Street Railway Journal

VOL. XXIX. NEW YORK, SATURDAY, JUNE 15, 1907. No. 24

PUBLISHED EVERY SATURDAY BY THE

McGraw Publishing Company

MAIN OFFICE:
NEW YORK, ENGINEERING BUILDING, 114 LIBERTY STREET.

BRANCH OFFICES:
Chicago: Old Colony Building.
Philadelphia: Real Estate Trust Building.
Cleveland: Schofield Building.
San Francisco: Atlas Building.
London: Hastings House, Norfolk Street, Strand.

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

TERMS OF SUBSCRIPTION

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

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

To Dominion of Canada

Street Railway Journal (52 issues), postage prepaid.....$4.50 per annum
Single copies ..... 10 cents

To All Countries Other Than Those Mentioned Above:

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

NOTICE TO SUBSCRIBERS

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

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

BACK COPIES.—No copies of issues prior to September, 1904, are kept on sale, except in bound volumes.

DATE ON WRAPPER shows the month at the end of which the subscription expires. The sending of remittances for renewal prior to that date will be much appreciated by the publishers.

NOTICE TO ADVERTISERS

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

Of this issue of the Street Railway Journal 8000 copies are printed. Total circulation for 1907 to date, 198,050 copies, an average of 8252 copies per week.

Controlling the Scrap Heap

The disposal of scrap in power plants and repair shops is a matter of great importance, not only on account of the waste which often occurs in even well-organized stations and maintenance departments, but because of the demoralizing effect on the men of lack of care in the handling of all materials. Experience shows that men are often more wasteful of large quantities than of small bits of scrap, and for this reason it has been found wise in some instances to keep an open receptacle of moderate size for daily accumulation, and a larger bin, provided with a locked cover, into which the smaller boxes can be emptied from time to time.

Few roads are so improvident as to throw away copper wire or single pieces of equipment which can be melted over or used a second time without repairs, but there is often a tendency to throw into the scrap pile to be sold as junk parts of apparatus which lack only some one or two pieces, put in place on a rainy day, to make them good for at least a limited service. If a company maintains a brass foundry, a considerable amount of scrap can be remelted to good advantage. Trolley wheels which are worn out, broken or chipped controller contacts and fingers, parts of circuit breakers and various brass fittings used on the cars can be remelted, along with partly ruined wire stripped from burned-out armatures or fields. Even the dirt of the foundry beneath the brass furnace can be sold at a good price. It is, of course, a mistake to store obsolete equipment on the premises, for the room it requires is not worth the trouble as a rule. The problem of looking after the scrap, including burned-out incandescent lamps, wornout commutator brushes, broken rheostat grids, cracked bearing shells, etc., may well be taken in charge by the shop employee who keeps the storeroom in shops. What the situation generally requires is systematic treatment in place of the neglect so often seen.

The Under Side of the Car Again

That cars have been built with practically no thought to the wiring and to the hanging of the apparatus underneath the bodies is at once evidenced by an inspection of the under sides of many cars. The designers of some, it may be added, have arranged the bottom framing just as though wiring resistance boxes, air pumps and brake rigging were never to be required. Such procedure can only result in the apparatus being installed in an unsatisfactory manner. Moreover, the labor cost of installing the wiring and apparatus is greatly increased when no provisions for them have been made and the workmen are compelled to spend half their time in doing carpenter or machine work.

In the last few years, however, more consideration has been given to this feature of car construction. On another page of this issue an article will be found on the installation of the wiring and control apparatus of fifty Metropolitan West Side Elevated cars, Chicago, and reference to the cost data in connection with the installation will emphasize the statement that time spent in making provision for the wiring and the hanging of the apparatus when the body is designed is a good investment. These figures show that the apparatus was installed at an unusually low cost. In this case, a careful consideration of the location of the apparatus resulted in short connection conduits between the different parts of the control system. The lessened material of

course resulted in a decreased cost of labor as well as of material.

In the Metropolitan job, however, the aim was not to cheapen the cost of installation. It was rather to put the apparatus and conduit up in a manner that would assure of its not giving future trouble. The appearance was also considered. Lessened cost, substantiality and appearance seem to have gone hand in hand in this instance, and we believe it is safe to say that this will usually be found the case.

It must not be inferred that making provisions for wiring in the design of the car and giving attention to the installation of the wiring and the apparatus give good returns only with steel framings and conduit construction. We feel certain that like results will be obtained with timber framing and with wiring that is not run in conduit.

In locating the apparatus a very important point to be kept in mind is so to place it that a minimum amount of wire will be required. The less the wiring the less usually will be future trouble, the better will be the appearance and the less will be the cost entailed.

Superheated Steam

The numerous papers on superheat read at the recent Indianapolis meeting of the Society of Mechanical Engineers are, no doubt, some indication of the interest that is felt in the question of superheated steam. Historically, superheating is by no means new. Patents for a superheater were taken out over one hundred years ago. Trevithick or some other Cornish engineer discovered the merit of the principle when he built a furnace under the great cylinder, and later Penns, of Greenwich, fully proved the economy of superheat, but at the same time discovered the superior decomposing effect upon tallow of superheated as compared with saturated steam. Trevithick indeed patented a superheater in the year 1811, and Hirn wrote about them in 1857. But want of a permanent oil killed them, and meantime higher pressures and compound working came into being and superheating lapsed into desuetude until revived a dozen years or so ago after engineers had begun to grasp what the mineral oils now rendered possible, namely, higher temperatures. There are numerous superheaters now made, but they may be all classed in two divisions, controllable and uncontrollable. The former have the temperature of the steam controlled within narrow limits of variation by means of hot water circulated through pipes threaded through the pipes of the superheater. These latter pipes are large and heavy so as to give some inertia control by means of the mass effect of the heavy pipes and to give the finer control by means of variation of the quantity of water which is made to flow through the internal control pipes. This quantity is automatically increased or diminished by the use in the length of the circulatory system of a steam inspirator worked by superheated steam, and, therefore, more or less active as a propelling agent according as its temperature is higher or lower.

The uncontrolled type is always built up of small tubes and the temperature fluctuation is liable to be considerable. But in a battery of boilers, each with its superheater, the temperature of the superheat in the main steam pipe is the mean of that of all the contributing supplies from the several superheaters. Thus the engine will probably always receive a fairly average quality of steam. We think that power station engineers should pay attention to the question which is now being so much ventilated. In the use of steam there can be no doubt as to the economy to be derived from superheat in the matter of coal consumption. From the gross economy we have to subtract the interest and depreciation charges and various other expenses in order to arrive at a fair estimate of the commercial economy possible. With proper care and choice of apparatus, it ought not to be difficult to show an economy on the commercial side.

The Analysis of New Routes

In the regular growth of a large city street railway system the analysis of conditions bearing upon the selection of new car routes is a problem of far-reaching consequence. Hasty action in planning such alterations or extensions is likely to cut into the profits of the company as the system expands, and nothing but a detailed study of the relations of the new route to the rest of the company's territory is a safe guide to decisions. Small as is each change in routeing, it is of immense importance as a tendency in the service which creates or discourages traffic, and which enables the company to handle its business with greater economy or results in increased cost per passenger carried.

In general, the longer ahead an actual route change can be foreseen, the more probable it is that a sound decision can be reached in regard to it. On even small systems an endless study of the traffic and service must be conducted by operating officials if the data are to be secured which can some day be effectively utilized in settling broad and detailed questions of expansion. Conferences with real estate interests, observations of the prices of land and building tendencies in different districts, studies of tax records, proceedings of improvement associations, suggestions of the public as heard by conductors, inspectors and higher officers of the company, and as expressed in the press, must all be brought together in the study of the service and anticipation of future needs.

When a divisional organization obtains, the superintendent of each division should be able to present many valuable suggestions bearing upon present and prospective routes. An active superintendent will constantly study the traffic and characteristics of his territory with reference to the present service, growth and future prospects, keeping in close touch with the pulse of the public's desires through observation and conferences with his subordinate inspectors, whose duties of keeping the traffic in motion at the congested points keep them in almost hourly touch with the tides and whims of travel. The conclusions and suggestions of the division superintendent should form an essential part of the data which determines the wisdom of opening new routes to bring passengers to the business district more directly, thereby reducing the number of transfers previously necessary or decreasing crowding upon certain other lines, or of establishing a connecting line which will link together outlying suburbs previously separated and tend to build up sparsely settled intermediate territory. The es-

tablishment of faster service is almost certain to increase the population of a given section, and the prospects in this direction are profitable subjects for the study of the company. There is room for the closer fitting together of real estate, population and transportation developments and experience in the analysis of traffic on large systems.

A broad consideration of the relations of a new route to the system as a whole should supplement memoranda from local operating officials as to the needs of their special territory. Estimates of construction cost based upon experience on similar streets in building lines of single and double track, figures representing the probable traffic and earnings of a given schedule, and the anticipated reduction or increase of travel on associated lines, the number of passengers probable at different hours, number of cars that should be continued on the older lines in view of the effect at certain places of new facilities in order to meet the needs of passengers who use them at other parts of the route without reference to the point of starting, time table rearrangements and power requirements should all be finally considered in a careful determination of the need of new or revised routes.

The Advantages of Large Cars

An interesting commentary upon the increasing use of longer cars for city roads is shown by recent reports of the Massachusetts Railroad Commission. According to the statistics in that volume, the four largest electric railway systems of Massachusetts have added very few cars net to the total number owned by each in the past five years, although the traffic, and in three cases the track mileage, have increased by substantial percentages.

In 1902 the Boston Elevated Railway Company owned 3281 passenger cars; in 1903, 3280; in 1904, 3365; in 1905, 3325, and in 1906, 3338. At the end of the five years the increase was but 1.7 per cent, the total being actually lower than the number of cars owned in 1904. During this half-decade the track mileage of the system increased from 360 to 403, or 12 per cent, and the total number of passengers carried increased from 222,484,000 to 262,267,000, making a traffic gain of about 18 per cent. The Boston & Northern Street Railway Company owned 1162 cars in 1902 and but 1112 in 1906. The latter figure represents the minimum of the five years, but in this time the track mileage increased from 423 to 513. The number of cars thus fell off 4.3 per cent, while the trackage gained 21 per cent. Here there was also a substantial gain in traffic, from 69,299,000 in 1902 to 88,849,000 in 1906, or 28 per cent increase.

The Old Colony system reduced its cars from 746 to 721, and the mileage operated also decreased from 362 to 352. But the traffic increased from 46,321,000 to 53,713,000 during the five years. The Worcester Consolidated system gained a single car in 1906 over 1902, the figures being 315 and 316. In 1903 this company owned 347 passenger cars. The track mileage of the Worcester Company increased 23 per cent, or from 129 to 159 miles operated, in the period, and the number of passengers carried increased from 24,522,000 to 30,456,000, or 24 per cent.

Each car owned by these four companies handled, on the average, a much larger amount of work in 1906 as compared with 1902. The Boston Elevated carried 67,600 passengers per car owned in the latter case and 77,500 in the year 1906, or an increase of 15 per cent. The Boston & Northern raised the figure from 59,000 to 80,000, or over 35 per cent, and the Old Colony's patronage per car owned rose from 62,000 to 74,500, making a gain of 20 per cent. Worcester increased 23 per cent, from 78,000 to 96,000 yearly passengers per car owned.

On all four of the systems the total car mileage increased during the period under consideration. The Boston Elevated cars ran 45,770,000 in 1902 and 50,000,000 in 1906, a gain of 9.6 per cent. The Boston & Northern car mileage rose from 14,139,000 to 16,460,000, or 16.5 per cent, and the Old Colony's from 9,296,000 to 9,971,000, or 7.2 per cent. The Worcester Consolidated gained 16.3 per cent, from 4,679,000 to 5,459,000 car-miles. The mileage per car also increased with each company. In Boston each car's average gain in total yearly mileage was 1100 miles, from 13,900 to 15,000. The Boston & Northern increased from 12,100 miles per car in 1902 to 14,800 in 1906; the Old Colony raised its record from 12,500 to 13,800, and the Worcester system from 15,100 to 17,300.

While it is impossible to determine to what extent the use of larger cars is responsible for these greater transportation outputs per car, there is no question that the tendency toward higher speeds of operation and the increase of traffic density offered each car in the populous territory served are insufficient to account for all this gain in work per car. It is well known that as the four systems considered have expanded during the past five years, the companies have purchased many large and improved cars capable of handling more passengers per trip than was ever possible with the short, single-truck and the moderate length double-trucked cars which were standard a few years ago. These later cars have almost invariably been equipped with four motors each, and have, therefore, been able to make faster time than their slower predecessors, particularly on interurban and suburban runs. Thus far the total percentage of large modern cars, notably of the semi-convertible type, is probably not large in comparison with all the cars owned by the companies, but the adaptability of these cars to all seasons and hours undoubtedly makes their influence strongly felt in relation to the total number of cars in operation at any one time. In fact, the semi-convertible car has become so popular on some routes that other cars have been poorly patronized and in some cases have had to be withdrawn.

The only disadvantages of note characteristic of large cars are their higher first cost, their enlarged power consumption and probably increased maintenance expenses. These are minor considerations where the volume of traffic is sufficient to create good loading. The increased carrying capacity easily offsets with a liberal profit the extra power cost, and the greater comfort of riding, higher speed possibilities and superior attractiveness to the public are strong reasons why large systems should continue to supersede the older rolling stock by larger and more powerful units. Certainly the results in Massachusetts bear out the wisdom of such a policy.

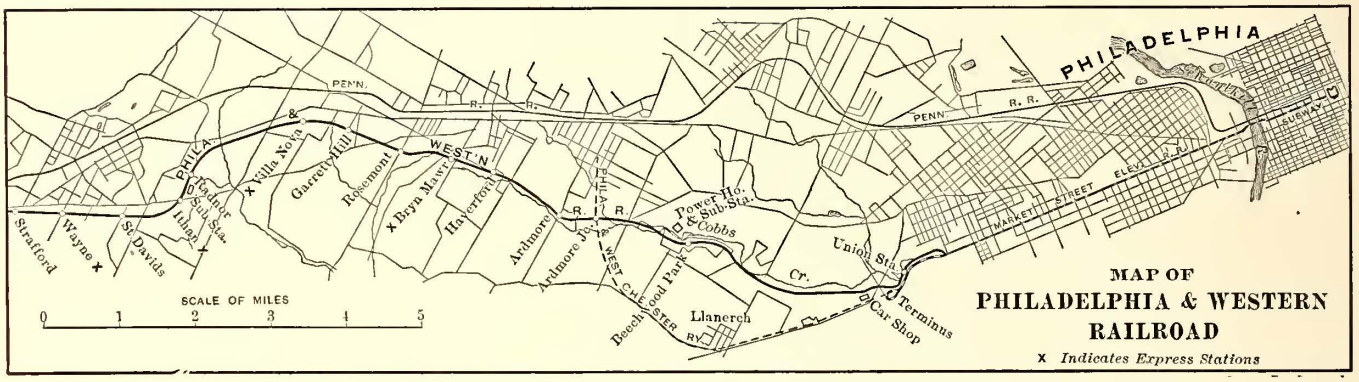
THE PHILADELPHIA & WESTERN RAILROAD

The Philadelphia & Western Railroad, which was opened for service between Philadelphia and Strafford, Pa., on May 22, marks another noteworthy step in the development of heavy electric traction for high-speed transportation of the suburbs of our large cities. Unlike other instances of heavy electric traction, this installation is not an old steam railroad electrified because of undesirable operating conditions, but one built from the first to give an electric train service along the most liberal lines and in competition with a long-established steam railroad. The operating results of the new line, therefore, may well be expected to demonstrate anew the superiority of electricity for suburban service.

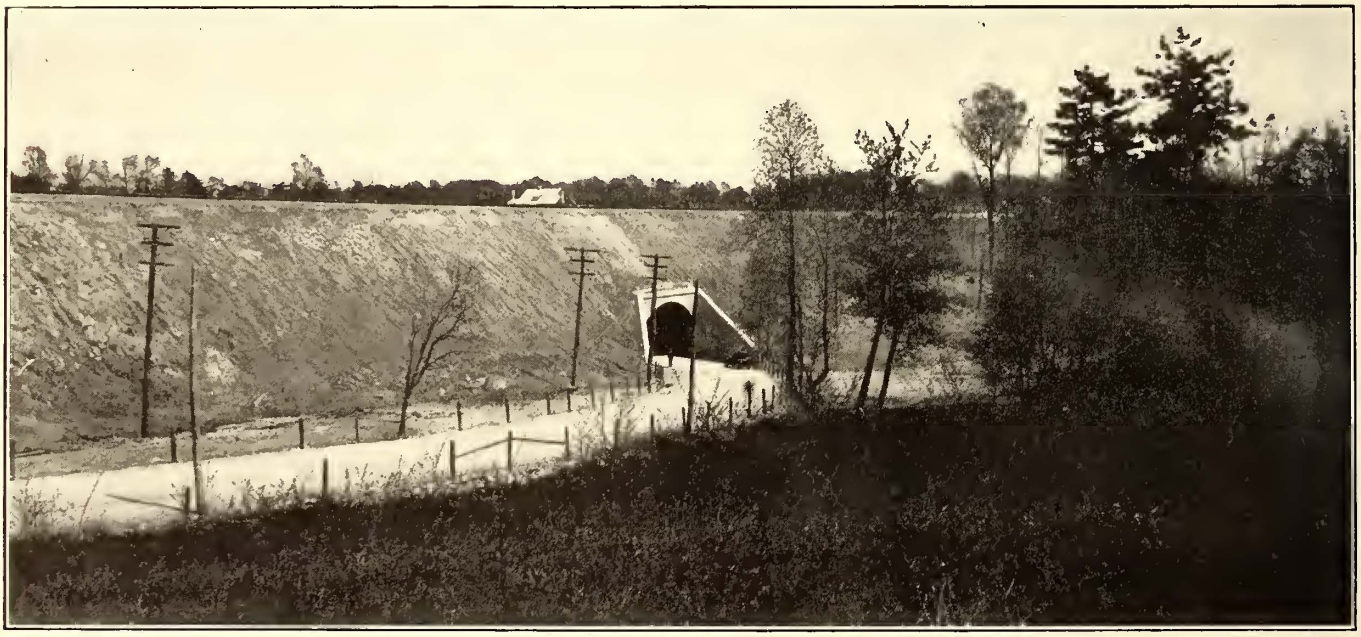
It would be difficult in any description to do justice to the splendid district west of Philadelphia chosen for exploitation by the Philadelphia & Western Railroad, yet even a brief glance at the accompanying map reveals that the territory must be one of attractive character. Within the 11½ miles between Strafford and West Philadelphia are the noted colleges of Haverford, Bryn Mawr and Villa Nova, as well as numerous smaller academies and schools, many sectarian institutions of charitable character, and a large number of golf, polo and cricket grounds. It is evident that aside from the prosperous class of permanent residents in this section, there must be a great deal of pleasure travel whenever the more important colleges have athletic meets and on holidays favorable for general outings and visits to the many points of interest.

As at present constituted, the Philadelphia & Western Railroad is a two-track line extending from Sixty-Third and Market Streets, in West Philadelphia, through the towns of Ardmore, Haverford, Bryn Mawr, Rosemont, Villa Nova, Radnor, St. Davids, Wayne and Strafford. The length of this route is 11½ miles, but the total in single track is 24 miles, this including the freight and storage sidings, etc. Eventually the line to Strafford will be four-tracked to permit an express service, and two local tracks will be continued to the town of Parkesburg, 32 miles further. All of the tracks are laid on the company's right of way, and, in accordance with the State law governing the grant of perpetual franchises, there are no grade crossings. The perpetual franchise also includes the obligation to carry freight, which accounts for the freight sidings mentioned.

