creek and Mad River are famous fishing streams. Neff Park, near Yellow Springs, on the Springfield & Xenia Railway, will also give this company considerable business, and through excursion cars will be operated to this resort, which is one of the most beautiful in that portion of Ohio. The park, embracing nearly two hundred acres, occupies a deep ravine, surrounded by lime-stone rocks affording rugged and picturesque scenery. There is a large lake, affording boating and bathing, and a large dancing pavilion and dining room are among the attractions. The management caters only to the best class of people, and the park is used primarily for picnics and evening trolley parties. Tickets are sold over both roads bearing coupons for admission to the park, and both roads have arrangements for furnishing special cars, with exclusive use of the dancing pavilion.

In planning for the power station for the Springfield, Troy & Piqua Railway, several circumstances made it inadvisable to follow the usual practice of placing it near the center of the line. The Springfield & Xenia Railway had no power station of its own, and it was thought probable that other roads would be built from Springfield which would require power. Excellent water supply and fueling facilities were available at Springfield, and a location was obtained at the crossing of the Erie and the Detroit Southern, where connections were made



POMPEY'S PILLAR IN NEFF PARK

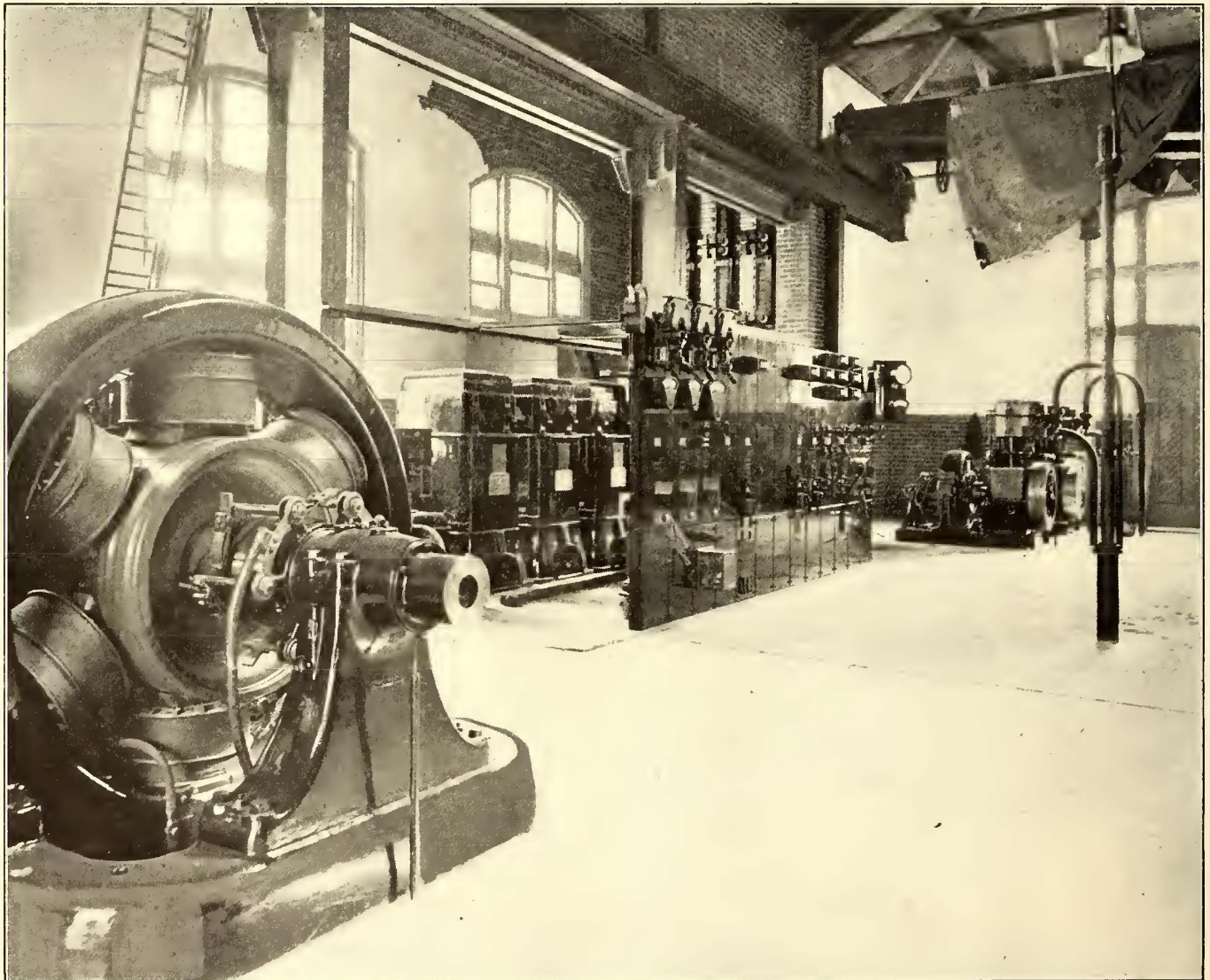
with both roads. The site faces Snyder Park, and General Bushnell decided on an ornamental building that should be in harmony with its surroundings. It is built of machine-made brick, with red mortar and sand-stone trimmings. The roof is tile, with 1½-in. roofing sheeting and roofing felt, with monitor construction resting on structural steel trusses. There are numerous ventilators, with transom-operating devices. The cornices are galvanized iron, and all gutters and down-spouts are copper. The flooring is all concrete on expanded metal, and the foundations are stone and concrete. There are numerous steel columns in the walls, and the crane beams are supported on steel columns. A 20-ton 60-ft. span crane, built by

the Case Manufacturing Company, of Columbus, covers the engine room. The coal bunkers at the side of the house are 75 ft. x 20 ft. x 20 ft. high, having a capacity of 600 tons, and are reached by a timber trestle from a siding. The trestle has scuttle openings for use of either side-dump or center-dump cars. The engine room is 75 ft. x 75 ft., and the boiler room 76 ft. x 46 ft., and there is a bay-off from the former 56 ft. x 11.6 ft. for the office and transformers. The boiler-room floor is 6 ft. below the engine-room floor and the pit below the engine room is 13 ft. 6 in. below the engine-room floor.

The boilers are four 300-hp Babcock & Wilcox, arranged in two batteries and having "Dutch Oven" extended furnaces, which give better combustion and larger grate surface than the ordinary type. Each boiler has 144 4-in. tubes 18 ft. long and two 42-in. steam drums. Grates are plain, measuring 7 ft. x 9 ft. 8 ins. Ample draft is afforded by a 160-ft. radial brick

driven exciters, and these are by-passed so that no matter what portion of the header is cut out, either or both exciter engines can still be supplied. All valves over 6 ins. are by-passed. The Holly return system is installed for taking care of condensation from main steam lines, separators, etc.

The engines are two Cooper-Corliss cross-compound condensing, high-pressure cylinder 22-in. low-pressure, 44-in. and 42-in. stroke, having intermediate receiver. They are rated at 850 hp, and are guaranteed for 50 per cent overload. They have Corliss valves, and Cooper safety governors operating butterfly valves at overspeed. Governors are connected with synchronizing devices for equalizing speed when engines are operating in parallel. Engines are provided with mechanism for operating automatic dampers in the furnace breeching. The high-pressure lines from the header to the engines are carried below the engine-room floor, and there is no steam piping of



VIEW OF POWER STATION, SHOWING SWITCHBOARD, TRANSFORMERS AND EXCITER SETS

stack 8 ft. inside diameter, resting on its own foundation ten feet from the building, and connected to the boilers by a 6 ft. x 9-ft. breeching. Run of mine or nut and slack will be used. The main steam header is a 12-in. wrought-iron pipe, fitted with Malmanco joints consisting of double flanges, obviating the necessity of threading the pipe. The header is supported on brackets hung from the dividing wall, and it rests on rollers to provide for expansion and contraction. There is an 8-in. line from each boiler to the header, and each is provided with two valves. The header is separated in the center by a Walworth 12-in. gate valve, so that it is possible to cut out either battery or any boiler. There are two steam lines to the engine-

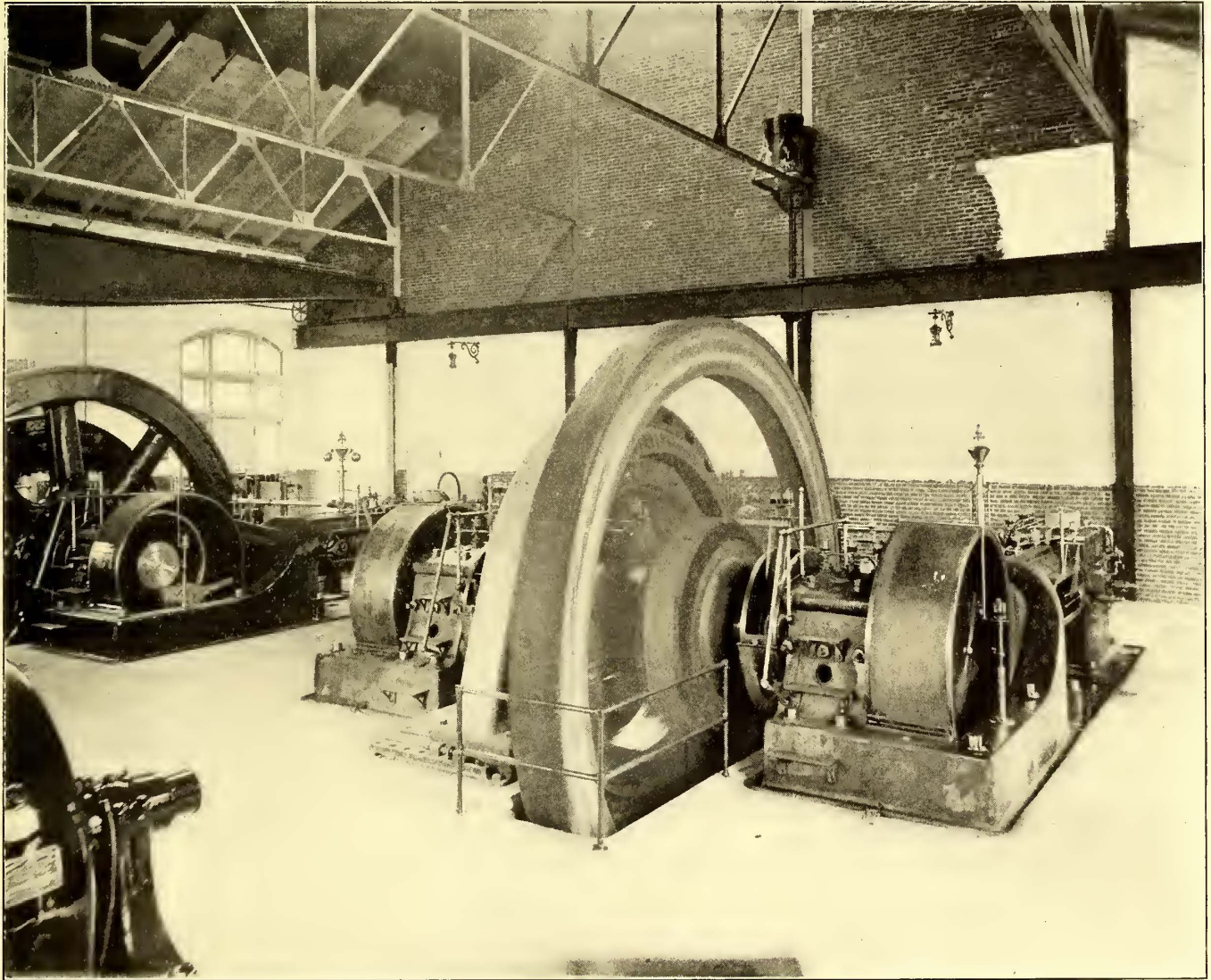
any kind in the engine room. There is a central condenser plant of the Worthington elevated cone type located outside the engine room. The dry-vacuum pump for the condenser is a Worthington, 10 ins. x 16 ins. x 10 ins., and is located on the engine-room floor to the rear of the engines. A Worthington 12-in. x 17-in. x 15-in. circulating pump, located in the pit below the engine room, supplies the cooling water, which is taken from a 10-ft. x 30-ft. well outside the building. The well is supplied by gravity a distance of 1200 ft. through a 20-in. sewer pipe. The digging of this 30-ft. trench was no small piece of work, particularly as a great deal of limestone rock was encountered. However, a large number of springs were turned into the line,



and the water supply is practically furnished by these, affording very clear cold water for condensing. The condenser system has been tested out satisfactorily, and from 26 ins. to 27 ins. of vacuum obtained. There is a relief valve on the exhaust line and the engines may exhaust through a Hoppes exhaust head, the condensation passing to the hot well. The condensation from the condenser system falls to a 4-ft. x 6-ft. hot-well located below the condenser head.

The facilities for handling feed-water are very complete. One end of the boiler room is devoted to the pumps, five in number. Two Worthington 6-in. x 7½-in. x 6-in. hot-well pumps take water from the hot well and deliver it to a Hoppes open-type heater of 1200-hp capacity, supported 25 ft. above the boiler room on a steel framework. Adjoining the heater

well-Bierce-Smith-Vaile underwriters' fire pump, which takes cold water from the cold well, supplying water to all parts of the house. By means of an automatic regulating valve, a constant pressure is maintained in the fire system, and by means of a by-pass on the steam line it is possible to turn direct pressure into the pump. An interesting manifold system of valves has been worked out in connection with the pumps. By means of these valves, which are located at the side of the pumps, it is possible to make any combination of pipe connections from the floor without the annoying and time-taking work of climbing all over the boiler room to change valves. The details of this manifold system of valves are illustrated in a drawing. All pumps are provided with Lunkenheimer mechanical lubricators. The exhaust lines from the engines to the condenser



INTERIOR OF POWER STATION, SHOWING DIRECT-CONNECTED GENERATING SETS

is a Hoppes closed type live-steam purifier, consisting of a large drum provided with numerous shells.

Two Worthington 9-in. x 5¼-in. x 10-in. inside-plunger type duplex pumps take the water from the heater and pass it through the purifier. The water flows over a series of shells and comes into contact with live steam from the boilers, which precipitates all impurities. The bottom of the purifier is 6 ft. above the boilers and the water flows by gravity to the boilers, flow being aided by the steam pressure in the purifier. Either of the boiler feed-pumps are amply large enough to supply the full capacity of the boilers, and the piping is arranged so that they can take water directly from the hot well to the boilers, if necessary, or can deliver cold water from the cold well. Adjoining the boiler-feed and hot-well pumps is a Still-

have Hoppes heaters, purifiers, steam separators and oil eliminators. The exhaust from the auxiliaries, steam pumps and steam exciters is all conveyed to the open type heater, giving the benefit of this additional hot water. The engines are lubricated by an automatic oiling system consisting of a 90-gallon overhead tank and a 90-gallon Cross filter in the basement. A small Victor pump delivers oil from the filter to the tank, and from the latter it flows by gravity to all bearings. Floor stands on the engine-room floor give the engineer control of the engines, condenser and exciter engines.

The main generators are direct-connected to the engine shafts and are the General Electric Company's revolving field, three-phase, 25-cycle type. They are rated at 540 kw, and deliver 845 amps. at 370 volts. They are guaranteed to stand 50

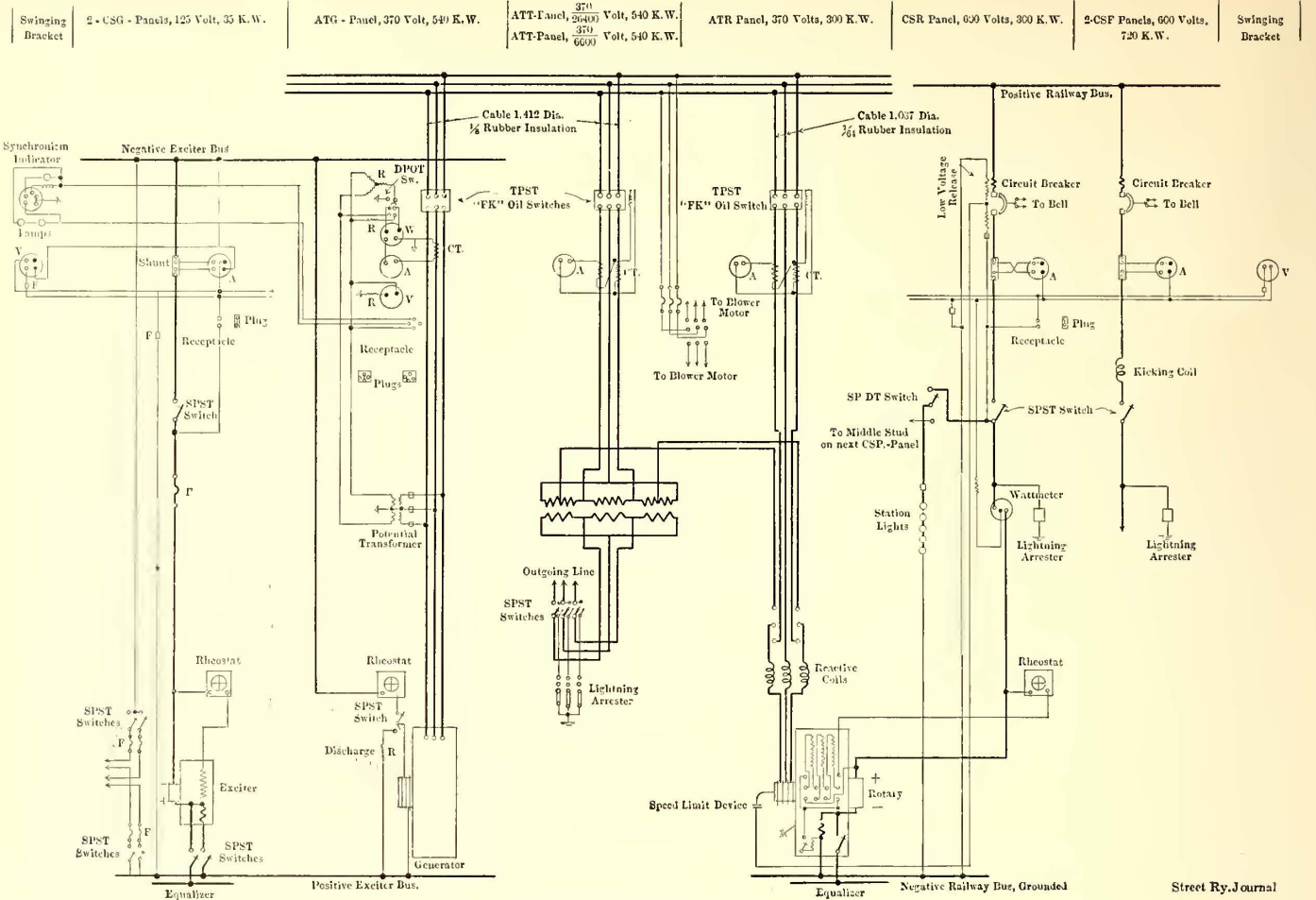


DIAGRAM OF MAIN SWITCHBOARD WIRING

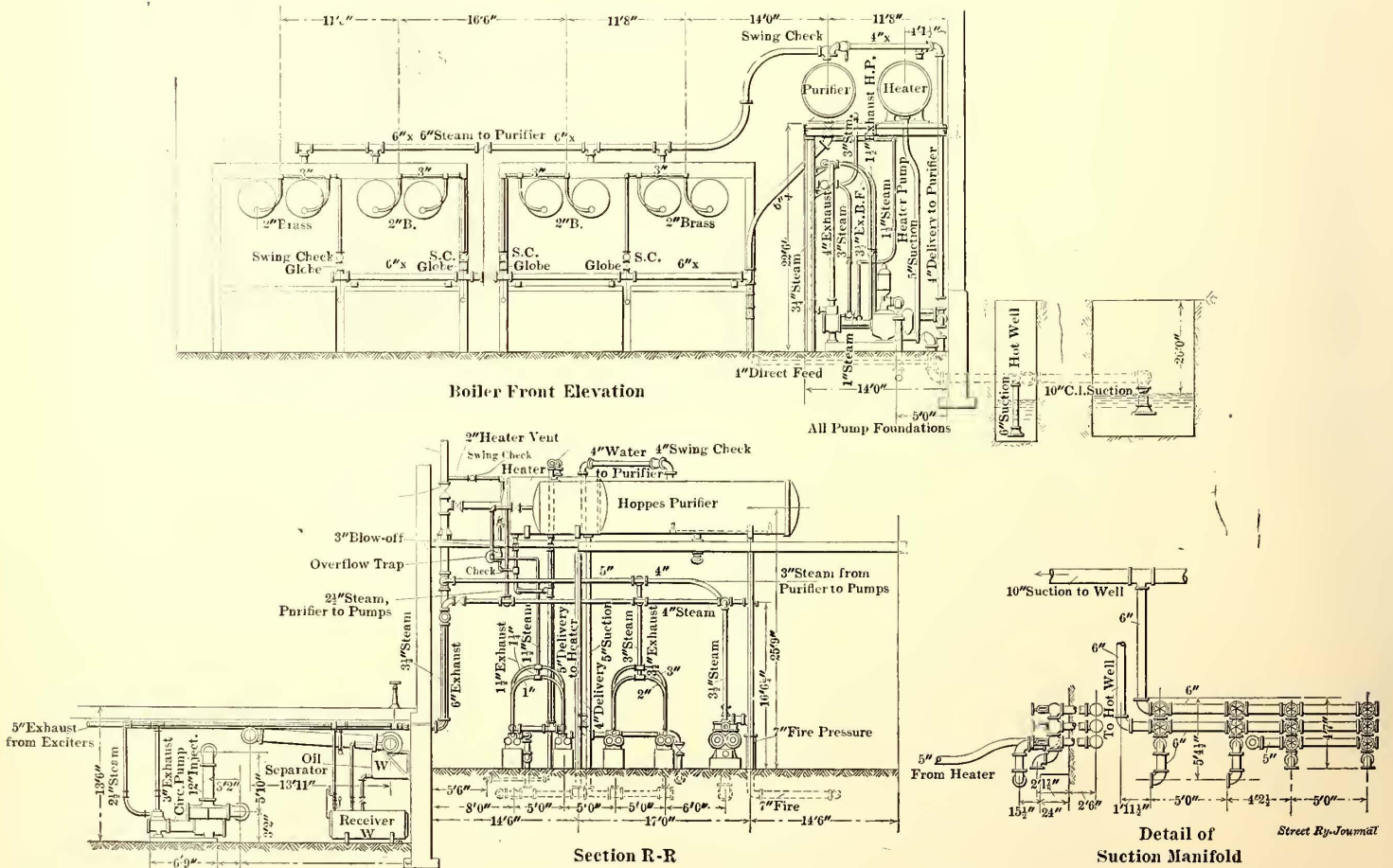


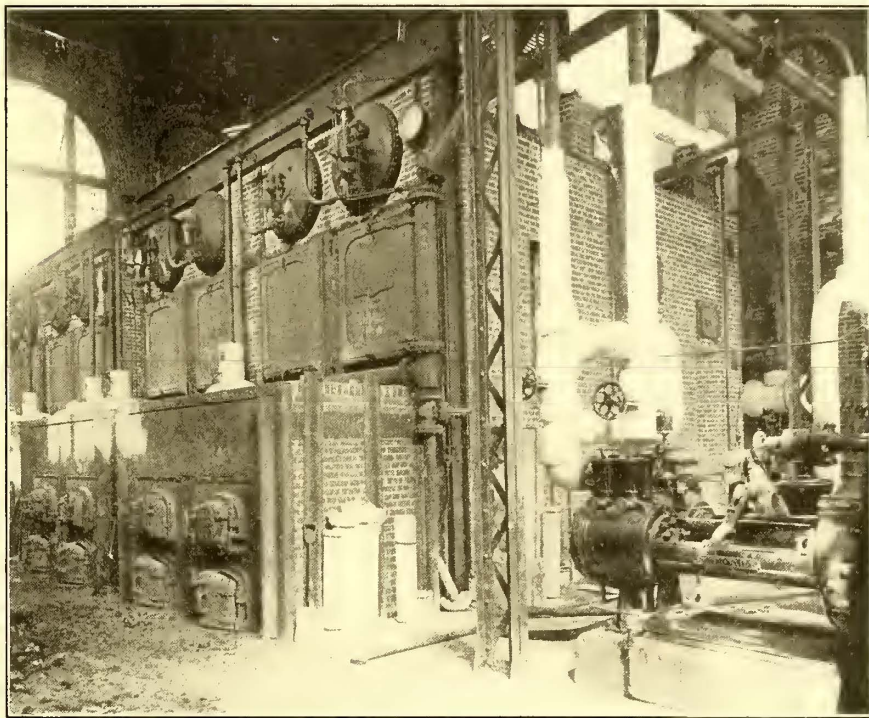
DIAGRAM OF FEED-WATER PURIFIER AND PUMPING ARRANGEMENTS, SHOWING ALSO AUXILIARY STEAM AND BOILER FEED PIPING

per cent overload for two hours and 25 per cent continuously. Speed is 94 r. p. m. Exciting current is supplied by two G. E. 35-kw 125-volt generators, operated by two marine-type steam engines. Either unit is sufficiently large for exciting both generators and supplying light for the house, 110-volt arc lamps, being used for this purpose.

The station was designed to take care of both the Springfield, Troy & Piqua and the Springfield & Xenia. The last-mentioned company uses 6600 volts in transmitting to two sub-stations, current for these at present being supplied from a power house which was leased and fitted with old d. c. apparatus. A. c. current was obtained by means of belted rotary converters and step-up transformers. A potential of 26,400 volts was decided upon for the new line, and to allow for the two voltages two sets of transformers were installed in the new house. The transformers occupy a bay off from the engine room, and the two sets of outgoing lines, lightning arresters, etc., are kept separate, the Springfield, Troy & Piqua lines passing out of the building to the north, and the Springfield & Xenia to the south, the latter line being carried around the city of Springfield to the first sub-station. To provide for possible multiple operation, and in case the voltage on the Springfield & Xenia should at any time be changed to that of the other road, the transformers were made interchangeable for either voltage. This was effected by making the total coils in the transformers in multiples of four. They may be connected in series for

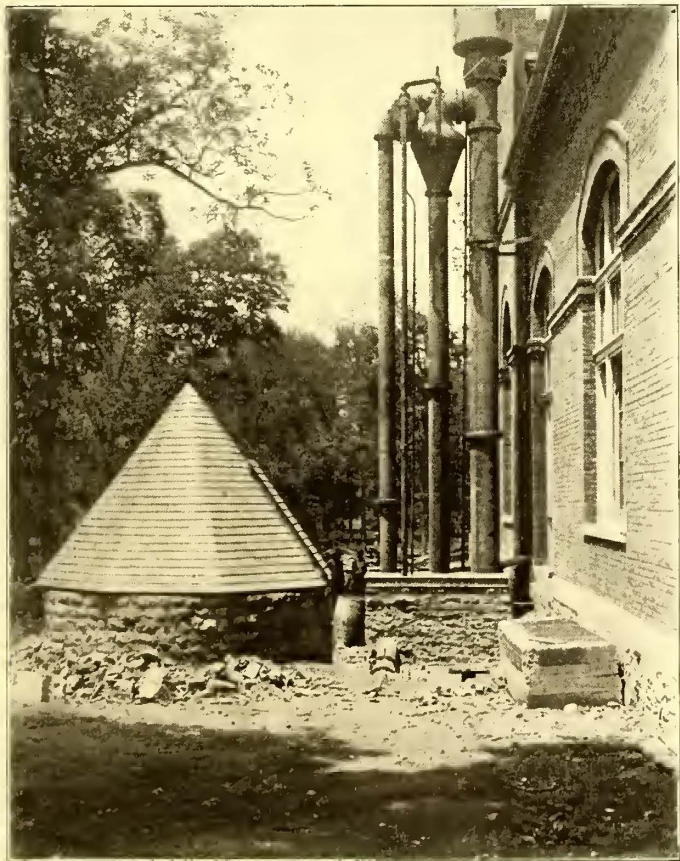
ers in each bank of the air-cooled type rated at 180 kw and having 370 volt secondaries.

The basement below the transformer bay is partitioned off for an air-blast chamber, and all wiring is carried through this

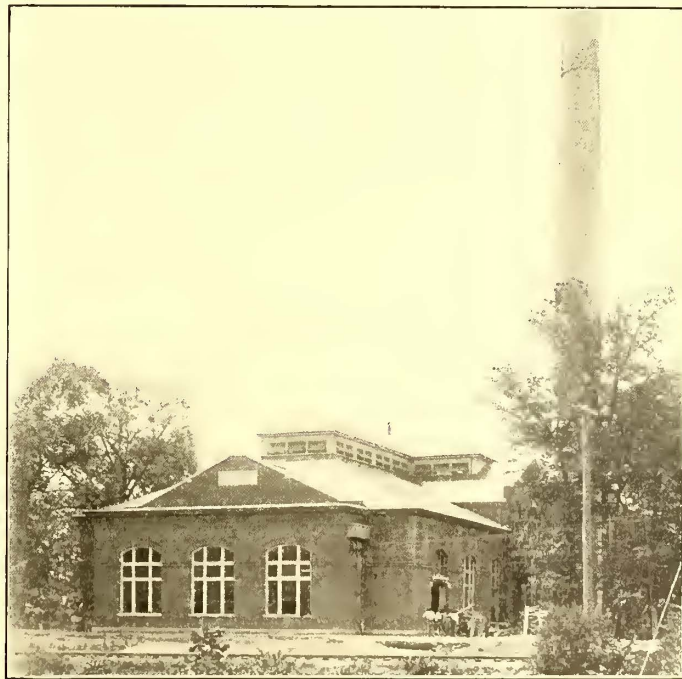


VIEW IN THE BOILER ROOM

chamber. There are two blower sets consisting of Buffalo Forge Company's fans, driven by 4-hp induction motors taking current from the low-tension bus-bar. The blowers are provided with dampers, which are automatically regulated by air pressure, so that they require no attention. Either set is large enough to cool both sets of transformers. No high-tension oil switches are installed in the station, since each line has its own group of transformers, and short circuits or other line



CONDENSER, HOT WELL AND COLD WELL AT POWER STATION



POWER STATION OF THE SPRINGFIELD, TROY & PIQUA RAILWAY

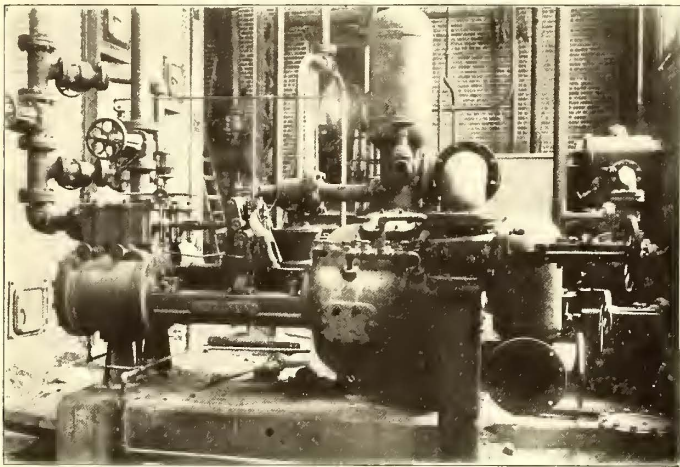
26,400 volts, two in series and two in parallel for 13,200 volts, or four in parallel for 6600 volts. There are three transform-

troubles are opened by means of 1500-amp., 600-volt automatic oil switches between the low-tension buses and the transform-

ers. These switches are suspended from a tubular framework immediately below the switchboard, which is located in front of the transformers. In case the high-tension lines are paralleled

7-in. chocolate insulators. The high-tension wires are carried up through shafts at either end of the air-blast chamber to line anchorages, which, together with the lightning arresters, are accessible from galleries in the transformer bay. The high-tension shafts are sealed at the top just below the lightning arresters, and the high-tension lines pass through Locke 21 porcelain bushings. Similar bushings are used in carrying the high-tension lines through the walls of the air lock at one end of the air chamber. Back of the lightning arresters each line is connected to one pole of a double-pole copper-blade switch, which is used to disconnect the line from the apparatus in the building. The other pole of this switch is interposed between the line and the lightning arresters; opening this blade of the switch makes it possible to do the necessary cleaning of arresters, while the current is on the line. The lightning arresters are standard G. E., designed for 26,400 volts, having multiplex connections to prevent abnormal voltages between lines. Both sets of lightning arresters are the same, except that for the 6600-volt line the ground is tapped part way up the bank of arresters.

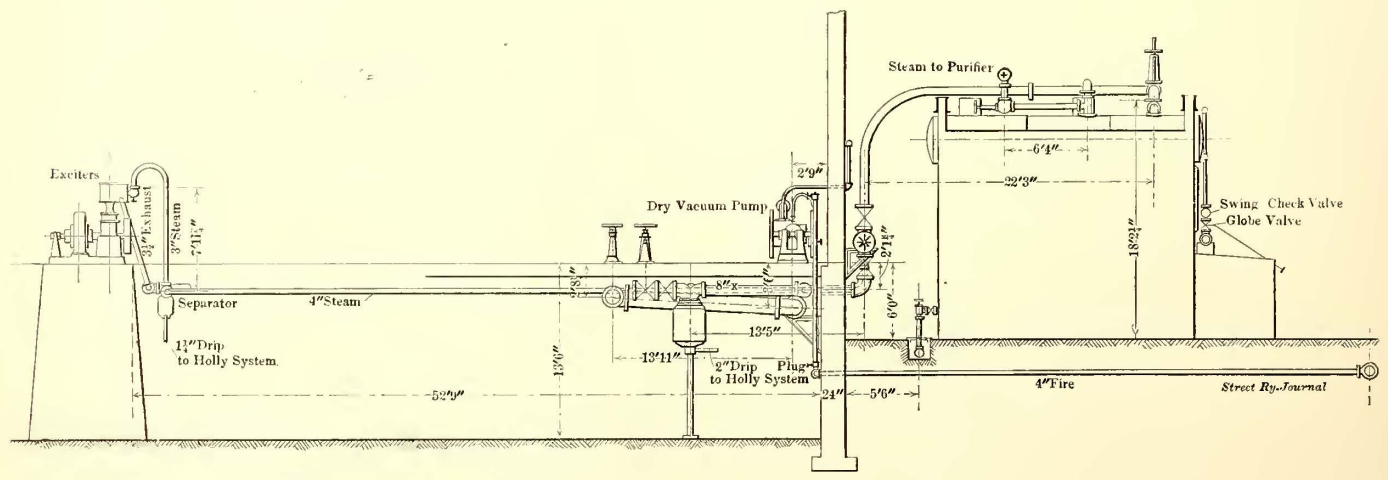
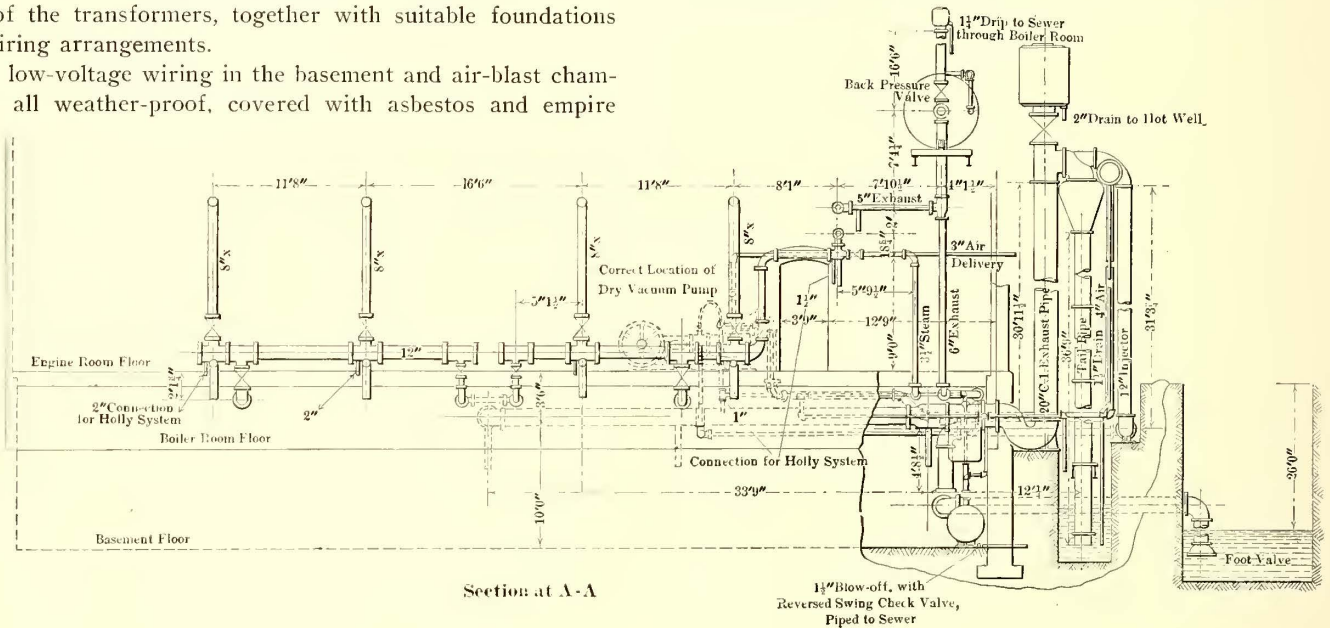
About ten miles of road are fed direct from the power station and a rotary converter is installed in the house. Space and wiring arrangements provide for a second rotary, which may be installed later. The rotary is a standard G. E. 300 kw 370



FIRE PUMP IN PUMP ROOM OF POWER STATION

at any time in the future, motor-operated high-tension oil switches will be installed, and space has been left for these back of the transformers, together with suitable foundations and wiring arrangements.