Since the section now operated will be four-tracked in the future, the company secured a 230-ft. right of way as far as Strafford. Surveys have also been made through to Parkesburg. The right of way includes several large parcels of land purchased to avoid litigation. One of these tracts



THE PRESENT ROUTE OF THE PHILADELPHIA & WESTERN RAILROAD, FROM WEST PHILADELPHIA TO STRAFFORD



A VIEW OF THE BIG FILL AT ROSEMONT, SHOWING ALSO THE ARCH FOR OLD CONESTOGA ROAD. NOTE THE COMPARATIVE HEIGHTS OF THE AUTOMOBILE, ARCH AND FILL

amounts to about 180 acres, and, together with other property on the line, is being developed by a subsidiary real estate corporation.

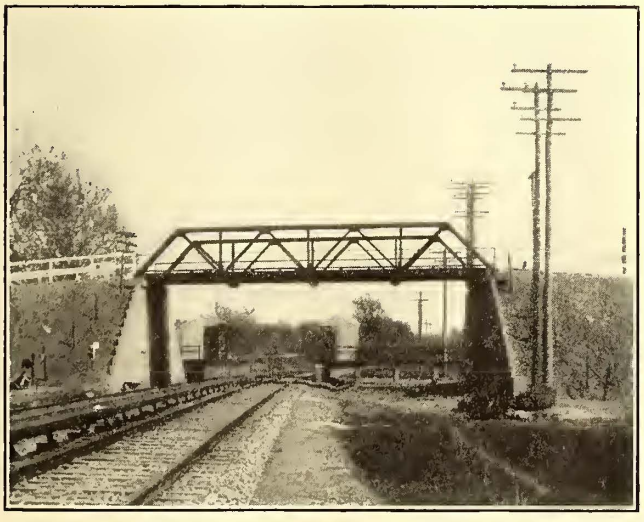
ROADWORK

The rolling character of the territory traversed by the Philadelphia & Western Railroad would have required a large number of fills, cuts and culverts in any event, but compliance with the law prohibiting grade crossings with other railroads and public highways necessitated also an extraordinary number of bridges, arches and culverts. Besides the foot bridges, there are in the 11½ miles of route fully thirty-four over and under grade crossings, made up as follows: Eleven overhead bridges for public highways; four overhead bridges for private crossings; two arches, one of 33 ft. diameter under the big fill at old Conestoga Road, Rosemont, and the other at the power house, and seventeen railroad bridges. There is also a 33-ft. span concrete arch at Cobbs Creek west of the power house.

The foot bridges are of steel with wooden steps and floors, and are found at stations, at certain points connecting private property, and at the company's Ithan quarry. The road bridges are of heavily reinforced concrete designed in accordance with the standard loading specifications of the Pennsylvania Railroad. The abutments are set back for four tracks, so when the road is ready for express service the expense and time for changes required will be very little.

All of the arches are of concrete reinforced with plain round bars of high carbon tensile steel capable of withstanding a stress of 15,000 lbs. per square inch. Plain reinforcement was chosen in preference to special shapes because of its greater economy and ease in securing the material. The most important arch on the line is the one carrying part of the Conestoga fill at Rosemont, mentioned later, and which had to be made to provide for a roadway. Owing to the presence of a stream at this point, this road is built over a culvert.

The cut and fill work was of a peculiarly difficult character, due to the heavy rock work and to the slippery soil,

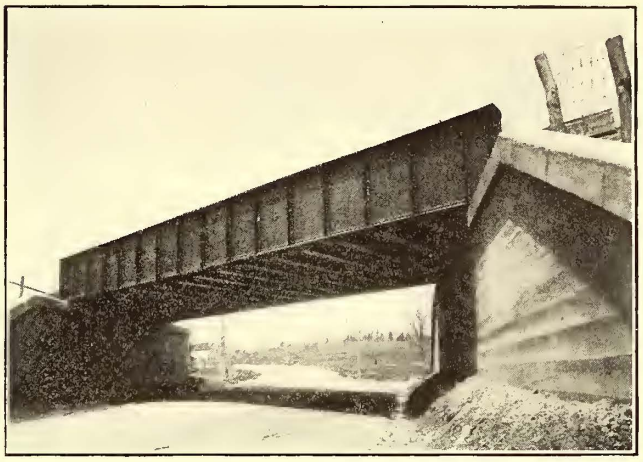


HIGHWAY BRIDGE AT ARDMORE AVENUE, SHOWING ALSO THE DOUBLE-POLE CONSTRUCTION AT CROSSINGS WITH FOREIGN WIRES

of which a considerable proportion is disintegrating mica. The company is sowing alfalfa on all of its fills to secure a good binder and enhance the appearance of the right of way, in favorable contrast to the cinder-covered roadway of steam railroads.

The largest cut is 500 ft. west of the power station. It is 600 ft. long and has a maximum depth of 40 ft., and required the removal of 20,000 cu. yds. of granite. The biggest fill is located over the old Conestoga road. It is 1850 ft. long, has a maximum height of 65 ft., a slope of 1½ : 1, is 33 ft. wide at the top and 230 ft. wide at the bottom.

In all, the total excavation amounted to about 1,000,000

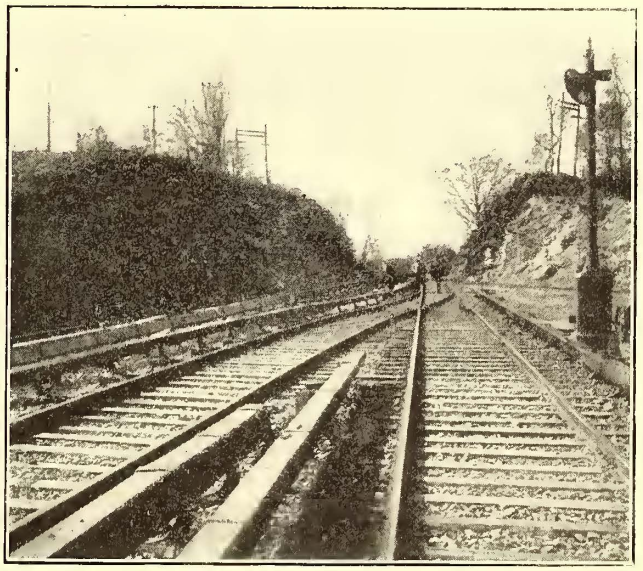


A TYPICAL STEEL BRIDGE WITH REINFORCED CONCRETE FLOOR ARCHES

cu. yds., and this practically was balanced by the material needed for the fills. The result of this work has been to limit the maximum grade to 2½ per cent, and the maximum curve, except at the Strafford loop, to 5 degs. The 5-deg. curve is practically no hindrance to the service, since it is very near the Bryn Mawr station, where trains must slow down as a matter of course.

TRACK AND THIRD-RAIL CONSTRUCTION

As already noted, the service tracks at present are double, but there are extra loading tracks and platforms at the



LOOKING WEST AT THE GREAT ROCK CUT NEAR THE POWER HOUSE, WITH SIGNAL POST AT THE RIGHT

terminals, the Bryn Mawr station and other places where picnics or college games involve the handling of large numbers of people in short periods. At Strafford, for example, there is an extra track to allow room for eight to ten cars. Throughout the entire system the track consists of 85-lb. T-rails laid on wood ties spaced 21½ ins. center to center in rock ballast taken from the company's quarries along

the line. The rails have Continuous joints and are bonded with two 400,000 circ. mil Protected bonds per joint.

The striking feature of the power-collection system is the use of the Farnham inverted U-shape third rail. This conductor is of soft steel, its low proportion of carbon giving it a conductivity equal to an 800,000 circ. mil copper cable, while its bearing surface is equivalent to a 70-lb. T-rail. The U-shape of the rail offers another advantage in that the extra conductivity possibly needed by traffic increase can be obtained easily by placing the desired size of bare copper cable inside the rail, contact being secured in such cases by a compound plastic bond at all rail joints. The upper part of the rail section is provided with lips or side flanges for fastening to the bracket structure, which also carries the three protective planks, insulator, bushing, etc., as shown in one of the accompanying illustrations. The latter also illustrates the method for making feeder connections to the rail. Further particulars regarding this system as applied on the Philadelphia & Western Railroad will be found in the STREET RAILWAY JOURNAL of Jan. 6, 1906, on page 45.

To mark the boundary of the right of way and as a precaution against trespassing, the company has put up stout wire fences over 5 ft. high on both sides of the track. Warning signs regarding interference with the third rail are placed at frequent intervals on the fence posts, station platforms, etc.

HIGH-TENSION TRANSMISSION AND OTHER WIRING

All of the wiring is carried on chestnut poles 40 ft. high, spaced 100 ft. on tangents. These poles were heavily tarred to about 8 ft. above the butt, and to prevent ground rot were placed in concrete to a depth of 7 ft. After the concrete had set, the space left by shrinkage between it and the pole was filled with hot tar.

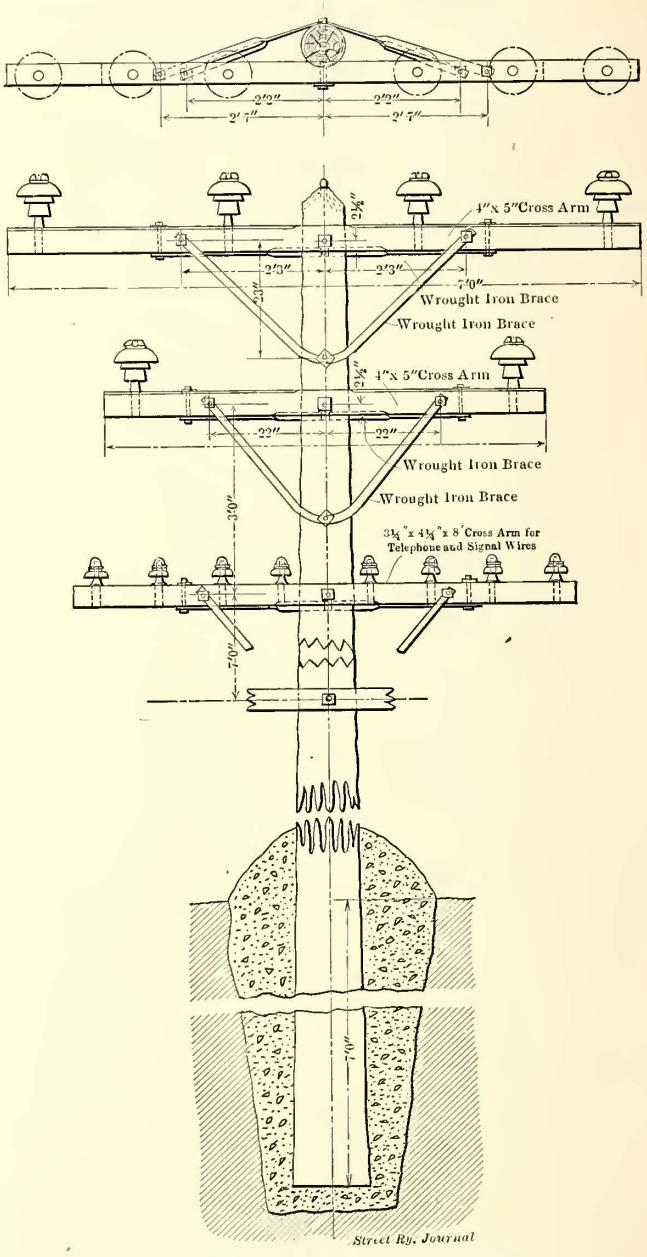
The 19,000-volt, three-phase transmission system extends at present only as far as the Ithan sub-station. The wires are carried on Thomas triple petticoat insulators set on wood pins. The feeders are of 600,000 circ. mils section. There is no feeder between the West Philadelphia terminal and the power station, as two rotary converters in the latter feed current directly into the rails.

An interesting feature of the overhead construction is that the company has installed a private telephone system, the wires of which are carried on the same poles as the high-tension wires on a separate cross-arm 3 ft. below. This cross-arm also carries the signal wires. To avoid the effects of induction the telephone circuit consists of a twisted pair of insulated wires, while the high-tension conductors are transposed every mile.

An important problem that arose in connection with the high-tension transmission was to devise some sure method of avoiding short-circuits possible through a broken high-tension wire falling on foreign wires at the crossing of pole lines. An effective yet simple preventative has been secured by running a ¼-in. stranded steel cable alongside each transmission wire and tieing in every 6 ft. for 100 ft. on both sides of the crossing. Should either wire break, therefore, the one paired with it will keep more than a 6-ft. length from falling, and thus the high-tension wires can never come dangerously near foreign wires. The same insulators carry both the steel cable and copper wires in the protective section and the steel cable is looped around the last insulator. A crossing of this kind is shown in a view taken near Ardmore Avenue, and illustrates also that at such places the poles are doubled up to carry the extra wire.

POWER STATION

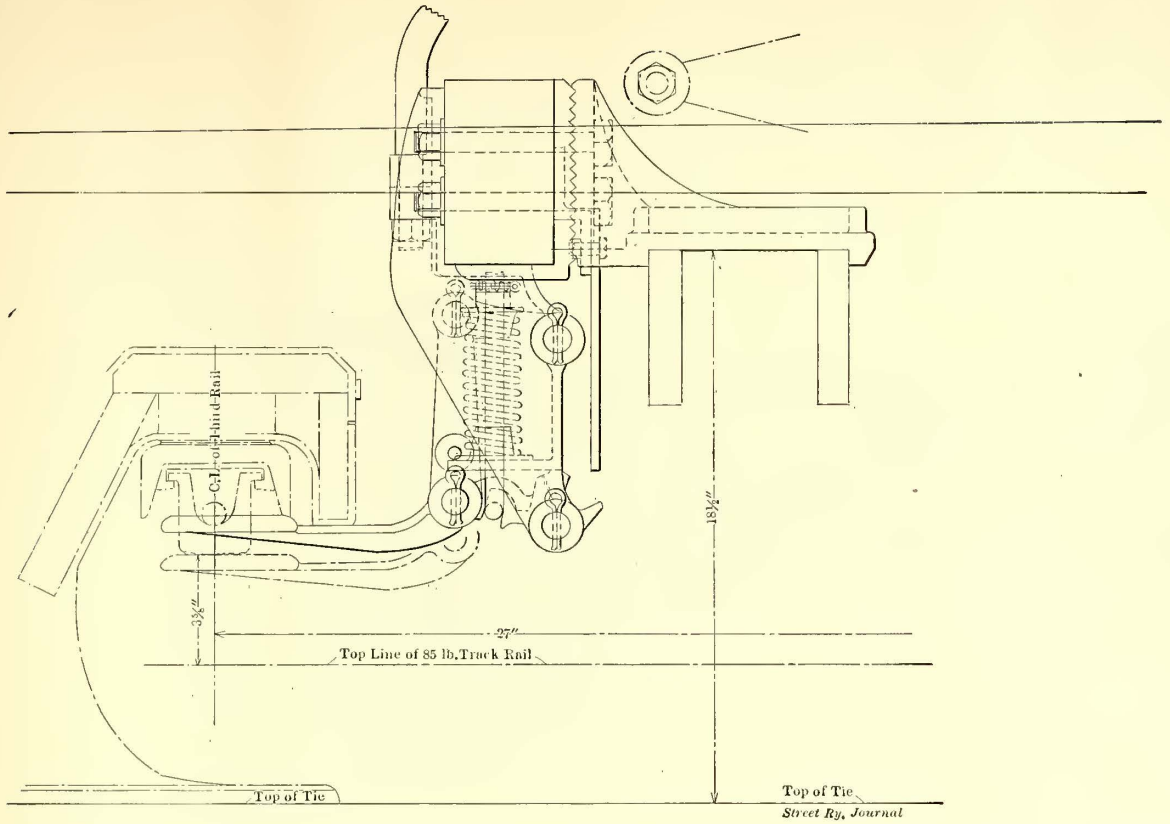
The power house is located on Cobb's Creek 2½ miles from the West Philadelphia terminal. As shown in the section and plan on pages 1056 and 1057, the building is divided into two parts, one for the boilers and superheaters and the other section with a mezzanine floor for carrying the transformers, exciter sets, rotary converter and other electrical equipment, while the main floor accommodates the turbines, with condensers and other steam auxiliaries.



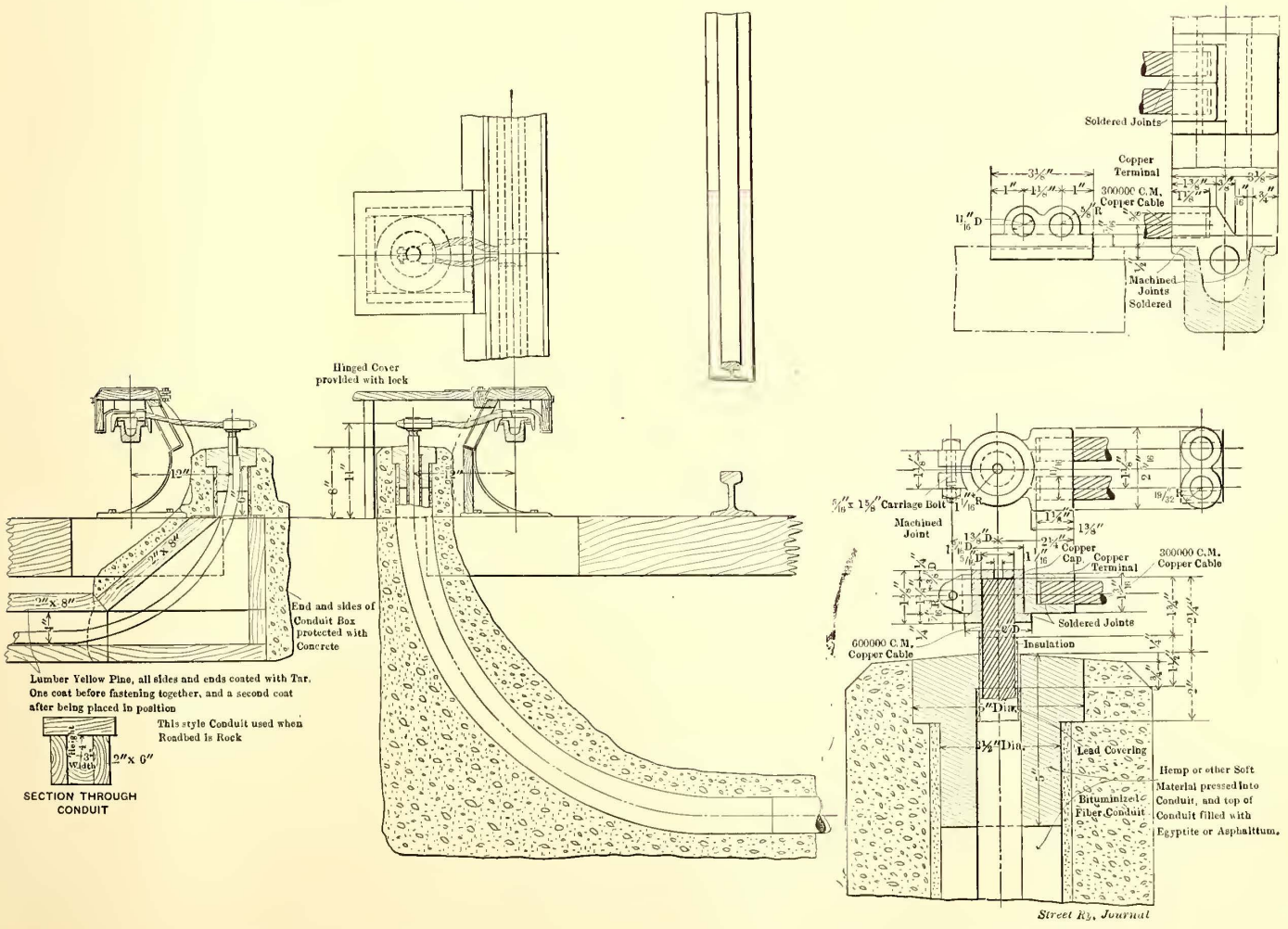
DETAIL OF POLE FITTINGS AND SETTING

To permit easy extension, the station is very simply constructed, the footings being of concrete, the walls of corrugated sheet steel fastened to steel columns, and the roof, which rests on angle-iron framing, of concrete with a slag finish. The gallery floor, like that of the lower one, is of concrete, but is carried on channel beams.