The low-voltage wiring in the basement and air-blast chamber is all weather-proof, covered with asbestos and empire

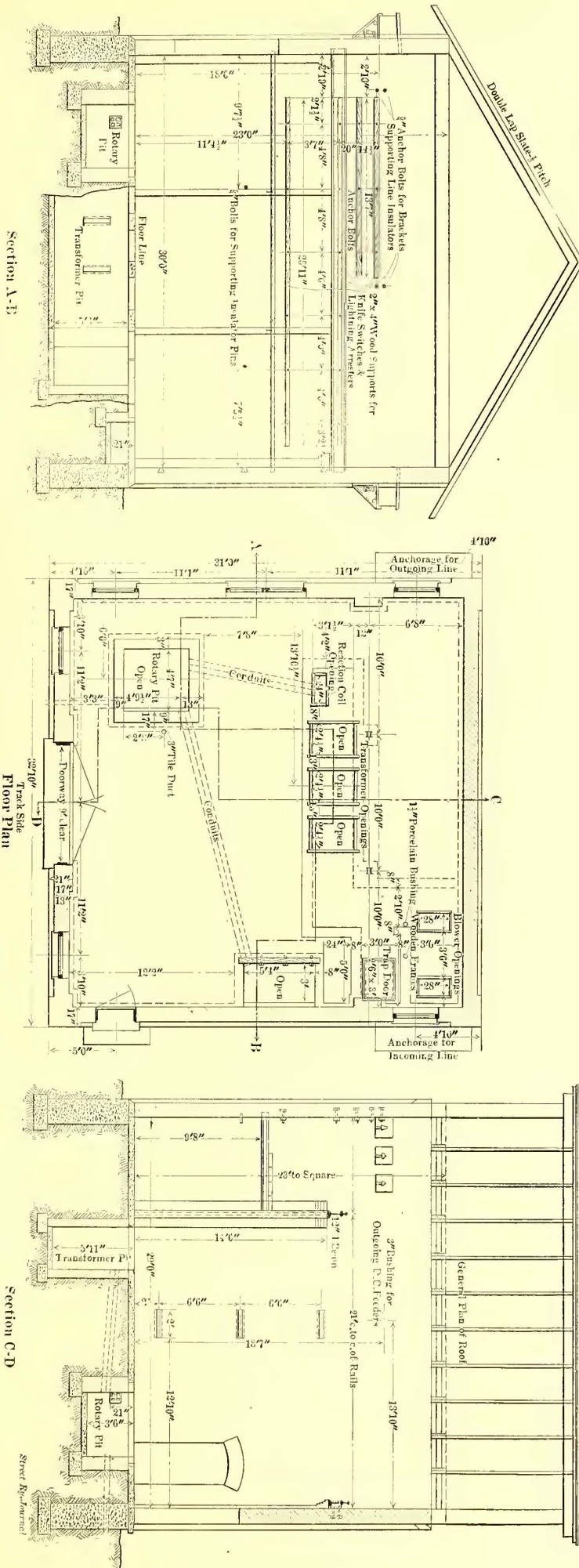


SECTIONS SHOWING MAIN AND AUXILIARY STEAM PIPING AND ARRANGEMENT OF BAROMETRIC CONDENSER, DRY VACUUM PUMP, HOT WELL, ETC.

linen, and is carried on porcelain cleats. The high-voltage wiring is bare, carried on wrought-iron brackets, with Locke

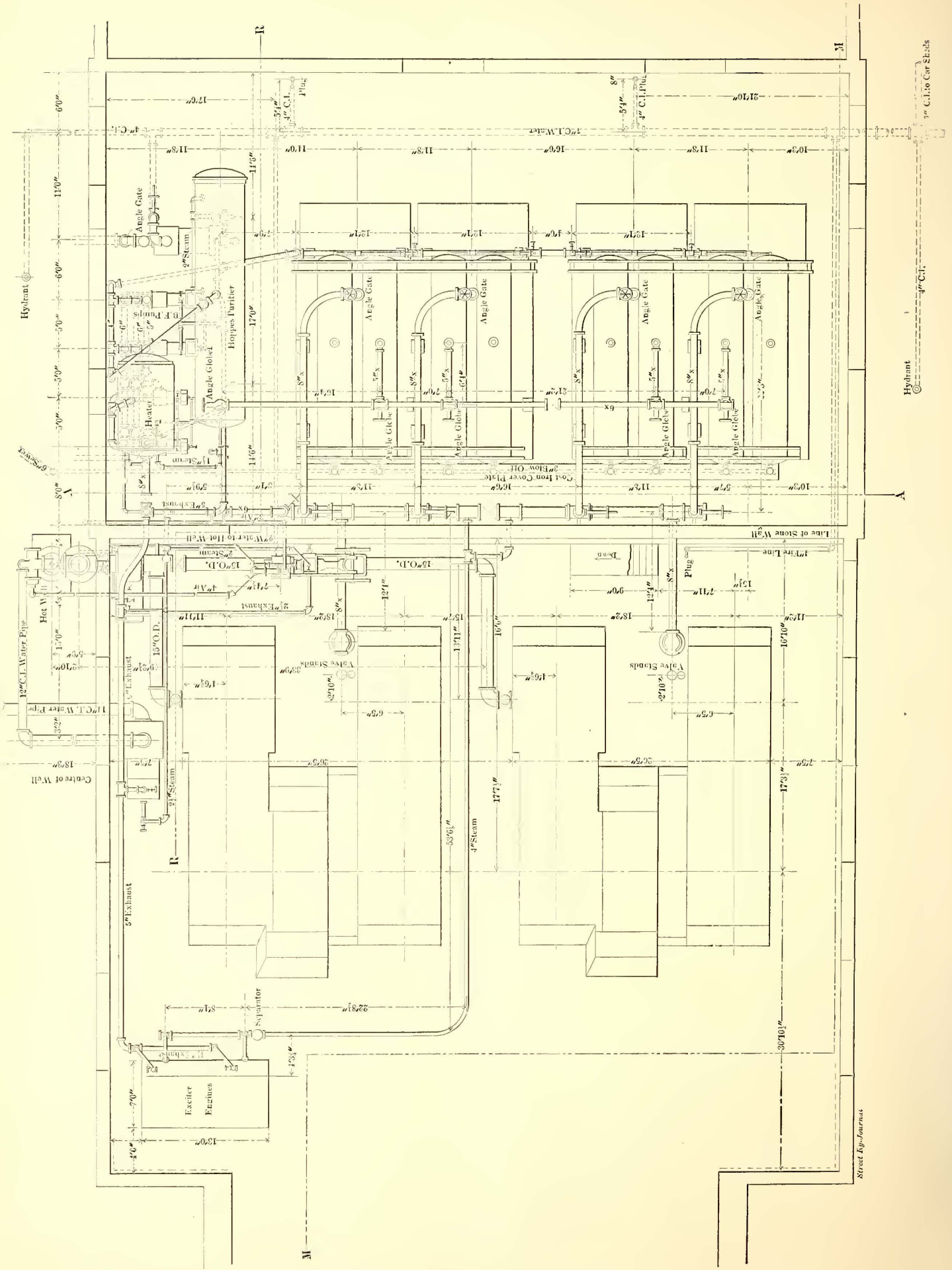
volts a. c., 600 volts d. c., revolving at 500 r. p. m. The machine has a standard G. E. end-play device, a speed-limiting

FLOOR PLANS AND SECTIONS OF INTERMEDIATE SUB-STATION ON THE SPRINGFIELD, TROY & PIQUA ELECTRIC RAILWAY



device and a field break-up and reversing switch for changing the polarity if it comes up reversed. There is a reactive coil between the transformers and the rotary for regulation, and there is a starting panel for the rotary mounted on the reactive coil. The standard practice of starting by alternating current at low voltage is followed. In this particular case, since the converter has no transformers of its own, half voltage for starting is obtained from taps in the low-voltage windings of one group of step-up line transformers. After the rotary is started it takes current directly from the a. c. bus-bar. This bus-bar consists of copper bars carefully insulated and hung from an I-beam framework above the oil switches in the basement.

All switching is done from the low-tension side, and no high-tension wires reach the board. Eleven panels are at present installed. The first two panels are the exciter-generator panels and are connected on the negative side of the exciter circuits. They have single-pole switches connected to the positive leads from the positive bus in the basement, and positive current only is brought to the board for field excitation. Each panel has an exciter field rheostat, ammeter, voltmeter and voltage plugs, and the sub-base of one panel has switches for the lighting circuits. Two a. c. generator panels have hand wheels governing field rheostats in the basement below the board; also voltmeters, ammeters and balanced three-phase indicating wattmeters, together with switch levers operating 1500-amp., 600-volt non-automatic oil switches in basement below, which connect generators to low-tension buses; also two transformer panels, each of which controls a bank of step-up transformers. Each panel has one ammeter-switch lever, operating 1500-amp., 600-volt oil switches, and trip coils operated from current transformers in the circuit between the low-tension buses and the low-tension transformer deltas. Next to these two panels there is space for two panels to be installed when motor-operated Type H oil switches are installed on the outgoing high-tension lines. Then there is a panel controlling the a. c. side of the rotary and containing a Thomson ammeter and a switch lever operating an oil switch in the basement, which connects the rotary through the reactive coil to the low-tension buses. On the sub-base of this panel is a three-pole double-throw switch, with fuses for motor-driven blowers. Next, there is a blank panel for the a. c. side of another rotary, and it will have similar instruments, with the exception of blower switches. The next panel is for the d. c. side of the rotary, and contains a 1200-amp. M. K. circuit breaker, main switch, rotary field rheostat, Thomson recording wattmeter and an illuminated dial 1000 ammeter. The circuit breaker has a low-voltage release coil, which operates also in connection with speed-limiting switch on converter. The two following d. c. 600-volt feeder panels have M. K. circuit breakers; 1500-amp. static ammeters, main switches and M. D. lightning arresters. The d. c. feeders are carried through clay conduits to a distributing pole, where they are tapped to the trolleys. At one end of the board is a d. c. 750-volt astatic voltmeter on a swinging bracket, and on the other end, adjoining the exciter panels, is a 175-



PIPING PLAN OF POWER STATION OF THE SPRINGFIELD, TROY & PIQUA ELECTRIC RAILWAY

Street Railway Journal

volt astatic meter for exciters; also a G. E. round-pattern synchronizer, used in paralleling generators. This operation is effected on the low-tension side.

The generator panels contain instruments which serve as combined wattmeters and power-factor indicators. They are operated by double-throw switches. When the switch is in the upper position it throws the potential coil of the wattmeter in phase with current on the current-coil on unity power-factor. A lag or lead of current out of phase with e. m. f., of course, reduces the watts, the true power-factor being shown by the reading of instruments. With the switch in the downward position the potential coil of wattmeter is connected across the two outside legs, thus forming a potential 90 degs. out of phase with current at unity power-factor and wattmeter will indicate zero. With a lag or lead of the main current out of phase with e. m. f., the e. m. f. in the potential coil of wattmeter will be no longer 90 degs. out of phase with current on current-coil, and wattmeter will indicate that current and e. m. f. are no longer in phase. The station attendant then takes steps to so adjust the field excitation of generators and rotaries that instrument will again record zero, thus showing that current and e. m. f. have been brought back into phase. All a. c. instruments on the board are of the G. E. horizontal edgewise type, and the d. c. instruments are the G. E. astatic, with separately excited fields.

and the other at Casstown. The buildings are plain structures, built unusually high to allow for a crane, which is high enough to lift one rotary over another if desired; also allowing for the lightning-arrester gallery. The buildings have concrete

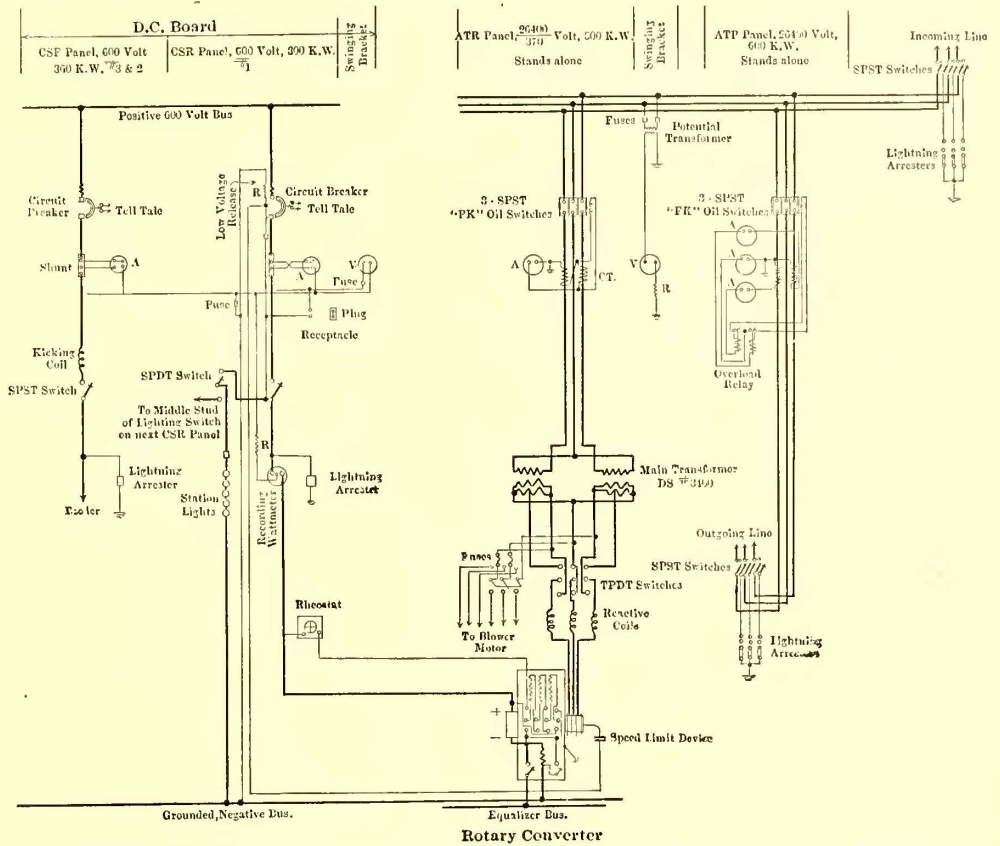


DIAGRAM OF SWITCHBOARD WIRING AT INTERMEDIATE SUB-STATION OF THE SPRINGFIELD, TROY & PIQUA ELECTRIC RAILWAY



SUB-STATION ON THE SPRINGFIELD, TROY & PIQUA RAILWAY

There are two sub-stations on the Springfield, Troy & Piqua in addition to the one in the house; one located at Thackary

floors, with air-blast chamber for a. c. wiring, as in the main station. Each station is designed for two 300-kw rotaries, although but one is installed at present. It is the intention to run two rotaries from one bank of three transformers, and at present but two transformers are installed.