The position of the station alongside the company's tracks greatly simplified the coal handling problem. All fuel is brought in standard cars which are run up a concrete-supported trestle alongside the outer boiler room wall. The cars may dump either through chutes directly in front of the boilers or to the outside storage under the trestle.



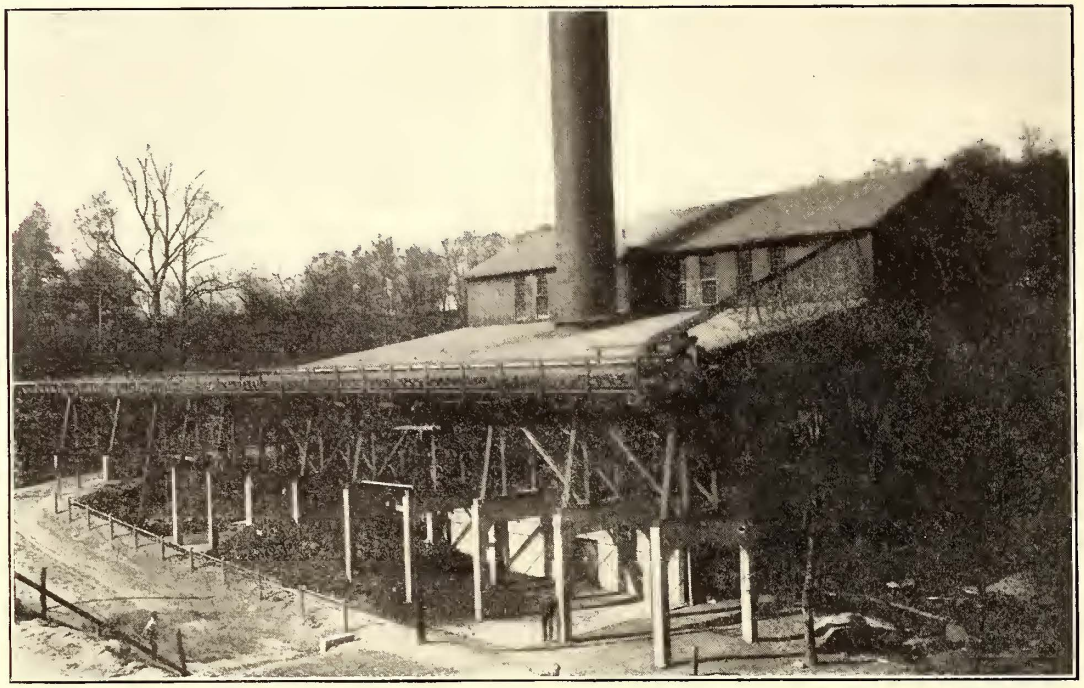
CONSTRUCTION DETAILS OF THIRD-RAIL SHOE



DETAILS OF CABLE TERMINAL, CONDUIT CONNECTIONS, ETC., FOR THIRD-RAIL OPENING

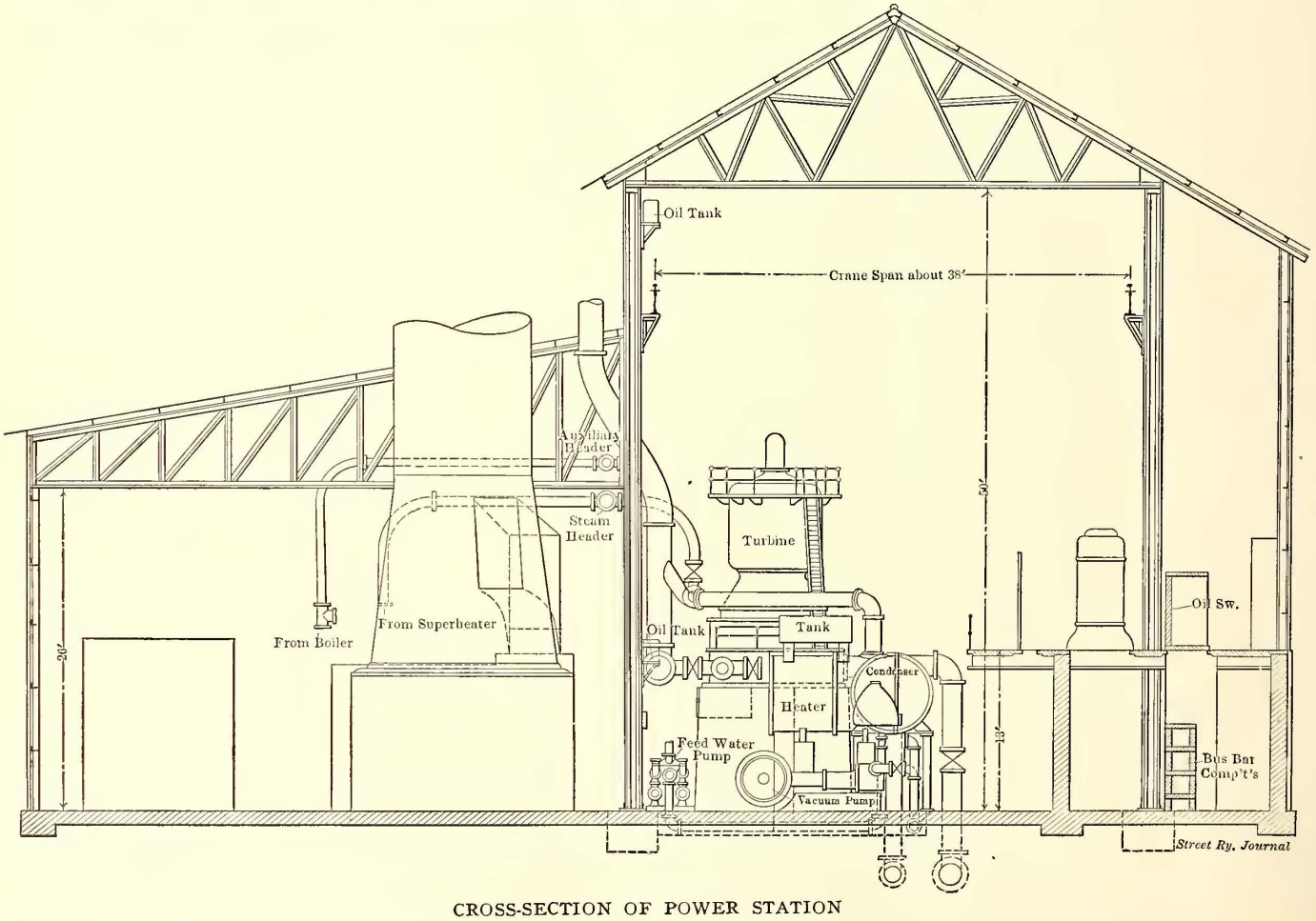
Ashes are taken out in side-dump cars on a narrow gage track running alongside the boilers.

The operating equipment of boilers now consists of five 500-hp Heine units. These boilers each have 5000 sq. ft. of heating surface and are built for 200 lbs. working pressure. They are made up of two sections, each having 138 3½-in. x 18-ft. tubes and one 48-in. shell 21 ft. 9 ins. long. The grate surface is 15 ft. 3 ins. wide and 7 ft. deep. The fifth boiler has been installed primarily for the summer lighting and power load at Beachwood Park, but it can also be used as a spare. There is but one stack, which is of steel 13 ft. in diameter and 160 ft. high.



COALING TRESTLE ALONGSIDE THE POWER STATION

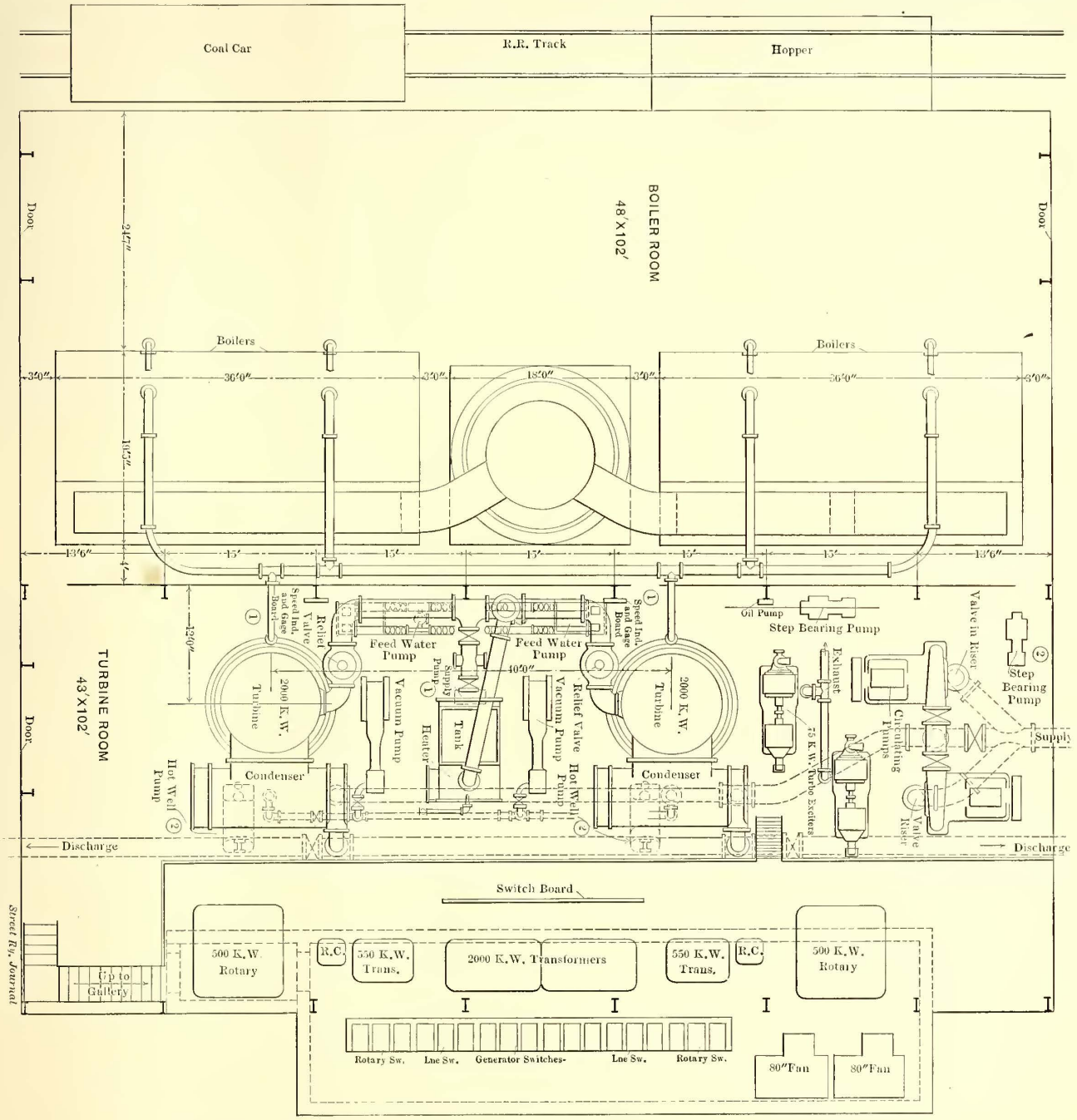
The power generating equipment consists of two four-stage, 2000-kw, 2300-bolt, three-phase, 25-cycle Curtis turbines, running at 750 r. p. m. These turbines are now being changed over from water to oil step bearings. It will be noted that either turbine is capable of taking the output of the five boilers, so that under general operating conditions one turbine will be ready for emergencies or to carry loads that are too heavy for one machine.



CROSS-SECTION OF POWER STATION

The steam auxiliaries comprise a Foster superheater, Cochrane open-type feed-water heaters and Worthington condensers. Gravity feed lubrication is employed.

The superheater is placed in the upper part of the boiler setting in chambers provided alongside of the drums. The superheater consists of a nest of horizontally disposed straight tubes surrounded by cast-iron rings and joined at their ends by connecting headers and return headers, so that the steam is passed back and forth three times. By means of a damper in the superheater flue, the heat may be diverted entirely or the degree of superheat regulated. The



PLAN OF THE PHILADELPHIA & WESTERN RAILROAD COMPANY'S POWER STATION

superheater increases the temperature of the steam 150 degs. F. at 200 lbs. pressure.

The feed-water heater and purifier is of horizontal cylindrical construction, rated to take care of 4000 hp. A second heater can be added at any time after a three-way transfer valve has been installed in the exhaust main to permit cutting off either heater at will or using both together. The steam enters the heater through an oil separator, the drips of which are piped to waste. The body of the heater is of cast-iron plates reinforced by ribs and bolted together at the corners where the joints are calked from the inside with a "rust" joint. Cast iron is preferred for heater construction, as that material is less susceptible to corrosion than sheet iron or steel plate; for the same reason, the fittings are of copper or brass.

The condensing apparatus consists of two units, each capable of taking care of one of the 2000-kw turbines. The condensers are of the surface type built for what is known as the wet and dry vacuum system. Each unit condenses 40,000 lbs. of steam per hour with 70 degs. F. water, maintaining a condenser pressure of 2 ins. absolute, which is equivalent to a 28-in. vacuum based on a 30-in. barometer. The condensing units consist of the following parts: One 6750-sq. ft. surface condenser; one 10-in. x 22-in. x 18-in. horizontal, single rotative dry vacuum pump; one 20-in. horizontal volute centrifugal circulating pump direct connected to a 12-in. x 12-in. vertical engine mounted on the same bed plate, and one 3-in. horizontal two-stage turbine

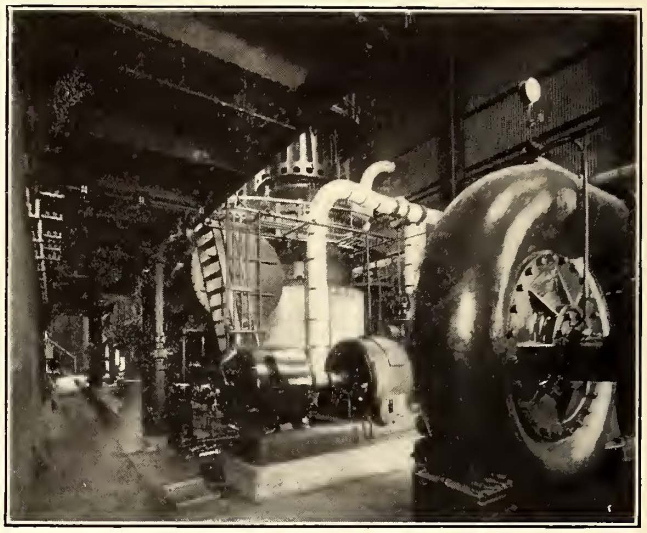
centrifugal hot-well pump electrically driven at 1200 r. p. m. The same manufacturer also supplied two 14-in. x 8½-in. x 15-in. pressure type boiler feed pumps, each capable of taking care of 3500 boiler hp. These pumps are of the out-

IN THE BOILER ROOM

side end packed plunger type with pressure pattern water ends, the water valves being of the brass winged type working in brass seats. Among the special features of the installation are the equipment of each surface condenser with a special air cooler, which is very efficient to move the non-condensable vapors from the condenser chamber at the point of greatest density; the vacuum pump, which is of the crank and flywheel pattern and special high vacuum design, all air valves being mechanically operated; the volute pumps, which, combined with the engines, form self-contained units operating at approximately a speed of 300 r. p. m., and the hot-well pumps, which are specially noteworthy in that they are automatic in their action and require no special floats and valves for their operation, and consequently there is less liability to cause trouble. These hot-well pumps are designed to carry overloads of 100 per cent and deliver the water of condensation into an open tank against a slight discharge head.

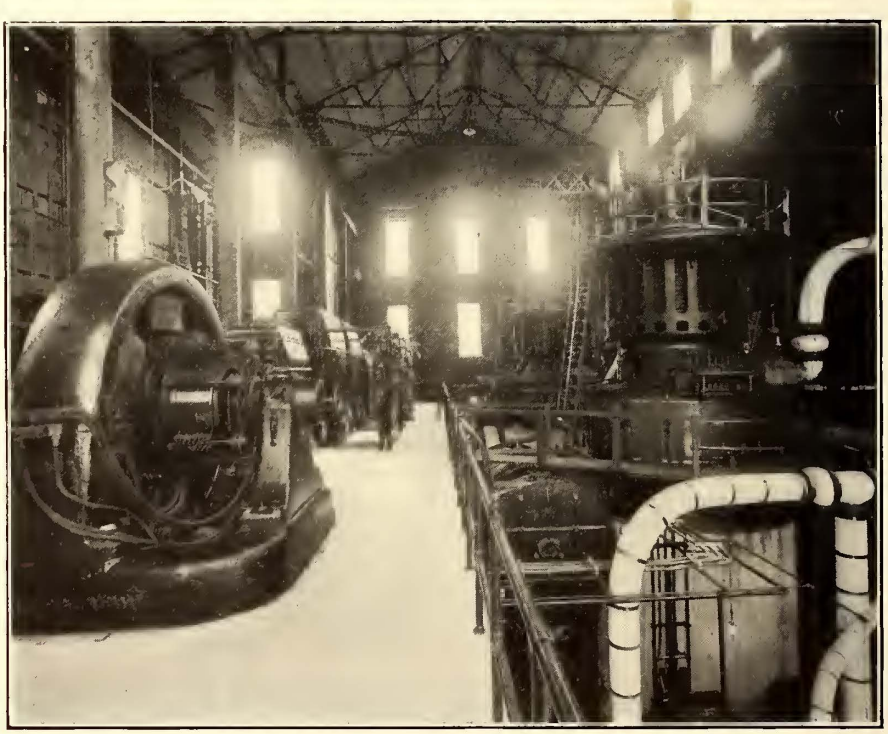
All of the heavy piping of the condensing system is under the floor; the condensing water is taken from Cobbs Creek, where a dam was built for that purpose. When the water is low the return pipe discharges into a flood box into the center of the pond, the surplus going down stream. Aside from this supply, the company has a connection with the mains of the Springfield Water Company 2300 ft. distant, which can be used when the creek water is muddy.

All of the purely electrical apparatus, which includes a regular sub-station equipment, is mounted on the concrete platform in the section containing the turbines and auxiliaries. This comprises the following: Two four-stage, 75-kw, 2400-r. p. m., 120-volt Curtis turbo-generators for exciting the large turbines; two 25-cycle, 2000-kw air-blast transformers now arranged for 2300 volts primary and 19,100 volts secondary; two 25-cycle, 550-kw air-blast transformers to step-down from 19,100 volts primary to 430 volts



CONDENSING AND FEED-WATER APPARATUS SECTION

secondary; two 80-in. Buffalo blowers; two six-phase, 600-volt, 500-kw, 500-r. p. m. rotaries, and two 75-kva reactive coils. This equipment is controlled from a black slate switch-



THE GALLERY IN THE POWER HOUSE ON WHICH ALL OF THE ELECTRICAL EQUIPMENT EXCEPT THE TURBINES IS CARRIED

board in the same gallery. The high-tension switches are electrically operated. It may be added that the transformers are wound for an eventual maximum potential of 33,000 volts.

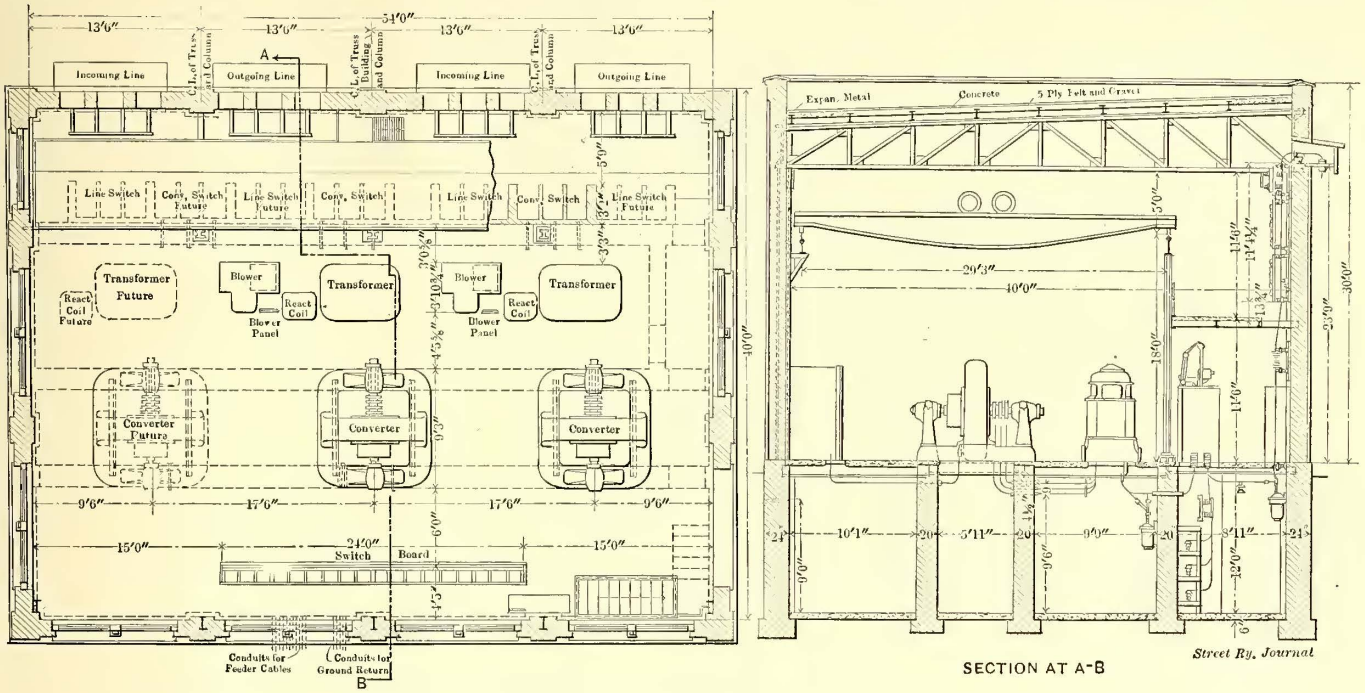
THE ITHAN SUB-STATION

The only sub-station on the line is at Ithan, 2 miles from Strafford and 6 miles from the main power station.

It is a neat brick structure with concrete footings, and is 40 ft. wide by 54 ft. length. The roof is of concrete reinforced with expanded metal resting on I-beams over the roof framing. The concrete is covered with a five-ply felt and gravel. The windows are made up of small panes, which, with the arch construction and white copings, give the station a pleasing appearance. The interior of the station is trimmed with enameled brick; red is used for about 1 ft. from the floor, then about 5 ft. of white and the rest in buff.

The relative location of all the equipment is plainly shown in the plan, but it might be well to add that as this station represents the terminal of the present high-tension system, provision for the future lines toward Strafford has been made as indicated. It will be noted also that the station now has but two-thirds of its ultimate equipment. Even with three rotaries it will not be too crowded for convenient working. The switchboard, for example, is set back 4 ft. 5 ins. from the wall, and is so placed with reference to the other apparatus that the attendant can move about without hindrance or danger.

The present converter outfit consists of two G. E. six-phase, 25-cycle, 500-r. p. m., 600-volt, 500-kw rotaries. The two 550-kw transformers are of the air-cooled type with two Buffalo 40-in. blowers. The transformers are placed in front of the oil switches, which are in compartments faced with white brick. The oil switch compartments are directly beneath the high-tension switchboard gallery. There are also two 75-kva reactance-coils and the usual protective apparatus. The station is spanned by a 10-ton Maris crane. The building is heated by steam radiators from a separate steam plant in the cellar.



PLAN AND SECTION OF THE ITHAN SUB-STATION

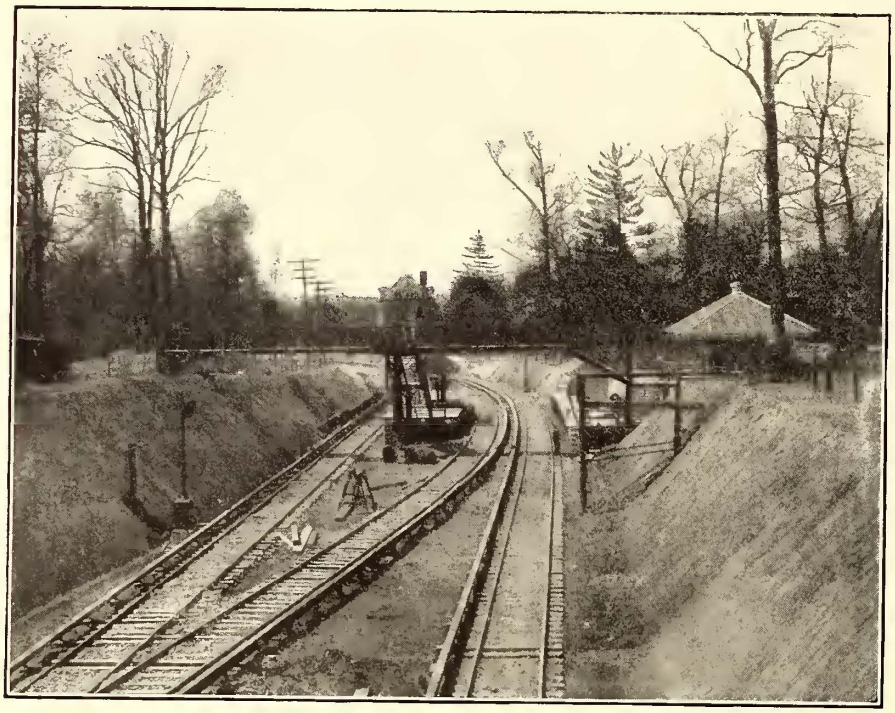
EXTERIOR OF THE ITHAN SUB-STATION

ITHAN SUB-STATION, SHOWING RELATIVE LOCATION OF SWITCHBOARD, ROTARIES AND TRANSFORMERS

STATIONS AND SHELTERS

Including the terminals, there are fourteen regular stations and two flag stops (at Radnor and Ardmore) on the present trackage of the Philadelphia & Western Railroad. All of the station buildings are of wood with corrugated

iron roofs. The platform sheds also have the same type of roof and rest on steel posts built up of Ls. The flag stops are regular platforms 32 ft. long furnished with corrugated metal shelters. In general, the stations and shelters are constructed for easy removal, since some of them may be transferred to other points, according to traffic developments.



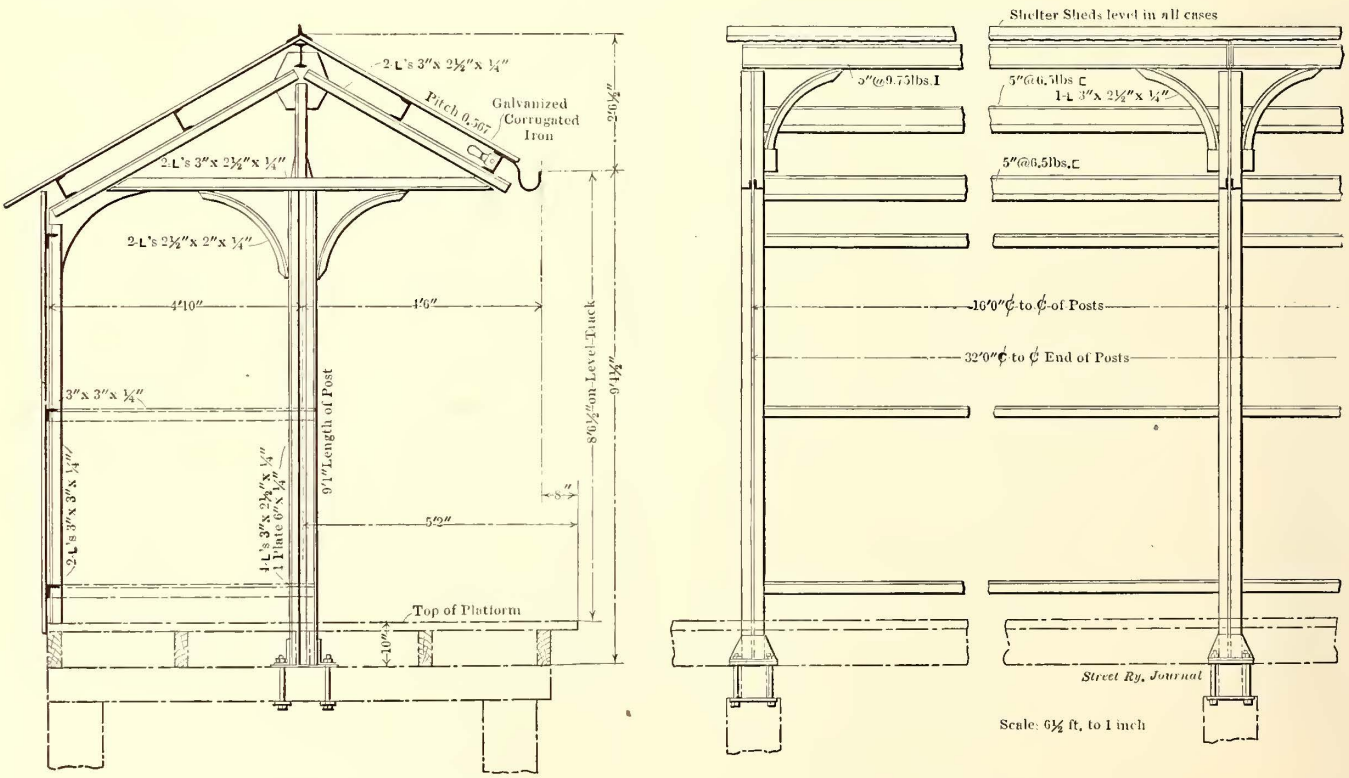
THE EXTRA LOADING TRACK AND PLATFORM AT BRYN MAWR

A notable feature is that all of the platforms, which are of wood on concrete piers, are built flush with the car floor, thus following regular elevated railway practice. This variation from steam road methods is a very sensible one, as there is no excuse for making passengers climb up and down steps except on roads where passengers are picked up anywhere on signal. All stations are furnished with enameled metal signs having 5-in. letters on a green background. There are at least three of these per station, so passengers will have little difficulty in learning their whereabouts.

The West Philadelphia terminal of the company was described in the Street Railway Journal of Feb. 15, 1907, in connection with the Philadelphia Rapid Transit Company's terminal at the same point. At the Strafford terminal the old stone building shown in the view on page 1061 has been converted to a waiting room. Probably the most important station along the line is the one at Bryn Mawr. At this point there has been installed a freight siding and an extra loading track with platform. The platforms are joined by the cross-over illustrated.

THE CAR HOUSE AND SHOP

The car house and shop is located a few hundred feet west of the West Philadelphia terminal. As shown on the final plan, the building will be divided into three sections, two for the cars and one for shop and general purposes.



CONSTRUCTION DETAILS OF STATION AND SHELTER PLATFORMS AND ROOFS

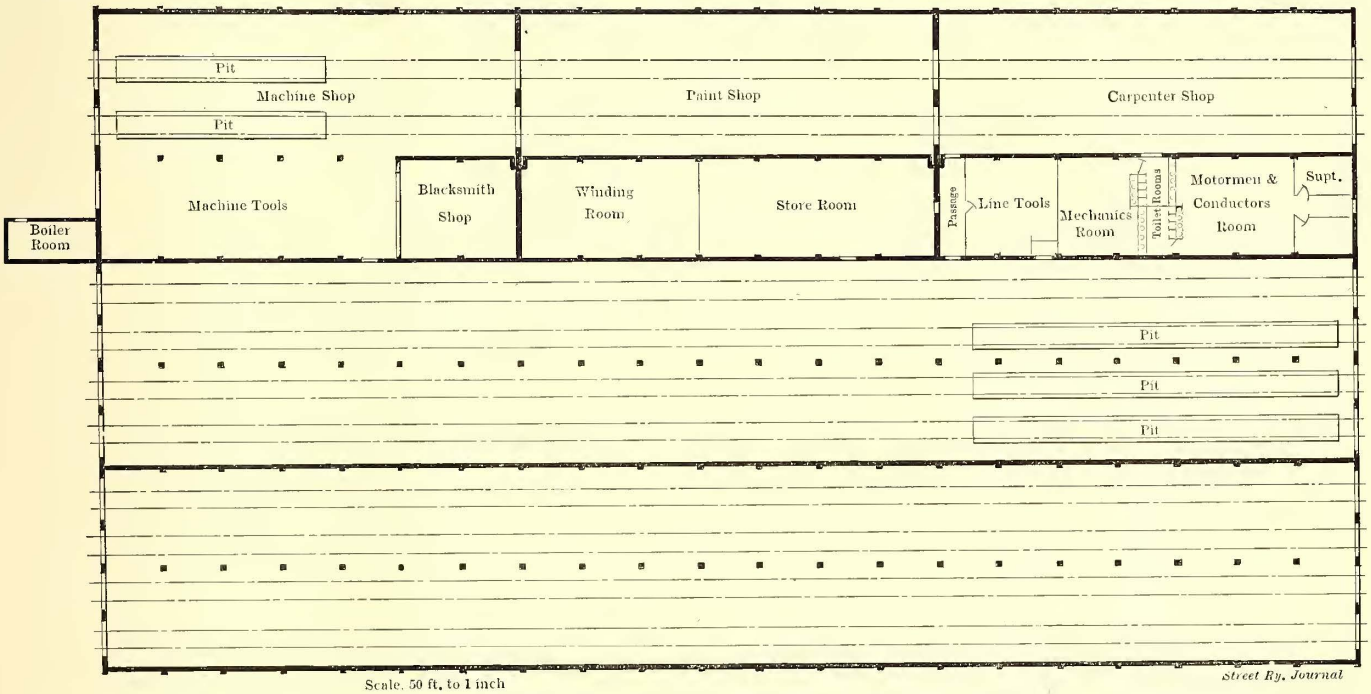
The present building, however, comprises but one car section. It has a frontage of 120 ft. and a maximum length of 330 ft. 9 ins., the car section being now 110 ft. 3 ins. beyond the present shop division to secure storage capacity for thirty-two cars 51 ft. 4 ins. long.

Concrete is used throughout in the construction of the walls, floors and roof. The roof varies in thickness from 5 ins. to 6 ins. It is longitudinally reinforced with ½-in. diameter rods 20 ft. long spaced 5-in. centers and transversely reinforced by ¼-in bars of the same length and spaced 12 ins. centers. The concrete and reinforcement are turned up several inches at the skylights. The latter are 8 ft. wide and are regulated from the floor by chains.

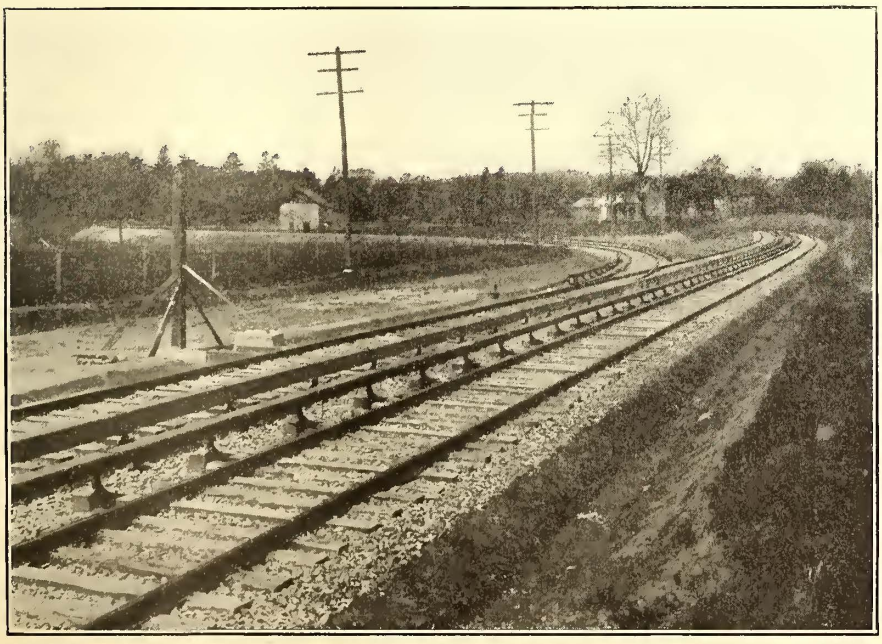
The intermediate roof beams are carried on two sets of 12-in. columns. They are 4 ft. deep throughout, but in the shop or overhauling section are 15 ins. wide, or 3 ins. more than the beams in the office and car sections, to enable them to carry weights as high as 42 tons imposed through the rails of the crane runway. All of the intermediate beams are reinforced at the bottom, four 1½-in. bars being used for the 12-in. and six 1½-in. bars for the 15-in. This reinforcement is not tensional throughout, as a stirrup-effect is secured by turning one of the bars up at the ends or point of greatest unresisted shear. Pairs of beams for each bay are tied by prolonging the rods. As the building probably will be extended at an early date, the roof beams were built to project several inches and end with a plane of weakness so when extensions are made the abutting beams of the new section can be quickly placed by chipping off the concrete at the ends of the installed beams.

The front wall is also reinforced both longitudinally and transversely. For securing framing, 2-in. x 2-in. wooden strips about 8 ins. long were set in the concrete around the doors and the windows.

THE VILLA NOVA STATION, WITH TYPICAL FOOT-BRIDGE



FINAL LAYOUT OF THE PHILADELPHIA & WESTERN RAILROAD COMPANY'S CAR HOUSE AND SHOPS



THE LOADING LOOP AT THE STRAFFORD TERMINAL

The car section contains four tracks, three of which are furnished with pits. The cars enter the building through openings 10 ft. 2 ins. wide, with a head room of 17 ft. 3 ins.

INTERIOR OF THE CAR HOUSE, SHOWING THE CONCRETE ROOF BEAMS, HEATING DUCTS, PITS, ETC.

These openings are closed by swinging wood and glass doors. The tracks are carried clear through the building to the running tracks to avoid dead-ends.