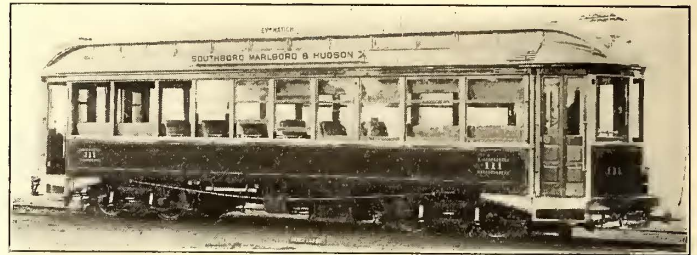
The transformers are rated at 220 kw each, and are, of course, more than ample capacity for the one converter. They are operated on "open-delta" connection, the two secondary windings under this arrangement being connected in multiple. In case it is ever desired to install a second rotary in the sub-station, one more transformer will be added to the group, in which case three transformers will supply two rotaries, as stated above. The incoming and outgoing high-tension lines are protected by 33,000-volt hand-operated oil switches in concrete cells, with slate tops, located back of the transformers. The two sub-stations are alike, except that the intermediate sub-station has outgoing as well as incoming lines, together with the necessary oil switches and lightning arresters. The terminal sub-station, however, has outgoing line anchorage and space for additional oil switches and lightning arresters, which could be installed without change in case the line is extended or in event of consolidation with other roads. In the terminal sub-station the a. c. switchboard panel stands in front of the transformers and carries ammeter, voltmeter and switch-lever operating 33,000-volt oil switches connecting incoming lines to transformers, and there is an a. c. half-tap rotary starting-switch mounted on the reactive coil. In the intermediate sub-station the a. c. switching is similar to that in the terminal sub-station with the addition of a second panel bearing three ammeters and levers operating oil switches, which are between the high-tension buses and the outgoing line. In both cases the oil switches are arranged to operate automatically by means of trips operated by current transformers connected to the high

tension. The d. c. boards are duplicates of those in the main power station.

The stock of the Springfield, Troy & Piqua Railway Company is practically all held by the Bushnell estate and its immediate friends. The bonds have not been sold, and no attempt will be made to dispose of them until the property develops its earning power. All construction work was done by the company's own engineers and force, this being true even to the installing of the engines in the power house. The electrical equipment, however, was installed by the General Electric Company, with W. S. Culver, the engineer, in charge of the work. The officers of the company are: John L. Bushnell, president; Fred J. Green, vice-president and general manager. H. C. Dimond, secretary-treasurer and purchasing agent; D. H. Ullery, chief engineer. The Springfield & Xenia Traction Company is under practically the same management; F. J. Green being president and general manager; John L. Bushnell, vice-president; H. C. Dimond, secretary-treasurer, and D. H. Ullery, chief engineer.

sash frames, is quartered oak, and the ceilings are birch veneer, tinted light green and decorated with gold.

The bottom framing is very substantial and includes 4-in. x 7 3/4-in. long-leaf yellow pine side sills, with 12-in. x 3/8-in. steel plates on the inside, to which the bases of the posts are secured. These plates take the place of upper trusses. Heavy under trusses, with queen posts, are firmly anchored at the

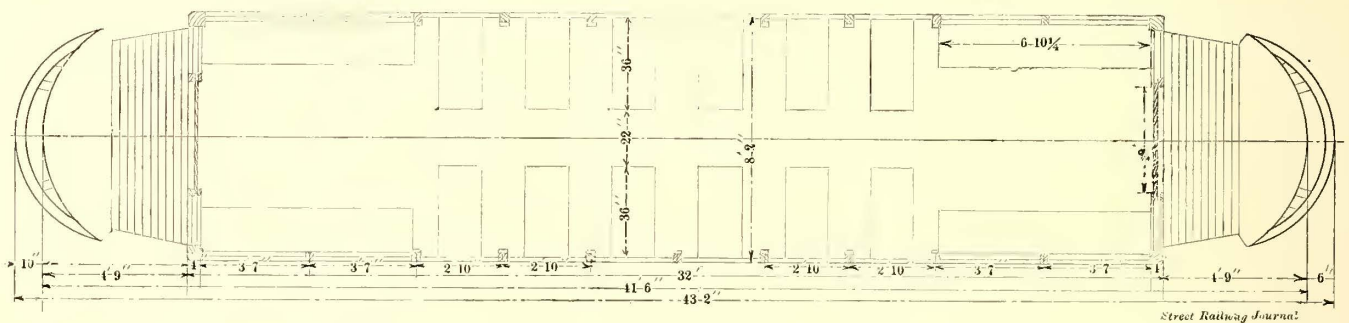


SEMI CONVERTIBLE VESTIBULED CAR ON BOSTON & WORCESTER STREET RAILWAY

### FINE CARS FOR THE BOSTON & WORCESTER RAILWAY

Ten large semi-convertible cars like the one illustrated were lately delivered to the Boston & Worcester Street Railway Company by the J. G. Brill Company, and are now in use on the high-speed double-track line recently completed. The new road is for the most part on private right of way, and extends in almost a straight line between Boston and Worcester. Passengers coming from any point of the immense surface and

body bolsters. End sills of white oak are 5 1/4 ins. x 6 7/8 ins. The platform timbers are reinforced with angle-iron, and angle-iron center knees extend well back of the body bolsters. The car bodies measure 32 ft., and over the vestibules 41 ft. 6 ins.; from end panels over vestibules, 4 ft. 9 ins.; height from rail over trolley board, 12 ft.; from center to center of body bolster, 22 ft.; angle-iron bumpers, Dedenda gongs, Retriever conductors' bells, track scrapers and other furnishings are of the builder's manufacture. The trucks are No. 27-F-E-1, with 4 ft. 10-in. wheel base and solid forged side frames. A car and



FLOOR PLAN OF BOSTON & WORCESTER SEMI-CONVERTIBLE CAR

elevated system of Boston are taken on at the Park Street subway station and carried to Worcester, a distance of 40 miles, in two hours. The towns and cities along the route aggregate a population of nearly 100,000, and including the terminal cities, it is estimated that a population of about 1,000,000 is served by the road.

The cars are of the builder's well-known semi-convertible type, and are mounted on Brill trucks. Longitudinal seats accommodating five passengers each are at the corners, on account of which the two windows next the ends are extra wide, being 3 ft. 7 ins. from center to center of posts. These seats have 19-in. backs, while the transverse seats have 22-in. backs, with comfortable head-rolls, and are 36 ins. long. Hand-rails, with straps, are provided over the longitudinal seats. It will be noticed that several windows are opened to different heights, showing that passengers may admit as much or as little air as they please, five window-lock stops being provided in each sash runway for the purpose. The neat arm-rests on the window sills will also be noticed. They are necessary because the window sills are extra low in this type of car. The sashes of the rear windows in the illustration are completely raised into the roof pockets, giving an idea of the appearance of the car when entirely opened. All three sashes of the vestibules are composed of single lights and arranged to drop into pockets. The interior finish of the car, including vestibules, doors and

trucks, with electrical equipment, including train-control apparatus, but without motors, weighs 35,660 lbs.

### LAKE SHORE ELECTRIC MAKES TRAFFIC AGREEMENT WITH STEAM LINE

The Lake Shore Electric Railway Company has entered into an arrangement with the Toledo, St. Louis & Western Railway (Clover Leaf) to take care of St. Louis business throughout its territory. Through tickets will be sold from all points on the electric system. The Clover Leaf is one of the "differential" roads, and the result of the arrangement is that the rate from Cleveland over this route is \$2 lower for all classes of tickets than is the rate on the steam roads out of Cleveland. Another interesting point is that people from all over northeastern Ohio can come to Cleveland by electric railway, and go to St. Louis at a lower rate than the through steam rate from Cleveland. The electric company expects to advertise this business extensively throughout its district.

All the Oakland Transit Company's lines running into Berkeley have had their tracks treated with crude oil, sprinkled by means of a tank car. The object is to lay the dust effectually by turning the road into a mixture, which will eventually wear down into a surface similar to asphaltum.



## CORRESPONDENCE

## THE PAINTING DEPARTMENT IN THE PORTLAND SHOPS

New York, July 12, 1904.

EDITORS STREET RAILWAY JOURNAL:

While in many respects the design of the Portland Railway Company's proposed new repair shops, as published in your issue of July 2 are very desirable, one or two improvements might be made, in my opinion, so far as the plan of the paint shop is concerned. As I understand that suggestions of this kind are welcomed, I shall take the liberty of mentioning a few of them.

The plan shows four separate tracks 150 ft. in length on what is known as the pocket plan. I do not know the length of the Portland cars, but estimate that each track will hold four cars, with ample room to work between. These cars are to enter and leave by one end of each track. If this plan is adhered to it will result in much confusion and expense in the handling of the cars. In the operation of painting, the first car entering any one of the tracks would be the first one to leave the shop to go into service, and in order to do this, the three cars in front of it, in case the track is filled up, would have to be moved out the shop and switched out of the way in order to let No. 1 out.

In nearly all shops now the practice is to put the cars in the paint shop dead, the motors undergoing repairs while the car is in the paint shop. In this case a line car would have to be used to do the switching, so that to relieve car No. 1 three cars would have to be switched and then returned to their track. This operation will be found expensive and also vexatious to the management, for it will often happen that one or two of the three cars to be moved will be wet in paint or varnish, and not in condition to be moved out into the dust or wet of the street. It may also happen that one of the cars to be moved out in order to relieve No. 1 is minus its trucks and is jacked up. This would entail additional time and cost to move and return it to its position after No. 1 has been taken out. Again, it will occur frequently in paint-shop practice that a car merely requiring to be touched up and revarnished will be placed on a track and ahead of three cars to be repainted. The revarnished car will take only one-third of the time necessary to repaint the other cars, so that to relieve the revarnished car the same confusion will occur. The writer figures out that the full complement of cars in this particular shop would be sixteen. If the work was in full swing on these cars, one or other of the doors would have to be opened twice every time a car was moved; once when it was taken out and once when the next car entered. The result is that on a windy and dusty day the whole shop for a considerable time would be exposed to the dust, which would be bad for wet paint or varnish, and should a car wet in varnish happen to be near the door or on the next track, the varnish would be ruined by the dust. This has actually occurred several times in the writer's experience in shops so constructed.

Nothing in the plan indicates the manner of heating the paint shop. It will be found impossible to carry on painting in the winter without heat of some kind, and winter months are generally the busiest in the paint shop.

There is a track in the paint shop which is to be devoted to "washing cars with a hose when found necessary." The writer is not clear as to the meaning of this. Is it meant to use that portion of the paint shop as a stand to wash such cars as require it in the ordinary running of the road? In that case, there would be a part of the paint shop in a constant state of slop. This is bad. Moisture should be very carefully avoided in the atmosphere of the paint shop, and for that reason, when a car is washed in the paint shop for revarnishing or painting, the painter uses little water, certainly not a hose. Energy, pumice stone and soap are more to the purpose.

The writer very carefully noted the position of the paint store room and heartily endorses the type of roof. It is an apt idea as set forth, but of the many fires which have occurred in car houses from time to time, the writer does not recall to knowledge that a fire ever started in the paint shop. Care is always exercised in the storage of paints from the fact that they are known to be highly combustible. It is in the other departments and where danger is not a first consideration, and where, consequently, carelessness occurs, that fires are apt to originate. Frequent causes are a too lavish use of gasoline, the oil lamp turned down low, the lavish and careless use of cotton waste and the saturating of floors with lubricating oil, and, worst of all, the pipe-smoking sneak.

The most perfect street railway paint shop with which the writer is acquainted is one which was built to his plans and which was on the top floor of a building. The cars were elevated to a track running at right angles to the tracks in center of shop, and as the cars came up on the elevator, they were pushed on the table operating the center track. By this means switching was reduced 75 per cent, and as there was no opening of doors, the elevator being enclosed, the weather conditions outside the shop were not considered. As the shop was elevated, dampness was overcome and the heating question was easily solved, while dust did not give any trouble, even in the hot weather, when windows and skylights would be open on fine days. The writer is of the opinion that the Portland car shop could be easily altered to obviate any of the trouble described above. It would also be more practical to have the woodworking shop next to the paint shop, as there is work for the painter in the workshop all the time, such as priming and touching-up emergency jobs.

Trusting the motive of writing the above reflections will not be misunderstood, I am, yours truly, JOHN C. WEAVER.

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 THE ADVANTAGE OF PUBLICITY
 

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Jamaica, N. Y., July 11, 1904.

EDITORS STREET RAILWAY JOURNAL:

The short article in your issue of July 9 about the policy of the Trenton & New Brunswick Railway Company toward the newspapers was to the point. My opinion is that not one manager in one hundred has any idea of the value of the newspaper man as an asset. And my opinion is based on practical experience. Not so many years ago I was on a paper in a town that was the division headquarters of a large steam road. Things were always happening on that road. But we newspaper men never hunted for a story, for we knew that the facts were ours for the asking. In the case of the few minor accidents on the system we first obtained the accounts of the eye witnesses and then got the details as given out by the company. Thus we were often able to modify greatly a story that if printed as given by excited spectators would have contained that element of the terrible so very likely to be injected into a tale told by a sufferer. The superintendent of the road realized that we were desirous of publishing the facts, but that a story would be printed, and that if he did not do his duty and present his side, the tale would go just as gotten from spectators or as conjured in the fertile mind of the writer. The boys really learned to love that "super." Whenever any new equipment arrived, we were notified, and every means was placed at our disposal for getting a good story. The arrival of a new coach or a new locomotive was duly heralded, and every change that in any way worked to the benefit of the patron of the road was given publicity, and publicity that was truth and nothing but the truth. To illustrate the point I am trying to make, a certain street railway system was recently equipped with air brakes. Frequency of accidents on this road had made necessary the adoption of power brakes. Here was a chance to restore public confidence through publicity, but as far as I know,

the chance was lost. Some one in authority in that company might have devoted an hour or two to giving the newspaper men there that story. What would have been the result? Every paper in town would have devoted space to it, and the confidence of a timid public would have been restored. As it is now, the people at large are totally ignorant of an expenditure of thousands of dollars that has been made solely to protect them. It seems to me that it does not take great news sense in a manager to see the benefit of all this to the company.

G. M. MURRAY.

### CAR SIGNS IN BERLIN

Cincinnati, Ohio, July 17, 1904.

EDITORS STREET RAILWAY JOURNAL:

In connection with your editorial on "Car Signs" in your issue of July 2, I should like to call your attention to a method of indicating different routes, as noticed in Berlin, Germany, during a recent trip abroad. This method consists in giving each route a number, this number being put on a large disk at the top of the car in addition to the regular car sign indicating the destination. It is obvious that such a sign can be readily seen and recognized from a long distance.

This method has been in operation for some time, and has proved to be a success, and if it were given a trial in this country by one of the large companies it would undoubtedly prove equally successful.

L. C. MARBURG.

### COLLEGIATE RECOGNITION OF THE ENGINEER

New York, July 19, 1904.

EDITORS STREET RAILWAY JOURNAL:

I have read with interest the editorial in your issue of July 16 on "The Engineer Gets Left."

It appears to me that much good would be done if the engineering press of this country will impress upon the various institutions of learning that they would materially advance the art if, among other things, they showed their recognition of the worth of the engineers of the country. It is a lamentable fact that it is most difficult to find cases where institutions of learning have seen fit to confer their honorary degrees upon engineers—and this, notwithstanding the fact that some of the world's most notable achievements have been the work of engineers.

I congratulate you upon the editorial, and hope that you will continue to hold the matter up to public view until some of the universities of the country will be brought to a realization of the fact that others besides politicians and clergymen are entitled to their recognition and the honors which they occasionally confer.

W. C. GOTSHALL.

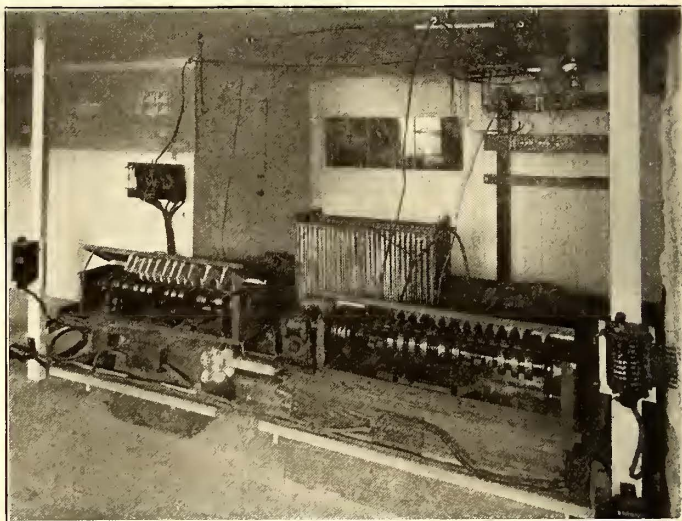
The Grand Rapids, Grand Haven & Muskegon Railway Company, of Grand Rapids, Mich., conducts a school of instruction for its employees. Sessions are held every Friday, and there is a special session in the evening for those whose duties do not permit of their attending the regular session. A feature of the instruction is a question-box, to which the men contribute such questions as suggest themselves during service. The box is opened at each session, when the questions are read and discussed.

E. B. Kirk, master mechanic, instructs in handling electrical apparatus; J. P. Pulliam, train master, gives lessons in the operation of trains, handling train orders, etc.; T. L. Hackett takes up with the men the handling of tickets, the collecting of fares and dealing with the public in general. The principal of the school is General Manager Morley, who looks after the work as a whole.

### ELECTRIC RAILWAY INSTRUCTION AT CORNELL UNIVERSITY

The constantly increasing application of electricity to practical affairs has made it evident to progressive instructors that something more than theory and trifling experiments must be given to students of electrical engineering. Sibley College, the engineering school of Cornell University, is an excellent example of the most advanced practice, and the apparatus installed for experimental work by the students is characteristic of what is being done by the best technical schools.

The accompanying illustration shows the Sprague multiple-unit outfit used at Sibley College. This outfit is of entirely modern construction, and was purchased to show to the students of electric railway engineering the principles which underly the control of heavy electric trains. The apparatus is kept in working condition, both for demonstration and testing, the former being considered the more important for instruction purposes. The large class of over one hundred is divided into small sections for the study of such equipments, and they are permitted to operate it and to study the general features which have been previously described in the lecture room. Electric railways is a subject which is not required of the regular elec-



MULTIPLE UNIT EQUIPMENT AT CORNELL UNIVERSITY

trical engineering students at the present time, but it is required in the course in railway mechanical engineering, showing that those in charge of that work realize the great importance of this subject in relation to the motive-power departments of steam railroad systems. In time it is probable that the college will expect all of its electrical students to take this course as a part of the required work. They now take it quite generally as an "elective" subject, voluntarily carrying it in addition to the heavy required work of the course. It is the intention of the electrical department to provide as complete an equipment for this work as the means of the college will allow. The manufacturers of railway apparatus appreciate the importance of this movement and are heartily co-operating in making it a success. This work is in charge of Prof. Henry N. Norris, of the electrical department, at Cornell University, and also of the Electric Railway Test Commission at St. Louis.

The Sterling, Dixon & Eastern Electric Railway, operating between Sterling and Dixon, Ill., has built platforms at all stations on its line between the cities. The stations are built at the regular stopping places and consist of a bed of gravel eight feet long and six feet wide. This gravel is even with the ties of the road, making it easy to step on and off the cars. The section men along the road have been given orders to keep the grass mowed and otherwise make the right of way of the company neat and beautiful.

**PUGET SOUND ELECTRIC RAILWAY COMPANY'S EFFECTIVE METHOD FOR HANDLING LARGE CROWDS**

The accompanying illustration is from a photograph of one of the race track trains on the Puget Sound Electric Railway, operating between the race track, known as the "Meadows," 6 miles out of Seattle, and Seattle. The Puget Sound Electric Railway is the interurban line between Tacoma and Seattle, and is a third-rail line, except between Seattle and this race track, and through the city streets of Tacoma. For two seasons the company had found it very expensive to handle the crowds going to the races, which are run through the months of June and July, when such traffic was handled with the ordinary double-truck passenger car. While the company's line is virtually double track all of the way between the above points, the percentage of accidents is greatly increased by running so many different cars, from the fact that it is almost impossible to obtain men who will keep the cars a proper and safe distance apart, and the liability of rear-end collisions is very great. The problem has, however, been solved by using the ordinary flat car with a canvas top upon it, such as shown in the illustration. The company is now able, with two trains of the type in question, to give a half-hour service between Seattle and the race track, and runs two to four ordinary double-truck passenger cars between these trains to pick up the stragglers. This method has worked out very satisfactorily. As soon as the season is over the tops will be removed from the cars and stored one above another in a car house, where summer cars are stored, where they will be ready for use next season. The railing around the cars will be taken off, and the motors and flat cars will again be ready for the freight service. The motor equipment is of the company's ordinary center-cab type, used in the freight service between Seattle and Tacoma, speeded to about 30 miles per hour, and containing four 125-hp G. E. No. 66 motors. The inside of the car is arranged with two longitudinal rows down the center, and a longitudinal row on each side. There is an opening upon the other side of the car at the opposite end to that shown in the illustration.

On busy days the trains are composed of one motor and five cars. During the middle of the week, when the crowds are smaller, the traffic can be handled with one train, made up of eight cars, to reduce the expense.

This style of car, while just as safe as other designs, is not quite as handy as the cross-seat car, with entrance opposite each seat. But the local conditions for loading and unloading, of course, govern the style of car the company is compelled to use. As the interurban line is run strictly upon steam road principles, each train is equipped with one motorman and conductor, who have charge of the train and its operation under standard rules, and there is besides a conductor to each car to look out for the loading and unloading of passengers, and the collection of fares. The cars are equipped with ordinary registers.

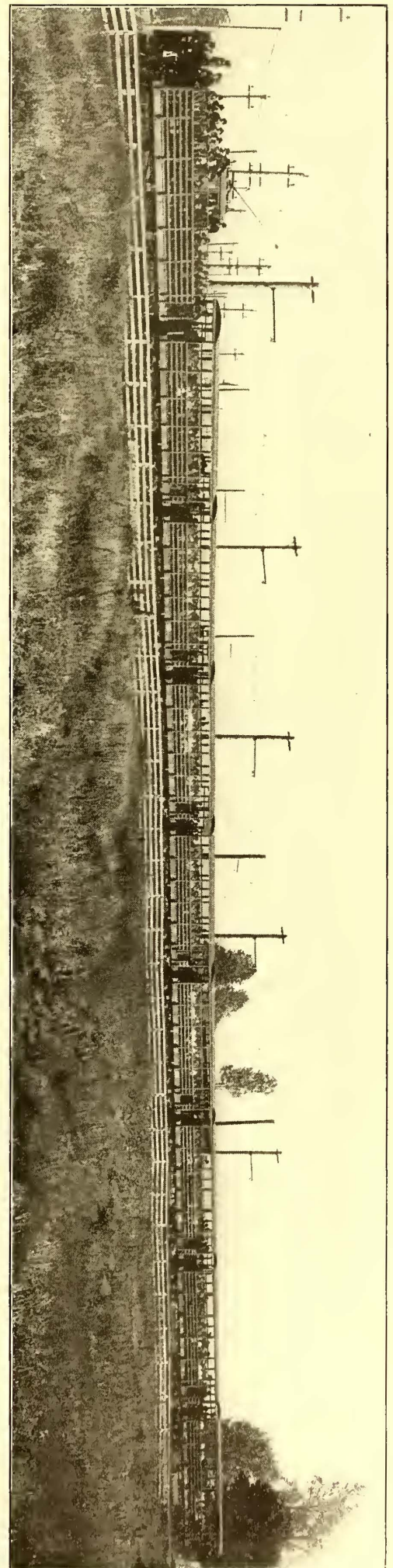
There is a pair of steps carried upon the small bumper platform at the end of the cars, and the moment the car stops the conductor hooks the step into a heavy iron fastening opposite the entrance, thus making an easy mode of ingress and egress.

Acknowledgment is due to W. S. Dimmock, manager of the company, for the illustration and data given in this article.

The Metropolitan West Side Elevated Railroad Company, of Chicago, is installing two interlocking switching plants operated upon the electro-pneumatic system. One of these plants will be located just east of the river, to control the tracks running into the stub terminal and also to the Union Loop. The other will be at Marshfield Avenue, which is now the busiest junction on the line. A provision in the new Union Loop ordinance, which is now before the City Council, will permit the Metropolitan Elevated to make a turn-out on Van Buren Street and thereby complete a little loop of its own. This will allow the turning around of the trains that enter the stub terminal, thus greatly increasing its capacity. Progress is reported in the work of equipping the cars with the multiple-unit control system.

Traffic on the Lake Shore Electric Railway was interfered with for a short time a few days ago by a vessel entering Black River and tearing down the high-tension lines which had been strung across the river on two high steel towers 140 ft. tall. It appears that the feeders, which are of aluminum, had sagged considerably, owing to the extremely long span.

A NINE-CAR ELECTRIC TRAIN OPERATING ON THE LINES OF THE PUGET SOUND ELECTRIC RAILWAY BETWEEN SEATTLE AND THE "MEADOWS" RACE TRACK



## RECONSTRUCTED CARS OF PACIFIC ELECTRIC RAILWAY, OF LOS ANGELES, CAL.

An interesting example of what may be done by an electric railway in rebuilding and equipping for efficient service cars that apparently are only suitable for the junk heap, has recently

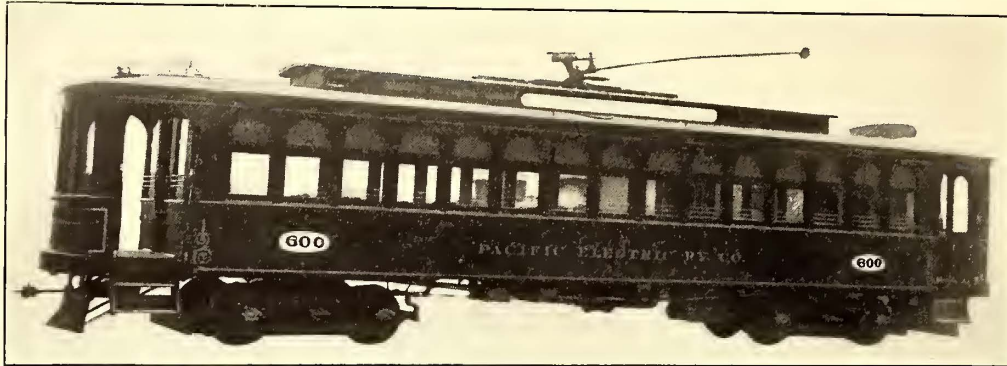


FIG. 2.—REBUILT PASSENGER MOTOR CAR

been set by the Pacific Electric Railway Company, of Los Angeles, Cal. About the time of the incorporation of this company, two years ago, it purchased three motor cars and twelve trailers or coaches that had been operated in trains on the rail-

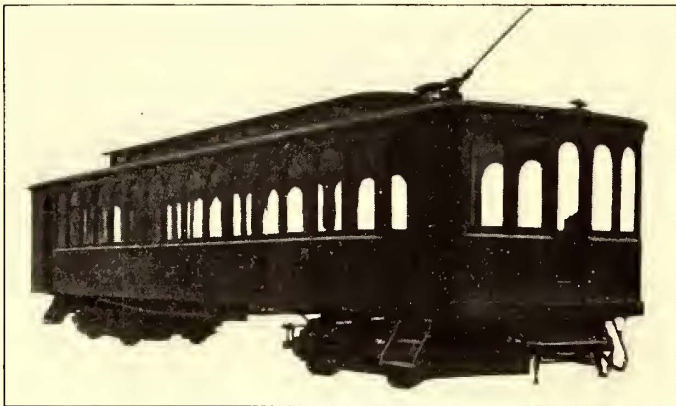


FIG. 1.—OLD MOTOR CAR BEFORE REBUILDING

way running between Golden Gate Park and the Cliff House in San Francisco. At first it was thought they could be run as they were on the interurban lines near Los Angeles, but it was soon seen that they could not be used without reconstructing them, and so they were temporarily relegated to the storage end of the car house. A few months ago, J. McMillan, at that time chief clerk to the general manager of the company, and at present traffic manager of the Pacific Electric and Los Angeles Interurban Railway Companies, interested himself in the old cars, and it has been under his supervision that they have been reconstructed.

The motor cars have been narrowed to conform with the width of the standard Pacific Electric interurban car, the closed vestibules have been changed to an open construction, the stationary windows to movable ones, the seats upholstered with imitation leather and the cars painted the standard color of the others on the line. The cars have smoking compartments, which occupy about one-third of the total length. The seating capacity is sixty-eight passengers. Fig. 1 shows one of the motor cars before being rebuilt, and Fig. 2 the same car in its present improved form. The original trucks, which are of the remodeled Brill 27-A type, have been retained, the gear ratios being al-

tered to meet the local conditions. Each car is equipped with four G. E. 51 motors, rated at 80 hp each, and pneumatic trolley bases have been fitted on them. One of these cars has been in constant service on the Long Beach line of the Pacific Electric Railway for some time, and is used for the "flyer" service, morning and evening, making a speed regularly of a mile a minute. The reconstructed car is 55 ft. long over all, and weighs 62,500 lbs., while the standard "250" type car of the company is 49 ft. 6 ins. in length and weighs 64,700 lbs.

The trailers were originally 40 ft. long and had no windows, being as shown in Fig. 3. Six of these cars have been rebuilt into express cars of the type illustrated in Fig. 4, and six will be remodeled and used as passenger trailers for service on the San Pedro and Newport Beach

branches of the Long Beach line. The express car, as rebuilt, is 41 ft. 9 ins. long, weighs 37,360 lbs., and is mounted

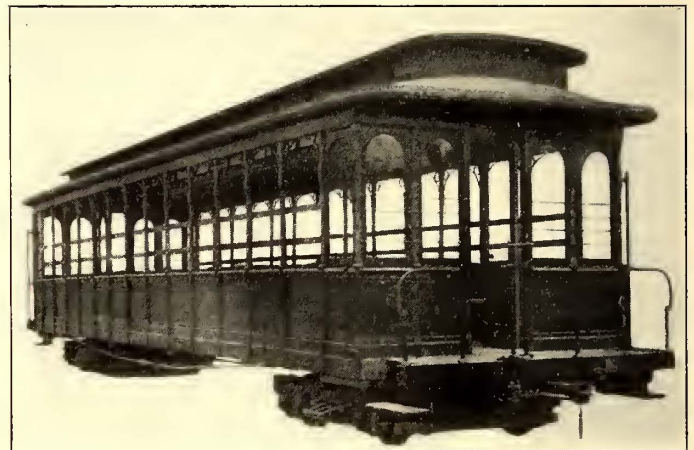


FIG. 3.—OLD TRAILER CAR

on two standard trucks, equipped with four 50-hp motors. A large sliding door has been placed on each side, the cabs have been vestibuled, and at each end small slid-

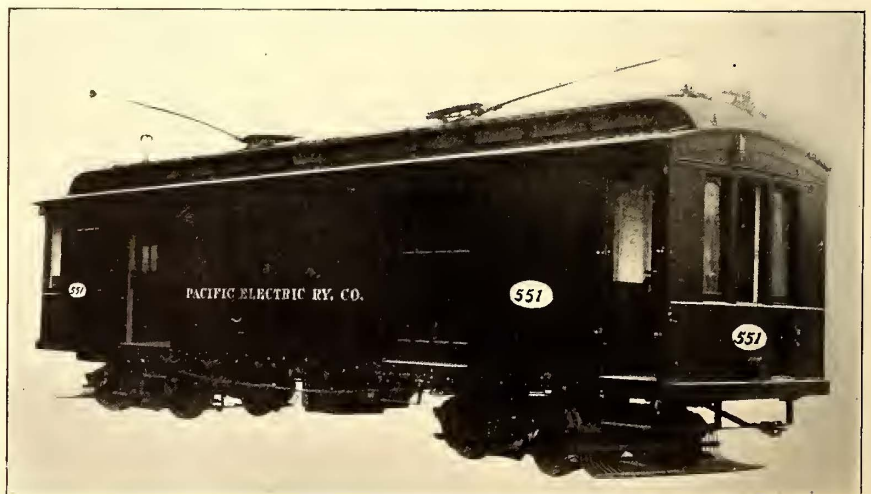


FIG. 4.—CAR 551 REMODELED FROM 611 TYPE

ing doors have been placed under the vestibule windows, so that poles and other long articles may easily be loaded. It is interesting to note that the three motor cars as now equipped are considered worth what the entire fifteen cost the company.

**CONVENTION PROGRAMME OF THE AMERICAN RAILWAY, MECHANICAL & ELECTRICAL ASSOCIATION**

In addition to the five papers which are to be presented at the convention of the American Railway, Mechanical & Electrical Association on Oct. 10 and 11, there will be a question box. It is hoped that this will give rise to very interesting discussions on subjects aside from the topics on which papers are being prepared.

Members have been requested to submit on a special blank any questions pertaining to the electrical and mechanical departments which they desire to bring up for discussion, mailing them to S. W. Mower, secretary, 12 Woodward Avenue, Detroit, Mich., not later than Aug. 1. All questions will be printed and distributed to the members for replies as soon thereafter as possible, as will also the answers when they are received, and, together with the discussions at the convention, will be included in the annual report. The questioner's names will not be made known. It is believed that this feature of the convention will be a very interesting one. The papers which are being prepared for discussion at the convention are the following:

"Inspection and Maintenance of Electrical Equipment," by Messrs. Baker and Lindall, of the Boston Elevated Railway, Boston, Mass.

"Wheels," by J. Millar, of the International Railway Company, Buffalo, N. Y.

"Universal Street Car Body," by W. W. Annable, Grand Rapids Railway Company, Grand Rapids, Mich.

"The Ideal Shop," by W. D. Wright, of the Rhode Island Company, Providence, R. I. There will also be a joint meeting with the accountants on Oct. 14 to discuss "Shop Records and Accounts." H. H. Adams, of Baltimore, and H. E. Farrington, of Boston, have this matter in charge for the mechanics, and H. M. Pease, of Buffalo, and W. G. McDole, of Cleveland, are to represent the accountants.

The headquarters of the American Railway, Mechanical & Electrical Association will be at the Inside Inn during the convention period.

**FIRST PUBLIC SINGLE-PHASE RAILWAY OPENED IN GERMANY ON JULY 4.**

As noted in the STREET RAILWAY JOURNAL of Oct. 17, 1903, the Allgemeine Elektrizitäts-Gesellschaft, successor to the Union Elektrizitäts-Gesellschaft has been conducting a series of important tests with the Eichberg-Winter single-phase motor on the Niederschöneweide-Spindlersfeld State railroad line, which is 4.1 km. (3 miles) long, and connects the Berlin suburbs known as Niederschöneweide, Johannisthal and Spindlersfeld. These experiments began Aug. 15, 1903, and by July 4, 1904, the single-phase equipments were placed in regular service after the experimental cars had traveled about 30,000 km (18,000 miles).

The experiments were begun with one motor car, then with a train of two motor cars and finally a train consisting of two motor cars and five trailers between. The average speed, including stops, was 40 km (24 miles) an hour, and 30 watt-hours were required per tonne-kilometer (50 watt-hours per ton-mile). All of the trips were under the supervision of special government officials, who reported to their bureaus the results of the several trials.

The single-phase equipment is now operated by the Government under a tentative lease for one year with the Allgemeine Company. During this period the service will be steam and electric, since the present apparatus suffices for one regular train only. As no reserve power has been provided, the electric service will suffer interruptions whenever repairs to the equipment are necessary.

**TRAFFIC TICKET SYSTEM**

Very many suburban and interurban electric railways operate cars over the tracks of other independent city line companies, under a traffic agreement, whereby the former pay tribute to the city lines over whose tracks they run. This tribute is assessed against each passenger or other traffic named, and the usual method employed for checking this traffic is by the conductor of the suburban or interurban car counting the passengers and then registering the number counted upon the ordinary counting-machine or register. This operation is crude, annoying, and, at best, is unreliable; nor does it provide means for making the division of accounts—for example, as between adults and children; neither does it provide a separate accounting from the passengers and other traffic, such as freight, baggage, express, etc., from which a levy must be made.