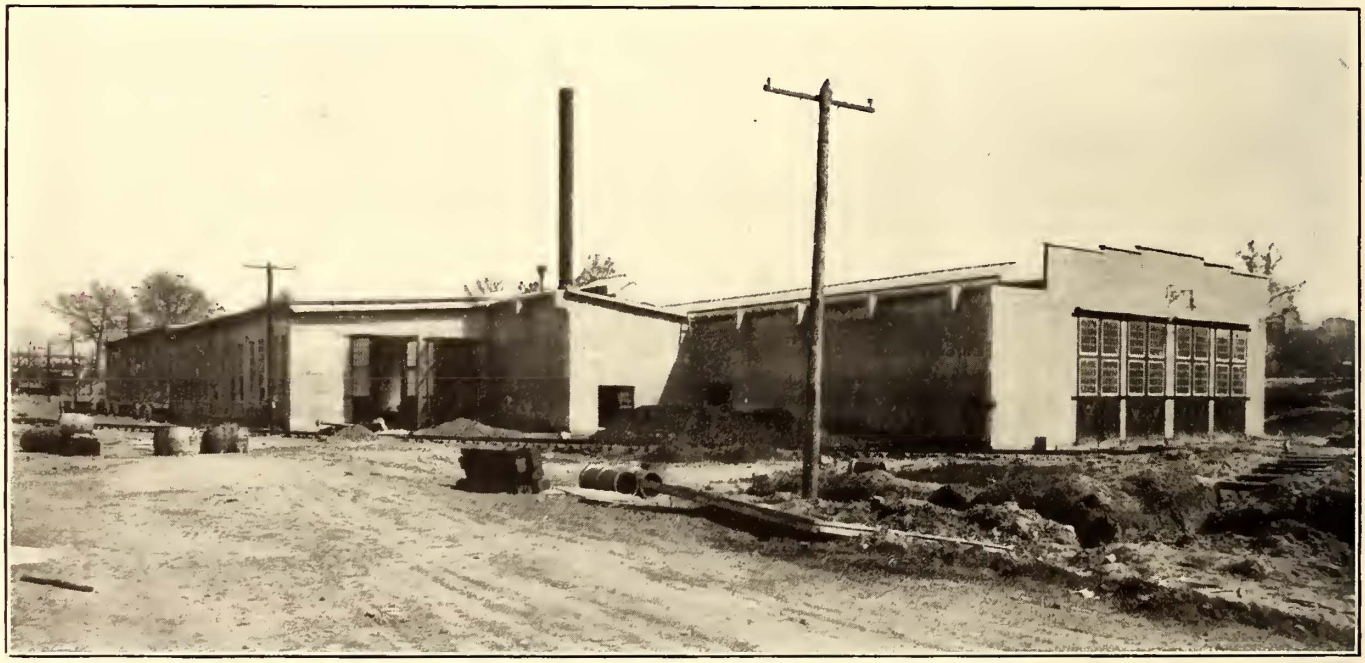
piers which carry the columns between the second and third tracks. The devil strip drains toward the pits on both sides.

Between the car section and shop proper is a group of rooms enclosed by an 8-in. concrete wall with openings controlled by fire doors. These rooms are used respectively for offices, employees' quarters containing toilets and Darby lockers, a tool room, storeroom and winding department. The space beyond this is now a blacksmith and machine shop.

One of the accompanying illustrations gives a good idea of the present appearance of the overhauling section. It will be seen that the machine shop is placed on an elevated section alongside the tracks, while the portion in front is used for blacksmith and miscellaneous work. This section contains one pit and a 20-ton Maris crane. The other track is for carpentry and painting.

The machine tools installed were furnished by the Bement-Niles Works, of the Niles-Bement-Pond Company, and consist of the following: One 24-in. engine lathe, one 18-in. engine lathe, one 16-in. Stockbridge shaper, one Sigourney single-spindle drill, one No. 2 Bridgeport combination wet and dry grinder, and one Washburn twist drill grinder. All of these tools, except the lathe, are driven from one countershaft.

The building is heated from the small steam plant, which contains a Buffalo blower outfit and Erie boilers. The offices and employees' rooms have steam radiators, but the car house and overhauling shop are heated by the indirect system through an



VIEW OF CAR HOUSE TAKEN FROM THE REAR TO SHOW HOW THE BUILDING WILL BE EXTENDED WHERE THE PROJECTING ROOF BEAMS ARE SHOWN

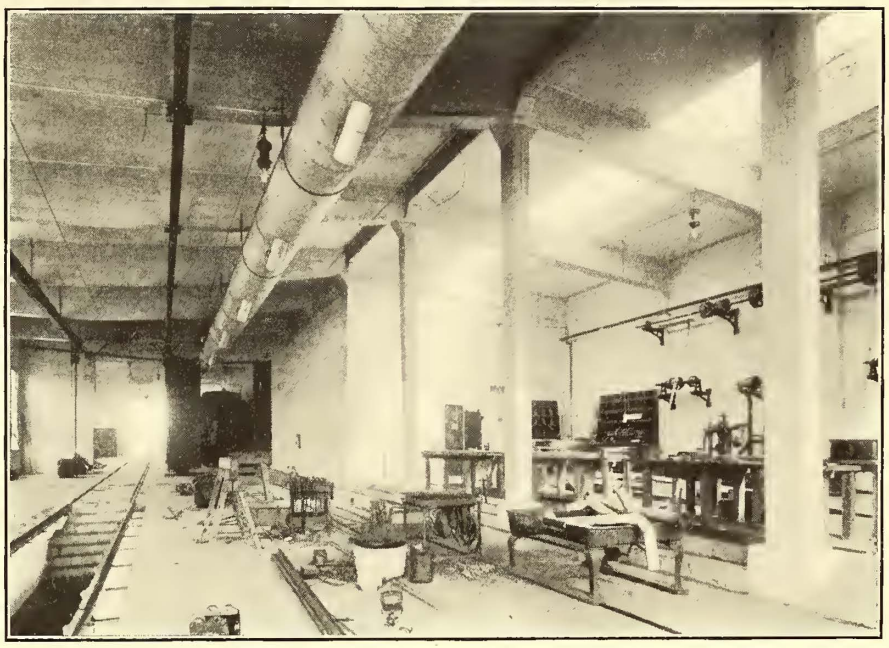
The pits are of rather novel construction, as the rails are carried on the projecting ends of 10-in. concrete-encased I-beams set under the concrete devil strip. The pits are of the open type, the only obstruction being the concrete

overhead duct carried from the roof beams, as shown in the interior illustrations.

The car house and shop are lighted by arc lamps, but incandescent lamps are used elsewhere. The pit lamps are

staggered every 5 ft., and each pit is separately controlled from a switch box set on the columns.

As to the fire protection, the usual precaution has been taken of closing all inside openings by fire doors. There are thirteen fire plugs throughout the building ready to distribute water at the supplied city main pressure of 80 lbs., and a number of Patrol chemical fire extinguishers made by the LaFrance Fire Engine Company, of Elmira, N. Y.



IN THE MACHINE SHOP AND OVERHAULING SECTION. THE STRUCTURE IS HEATED FROM THE DUCT SUSPENDED FROM THE ROOF BEAMS

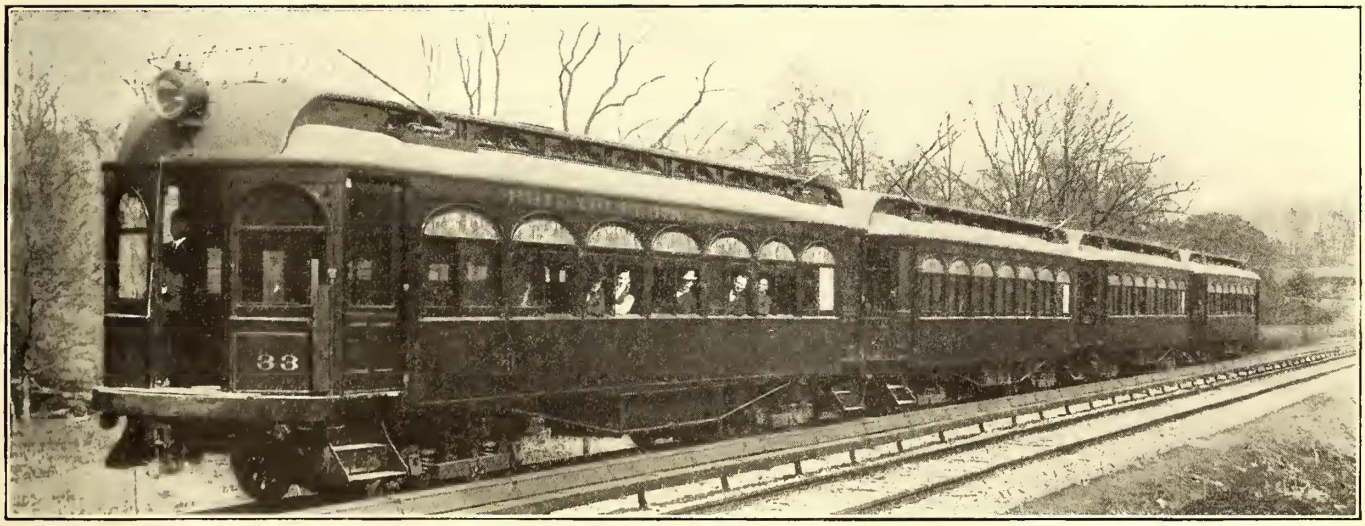
ROLLING STOCK

The company's passenger equipment now numbers twenty-two four-motor baggage cars and one four-motor work car. The general features of the passenger car body and truck construction were described in the STREET RAILWAY JOURNAL of May 4, 1907; but it may be worth while to summarize the most important points and include further details of the equipment.

The cars, which were furnished by the St. Louis Car Company, are 51 ft. 4 ins. long over the bumpers and 40 ft. over the corner posts; width over all, 9 ft. 3 ins. The body is mounted on the car builder's No. 161 truck, each of which carries two G. E. No. 73 75-hp motors adapted for the type M multiple-unit control. Train operation is also facilitated by the use of automatic couplers, spring buffers and Westinghouse automatic air brakes. Despite the fact that the station platforms are flush with the car floors, it will be noted that the usual steps have been provided for emergencies.

The interiors are furnished in mahogany with marquetry inlay design. The seating in both the regular and the smoking compartments is of the reversible type with high back and head roll, all upholstered in green leather. The side windows, which are double, are furnished with the Curtain Supply Company's Forsyth roller-top fixtures attached to Pantasote curtains on the regular spring roller. Round bar metal basket racks are installed throughout.

Although fourteen 16-cp lamps were provided on each side, equivalent to spacing them 3-ft. centers, additional interior illumination is derived from three arc lamps. The heating is supplied by the Consolidated Car Heating Company's apparatus. Each equipment consists of twenty truss plank heaters, No. 203 S, arranged for three points of heat. These are controlled by a double-knife switch. The switch cover bears the monogram of the Philadelphia & Western Railroad. Each vestibule contains one 192 M. S. heater controlled by a quick-break knife switch. These cab heaters are furnished with locks and the motormen keep the keys. This heater is very compact, as appears from the following dimensions: Length, 16⅜ ins.; width, 7 ins., and thickness, 5⅜ in.



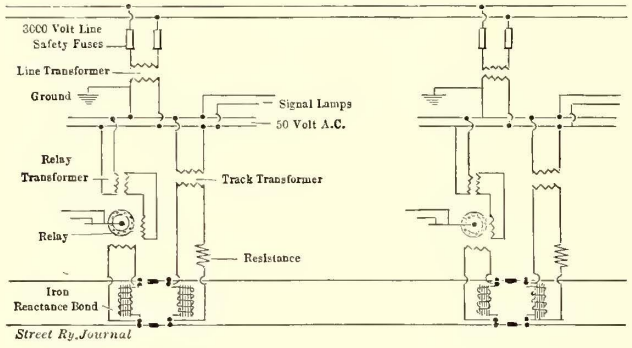
A TRAIN OF CARS IN SERVICE ON THE PHILADELPHIA & WESTERN RAILROAD. THE SLIDING BOWS ARE USED ONLY FOR CAR MOVEMENT IN THE CAR HOUSE

For convenience in moving cars in and about the car house, every car carries two copper sliding bows.

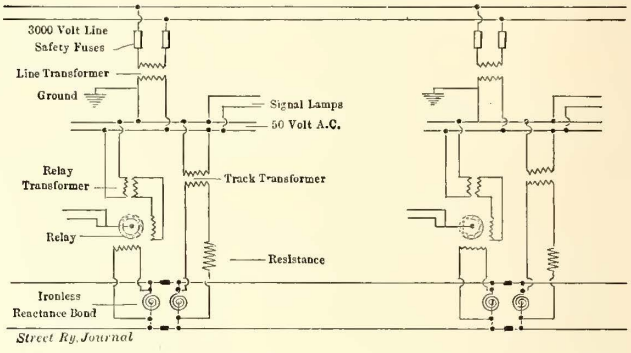
SCHEDULES AND OPERATING FEATURES

The company will operate cars in trains from the union terminal at Sixty-Ninth and Market Streets to Strafford in about twenty-eight minutes. Adding the nineteen minutes required to make the run from the business center on

and secondary relays with a tap for certain low-voltage relays employed, and two windings for feeding track circuits. In the Market Street elevated line of the Philadelphia Rapid Transit Company, the total time will be forty-seven minutes, as against the forty-five minutes on the Pennsylvania Railroad from the Broad Street station. This slight difference will be more than counterbalanced by the greater



TYPICAL A. C. TRACK SIGNAL CIRCUIT, TWO-RAIL RETURN, USING IRON BONDS



TYPICAL A. C. TRACK SIGNAL CIRCUIT, TWO-RAIL RETURN, USING IRONLESS REACTANCE BONDS

number of trains and lower fares offered by the Philadelphia & Western Railroad. As against the approximately half-hour service of the Pennsylvania Railroad the electric line will run cars every fifteen minutes from 5:15 a. m. to 1 a. m., all trains starting on the even quarters of the hour in both directions. The following table shows the great difference in fares in favor of the electric line, even though the Philadelphia & Western figures include the 5-cent fare on the Market Street elevated:

	P. & W.	P. R. R.	P. & W.	P. R. R.
	One Way		Excursion	
To Bryn Mawr	16c.	26c.	29c.	41c.
To Villanova	19c.	30c.	35c.	48c.
To Wayne	25c.	37c.	45c.	58c.
To Strafford	27c.	39c.	47c.	62c.

For ten-trip tickets to Strafford the Pennsylvania Railroad charges $2.61. Ten rides on the Philadelphia & Western and elevated lines, covering the same distance, are to cost $2.

Although a double-track line, the Philadelphia & Western has a complete dispatching system. Cars are dispatched by telephone from the West Philadelphia terminal. The telephones are also used for other company business, for which purpose they are installed in all company buildings. The instruments are sixteen in number, and were furnished by the Stromberg-Carlson Company, of Rochester, N. Y.

SIGNAL SYSTEM

The management of the Philadelphia & Western Railroad early recognized the necessity of an absolute block signal protection on a high-speed line parallel to the perfectly signaled Pennsylvania Railroad main line carrying exclusively human freight in comparatively frail cars. A contract was made, therefore, with the General Railway Signal Company, controlling the two-rail Young system, for the complete signaling of the line. This installation will be completed during the coming month. The system is in many respects identical with the installation made by the same company on the electric zone of the New York Central & Hudson River Railroad (described in the Street Railway Journal of June 9, 1906), although the blocks are necessarily longer, and the design and arrangement of the reactance bonds is dependent upon the length of the road and the necessity of cross bonding between the tracks.

On the New York Central above Mott Haven where the traffic divides into the Hudson and Harlem divisions and the speed is increased, the blocks lengthen from 1600 ft. to 3500 ft., and the necessity for cross bonding requires a change in the arrangement of reactance bonds in blocks longer than 1600 ft. For short sections the scheme in the left-hand diagram shown above admits cross bonding only at the ends of sections. For longer sections the scheme shown in the right-hand diagram has been adopted, as it admits cross bonding between the undivided rails as often as desired, and thereby supplies a most highly conductive return for the propulsion current. As the Philadelphia & Western Railroad blocks are some 1½ miles long, the latter scheme is used, as cross bonding with the former method at such long intervals would not be practicable.

The operation and control of all functions is obtained by 25-cycle, single-phase current drawn directly from the railway's 2300-volt busses. It is transmitted at that voltage

THE SHELTER AT WYNNEWOOD AVENUE

after having passed through a switchboard which controls the two feeder circuits for the signal system, one running in each direction from the power house.

At each signal location the 2300-volt current is stepped-down by a single transformer to the various operating voltages required. This transformer has three secondary windings—one 50 volts for the operation of signal motors, lamps

cuits, one of which is used for each track, when the sections on these tracks end opposite each other. The track windings are furnished with taps to permit adjustment of the current to secure satisfactory operation of the track relays. The adjustment required depends upon the length of the section.

The transformer is located on a stub pole which also supports a grid box containing an adjustable resistance connected in series with the track winding of the transformer to prevent excessive flow of direct current through this winding, with its resulting saturating effect, and also to secure the proper phase relation between the currents and the two windings of the track relay, which is of the polyphase induction-motor type. A track box containing controlling relays and a terminal board, to which all wires are led, is also located on this pole. This localizes all apparatus, thereby making it easy to maintain, and also to locate troubles should they occur.

The reactive bonds used for track circuit work are of the ironless type; these consist of coils of strip copper with a sufficient number of turns insulated from each other to give the requisite reactance, and of sufficient cross section to carry the propulsion current without undue heating. These bonds are oil-cooled, and are placed in an iron case located on extended ties at the end of each section.

The signals are of the one-arm, home, automatic block type, and are overlapped, the average length of overlap being about 3200 ft. East of Beechwood Park, where traffic will be very dense, short blocks with a full block overlap are employed, both the block and overlap averaging 3200 ft. West of the Park the blocks average about 8000 ft. in length.

The average length of track sections is 3500 ft.; the longest is 8800 ft. The ability to operate long track sections with alternating current is, in fact, one of the important advantages of this type of control.

This company is the first high-speed interurban railway, in contradistinction to an electrified steam railroad, to provide such an elaborate and scientific system of block signals. Without question, it has set an example which must be followed on future roads of similar class where high speed must be maintained with absolute safety, and where one rear-end collision might well equal in cost of damages a large part of the road's capitalization.