The Ohmer Fare Register Company, of Dayton, Ohio, has devised a duplex ticket system, with which a complete record of the traffic, whether it be adults, children, employees, passenger traveling on pass; freight, express or baggage, can be obtained in a concise form, correctly and expeditiously, and the record made in duplicate, one copy of which may be turned over to the city line over which the suburban cars operate.

Issued to **710** returned **710**

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Other System.		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Local Traffic	Child	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Local Traffic	Adult	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Through Traffic	Child	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Through Traffic	Adult	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Emp.		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pass		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Trip		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
HR.		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Min		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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A NEW TRAFFIC TICKET

The accompanying illustration is a reproduction of one-half of a specimen ticket used in this system, the other half being a duplicate. It is stated that this style of ticket is to be put in use between the People's Railway, of Dayton, and the Dayton & Troy Electric Railway, which enters Troy over the first-named company's lines.

There are spaces on the ticket for punching, and thus indicating adults and children, with year, month and day, the direction and the time by hours and minutes. These tickets are bound in the usual form, and are charged out to the conductors in the regular way. The conductor does not detach any of the tickets, but returns the books when all the tickets therein have been punched, one copy of which may be detached and turned over to the city company each day, if desirable. It is believed that this traffic system will subserve its purpose in the best, quickest and most economical manner. It dispenses with the annoyance of ringing up the number of passengers on a register provided for the purpose. If excess baggage, express matter and other traffic are to be accounted for, the ticket can be altered especially for that purpose. As only one ticket is required for each trip, the number necessary for the largest interurban lines would not be many.

The annual report of the Montreal Street Railway Mutual Benefit Association, submitted to the members, shows that during the past seven months, Oct. 1 to April 30, the sum of \$3,049 has been paid out in sickness and injury benefit claims. The association had on hand after meeting all payments, the sum of \$5,800. The total contributions have amounted to \$9,513, and of this sum the Montreal Street Railway Company has contributed \$3,000. The membership is now 1152. Sick committees, composed of five members for each division of the system, visit disabled members and report upon their needs.

RULE BOOK IN DENVER

The Denver City Tramway Company has just issued a new rule book for its employees, which possesses a number of novel features. As stated in the preface to the book, the rules and regulations embodied in it are based upon those adopted by the American Street Railway Association at its convention in Saratoga last year. In addition, a number of local rules have been added, but, as far as possible, all rules of a purely temporary character, such as those pertaining to the issue and acceptance of transfers and time allowances on the various lines, have been eliminated. These transfer rules and regulations and time schedules are published in convenient pamphlet form by themselves. As these regulations are changed more frequently than the general rules, this plan eliminates the possibility of being obliged to change the book frequently or the charge that one sometimes hears made, that "the rule-book is obsolete."

This plan, and the fact that all rules introduced by the company have been expressed very concisely, has brought the operating rules down to 59 pages. Each page is 5 1/4 ins. x 3 1/4 ins., and as the book is printed on thin bond paper, with narrow margins and is provided with semi-flexible binding, it can be easily carried in the vest pocket.

Another interesting feature of the book is that besides numbering each rule, each paragraph is lettered. This plan was adopted principally on account of the recent installation on the Denver Tramway system of the Brown "Merit System." For example: Should a trainman fail to answer civilly, he would receive a small slip stating that he had violated Rule 10, Section C, for which he had received two demerit marks. Or, as another illustration, a motorman might pass a school house recklessly. His attention would then be called to Rule 89a. Rule 89 provides for caution when children are around a car; the first paragraph (a) warns against running past a school-house recklessly, and the second paragraph (b) states that children should not play in or around a car. The penalty in demerit marks for the violation of the various rules is indicated on the margin of the general manager's and superintendent's books. This system has a tendency to encourage and interest employees in studying and becoming familiar with the rules.

Where a rule in the book is the same as that adopted by the association, this fact is indicated in parenthesis immediately following the number given to the rule. For instance: Nos. 1 and 2 of the association rules are also Nos. 1 and 2 of the Denver rules, and the association numbers follow in a parenthesis the Denver numbers. On the other hand, rules Nos. 3, 4 and 5 of the Denver rules are requirements not covered by the association, and have only the Denver numbers.

On April 21 of the present year, the Brown "Merit System" was adopted by the Denver City Tramway Company. The following bulletin, which was posted by the company at that time, explains the operation of the system:

Commencing April 21, 1904, the Brown System, otherwise known as the "Merit System," will be adopted by The Denver City Tramway Company, as regards the operations of the Transportation Department, and gradually extended to other departments as experience may warrant.

The objects to be obtained by the adoption of this system are briefly stated by the author, Mr. George R. Brown, as follows:

1. To secure the highest possible state of efficiency. To accomplish this, strict discipline is essential to successful operation.
2. To avoid loss of time and earnings of employees.
3. To judge each case of an erring employee on its merits, with regard to his previous record and his possible future availability.
4. To stimulate co-operation, which is to the mutual advantage of employer and employee.
5. To enable employees to gain in self-respect, loyalty, watchfulness and zeal, and realize that the interests of the company are practically their own, and to establish discipline in which the element of force is not predominant.
6. To become acquainted with other cases of discipline or com-

mendation, through the bulletin notices, and learn from them the lesson which is taught by the success or failure of others.

7. To inspire and develop in all employees a feeling of security, and confidence that faithful service is appreciated and will be rewarded by their uninterrupted retention in the service, and that the names of the employees who are habitually careless and indifferent to the company's and their own interests will be dropped from the rolls.

All trainmen will start on the above date with a clean record, except where it may hereafter develop that old offenses are being repeated.

Infractions of rules and regulations will be charged against the individual employee by one or more demerits for each offense, and where a repetition of the same offense occurs, the number of demerits for the second and third offense may be increased.

Incompetency, dishonesty, making false statements, disloyalty to the company, gross or ungentlemanly conduct, immorality or intoxication, failure to report an accident, or concealing facts concerning matters under investigation, will be cause for immediate discharge.

Merits will be given for: Especially meritorious acts and good conduct generally, such as unusual display of skill or energy in avoiding an accident, or making an especially complete accident report or securing names and addresses of witnesses of accidents occurring on other cars, etc. For making good suggestions as to betterment of service,

pointing out where time can be saved, unnecessary stops eliminated or travel stimulated and increased. For uniform politeness and courtesy to patrons, and rendering assistance to them cheerfully when necessary. For running on time, economical use of current, and generally efficient service. For taking up badge or pass-book, etc., found in the hands of an unauthorized person, or securing information whereby the company is being defrauded or their property damaged in any manner. For display of energy and good generalship in removing blockade, taking care of disabled car, clearing tracks after an accident or casualty, or preventing damage to company's property, resulting from fire, accident or maliciousness. For perfect trip-sheets for the month. And for many acts which good judgment will suggest.

Each merit will offset one demerit, and record will be determined by taking the difference between the debits and credits. At any time should the demerits exceed the merits by one hundred (100), such fact will be sufficient cause for dismissal. Each record will be kept strictly in confidence between the management and the individual employee, and may be seen by that employee, only.

Promotion will be governed, as far as possible, by the records, taking into consideration, of course, the individual's personal qualifications for the position in question.

The discipline bulletins published from time to time have been of considerable interest to the men, and the system so far, as shown by the results in Denver, seems to be working satisfactorily to all concerned.

Where a trainman has worked for a month without having received any demerits whatever, at the end of the month he receives a slip notifying him that three merits have been placed to his credit. All reports are made in duplicate, as shown by the Inspector's Report, reproduced herewith, and are sent in to the Superintendent's office, where the number of the rule violated and the number of demerits for such offense are indicated on same. Where demerits are given, the reason for so doing is indicated under "Remarks." The carbon copy of each report is then forwarded to the General Manager's office for filing.

FORM 100

**The Denver City Tramway Co.**

**INSPECTOR'S REPORT**

When making any statement regarding this report, always give above No.

Date..... Time..... M.

Line..... Car No.....

Conductor, Mr. ....

Motorman, Mr. ....

Violation Rule.....

Remarks:.....

Demerits..... Merits.....

Signed..... Superintendent.

Employee receiving this notice will acknowledge receipt of same by signing name in line below, returning this to superintendent's office within 48 hours of receipt of same, together with such explanation as he may desire to make.

(Signature).....

FORM OF INSPECTOR'S REPORT USED BY THE DENVER CITY TRAMWAY COMPANY

FOR perfect trip-sheets for the month. And for many acts which good judgment will suggest.

Each merit will offset one demerit, and record will be determined by taking the difference between the debits and credits.

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## FINANCIAL INTELLIGENCE

WALL STREET, July 20, 1904.

**The Money Market**

No change in the ruling rates for money has occurred within the past week. That the active speculation in stocks has caused a larger demand upon local capital was shown by the \$9,000,000 increase in loans of the New York banks reported last Saturday. But money is pouring into this city so fast from the interior centers that the larger borrowing requirements find no reflection in the market. Call money is still quoted at 1 to 1¼ per cent, with renewals made at 1 to 1½. For sixty-day loans 2 to 2¼ per cent is asked, for ninety days 2½, for five months 3½ and for six months—that is, for a period extending over the first of the year—3½ to 3¾ per cent. Mercantile paper continues in good demand at 3¾ to 4 per cent for thirty to ninety days, indorsed bills receivable, and 4 to 4¼ per cent for choice four to six-month single names. Surplus reserve has now risen above \$44,000,000, which not only far surpasses the corresponding total of any recent year, but has rarely been equalled at any similar season in our history. In face of this unusual accumulation of idle funds, it is remarkable to find sterling exchange declining again, rates having dropped this week a quarter cent in the pound. With such a position and no visible signs of any change, it seems superfluous to discuss the question of the harvest movement and the effect which it will have on the local market. Should the promise of very large crops of corn and cotton be fulfilled, the drain upon the New York banks will undoubtedly be greater than usual, especially as deposits of interior institutions in this city at the present time are exceptionally large. But as the financial community now feels, this is a development which will be rather welcomed than feared.

**The Stock Market**

The upward movement has made further rapid progress on the Stock Exchange during the week. All classes of stocks have been active in the rise, but operations for higher prices have converged particularly on the railway shares and on a few of the industrials, such as Steel preferred and Copper, which suffered the most in last season's great decline. Dealings have expanded to nearly four times the daily average of the dull period six weeks ago, and in the main the familiar characteristics of a bull market have again appeared. For the first half of the week covered by this review Union Pacific was the leader in the speculation. The advance in the stock culminated for the time being, when on Friday last the New Jersey court handed down its decision making permanent the injunction obtained in April in the Northern Securities dissolution case. As a victory for the Union Pacific party this announcement had for the movement a powerful sentimental effect, helping the market for the stock. It was at once made apparent, however, that the litigation would be carried to the Supreme Court, and that a very long time must elapse before it could be determined whether control of the merger companies will rest with the capitalists representing the Union Pacific or with the rival party identified with the old regime. Calm consideration of the matter led to heavy profit-taking in Union and Southern Pacific shares, and in the later dealings of the week the leadership of the market was assumed by other issues. The sharp advance in such stocks as Atchison, St. Paul and Northwest has occurred in face of confirmation that very great injury was inflicted upon the wheat crop by the rains and floods early in the month. It has plainly reflected the confidence now felt in high financial circles that the losses in wheat will be more than made good by the huge yield now indicated for corn. The shares of the railroads in the South have also benefited greatly by the excellent outlook which continues undiminished for the cotton harvest. Subject, of course, to the usual setbacks of every speculation, the present advance is altogether a more substantial and better supported movement than Wall Street has seen since the period of depression which reached its climax last September.

The local tractions have attracted a less share of the general speculative interest than any other group of active stocks. This is explained in the case of Metropolitan and Manhattan, on the ground that these shares had most of their move before the general list started upward. Manhattan has been virtually neglected during the week; Metropolitan has been held in check by sales coming evidently from speculators who bought at the low figures re-

cently prevailing, and have utilized the general market's buoyancy to retire profitably from their obligations. Brooklyn Rapid Transit has also moved rather slowly. But the optimistic feeling which has for some time past centered upon this specialty, has been encouraged by the successful placing of a large block of the company's new 4 per cent bonds, part of which are said to have been taken by foreign capitalists. The stock is also understood to be a favorite in the speculative houses which have been most active in promoting the rise in other quarters of the market.

**Philadelphia**

The advance has continued in the Philadelphia market during the week, with more active and better distributed trading than has been seen in some time past. Union Traction rose to 54¾, and Philadelphia Traction to 98¾, both of which are new high points for the year. Philadelphia Rapid Transit, which has been conspicuously a laggard in the recent dealings, developed sudden activity and advanced from 117½ to 13¾. Philadelphia Electric gained a quarter point from 6 to 6¼. About 1200 shares of American Railways were taken on a scale up from 45¾ to 47, which is the highest the stock has reached this season. Consolidated Traction of New Jersey, on sales of 250 shares, declined from 67 to 66½, and recovered to 67. Philadelphia Company preferred was notably strong at an advance from 45 to 45¾, but the common, after a rise from 387½ to 405½, seemed to encounter very heavy distributive sales, and eased off to 39¾. The activity in all cases was due to speculative operations based on general market conditions, rather than on any developments, actual or prospective, affecting individual properties. Minor transactions of the week comprised Union Passenger Railway (35 shares) at 235, Thirteenth & Fifteenth Street Passenger (50 shares) at 305, Fairmount Transportation at 19, and Rochester Passenger preferred at 98½.

**Chicago**

Dealings in the Chicago tractions have been at a standstill during the week. A hundred shares of Metropolitan common sold at 20½, an odd lot of the preferred at 55, seventy-five shares of City Railway at 175, and a small block of West Chicago at 47. This is a complete list of the week's transactions, and no other comment is necessary.

A belt line for the transfer of passengers between the Northwest and South Side Street railway lines is proposed by George A. Yuille, the city's expert on transfers. Under Mr. Yuille's plan cars could be run each way on a belt line every two and a half minutes. The cars would run on three sides of a square, switching back at each end. It is proposed to make the belt lines on the following streets: Twelfth from Wabash Avenue to Halsted Street, Halsted Street to Indiana Street, and Indiana Street to North State Street. The South Side representatives favored the proposition, and the Union Traction interests can't get a franchise unless they agree to it.

Formal notice has been sent to the Union Traction Company by the Mayor of the City Council's action requiring the removal of the Chicago Passenger Railway's tracks in Adams Street, Desplains Street, Harrison Street, Western Avenue and Twelfth Street within ninety days from June 11.

**Other Traction Securities**

Prices have moved upward in the week's Boston trading, but the improvement has not been as great as the extent of the advance in other quarters would have called for. Elevated shares rose from 151 to 152, a new high point for the season. Massachusetts Electric preferred advanced from 74 to 74¾, and an odd lot went at 75. The common, however, after rising to 21¾ was well enough supplied to cause a recession to 20. West End common was steady around 91½, while the preferred gained a point from 111 to 112. Fifty shares of Georgia Railway common sold at 39. In Baltimore the United Railway issues made a further recovery, the stock rising from 7¼ to 7¾ on sales of about 400 shares. The income bonds gained 1½ points from 46½ to 48, then reacted to 47. The general 4s moved only between 90¼ and 90½. Charleston Consolidated Street Railway 5s were a feature at an advance from 84 to 85¾, and so were the City & Suburban (Washington) 5s at an advance from 98½ to 100. Anacostia & Potomac 5s sold at 99. Lexington Street Railway 5s at 100, and Wilmington (North Carolina) Electric, Light & Power 5s at 97¾. On the New York curb Interborough Rapid Transit sold down from 134½—its high record—to 130, but subsequently rallied to 134. Almost 15,000 shares

of this stock have been dealt in during the last ten days. The only other transactions comprised a few odd lots of American Light & Traction common at 50 and 50½, one small block of Washington Electric common at 12½, and one lot of the 4 per cent bonds at 78½.

#### Security Quotations

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

	Closing Bid	July 12	July 19
American Railways .....	45½		47½
Aurora, Elgin & Chicago .....	a12		—
Boston Elevated .....	151½		151½
Brooklyn Rapid Transit .....	50½		52½
Chicago City .....	168		175
Chicago Union Traction (common).....	a16½		4½
Chicago Union Traction (preferred).....	a30		a30
Cleveland Electric .....	70		73½
Consolidated Traction of New Jersey.....	66½		66½
Consolidated Traction of New Jersey 5s.....	107		108½
Detroit United .....	62½		67¾
Interborough Rapid Transit.....	132¾		133¾
Lake Shore Electric (preferred).....	a20		—
Lake Street Elevated .....	3¼		3¾
Manhattan Railway .....	151½		152
Massachusetts Electric Cos. (common).....	19½		19½
Massachusetts Electric Cos. (preferred).....	73½		73
Metropolitan Elevated, Chicago (common).....	19½		19½
Metropolitan Elevated, Chicago (preferred).....	52½		52½
Metropolitan Street .....	117½		117½
Metropolitan Securities .....	88		88½
New Orleans Railways (common).....	9		9¼
New Orleans Railways (preferred).....	29		29½
New Orleans Railways, 4½s.....	73		72
North American .....	87¾		88½
Northern Ohio Traction & Light.....	13		a15½
Philadelphia Company (common).....	38¾		39¾
Philadelphia Rapid Transit .....	11¾		13¾
Philadelphia Traction .....	98¾		98¾
St. Louis (common).....	9¾		11¼
South Side Elevated (Chicago).....	91		91½
Third Avenue .....	121½		121½
Twin City, Minneapolis (common).....	94½		95½
Union Traction (Philadelphia) .....	53¼		54½
United Railways, St. Louis (preferred).....	54		41¼
West End (common).....	90½		91
West End (preferred) .....	111		110

a Asked.

#### Iron and Steel

Doubt continues to be thrown on the reality of the recent improvement reported in the iron trade. One of the leading trade journals in its weekly review to-day declares positively that actual conditions have not changed for the better, that a further decrease in consumption is even expected next month, and that the better feeling in the industry is entirely a reflection of recent recovery in the Wall Street markets. A tendency toward lower prices is reported this week in several lines. Bessemer pig iron is now quoted at the lowest price in the last nine years, \$12 a ton; Bessemer steel is unchanged at \$23, and steel rails at \$28.

#### Metals.

Quotations for the leading metals are as follows: Copper 12¾ and 12⅞ cents, tin 26 cents, lead 4¼ cents, and spelter 4⅞ cents.

### REPORT OF THE MANCHESTER CORPORATION TRAMWAYS

The annual report of the Manchester (England) Corporation Tramways for the year ending March 31, 1904, has just been published. The length of line, measured as single track, on that day was 137 miles, 1602 yards. The following is a summary of the profit and loss account: Traffic revenue, £603,182; other revenue, £8,698; total revenue, £611,881; working expenses, £392,504; gross profit, £219,376; add bank and other interest, £3,079; leaving a sum available of £222,456. This sum has been applied as follows: Interest on mortgage debt, £52,711; redemption of debt, £26,902; rent of tramways, £200,000; leaseholds, £1,136; reserve and depreciation accounts, £69,693; contribution to relief of rates, £50,000; street improvements, interest, etc., £2,012.

The number of passengers carried was 120,772,368. Of this number the percentages at the different fares was as follows: ½d., 4.56; 1d., 75.2; 1½d., 5.32; 2d., 10.69; 2½d., 1.05; 3d., 2.2; 3½d., 0.52; 4d., 0.46. The average revenue per car mile 10.52d., and per mile of track £4.468. The average fare per passenger was 1.2d.

### REPORT OF THE GLASGOW CORPORATION TRAMWAYS

The report of the Glasgow Corporation Tramways for the year ending May 31, 1904, contains the following: Traffic receipts, £717,893; other receipts, £6,958; working expenses, including depreciation, £496,266; balance, £228,584. From this sum the following amounts have been deducted: Interest and sinking fund on Govan Tramways, £5,068; interest on capital, £59,307; sinking fund, £45,552; Parliamentary expenses, £12,864; payment to common good, £25,000; leaving a balance of £80,790.

There are now 140 miles of line, measured as single track. The passengers carried were 188,962,610.

### RECEIVERS FOR RICHMOND PROPERTIES

Upon the petition of the Bowling Green Trust Company, trustee, under the consolidated mortgage of the Virginia Passenger & Power Company, William Northrup and Henry T. Wickham have been appointed receivers of the Virginia Passenger & Power Company, the Richmond Passenger & Power Company and the Richmond Traction Company, of Richmond, Va. The application of the trustee for the appointment of receivers for these properties was one of the results of the harassing litigation which has been instituted in the courts of Virginia and New York for the past few months by George E. Fisher and his associates.

In December, 1902, the control of these properties, which had formerly been held by Mr. Fisher, was acquired by Frank Jay Gould and Miss Helen Miller Gould, of New York.

Since Jan. 1, 1904, Mr. Fisher and his associates have instituted against the company and Mr. and Miss Gould some eight or ten suits in the courts of Virginia and New York, alleging various grounds of complaint, and in the last suit, instituted in Petersburg about three weeks ago, they asked for a receiver for the Virginia Passenger & Power Company.

As a result of this motion the company was not in a position on July 1 to make its financial arrangements to pay interest coupons maturing on that date, and the management had hoped to be able to defeat the motion for a receiver in time to avoid other litigation and enable the company to carry on its business. A few days since, however, the trustee in one of the underlying mortgages filed a bill in the United States Court against the Richmond Traction Company to place that company in the hands of a receiver, and the dismissal of the bill was only secured with the greatest difficulty and by the advancing of a considerable sum of money by Mr. Gould personally.

Only a few days ago the company learned that the Metropolitan Trust Company, of New York, trustee in the debenture mortgage of the Richmond Passenger & Power Company, had declared the principal of the bonds due and would proceed at once to foreclose that mortgage. It was at once realized that there was no way to avoid a receivership for the Richmond Passenger & Power Company, except by paying the principal and interest of the debenture bonds, which would have required the sum of \$1,025,000. This the company did not feel justified in doing, with a motion for a receiver pending in Petersburg and in the face of imminent danger of other litigation which it had reason to believe would be brought or instigated.

The consolidated mortgage of the Virginia Passenger & Power Company was the only mortgage constituting a general lien upon all of the properties, the other mortgages being only upon portions of the property originally owned by the several companies. It at once became manifest, therefore, that in order to avoid a disintegration of these properties, which would result from separate receiverships for each company, and which would have been ruinous to the holders of the consolidated bonds, as well as injurious to other security holders and to the public, steps must be taken to place the property under the control of a court having jurisdiction of all of the companies and in which it could be properly administered.

It is understood that counsel for the Bowling Green Trust Company were very reluctant to institute proceedings in any other court until the motion now pending before Judge Mullen in the hustings court of Petersburg had been disposed of; but, in view of the imminent danger of disintegration and of the further fact that the hustings court of Petersburg only had jurisdiction of the Virginia Passenger & Power Company and therefore could not appoint receivers for the Richmond Passenger & Power Company and the Richmond Traction Company and maintain the integrity of the system, no course was left open for the protection of the bondholders except for the trustee to apply to the United States Court, which had jurisdiction of all the companies, and to operate them all under one receivership.



## STATISTICS OF RAILWAYS IN THE UNITED STATES FOR THE YEAR ENDING JUNE 30, 1903

The following figures relative to all steam, electric and other railways in the United States are taken from summaries which will appear in the Sixteenth Statistical Report of the Interstate Commerce Commission, prepared by its statistician as the complete report for the year ending June 30, 1903. The total single-track railway mileage in the United States on June 30, 1903, was 207,977.22 miles, having increased 5,505.37 miles in the year ending on that date. This increase exceeds that of any previous year since 1890. The operated mileage concerning which substantially complete returns were made was 205,313.54 miles, including 5,902.87 miles of line on which trackage privileges were exercised. The aggregate length of railway mileage, including tracks of all kinds, was 283,821.52 miles, being classified as follows: Single track, 205,313.54 miles; second track, 14,681.03 miles; third track, 1,303.53 miles; fourth track, 963.36 miles; and yard track and sidings, 61,560.06 miles. The number of railway corporations included in the report was 2078. Of this number 1036 maintained operating accounts, 805 being classed as independent operating roads and 231 as subsidiary roads.

The total number of cars of all classes was 1,753,389, this total having increased 113,204 during the year. The assignment of this rolling stock was, to the passenger service, 38,140 cars; to the freight service, 1,653,782 cars; the remaining 61,467 cars being those employed directly by the railways in their own service. The number of persons on the pay rolls of the railways in the United States, as returned for June 30, 1903, was 1,312,537, or 639 per 100 miles of line. These figures, when compared with corresponding ones for the year 1902, show an increase of 123,222 in the number of employees, or 45 per 100 miles of line.

The par value of the amount of railway capital outstanding on June 30, 1903, was \$12,599,990.258, which represents a capitalization of \$63,186 per mile for the railways in the United States. Current liabilities for the year amounted to \$864,552.960, or \$4.211 per mile of line. Of the total capital stock outstanding, \$2,704,821,163, or 43.94 per cent, paid no dividends. The amount of dividends declared during the year was \$106,728,176, being equivalent to 5.70 per cent on dividend-paying stock.

The number of passengers reported as carried by the railways in the year ending June 30, 1903, was 694,891,535, indicating an increase of 45,013,030 as compared with the year ending June 30, 1902. The passenger-mileage, or the number of passengers carried 1 mile, was 20,915,763,881, having increased 1,225,826,261. The average revenue per passenger per mile for the year mentioned was 2.006 cents, the average for the preceding year being 1.986 cents.

The gross earnings of the railways in the United States from the operation of 205,313.54 miles of line were, for the year ending June 30, 1903, \$1,900,846,907, being \$174,466,640 greater than for the previous year. Their operating expenses were \$1,257,538,852, or \$141,290,105 more than in 1902.

The income from operation, or the net earnings, of the railways amounted to \$643,308,055. This item, when compared with the net earnings of the year 1902, shows an increase of \$33,176,535. The amount of dividends declared during the year (including \$420,400, other payments from net income) was \$197,148,576, leaving as the surplus from the operations of the year ending June 30, 1903, \$99,227,469, that of the previous year having been \$94,855,088.

The total number of casualties to persons on the railways for the year ending June 30, 1903, was 86,393, of which 9840 represented the number of persons killed and 76,553 the number injured. Casualties occurred among three general classes of railway employees, as follows: Trainmen, 2070 killed and 25,676 injured; switch tenders, crossing tenders, and watchmen, 283 killed, 2352 injured; other employees, 1253 killed, 32,453 injured. The casualties to employees coupling and uncoupling cars were, employees killed, 281; injured, 3551. The ratios of casualties indicate that 1 employee in every 364 was killed, and 1 employee in every 22 injured. With regard to trainmen—that is, engine-men, firemen, conductors and other trainmen—it appears that 1 trainman was killed for every 123 employed, and 1 was injured for every 10 employed.

One passenger was killed for every 1,957.441 carried, and 1 injured for every 84.424 carried. With respect to the number of miles traveled, however, the figures show that 58,917,645 passenger-miles were accomplished for each passenger killed, and 2,541,006 passenger-miles for each passenger injured.

The attorneys of the Chicago Union Traction Company have sent a letter to Mayor Harrison, in which it is asserted that the franchises of the Chicago Passenger Railway Company run until March, 1907. These are on the streets which the City Council recently ordered the company to vacate because it was thought the franchises had expired.

## REPORTED HUNTINGTON MERGER

Persistent rumors are abroad in Los Angeles, Cal., to the effect that all the Huntington interurban roads in that section are to be consolidated and that a European syndicate wants \$4,000,000 worth of the bonds of the new company, which will probably be known as the Pacific Electric Railway Company of California. Since the Huntington companies were organized, their investment has amounted to more than \$15,000,000, and is said to be continuing at the rate of about \$500,000 per month. In this connection it is known that Mr. Huntington said to a friend last winter that he had it in mind to put all of his interurban lines under one management. Said one of his closest friends to a representative of the STREET RAILWAY JOURNAL recently: "If I were to tell you what Mr. Huntington believes as to the future of this country, you might think he was 'daffy.' What are apparently the wildest claims of the realty brokers in Los Angeles do not approach his idea of what the next decade will bring about. He has plans to meet the growth he feels sure will come that are simply tremendous. He believes that electricity will eventually take the place of steam in transportation, so he aims to be ready and a little more than ready when that time does come."

## NEW YORK CENTRAL BECOMES INTERESTED IN TROLLEYS

On Saturday, July 16, the report came from Syracuse that the New York Central interests had just closed a deal for the purchase of the stock of the Syracuse Rapid Transit Railway Company held by the estate of L. K. McClymonds, of Cleveland, and that at the same time and by the same transaction the Central secured control of the Utica & Mohawk Valley Railroad Company, which operates from Little Falls to Rome, with city systems in Utica, Rome and Oneida. This statement contained a certain element of truth, but according to an announcement made later by the management of that company, the Stanley-Andrews syndicate of Cleveland, controlling the Utica & Mohawk Valley Company, really acquired a controlling interest in the Syracuse Rapid Transit Company, and proposes to merge these properties in one system. The New York Central & Hudson River Railroad Company has purchased an interest in these properties, and will probably enter into a trackage agreement for the use of the West Shore Railroad to connect the systems of which Syracuse and Utica are the centers. Further extensions, east and west, are in contemplation. The New York Central intends to aid the new company in taking care of and developing the short-haul traffic to the fullest extent. In Syracuse it is said that the West Shore will be electrified from Canastota to Syracuse, permitting the Utica & Mohawk Valley cars to enter this city over that line. The report that the West Shore would be electrified to Rochester is regarded as a move to influence the sale of the Rochester, Syracuse & Eastern Railroad, which has expended \$500,000 and has a right of way between the two cities.

## A BROOKLYN COMPANY TO EMPLOY ONLY UNION MEN

An announcement which caused much interest was that made Saturday, June 16, of an agreement entered into between the Coney Island & Brooklyn Railroad Company and its employees. The company voluntarily engages to employ only union men on its lines, even expressing preference that its employees be members of the local organization of electric railway workers.

It has been the custom of the company for years to treat annually with its men, and to enter into an annual agreement each July. The men have for a long time desired to get the union concession from the company, but have never threatened trouble over the matter. One clause in the agreement entered into is as follows:

"The party of the first part (the company) does not object to any employee belonging to the union, and would prefer that the employees should, and will not employ or keep any man who does not belong to the union."

The company also agrees that no motorman or conductor on straight runs shall be required to be on duty more than ten hours, inside of eleven hours from the time of reporting for duty, instead of ten hours inside of twelve from the time of reporting for duty, as at present, and that seven Park Circle trips shall be considered a day's work on the Franklin Avenue line, instead of eight trips, as now. The agreement as to the matter of pay in force during the last year is renewed. The motormen and conductors are receiving \$2.25 for a full day's work.

It is said there are only about a dozen non-union men now in the company's employ, and that they will all probably join the union.

## SEVERE MEASURES RESORTED TO IN MASSACHUSETTS

Action unprecedented in Massachusetts was taken on the night of July 13, when newly laid tracks of the Hoosac Valley Street Railway Company, of North Adams, Mass., were torn up by order of the Massachusetts Highway Commission. Procuring a steam roller at Williamstown, Mass., Engineer F. H. Joyner, of the commission, proceeded to North Adams. The steam roller was chained to the tracks and the engine started, the result being that the rails were pulled from the ties and twisted out of shape. This operation was repeated in two separate places.

When the first car was run over this line the following morning the motorman came upon a section of the torn up track and was forced to bring his car to a sudden stop in order to prevent an accident. It has been stated that wheel-barrows were placed across the track in order to give the motorman warning, but the motorman reported that no such obstruction was there when his car approached.

Secretary Austin B. Fletcher, of the Highway Commission, gave as a reason for this summary action on the part of an agent of the commission that the street railway company had violated the terms of its franchise over the State highway in North Adams in neglecting to leave the highway in as good condition after the tracks had been laid as it was before work was begun. It is stated by the company's representatives that an offer had been made to pay the highway commission for whatever work it considered necessary.

Secretary Fletcher says that he sent a letter to President A. H. Rice, of the Hoosac Valley Street Railway Company, on June 22, calling his attention to the condition of the highway in question. President Rice replied that he had called the matter to the attention of his general manager and that he would attend to it. Secretary Fletcher wrote another letter June 30, notifying President Rice that the locations would be invalid unless the conditions were complied with.

What adds importance to this case is the intimation given by officials of the commission that the action it took is intended not only as a check to the one street railway, but as a warning to all the Western Massachusetts street railways, with which it claims to have had more or less trouble.

## MERIT SYSTEM IN LOS ANGELES

The Pacific Electric Railway Company and the Los Angeles Interurban Railway Company adopted on July 1 the merit system of discipline, such modifications of the system being made as were thought necessary to meet peculiar local conditions. With the adoption of the new system all employees were freed of any charges of misconduct standing against them. Under the new code, instead of actual suspension, employees are continued at work while charges against them are under investigation. For good work credits are given, and they are allowed to offset particular offenses. Disloyalty, dishonesty, desertion, intemperance, insubordination, willful neglect, gross carelessness and immorality continue, as in the past, to be cause for dismissal, and no reprimand is published without giving to the offender an opportunity to be heard in his own defense. A reprimand is canceled by a perfect record for two months. A suspension of five days is canceled by a perfect record for three months. A suspension of ten days is canceled by a perfect record for four months. A suspension of twenty days is canceled by a perfect record for eight months. A suspension of thirty days is canceled by a perfect record for one year.

For the assignment of credits for good record, the year has been divided into three periods of four months each, beginning July 1, Nov. 1 and March 1. An employee who maintains a clear record, secures a credit of ten days for each perfect period until the thirty demerits are wiped off. In the event, however, of additional demerits being assessed against the same employee, no credits accrue during any portion of the four months period in which the demerits are recorded.

Credits for extraordinary service are given at all times and are cumulative. If any employee has a credit of thirty days for an extraordinary service and then receives a debit of thirty days for violation of rules, his account will stand even. A balance of sixty demerit marks subjects an employee to dismissal, in which case he is called in by the head of the department, and, unless there are mitigating circumstances, is taken out of the service.

In adopting the system the companies issued a statement in which they said: "It is expected that the system of 'discipline by record' will prove of great advantage alike to the company and to its employees and their families. Wages will not be lost by disciplined employees, who are not to be suspended, except for such time as may be required for satisfactory investigation, in attendance at the office of the head of the department, or by themselves

looking up facts, witnesses, etc., after which the employee will return to his work. It is also expected that it will encourage and stimulate all employees to co-operate heartily with the officers of the company in matters pertaining to harmony, economy, safety and efficiency, thereby securing better service and increasing benefits, security and satisfaction to the public and to all."

## PROPOSED ELECTRIC RAILWAY IN ECUADOR

L. F. Carbo, of New York, is interested in the development of an electric railway in Quito, Ecuador. The proposed line is to be 36 miles in length and is to be operated by water power. Mr. Carbo, who has a perpetual and very liberal franchise, leaves for Quito in the latter part of July with a well-known American engineer to investigate the possibilities of the system. The situation may turn out to be a good investment for American capital.