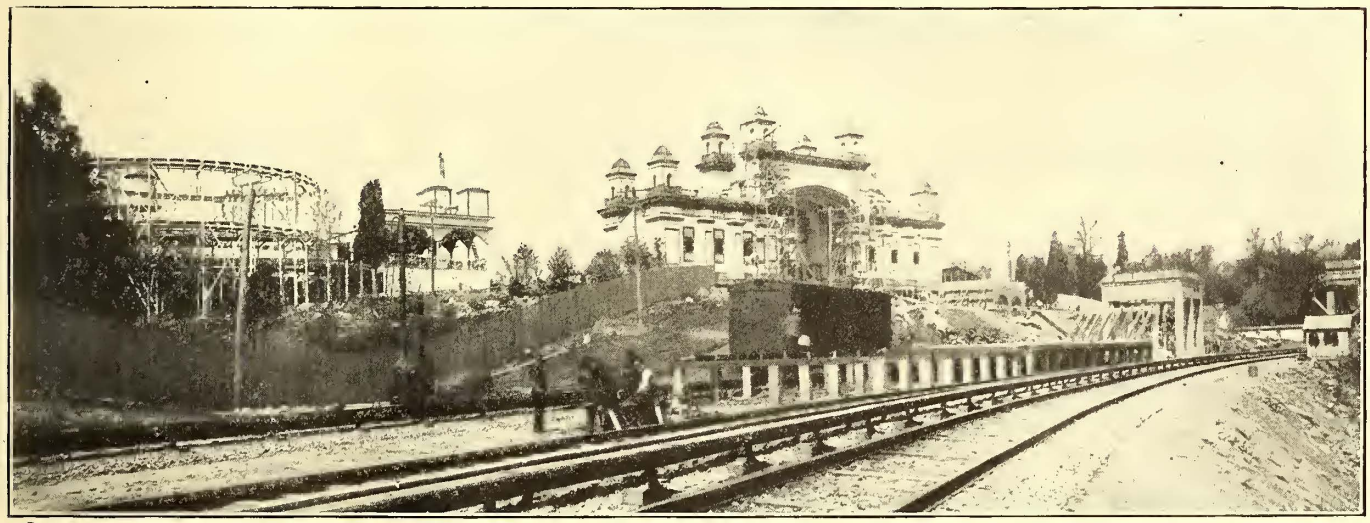
EMPLOYEES

Recognizing that the reputation of a railway depends largely upon the character of its trainmen, the Philadelphia & Western not only is exercising great care in selecting such employees, but also is offering liberal wages for this class of work. In all cases, the company requires experienced motormen, but conductors and brakemen need have no previous training in railway work. Motormen and conductors will receive 25 cents an hour, and brakemen 20 cents an hour. Ten hours will constitute a day's work. The regular crews will work from early in the morning to 3 and 4 o'clock, when they will be relieved by other crews continuing service until 1 and 2 o'clock the following morning.

BEECHWOOD PARK

The Philadelphia & Western Railroad anticipates heavy amusement traffic between the West Philadelphia terminal and Beechwood Park, which enters on its first season. This resort is directly opposite the power station of the railroad company and is within a through-run, 5-cent zone. The passengers visiting the park will be accommodated by an extra track and the large platforms shown under construction, and will reach the park entrance safely over a bridge carried on concrete towers. The railroad company also has erected on the park grounds a 600-kw sub-station for lighting and power.

The park is divided in two sections, one of which will be enclosed and devoted wholly to amusements of the highest order. The other will be used for picnic parties, and ample tables and seating facilities will be provided for public and Sunday school parties that are already engaging dates for outings during the summer. The amusement section, which is enclosed, consists of about 10 acres properly laid out and devoted exclusively to the best attractions and high-class music, while an additional 10 acres of prettily shaded woodland comprise the picnic grove. The park attractions will be placed on the sides of a hollow square and be accessible by a board walk 40 ft. wide. The capacity of the grounds is estimated at 15,000 to 20,000. It is hoped to make this a great family resort, inasmuch as the policy announced by the management prohibits the sale of liquors, and special attention will be given to women and children.



A VIEW OF BEECHWOOD PARK, SHOWING SOME OF THE PRINCIPAL ATTRACTIONS AND THE SPECIAL PASSENGER PLATFORM UNDER CONSTRUCTION

GENERAL

The Philadelphia & Western Railroad Company is owned by a syndicate headed by Mackay & Company and William C. Sheldon & Company, both banking firms of New York. The officers of the company are the following: President, George R. Sheldon; vice-president, Thomas Newhall; secretary and treasurer, Davies Murdoch; chief engineer, W. R. Molinard, and general superintendent, W. H. Simms.

SOME COMMON FIRE HAZARDS OF CAR HOUSES

BY W. J. CANADA
Electrical Inspector of Ohio Inspection Bureau

The larger electric railway companies are now paying considerable attention to the installation of fire preventive measures in their car houses and repair shops as well as to fire-fighting facilities,—a natural step in view of the recent disastrous fires in this class of buildings. As a result the car house itself is becoming more nearly fireproof in construction and some of the fire hazards have been lessened, although there are still many comparatively inexpensive protective features which the experience of the next few years will demonstrate to be necessary. It is among the smaller systems, however, that protection has been most neglected, and with whom even the most ordinary precautions are often omitted. Apparently many of them are in blissful ignorance of what constitutes a fire hazard and what it really means to the continuity of their service to have the safety and availability of their rolling stock assured.

A number of serious potential causes of fire inception and spread are prevalent in the buildings of these companies. Some of these are almost universal, and most of them are very general. When one considers that those responsible for their existence are trained engineers, the surprise is increased that more forethought has not been employed in their prevention.

Every one recognizes the danger of a live trolley wire in a burning car house or in one not actively used except for storage. But in very few of the storage houses are the tracks inclined so that with dead trolley, cars may be cleared from burning buildings by simply releasing the brakes. In a majority of cases, too, the switches within the car house are solid-throw instead of the spring type, and so will occasion additional delay to the quick removal of cars.

Most car houses and shops have very unsafe trolley wire protection. Comparatively few have the running trough for wheels which leave the wire, and many employ so few hangers that a break near one will allow wire to fall to the track or to grounded parts of cars. Both these defects are frequently the causes of incipient fires. Within the past year a fire has been started by a trolley wheel leaving the wire, and the pole grounding the trolley wire against a sprinkler pipe. This might also put the sprinkler system out of commission at the time of its greatest necessity. Two fires have occurred within six months, caused by the trolley wire falling and making contact with grounded parts of cars in car houses. In one case, the car body was almost destroyed. Broken or missing bond connections are another prolific source of arcs which become especially hazardous over pits or in painting and cleaning sheds. Wooden pits which have communicating tunnels or are partially used for storage are contributing causes. Electric wiring for light and power is often of the frailest construction and productive of frequent local troubles. The location of rheostats is generally apparent by scorched woodwork. Wires are so overloaded that the insulation soon becomes useless, and these wires are frequently so placed that they are against adjacent combustibles. Out of twelve car houses in one district, seven fires from these causes occurred within a year. Open forges, stoves, storage of oils in repair shops, drying ovens of asbestos-lined wood, and the like, add to the list of usual hazards about these buildings.

In many cases it has been only through the strenuous efforts of the insurance companies that some protective apparatus, such as sand buckets, water barrels, hose, standpipe, tanks, and occasionally a sprinkler system, has been installed. With these in place there is often a perpetual war between insurance companies and operating force over their proper maintenance. It is a strange fact that "fooling the inspector" is regarded more highly by some foremen than safeguarding the building. Waste cans have been frequently discovered open and full of oily waste, while an accumulation of greasy rags of the past week is found on benches, shelving, or in pits. Sand buckets will be used to supply track sanders. Barrels become dry and leaky. Standpipes are disconnected and left in that condition. The sprinkler system leaks and is cut off. An especially aggravated case was recently observed where a main supply pipe was utilized as a ground return for an armature testing and heating stand, the track return not being easily accessible. A smaller air supply pipe, paralleling this water pipe, had only a few months before broken down on account of electrolytic corrosion, so that this case could hardly be ascribed to ignorance alone.

The attitude of the management, which must finally determine the degree of safeguarding to be maintained, is often a complicated one. It vacillates between a desire to secure a vaguely understood condition of safety, and an uncertain idea, frequently fostered by a foreman's report, that the insurance interests are more rigorous in their demands than the occasion requires. That insurance rates are a result of fire loss experience and are reduced by better protective and preventive construction is a fact which does not properly appeal to the managements. Careful inspection by a competent employee will keep the fire hazard within the lowest possible limits. This should be supplemented by periodic inspection from a disinterested source. Construction necessary to assure a high degree of safety to shops and rolling stock should be installed. All this will result from a careful study of the question by the management, but this study cannot be made from the office. A personal inspection into every detail which enters into the question will bring most managers to a different viewpoint, and their attention to the matter will be reflected in the maintenance of safer conditions by the operating force.

The so-called Public Utilities bill, signed by Governor Hughes of New York last week, puts under direct State control every public service corporation in the State of New York, with the exception of the telephone and the telegraph. Under the new law four of the most important State commissions will pass out of existence. In their place will be two boards of five members each, all of whom are to be appointed by the Governor, and these boards will have complete control of the regulations governing the transportation and lighting facilities of the State. One of the commissions will have jurisdiction in the four counties composing New York City, and the other will have under its direction all the other counties of the State. These two bodies will have complete and free-handed control, and will be held to enforce the regulations provided for in the measure. The State Railroad Commissioners legislated out of office by the new law on July 1 are Frank M. Baker, of Owego; Joseph M. Dickey, of Newburg; George W. Aldridge, of Rochester, and Henry N. Rockwell, of Yonkers. George W. Dunn, of Binghamton, resigned a few weeks ago. The State Commissioners of Gas and Electricity, who also go out, are Lucian L. Sheddon, of Plattsburg; John C. Davies, of Camden, and Frederic E. Gunnison, of Brooklyn. The State Inspector of Gas Meters also is legislated out of office.

CAR WIRING AND PIPING PRACTICE OF THE METROPOLITAN WEST SIDE ELEVATED RAILROAD, CHICAGO

Too frequently the wiring of cars and the disposition of the apparatus under the car receives very little attention, and for this reason the practice of the Metropolitan West Side Elevated Railroad, Chicago, in the equipment of fifty cars recently put in service, is of especial interest. The company has given particular attention to this phase of car construction for several years, and frequent orders for cars have enabled the officials to work out methods which are believed to be superior to those usually followed. The problems connected with the wiring and piping of the cars have been worked out by E. T. Munger, master mechanic of the system, under the supervision of Benj. H. Glover, superintendent of motive power.

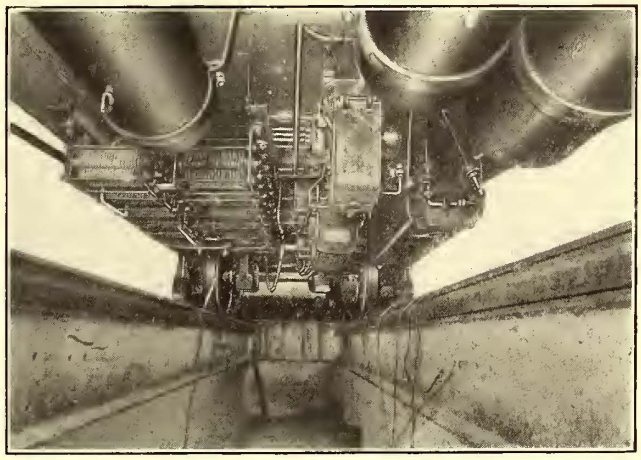
In general design and dimensions the new cars are similar to those described in the Street Railway Journal, April 22, 1905. However, the design of the bottom framings of the two types of cars are radically different. The bottom framing of the former car consisted of built-up side girders of the fish-belly type with cross channel bars at the ends and intermediate bridging of I-beams. The wood floors rested directly on this framing. The bottom framing of the new cars consists of two parts, a steel sub-framing of I-beams covered over entirely with a 3-16-in. steel floor and a wood framing over this consisting of wood side sills and stringers carrying a wood floor. Between the wood floor and the steel plates there is a space of about 1¾ ins.

The fish-belly type of side girder was abandoned partly because of its depth, which prevented proper ventilation of the apparatus under the car. With it, to obtain sufficeint cooling of the compressed air, radiating coils were hung on the outer side of the girders. In the new car the decreased depth of the side I-beams permitted these radiating coils to be hung under the car, and their location is well shown in one of the accompanying reproductions from a photograph.

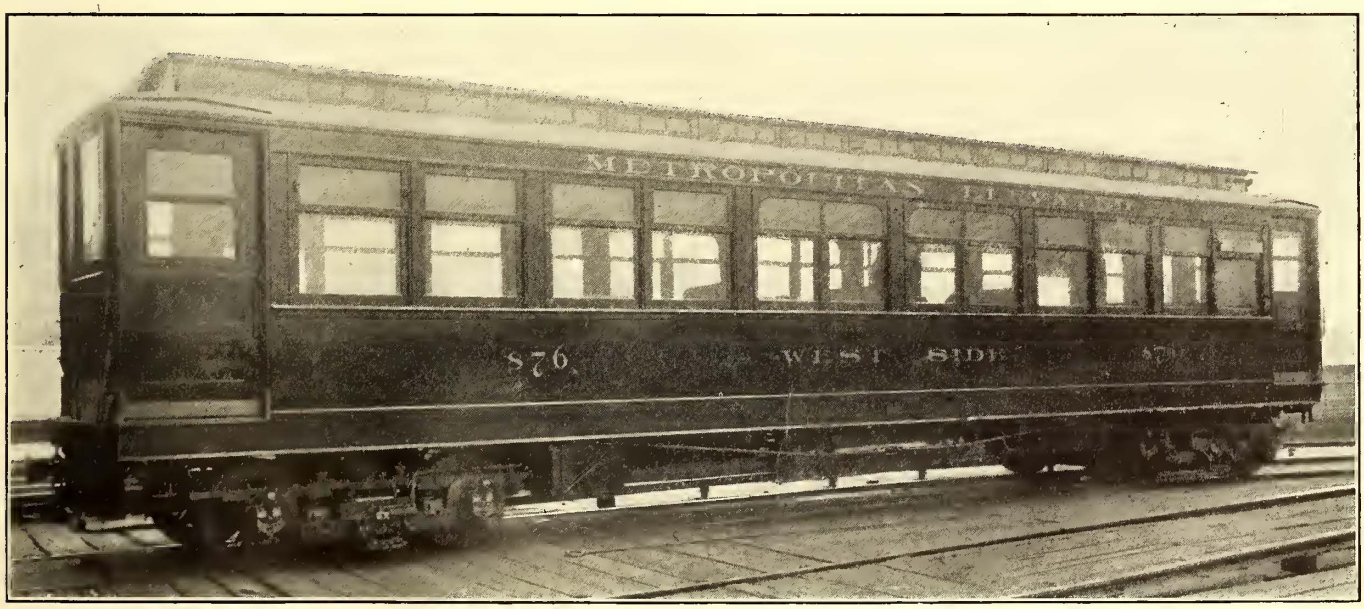
An increased cooling effect on the air in the tanks was obtained by hanging the tanks below the side I-beams. In fact they were placed so low that it was not advisable to put the customary drain cocks underneath, so to permit drainage the tanks were hung with one end about 3 ins. lower than the other and a drain pipe provided with a globe valve was fitted in the lower end.

All of the air apparatus was located at one end of the car so as to eliminate as much piping as possible. By placing the apparatus of the Westinghouse electro-pneumatic control system at the No. 1 end of the car, the connections between the motors and the reverser and switch group were kept short and in addition the weight of these heavy parts was thrown on the motor truck.

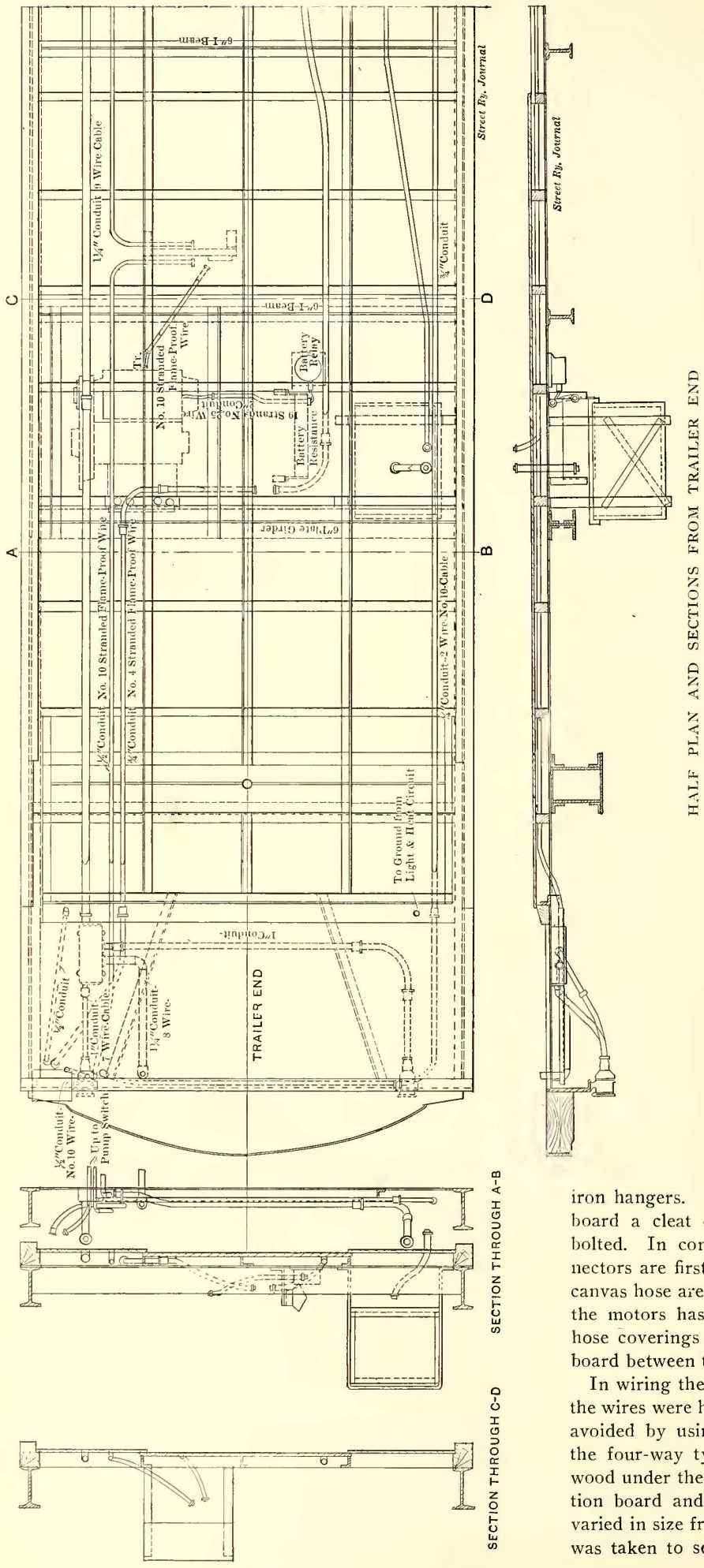
All of the wiring of the controller under the car with the exception of two or three cables about 1 ft. long is in loricated conduit. Probably the most unusual feature in connection with the wiring is the fact that all the conduits except the short ones are run in the space over the steel plates and underneath the wood floor. The conduits were built in this space during the construction of the car and are held in position in such a manner that vibration is impossible. Those terminating in the jumper receptacles on the end of the car and those leading to the master controller drop down through the steel plate just behind the end sills, while those leading to the pump and controller parts are carried through the plate immediately over the apparatus to which they connect. In the accompanying engraving the conduits shown by full lines are those above the steel



VIEW FROM TRAIL END, SHOWING FREEDOM FROM CONDUITS AND WIRES OF UNDER SIDE OF CAR FLOOR



CAR OF THE METROPOLITAN WEST SIDE ELEVATED RAILWAY READY FOR SERVICE



HALF PLAN AND SECTIONS FROM TRAILER END

SECTION THROUGH A-B

SECTION THROUGH C-D

floor. Those underneath are shown by broken lines. One advantage gained by carrying the conduits in this space above the steel floor was that no brake apparatus and other parts were to be avoided; in addition, they could be run straight with increased economy both in labor of installation and in material. An idea of the relative location of the switch group reverser, grids and main switch may be obtained from one of the illustrations. By assembling these, all connecting cables were materially shortened. The loricated conduits between the controller apparatus are held in by wrought-iron straps bolted to the steel floor above.

Although assembled compactly, the controller apparatus is so placed that any part of it may be easily reached for inspection or repair. The limit switches are mounted near the ends of the reverser, where they are readily accessible. All of the control apparatus, and in fact all the apparatus under the car, is suspended from the steel floor by wrought-iron supports. The rheostats are carried by angle-iron frames, and the supporting bolts for each grid are provided with lock nuts; provision is made also for the insertion of a cotter key underneath the nuts.

One of the illustrations shows the motor connection board used by the company on all of its cars. Instead of carrying the motor leads up against the car floor to a point near the bolster, as is usually done, the leads are clamped so that they rest on the top of No. 2 motor and drop down under the truck end frame and up to the connection board shown. This method of bringing out the motor leads, which has been used by the company for two years, avoids making short bends in the cables and also permits the two way-connectors to be placed at a point where they can be gotten at without difficulty. The connection board referred to consists of a 2-in. oak block about 14 ins. square suspended from the steel flooring above by wrought-iron hangers. At both the forward and rear edges of the board a cleat containing U slots for the seven wires is bolted. In connecting up the motors the two-way connectors are first clamped together and then short pieces of canvas hose are drawn over them. When that cleat nearest the motors has been bolted up the connectors with their hose coverings are held up rigidly against the connection board between the two cleats.

In wiring the cars, no cables were soldered except where the wires were held rigidly. In several places soldering was avoided by using Dossert connectors, both of the T and the four-way type. Special effort was made to eliminate wood under the car, none being used except for the connection board and in the battery boxes. The conduits used varied in size from 1¼ ins. to ½ in. In bending them care was taken to see that the bends were not too short or of

such a character as to make it difficult to draw the cables in them. All of the cables drawn in the conduits, with the exception of the control circuit cables, are of G. E. standard rubber-covered flame-proof wire.

In locating the apparatus under the car particular attention was given to distributing the weight with reference to the center of the car, and as placed the foot-pounds on each side of the car balance, or in other words, the sum of the weight of each piece of apparatus on one side of the car multiplied by its distance from the center line of the car in feet balances a similar sum of apparatus weight and distance on the other side of the car.

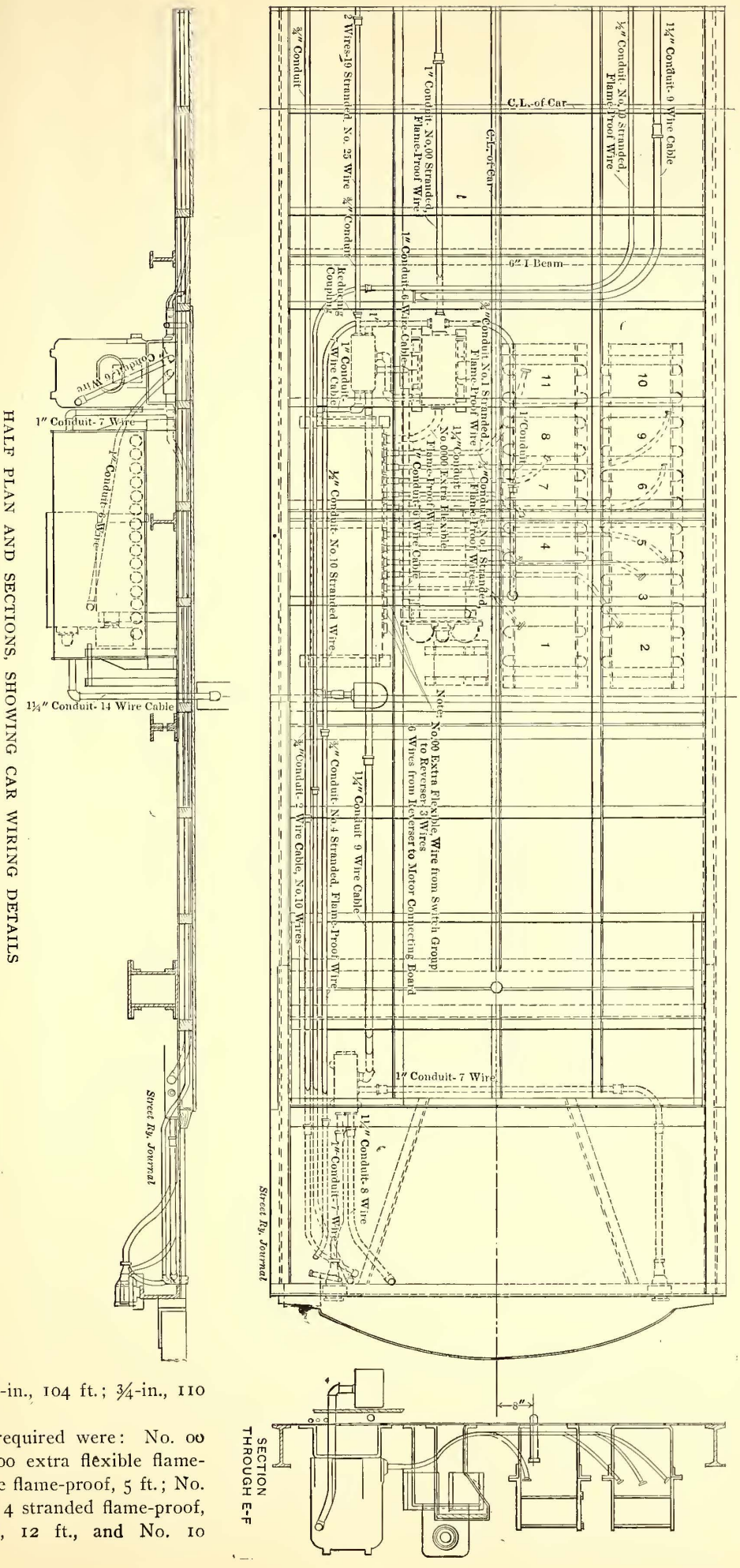
All the positions for the apparatus and conduits and the details as to hangings and supports were worked out before the construction of the car. This enabled the holes and openings in the steel work to be made during construction, and as a consequence the installation of the apparatus together with the piping and wiring was very much facilitated and cheapened.

The careful manner in which everything was worked out previous to the installation of the apparatus had a very decided effect on both the cost of the material required to wire the cars and of the labor necessary to install the apparatus and wiring. The average cost on fifty cars was: Material, per car, $85.14; labor, wireman and helpers, $46.77; labor, bending, placing and hanging conduit, $26.75, making a total per car of $158.66.

The costs given for material include all wires of the car body and trucks except those in the light and heat circuits above the car floor and the small cables of the battery control circuits which were purchased as part of the control apparatus. It includes all of the conduits, hangers for apparatus and conduits, all conduit fittings and wire connectors.

The amount and sizes of conduits used were: 1¼-in., 60 ft.; 1-in., 104 ft.; ¾-in., 110 ft., and ½-in., 20 ft.

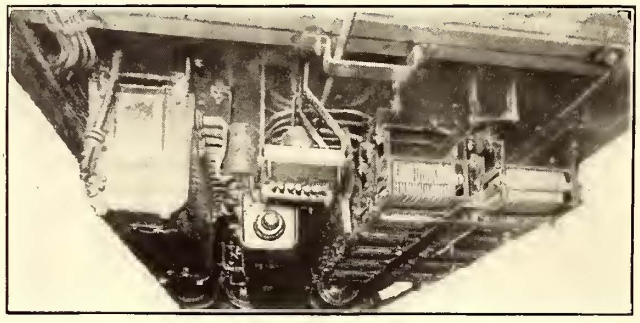
The amount and sizes of wire required were: No. 00 stranded flame-proof, 69 ft.; No. 00 extra flexible flame-proof, 17 ft.; No. 0000 extra flexible flame-proof, 5 ft.; No. 1 stranded flame-proof, 96 ft.; No. 4 stranded flame-proof, 38 ft.; No. 8 stranded flame-proof, 12 ft., and No. 10 stranded flame-proof, 15 ft..



HALF PLAN AND SECTIONS, SHOWING CAR WIRING DETAILS

SECTION THROUGH E-F

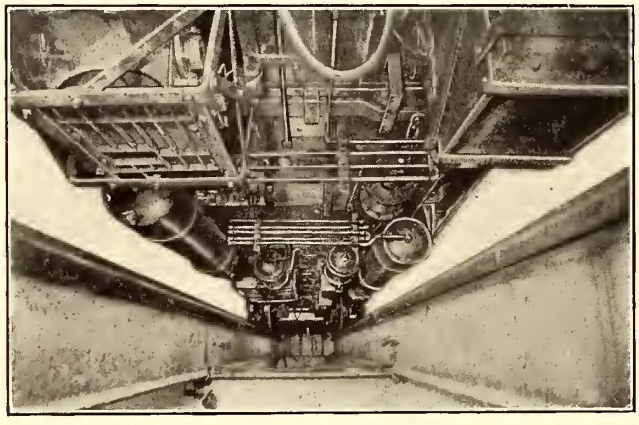
The No. 00 stranded flame-proof wire was used between the trolley shoes and the junction near the line switch where the trolleys from each end of the car are brought together, except where flexibility required the use of the No. 00 extra



VIEW FROM MOTOR END OF CAR, SHOWING THE RELATIVE LOCATION OF CONTROL APPARATUS AND CONNECTION BOARD

flexible flame-proof. The No. 0000 wire was used between the line switch and the junction referred to and between the line switch and the switch group.

The resistance leads are made of No. 1 stranded flame-



TRAIL END OF CAR, SHOWING AIR-BRAKE APPARATUS

proof and the trolley connection of the light and heat circuits and to the light and heat terminals on the ends of the cars are No. 4 stranded flame-proof wire.

ELECTRIC RAILWAY STATISTICS OF CANADA SHOW HEALTHY GROWTH OF THE BUSINESS

According to the annual report of the Department of Railways and Canals of Canada, there were in operation at the close of the fiscal year ended June 30, 1906, 814 miles of electric railway, 195 miles being double-tracked. The paid-up capital amounted to $63,857,070. The gross earnings aggregated $10,966,872, an increase of $1,609,747, and the working expenses $6,675,038, an increase of $756,844, leaving the net earnings $4,291,834, an increase of $852,903. The number of passengers carried was 237,655,074, an increase of 34,187,757, and the freight carried amounted to 506,024 tons, a decrease of 4326 tons. The car mileage was 56,618,836, an increase of 4,659,735 miles. The accident returns show a total of 47 persons killed during the year, and 1653 persons injured. Power was supplied in 15 cases by water, and in 41 cases by steam. Ontario has 441 miles, Quebec, 198; New Brunswick, 16; Nova Scotia, 54; Manitoba, 32, and British Columbia, 72 miles. Returns were received from 47 companies.

REPORT ON THE CAMBRIDGE SUBWAY STATIONS

William Barclay Parsons, of New York, consulting engineer for the city of Cambridge, Mass., in connection with the Boston-Cambridge subway, has submitted an exhaustive report to Mayor Wardwell upon the question of station locations. A rather full abstract of the report is given herewith:

The total length of subway from Park Street to Harvard Square is 3.2 miles, of which 2.3 miles are in Cambridge west of the Charles River, following Main Street and Massachusetts Avenue. The arrangement of stations suggested by the Boston Elevated Railway Company, no formal plan having been filed, calls for two in Cambridge, one at the terminus at Harvard Square and one at Central Square, free transfers to and from the surface lines to be given at both points.

At Harvard Square the surface tracks coming from the west are to be depressed beneath the surface, so as to give on the same level, as near as possible, a convenient transfer between the western trolley cars and the subway trains, while at Central Square the company would provide a transfer station so that passengers can go from one conveyance to the other under cover. The following items are important as bearing upon the problem:

(A) The character of the various districts regarding their population, occupations and traffic values, with possibilities of development and the probable effect upon them of subway station location.

(B) Actual information as to the origin and destination of passenger traffic as it exists at present in Cambridge.

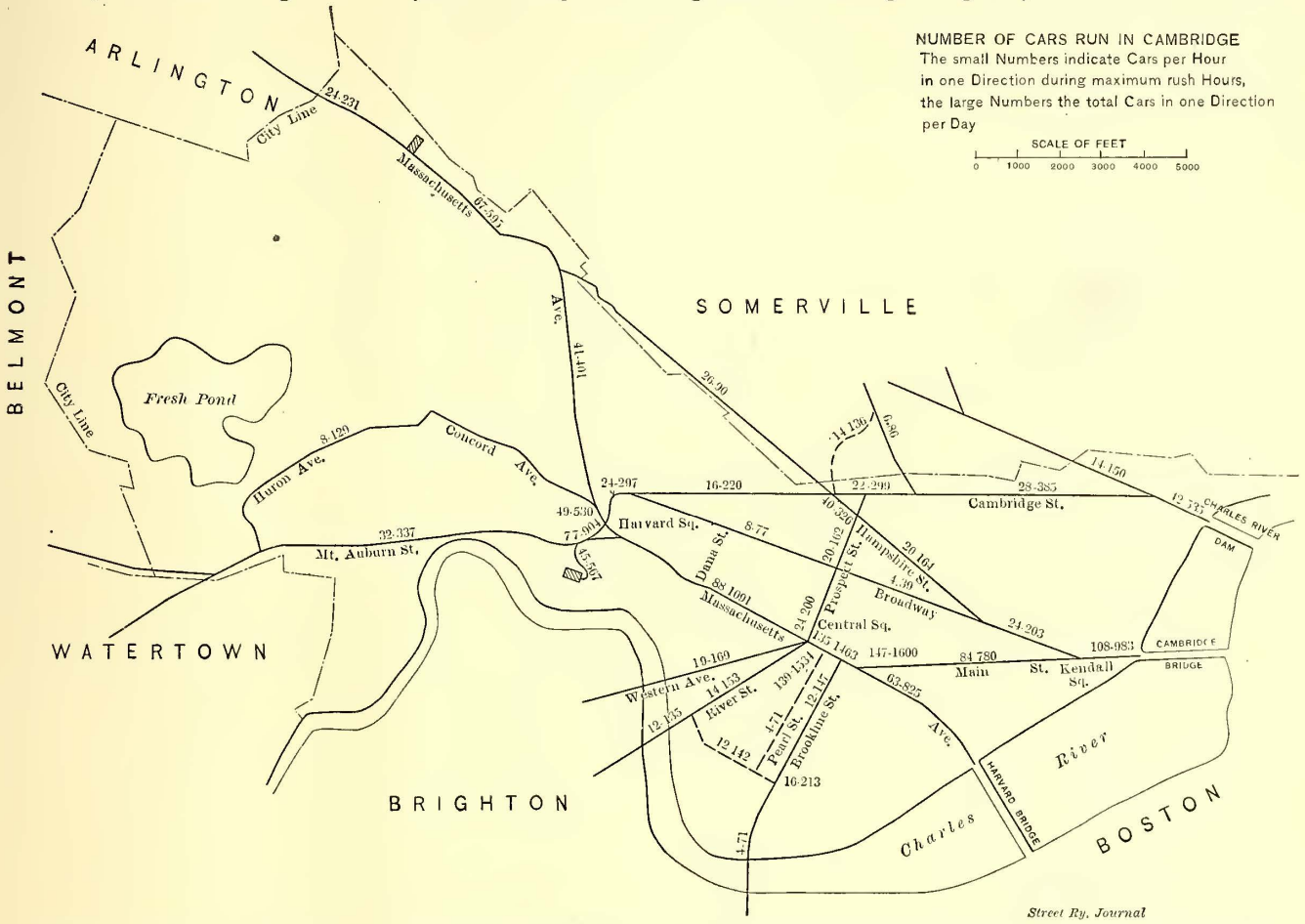
Within the limits traversed by the proposed subway, Cambridge may be considered as divided into four districts, the university on the west, the commercial near Central Square in the center, with a residential area between them, and a district of manufacturing industries and tenements to the east. The Harvard Square district being largely dependent on the university, will grow in population directly as Harvard grows. The commercial area next to Central Square will probably extend as a business district, and the actual increase in population may consequently be small, as is true of business districts in other cities, in some of which indeed the population in the business districts is actually decreasing.

Growth in population and growth in traffic are thus seen to be not necessarily related. Further increase in workmen population does not bring comparative increase in car travel. Such people, being of moderate means, endeavor to live near their work, so as to economize on car fares. On the other hand, a strictly residential district creates car travel that is above the average of car travel per population, as it furnishes travel not only to and from business morning and evening, but shopping and school travel during the day and to amusements during the evening. These basal principles must be kept in mind in discussing facilities to be furnished through stations. Given the facilities, a district well located and susceptible of dense growth, either in private houses or a good class of apartments, is certain to respond in traffic returns, and special allowance must be made for such demands.

In the lower district of Cambridge, called the "Port," it is probably certain that there will be more factories and tenements, a condition not conducive to rapid increase in car traffic. That section of Cambridge immediately tributary to the subway, where there may be expected a great increase in what is known as "residential" population, is in

the district in the neighborhood of Dana Street. In order to analyze the movement of passenger travel, and particularly the travel to be handled by the proposed subway, the origin of the present street car traffic must be determined. The information available consisted of passenger records in gross and some special counts made by the Boston Elevated and the City Engineer of Cambridge, but none of sufficient detail to answer the purposes of this inquiry. From the company was ascertained the number of cars run on the various routes in Cambridge, including the maximum number of cars per hour during the period of greatest traffic in one direction, and the total number of cars run in one direction during twenty-four hours.

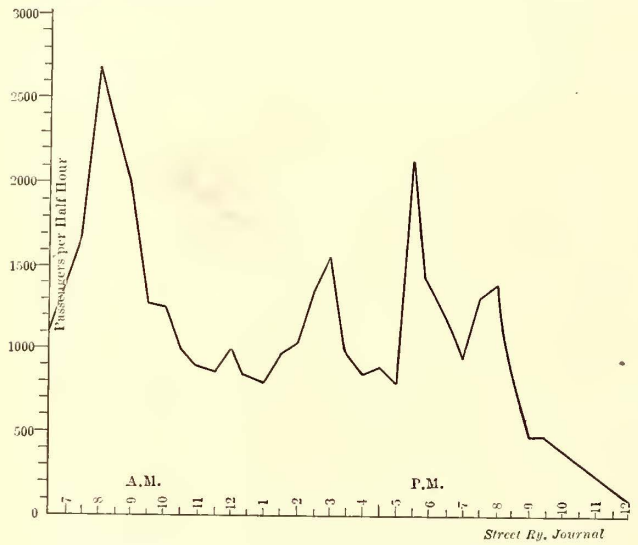
To determine the distribution of car travel in Cambridge in detail, Mr. Parsons organized a system of inspection, whereby the passengers boarding and alighting from the cars at all points on both Main Street and Massachusetts Avenue between Harvard Square and the Charles River were counted, and there were also counted the passengers arriving at Central and Harvard Squares and other transfer points from other parts of the city of Cambridge or outlying districts, or who either remained in the cars and went toward Boston or transferred to other cars in the same direction. This count of passengers extended from 6 a. m. to 9 p. m., and covered 95 per cent of the total travel. As a matter of convenience, passengers were counted on and off east (Boston) bound cars only, it being known that the traffic in the reverse direction is substantially equal in amount. The counts were made on four different days, on which complete returns were secured for two whole days. Individual observations were also made on the traffic lines over a period of about two weeks, under varying weather conditions. In taking these figures, not only was the number of passengers secured, but they were taken in point of time and according to car routes, so that the distribution of travel can be computed both by time and direction. A table was prepared showing the traffic by streets, and this gave the number of passengers getting on and off east-bound cars at each stop on or tributary to the proposed subway route. On April 22 at Harvard Square 9740 passengers were counted in the cars and 5075 got on at this point, making a total of 14,215. The passengers on the cars at Harvard Bridge were 21,935, and at the West Boston Bridge 17,588, or a total of 39,525. The figures for April 24 paralleled these quite closely. At the various street stops the inbound traffic represented by passengers boarding eastward moving cars greatly exceeded the number of passengers alighting. Detailed figures for each street were given in the report. The figures gave the number of passengers on the days in question, but an unusually constant set of travel conditions was noted under wide changes in weather, with local variations, increases and decreases, easily explainable by well-known traffic laws. While on the one hand the figures included many people who were going to parts of Boston distinctly removed from Park Street and its vicinity, on the other hand they did not include the increase in traffic that a fast service will incidentally stimulate. The figures represent proportions in which the traffic, whatever is its amount, is divided among the various localities.