## STRIKE IN NEWBURGH, N. Y.

The strike of the employees of the Orange County Traction Company, of Newburgh, N. Y., declared early Sunday morning, July 17, was settled Tuesday afternoon, July 19, when cars were immediately placed in regular operation again. The men demanded recognition of their union, the employment by the company of union men only, the discharge of certain non-union men and the adjustment of a few minor grievances affecting time allowed for meals, overtime allowance, etc. They modified these demands later on, however, so that it was possible for the management to accept the modifications. The agreement as finally drawn contains eleven sections, and is binding upon both parties to it for two years. It provides in brief that the management of the company shall treat with properly accredited representatives of the men who shall be employees of the company; that seniority of service shall be recognized in arranging runs; that any employee suspended by the company shall be reinstated and fully compensated at the prevailing wages, if the charges against him are not proved; that all employees in good standing on July 16 be reinstated; that the prevailing rate of wages shall continue to prevail during the life of the agreement, and that employees discharged at the beginning of the formation of the union shall be given a fair hearing.

## INCONSISTENCY OF GRADE CROSSING ADVOCATES

An application has been received by the Commissioner of Railroads of Michigan from the Detroit United Railway for the approval of a proposed grade crossing of its line with the Michigan Central, Lake Shore & Michigan Southern and Grand Trunk Railroads in Greenwood Avenue in the city of Detroit, such application having the approval of the Mayor and a majority of the Aldermen of the city.

As is well known, there has been during the past few years considerable agitation in the city of Detroit, in favor of a separation of the grades at all crossings of electric and steam roads, the advocates of this plan having been unusually active since the accident that occurred at Gratiot Avenue a few months ago.

As a result of this agitation, a contract has been entered into between the city and the railroad companies in interest, providing that the railroad companies shall expend not less than \$200,000 each year in grade separation work until the entire separation shall be accomplished, the city agreeing to take care of all damage to adjacent property.

Under this contract and the general plan that has been adopted it is hoped and expected that the much desired abolition of all grade crossings can be accomplished within a few years.

And now come the Mayor and the Common Council of the city, who entered into the contract referred to, and request the Commissioner of Railroads to approve of a new crossing that will, in the opinion of the Commissioner, be fully as dangerous if not more so, than any now existing, thus creating a new and dangerous condition that must be changed within a very few years at most, at the expense of the railroad companies.

It would certainly seem that if the city authorities, and others who are so actively advocating a change of grades, are sincere and consistent in their position and desires, they should insist that the new crossing, if constructed, shall be made at a separate grade at the expense of the company desiring to make the same, and the owners of the property to be benefited thereby, and not wait until there has been an unnecessary risk of life and property, and until the adjacent property has been built up around a grade crossing, to be changed in a short time at the expense of the railroad companies, and to the great inconvenience of the owners and occupant of such property.

## ANOTHER NEW ELECTRIC LINE FOR LOUISIANA

The Bayou Teche Electric Company will in the very near future construct an electric railway from New Iberia to Berwick, La., and will supply light and power to a large section of the State. The corporation is under the direction of General F. F. Myles, who has large personal interests in that section of the State. The company has a capital of \$1,000,000.

This is one of several electric railway projects on foot in Louisiana which will be of benefit to New Orleans, operating as they will through the most fertile part of the State, and opening new territory to settlement and development.

Work on this road will be begun in the early fall.

## WORK BEGINS ON BUFFALO, LOCKPORT & ROCHESTER LINE

Work was begun a few days ago at Albion, N. Y., on what is to be known as the Buffalo, Lockport & Rochester Electric Railway, which is to run from Rochester to Lockport, where it will make connections with electric lines running to Tonawanda and Buffalo, and Niagara Falls. This road, which was incorporated under the name of the Albion Electric Railway, was to have run only from Albion to Lockport, but it has since been decided to extend it to Rochester and operating agreements have been made with the International Traction Company, with lines running to Buffalo and Niagara Falls.

The cars of the new road are to enter Rochester over the Lyell Avenue tracks of the Rochester Railway Company, and will carry their passengers to the Four Corners. It is expected that the road will be laid at least from Rochester to Brockport by fall, when that part of the line will be operated.

Throughout its whole length the new line will parallel the Falls road of the New York Central. It will run on its own right of way, except through the streets of the villages and towns along the route. The line is on the north side of the steam railroad, between it and the canal. The new company has practically obtained the right of way from Rochester to Lockport and has permission to go through the business streets of the villages and towns. The places through which it will pass are South Greece, Spencerport, Adams Basin, Brockport, Holley, Fancher, Albion, Eagle Harbor, Knowlesville, Medina, Middleport, Gasport and Lockport.

The construction of the road is now being supervised by A. T. Tomlinson, who represents J. G. White & Company, of New York. The road is being financed by the Transit Finance Company, of Philadelphia.

## NEW PUBLICATIONS

Derrah's Trolley Trips: By Trolley Through Eastern New England; 154 pages. By Trolley Through Western New England; 105 pages. Bound separately in paper; also bound together in cloth. Price, \$1.15. Published by Robert H. Derrah, 365 Washington Street, Boston, Mass.

These trolley guides are models of their kind in every way, typographically and in arrangement and execution. The information in regard to the different attractions in the cities described is supplemented by well-chosen illustrations and time-tables of the different lines, and indices make the task of finding his way an easy one for the traveler. The New England district is a very popular one for trolley excursionists. One reason is that it possesses so many historical associations, but the fact that the territory is so well supplied with trolley guides is undoubtedly another reason for the popularity in that region of the trolley tourist. Other sections of the country might well draw a lesson from the way in which this business has been developed.

Manual for Engineers. Compiled by Charles E. Ferris, B. S., Professor of Mechanical Engineering, University of Tennessee.

Published by the University of Tennessee Press, Knoxville, Tenn. Price, by mail, 50 cents.

This little engineering manual is gratifying evidence of the steady advancement of the South along the lines of sound technical education. The primary object of the university in publishing this book is to bring directly to the attention of Southern men of affairs the value of technical training in the schools and colleges of the South. In addition to a small amount of matter about the engineering departments of the University of Tennessee, the book contains considerable information of the highest value to engineers and merchants. That the book has been successful is shown by the fact that the publishers have received orders for the book from nearly every part of the world, and that it has reached a fourth edition of 5000 copies.

## STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED JULY 12, 1904.

764,688. Trolley; George E. Smith, Exeter, N. H. App. filed June 5, 1903. A main truck in the trolley harp, a swinging frame supported on the harp and carrying an auxiliary truck and a pair of flaring fingers movably connected to the swinging frame.

764,692. Overhead Trolley; William J. Sumner, Holyoke, Mass. App. filed Feb. 6, 1904. Details.

764,758. Operating Mechanism for Fare Registers; Wilfred I. Ohmer, Dayton, Ohio. App. filed Feb. 24, 1904. Comprises a rotatable shaft and a longitudinally movable rod, a housing in which the shaft and rod are mounted, a vertical shaft mounted in the housing and having a geared connection with the longitudinal shaft within the housing, an operating handle mounted on the vertical shaft, so as to rotate therewith and movable longitudinally thereon, a bell crank lever mounted in the housing and engaging the rod to move the same longitudinally, a connection between the operating handle and bellcrank lever to actuate the lever when the handle is moved longitudinally, an indicator having a shaft mounted in the housing and operatively connected with the vertical shaft, and detent mechanism for holding the parts in indicating position.

764,780. Trolley for Overhead Tracks; William J. Sumner, Holyoke, Mass. App. filed Feb. 6, 1904. Consists of a wheel-supported head and a jointed pendant connected with the head and extending below the track, the pendant being capable of swinging transversely of the track and independently of the head.

764,781. Switch for Overhead Trolley Tracks; William J. Sumner, Holyoke, Mass. App. filed Feb. 6, 1904. Details.

764,807. Trolley Retractor; Richard H. Ham, Stockport, N. Y. App. filed Sept. 29, 1903. Means whereby when a pull is exerted on the retaining socket of the catcher, the socket will be freed from its locked position and caused to rotate or move in approximate parallelism to the dash, so as to exert a downward pull on the trolley rope.

764,867. Switch Point Shifter; Robert H. Roberts, San Antonio, Texas. App. filed April 2, 1904. Details of construction of a depressible operating rod mounted on the dash of the car.

764,836. Electric Fluid Pressure Switching Mechanism; Walter J. Bell, Los Angeles, Cal. App. filed Aug. 6, 1903. Comprises a switch element, a double-acting pump for moving the switch element, solenoids for reciprocating the pump piston, and a pole changer for said solenoids consisting of a contact carried by a moving part, spring contacts each electrically connected with one of said magnets and alternately engaged by said contact, and an inclined bar between the spring contacts for deflecting the contact whereby the latter is snapped from one contact to the other at the ends of its movements.

764,856. Electric Railway; Timothy Mahoney, San Francisco, Cal. App. filed Aug. 4, 1903. Means carried by the car for operating a switch-box consisting of a trolley wheel having a magnetizable rim and a series of readily magnetizable spokes inclosed thereby; the series of spokes being helically wound by a continuous conductor to form a single magnet whose opposite poles are at the center and the periphery of the wheel.

764,915. Trolley Guard; Anton Christensen, Chicago, Ill. App. filed April 29, 1904. Details.

764,942. Electric Railway System; Wilbur E. Guthrie, Chambersburg, Pa. App. filed Feb. 5, 1904. The system dispenses with the use of a continuous live trolley, either overhead or underground, and employs a feed wire buried in the roadbed and connected at intervals with a series of upwardly projecting contacts, adapted to make contact with a long shoe carried by the car and of such length as to bridge the space between the contacts.

765,004. Trolley Pole Head; John E. Greenwood, Utica, N. Y. App. filed Aug. 29, 1903. A coiled spring secured to the trolley pole at a point intermediate its ends, collectors on the spring, and means engaging the ends of the spring to maintain it in horizontal position.

765,004. Trolley Pole Head; John E. Greenwood, Utica, N. Y. App. filed Aug. 29, 1903. A cap-piece pivotally mounted on the trolley pole, a leaf spring supported on edge on the cap-piece and collectors arranged in tandem on the spring.

765,041. Car Fender; William H. Reece, St. Louis, Mo. App. filed Dec. 1, 1903. The fender comprises three separate parts pivotally connected to move in unison, to wit: An apron pivoted approximately at its upper edge, a cradle pivoted beneath the apron, and a pilot mounted below said cradle.

765,067. Street Car Fender; Jacob Derx, St. Louis, Mo. App. filed Jan. 29, 1904. Comprises a stationary frame and a pivoted

frame, and a plurality of pivotally-mounted rigid plates connecting the frames and forming the side walls of the fender.

765,075. Trolley Harp; Charles L. Hooper, Rochester, N. Y. App. filed Dec. 15, 1903. Details.

765,136. Overhead Conductor Point Operating Mechanism; Charles G. Goord, Brighton, England. App. filed Sept. 17, 1903. Comprises a switch operated by the rail-point, a magnet upon the overhead frog, an electric circuit including the magnet and switch, and conductor connections operated by the magnet.

765,137. Trolley Fork; Charles G. Hartman, Glens Falls, N. Y. App. filed Dec. 21, 1903. A disc mounted on the trolley fork is provided with means for temporarily holding the pin of the trolley wheel, means upon the fork for permanently holding the pin and means for bringing the two means into a registering position.

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### PERSONAL MENTION

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DR. SCHUYLER SKAATS WHEELER, president of Crocker-Wheeler Company, electrical manufacturers, sailed July 13, with Mrs. Wheeler, on the White Star liner "Baltic."

MR. G. H. WINSLOW, who has for several months past been in charge of the reading and club rooms of the Public Service Corporation of New Jersey, under the direction of the State committee of the Young Men's Christian Association, has resigned to accept the position of superintendent of the railroad Y. M. C. A. of the Louisville & Nashville Railroad, at the company's shops at New Decatur, Ala.

MR. JOHN P. POPE has accepted the position of superintendent of the Columbus, London & Springfield Railway Company, of Columbus, Ohio; Mr. B. M. Brown has accepted the position of superintendent of transportation of the Dayton, Springfield & Urbana Electric Railway Company, and Mr. C. C. Collins has succeeded Mr. F. G. Mensch as superintendent of express of the same company. Mr. E. B. Gunn has resigned as general superintendent of the Dayton, Springfield & Urbana Electric Railway Company, and is to be succeeded by Mr. A. H. Hayward.

MR. JAMES D. HOUSEMAN, who now is general manager of the Suburban Telephone Company, of St. Louis, Mo., made an enviable reputation while general manager of the St. Louis, St. Charles & Western Railway, from which, as previously noted in the STREET RAILWAY JOURNAL, he resigned quite recently. From the time of the opening of the road in 1899 until he resigned, Mr. Houseman did not have occasion to discharge a single man, and during that time only four regular employees resigned. But even more remarkable than this is the fact that during the five years only \$250 was paid out for damages, and that there are at present no damage suits against the company. Since the opening of the road Mr. Houseman has been able to grant the men an increase in wages amounting to 20 per cent. Mr. R. W. Gray has been appointed to succeed Mr. Houseman.

MR. J. A. BARRY, general manager of the New Jersey & Pennsylvania Traction Company, with headquarters at Trenton, N. J., has resigned his position to accept the managership of the Indiana Northern Traction Company's line between Marion and Wabash, Ind. Mr. Barry has been at Trenton since March, 1901, and succeeded Mr. Jilson J. Coleman, president of the New Jersey & Pennsylvania Traction Company, as general manager in 1902. Mr. Coleman is now president of the Indiana Northern Traction Company. The New Jersey & Pennsylvania Traction Company controls 25 miles of road, extending from Trenton to Princeton, in New Jersey, and to Newtown, Pa. The Princeton line was the pioneer high-speed line in the State. Mr. Barry has been very successful in his management of the road, carrying, since the opening in the fall of 1901, about 3,000,000 passengers without a single injury. He was the pioneer newspaper advertiser in Trenton, and, so far as known, in the State, running at first regular railroad time-cards, and, later, supplementing these by reading notices, to which attention has been called in the STREET RAILWAY JOURNAL. Previous to coming to Trenton, Mr. Barry was with the Brooklyn Heights and old Nassau Railroads in Brooklyn, N. Y. He began his railroad career with the Cleveland, Loraine & Wheeling Railroad, with which he served seventeen years, filling many positions. He left the steam railroad to take a position with the Yonkers (N. Y.) Street Railway, and has been connected with electric railways ever since.

MR. T. G. HANSEN, who, in June, 1902, resigned as general superintendent of the Northern Ohio Traction Company, of Akron,

Ohio, to become connected with the British Electric Traction Company, of London, has resigned from that company, and is returning to the United States. Mr. Hansen has been acting as manager of the Costa Rica Electric Light & Traction Company, of San Jose, Costa Rica. Here he became very popular with the employees, and earned the approbation of his employees by his loyalty to their interests. Mr. Hansen began his street railway career in Chicago. Here he was first employed as a gripman on a cable road. Later he became an inspector, and then went to Cleveland as a division superintendent of the Cleveland Electric Railway. His next position was that of superintendent of the Northern Ohio Traction Company. The employees of the Costa Rica Company presented Mr. Hansen with a gold chain and a charm as a token of their esteem when they learned he was to leave.

MR. A. J. WILSON has resigned from his position of master mechanic of the Brooklyn Heights Railroad Company, owing to ill-health. It has appeared advisable for him to take a much-needed rest, which he has decided to do, after which he will undoubtedly resume his railroad work. Mr. Wilson has



A. J. WILSON

been connected with the Brooklyn Union Elevated Railroad and the Brooklyn Heights Railroad for over fourteen years in the operating department and in charge of repair-shop work, coming to Brooklyn from the Central Vermont Railroad. His work in Brooklyn began very soon after the opening of the Brooklyn Union Elevated Railroad, upon which system he spent five years in the operating department and was then placed in charge of the work of repairs and maintenance of cars and locomotives. He has had a very valuable experience in the remarkable development of urban traffic that has taken place in that city, his experience covering both the earlier steam locomotive service and of installing and maintaining the electrical equipment which is now so successfully in use. He has for several years past been in charge of the three large repair shops of the surface and elevated divisions and the fifteen division shops, and has also been in charge of the important new work of reconstruction of elevated cars.

MR. FRANKLIN EVENS MORSE, superintendent of power of the Brooklyn Heights Railroad Company, died at his residence, at 1327 Dean Street, Brooklyn, N. Y., on Friday, July 15. His death comes as a shock to his many friends and co-workers, who had all learned to esteem him for his many sterling qualities. He was ill only a week of typhoid fever, but the immediate cause of his death was exhaustion from an operation. Mr. Morse was thirty-three years of age, unmarried, and lived with his parents and a sister. He was a native of Massachusetts, having been born in Walpole, Aug. 16, 1870. He was educated in the public and high schools in his home town, and received his technical education at Dean Academy, Franklin, Mass. Mr. Morse has been associated with the Brooklyn railroads for the last thirteen years, and in the capacity of superintendent of power for the last seven years. He was a popular member of the New York Railroad Club, and was also a member of the Masonic order, holding the high honor of Past Master of the Montgomery Lodge, F. and A. M. Mr. Morse's first electrical work was in the employ of the Wright Electric Company, of Boston. Subsequently he worked for the Electric Light Company, of Clinton, Mass. In 1891 he came to Brooklyn and entered the service of the Brooklyn City Railway Company as a switchboard operator under Mr. M. G. Starrett. His rise from this position was rapid and he soon became chief electrician of the Southern Power Station of the company, which position he held until the fall of 1894. He was then promoted to the position of superintendent of power of the Brooklyn Height Railroad Company by the late Mr. R. B. Brown, E. E. This position he has held very efficiently through several administrations of the company. Mr. Morse was one of the most popular and highly thought of men in the company, and his loss is deeply felt by all those connected with the mechanical department. His professional attainments were of the highest order. He grew with the electrical profession, and was probably one of the best posted men in the field upon practical power plant subjects. He was very fond of the work, and was closely devoted to it, and his interests were one with the company. In the field of invention, Mr. Morse has also made a record; he was the inventor and patentee of the Brazed Rail Joint.