MAP OF DISTRICT AFFECTED BY THE BOSTON-CAMBRIDGE SUBWAY, EACH LINE SHOWING CARS PER RUSH HOUR AND PER DIEM

the day, with increase in the morning of passengers going to Boston on business, with a maximum peak at 8:30 a. m.; with the Boston shopping traffic in the afternoon and amusement load in the evening. The travel from Dana Street area is heavier on Mondays, due largely to the increase in the shopping trade, and is more affected by inclement weather than any other area in Cambridge. In the neighborhood of the Port, the manufacturing district, one in the morning towards Boston, with the peak of the load at 7 a. m., being working people living in Cambridge and employed in Boston, and the other in the afternoon, with the peak of this load at 5 p. m., indicating the movement of operatives living in Boston but working in Cambridge. The travel to this area, conversely to the Dana Street travel, is increased by inclement weather, as the wage-earners who ordinarily walk are driven to the cars.

The traffic that will be tributary to the subway is partly transfer and partly local. The former arrives at Harvard



DISTRIBUTION OF TOTAL TRAVEL BY TIME FROM CAMBRIDGE TO BOSTON

Square by the Arlington, Belmont and Watertown cars, and at Central Square by River Street, Western Avenue and Prospect Street cars, and at Kendall Square by Broadway and Hampshire Street cars.

Two stations do not, therefore, take cognizance of all the surface lines of Cambridgs. The Broadway and Hampshire Street lines, carrying across the river about 5000 passengers in each direction, are important connections, and would be left without connection. In order to furnish facilities for this traffic a station at Kendall Square has been proposed, and, in addition, to furnish intermediate stations for local traffic and to reduce some longitudinal transferring, stops have been suggested in the neighborhood of Dana Street and Portland Street. It is axiomatic that high speed and frequent stops are antagonistic if only two tracks are used. With four tracks, as in the New York subway, the double service is maintained, and the public served by a change at the express stations. It is to be regretted that the traffic in sight does not justify immediate four-track construction in the Cambridge subway. When the details of construction are under consideration, it will be well to arrange the Harvard Square station so as to permit the building there of two more tracks for an express service running easterly by such route as may in some future year be chosen. The use of longitudinal surface tracks, as local feeders for the subway track below, is a temporary compromise for a four-track railway, on which it may be necessary to decide as to the advisability of the number of what may be called the express stations, with the extreme of two only (including the terminals at Harvard Square) as proposed by the Boston Elevated to three, four and five as proposed by different citizens.

The time occupied by a train under the various conditions can be taken substantially as follows:

	Min.	Sec.
Harvard Square to Park Street with one intermediate station	7	0
Harvard Square to Park Street with two intermediate stations	8	30
Harvard Square to Park Street with three intermediate stations	10	0
Harvard Square to Park Street with four intermediate stations	11	30

This time schedule is somewhat slower than some figures which have been published. It is certain to be found impossible to work up to a theoretical schedule during the rush hours, when delays by passengers and close train intervals are bound to occur. Such delays are here taken into account.

To determine the proportion of travel that may be considered as tributary to any station, it is necessary

1. To deduct from Harvard Square count passengers alighting from east-bound cars at Harvard Square and at streets east of Harvard Square to and including Trowbridge Street, as such passengers would obviously not use the subway.

2. To add to stations east of Harvard Square the passengers alighting, as such passengers would purchase tickets in the subway west-bound later in the day.

3. To add to Dana Street, Portland Street and Kendall Square a portion of passengers boarding cars on Broadway and Massachusetts Avenue, as probably tributary to the subway if built. This allowance is in favor of the small and at the expense of the large stations.

4. To add to Kendall Square the passengers going to Boston on the Broadway and Hampshire Street cars.

5. To group the traffic at the various streets according as such streets appear to be tributary to one or the other station.

Making these corrections and combinations, we have the following percentage of traffic probably tributary to the various stations, taking the liberal allowance of five stations as the basis:

	Per Cent
Harvard Square	35.85
Dana Street	8.12
Central Square	32.95
Portland Street	6.48
Kendall Square	16.6

The tables of travel showed the total travel at all points, regardless of whether the passengers came from Cambridge or from points beyond Cambridge. To make this separation, passengers entering the limits of Cambridge were counted, and those alighting before reaching Harvard Square and Central Square or at those points without taking transfers were deducted. It was found by this means that through passengers at Harvard Square would account for nearly one-half the passengers credited to that station, and more than one-third of the Central Square total.

The great preponderance of Harvard and Central Squares and the importance of Kendall Square is immediately evident. The placing of a station at Kendall Square is, however, very objectionable from an engineering and practical standpoint. Descending from the crown of the Cambridge bridge is a 3 per cent grade, continuing until the railway is underground, a total distance of about 2000 ft. Near the

foot of this incline would be the station. To permit a fast-moving train to descend the incline, unless the preceding train had cleared the station, would be highly dangerous. Mr. Parsons states that he is aware that this is done elsewhere, but it is dangerous practice and either restricts the speed of the trains or the capacity of the subway, or both. If the location of the station were moved westerly to Sixth Street, the same ends would be served. The station would still be among the large factories, in fact, rather nearer the center, while the transfer to the Broadway and Hampshire Street cars could be equally conveniently effected. This station would be far enough away from the incline on the bridge approach to permit the use of ordinary train block lengths irrespective of the station. Should a station be located at Sixth Street, and this is the proper point as determined by operating conditions, it would seem to be advisable to place another at Portland Street, or, in fact, between Sixth Street and Central Square. In this distance, about 4500 ft., there is no transfer traffic, and the longitudinal traffic, which is small in amount, in fact, less than 5 per cent of the total travel, can be accommodated by transfers from the surface cars.

The territory between Harvard Square and Central Square is the one section of Cambridge directly contiguous to the route of the subway, which is susceptible of great development for compactly built residences and apartment houses. Such development will undoubtedly be greatly stimulated by a subway station conveniently located. This has been the experience in similar districts in New York, apartment houses being built up in the immediate vicinity of the "up-town" stations, with a corresponding rapid increase in the subway travel, an experience which will doubtless be repeated in Cambridge.

The stations in New York at 135th Street and Lenox Avenue on the East Side subway, and at 137th Street and Broadway on the West Side subway, are good illustrations of how apartment house traffic increases. The travel at these two stations for the first six months and for the corresponding six months two years later are as follows:

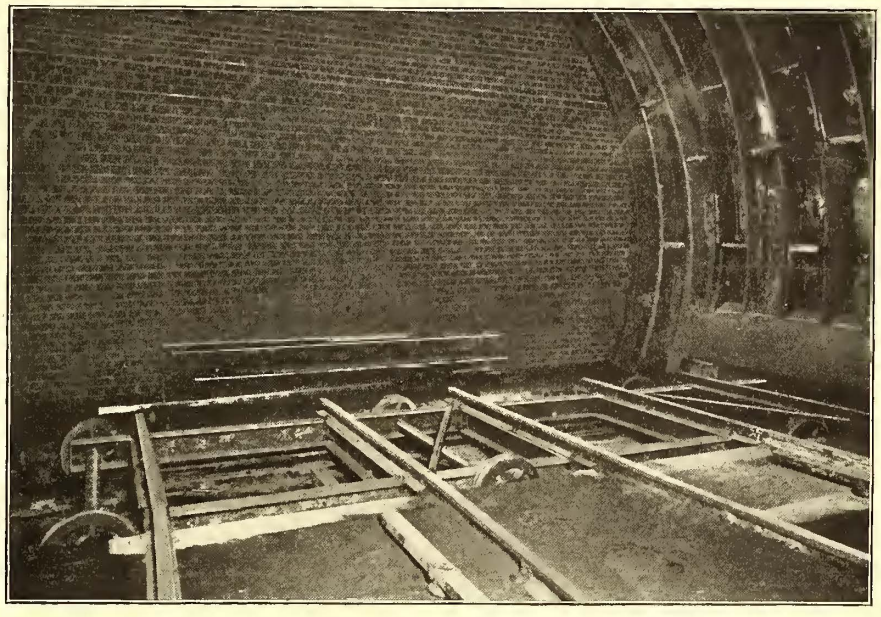
135th Street and Lenox Avenue, six months, ending April 30, 1905	1,419,519
135th Street and Lenox Avenue, six months, ending April 30, 1907	2,272,660
Increase	853,141
137th Street and Broadway, six months, ending April 30, 1905	1,419,519
137th Street and Broadway, six months, ending April 30, 1907	2,272,660
Increase	853,714

If no station could be located between Harvard and Central Squares the effect would be to concentrate development, with congested conditions, about these squares, while if a station was located midway between, development could be more evenly spread, and there would undoubtedly be a quickening of the apparent existing tendency toward apartment house construction in the district in question, with a corresponding increase in the travel derived from the district. Mr. Parsons recommends a station at Dana Street and criticises curved platforms as intolerable unless absolutely necessary. Should a four-station arrangement be adopted, the proportionate total distribution of traffic is:

Harvard Square 35.85 per cent (18.75 local, Cambridge).
Dana Street 8.12 per cent.
Central Square 32.95 per cent (20.75 local, Cambridge).
Sixth Street 23.08 per cent (13.62 local, Cambridge).

EXTENSION TO THE CITY & SOUTH LONDON TUBE

An account was given in the London Letter in the issue of June 1 of the opening of the extension of the City & Southern London Underground Tube Railway from the Angel to Euston station, but additional particulars of the equipment of the railway are now available. It will be remembered that the City & South London was the earliest of the electric tubes in London, and few changes, if any, have been made in the type of equipment used. Electric locomotives are still used and the normal length of train is five cars. The third rail is laid between the running rails, but not directly in the center of the track. The railway is operated on the three-wire system with 1000 volts pressure across the outside wires. Including the distribution system, however, an ingenious five-wire system is employed with 2000 volts between the outside conductors, as motor-generators operate boosters at the sub-stations on the outside of the system. In this way the amount of current returned on the neutrals is very small. A diagram illustrating the system of distribution used is contained in the paper by P. V. McMahon published in the STREET RAILWAY JOURNAL for Aug. 16, 1902.



TRAVERSER FOR LOCOMOTIVES AT EUSTON

The extension which has just been completed is built with two twin tunnels like the rest of the system, but at Euston station these two tubes are united in a tube 30 ft. in diameter. This is said to be the largest tube ever driven on the Greathead system, and has two tracks carried on each side of an island platform. In the view of Euston station herewith three tunnels are shown, but that at the right is simply a siding. The engraving on this page shows a transfer table employed at the Euston terminal for shifting the locomotives on to the return track.

A telephone signal system has been installed, in which

a telephone is carried on the locomotive and can be connected to two telephone wires, carried through the tunnel, by which the motorman can communicate with the nearest signal booth. In addition, the tubes are supplied with electric lamps, which are not normally in use, but each signalman has instructions that when a train has been in a section for a longer period than two minutes the tunnel lamps are to be switched into circuit. Electric block signals are also employed.

The company has recently added steel cars to its equipment. These cars were supplied by the Brush Electrical

EUSTON CROSS-OVER AND SIDINGS

Engineering Company, and their principal dimensions follow: Length over car body, 26 ft.; width over car body, 6 ft. 10 ins.; height inside car, 6 ft. 8½ ins.; total height from rail to top of car, 8 ft. 4¾ ins.; wheel-base of truck, 5 ft.; truck centers, 16 ft. 9 ins.; total length of five-car train, without locomotive, 160 ft.; weight of train, 37½ tons; number of seats per car, 32; weight of car per seat, 0.224 tons; weight of train per running foot, 0.284 tons.

The company has recently introduced geared motors on its locomotives instead of the direct drive originally employed. Westinghouse brakes are used throughout, and the train line and other pipes are carried on the roof.

PROGRAM OF NEW YORK STATE CONVENTION

As already announced in this paper, the annual convention of the Street Railway Association of the State of New York will be held at the Hotel Champlain, Lake Champlain, New York, on June 25 and 26. Hotel Champlain is on the Delaware & Hudson Railroad, and can also be reached by Lake Champlain boats. Reduced railroad rates will be granted to those attending the convention. The program follows:

TUESDAY, JUNE 25

Roll call.
Address by president.
Report of executive committee.
Report of treasurer.
Report of secretary.
Reports of committees.
Paper—"Some Phases of Electric Railway Accounting," by J. C. Collins, secretary, Rochester Railway Company.
Paper—"Existing Shop Practice in Central New York," by W. H. Collins, M. M., Fonda, Johnstown & Gloversville Railroad Company.

WEDNESDAY, JUNE 26

MORNING SESSION, 10 O'CLOCK

Paper— "Recent Improvements in Motors and Control," by G. H. Hill, Railway Engineer, General Electric Company, and Clarence Renshaw, Railway Engineer, Westinghouse Electric & Manufacturing Company.
Paper—"Relation Between Maintenance of Way and Equipment," by W. R. Griffin, Superintendent, Rochester & Eastern Rapid Railway Company.
Paper—"Power," by S. B. Storer, Niagara, Lockport & Ontario Power Company.

AFTERNOON SESSION.

Unfinished business.
Election of officers.

The entertainment decided upon is as follows: On Tuesday afternoon an excursion will be made to the far-famed Ausable Chasm; on Wednesday afternoon there will be a ball game between the railway and supply men present. Many short trips can also be made to points of interest on Lake Champlain.

The banquet will be held in the evening of Tuesday. Hon. W. Caryl Ely has consented to act as toastmaster. Banquet tickets will be provided to members, associate members, guests and the ladies. Each allied member will receive one banquet ticket. Extra banquet tickets will be sold at $5 each.

The secretary requests that those who have badges should bring them to the convention, and extra bars will be provided free. A charge of $1 each will be made for extra badges.

E. S. Fassett, of Albany, N. Y., chairman of entertainment committee, will arrange for hotel accommodations upon request. The hotel is conducted on the American plan only. The rates per person are $4 per day for room without bath and $5 per day per person for room with bath.

No provisions have been made for a general exhibit of appliances and apparatus by allied members, but any exhibit will be welcomed, and arrangements for space can be made directly with Hotel Champlain or E. L. Brown, manager, 1354 Broadway, New York.

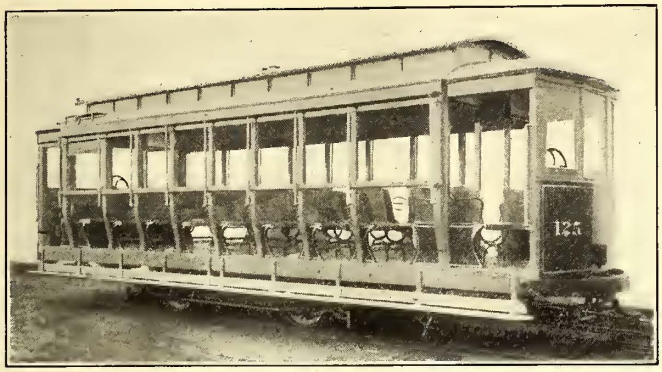
The Empire State Gas & Electric Association has arranged for a meeting at Hotel Champlain on Thursday, June 27, and has extended to the attendants at the New York Street Railway Association a cordial invitation to be present.

Reduced railroad fares of a fare and a third will be granted upon the usual certificate plan, provided one hundred or more persons secure certificates. These certificates must be vised by special agent of the Trunk Line Association at Hotel Champlain, June 26, 1907; for this there is a fee of 25 cents. Going tickets will be on sale from June 21 to 25. Return tickets are good until June 29, 1907. The reduction is from Trunk Line territory, namely, from Buffalo, Niagara Falls, Suspension Bridge, Dunkirk and Salamanca, N. Y; Erie and Pittsburg, Pa.; Bellaire, Ohio; Wheeling, Parkersburg and Huntington, W. Va., and points east thereof, except in New England.

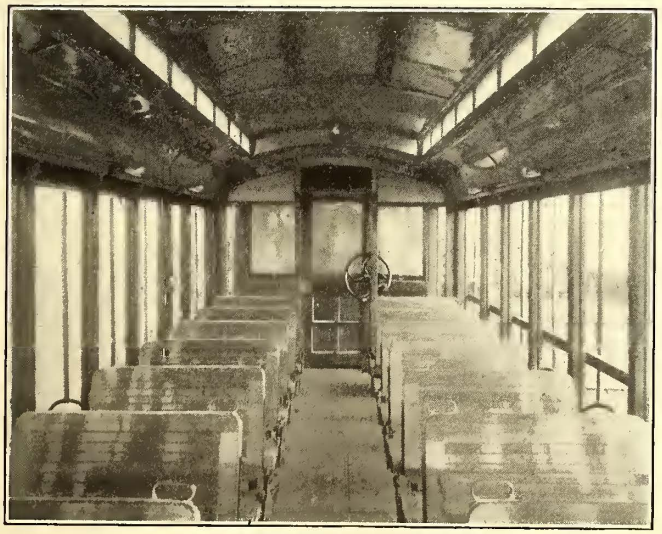
A handsome interurban private car has just been built by the Cincinnati Car Company for A. F. Schoepf, superintendent of the Cincinnati division of the Schoepf properties, and other officials of the system. The car has an observation end with concave glass windows extending almost to the floor, and a library compartment, toilet, kitchen and dining room in the front end. It is highly finished throughout and upholstered in leather. The car is 60 ft. over all, and is equipped for train operation.

CENTER-AISLE VESTIBULED OPEN CARS FOR SPRINGFIELD, ILL.

The Springfield Consolidated Railway Company, of Springfield, Ill., has received from the American Car Company five eleven-bench open cars which contain some features a little out of the ordinary. The cars are vestibuled at both ends, each vestibule accommodating four passengers; the total seating capacity of each car is forty-four passengers. The seats do not extend entirely across the car, as is the more common practice, the company preferring a center-aisle car. The metal arm pivoted to the back of the seat, although primarily intended to strengthen the back of the seat, may be used as a grab handle by alighting passengers. The truck used is the No. 21-E with 8-ft. wheel-base; two motors of 25 hp capacity each were installed on each car. The cars are finished in ash with ceilings of three-ply birch. The chief dimensions are as follows: Length over crown pieces, 30 ft. 6⅜ ins.; over sills, including sheathing, 7 ft. 3 ins.; over posts at seat ends, 8 ft. ½ in.; height from floor to ceiling, 8 ft.; from track to under side of sills, 26 3/16 ins.; side sills, 4¾ ins. x 7¾ ins.; sill plates, 8 ins. x ⅝ in. The company at present operates thirty-one cars over 31 miles of track on regular schedule. During the winter 22-ft. closed cars with longitudinal seats are operated. These cars are also of the American Car Company's make, the last to go forward being a lot of five shipped about six months ago. In the summer a complete equipment of open cars is operated, excepting four grooveless post, semi-convertible cars, which are used during the entire twelve months.



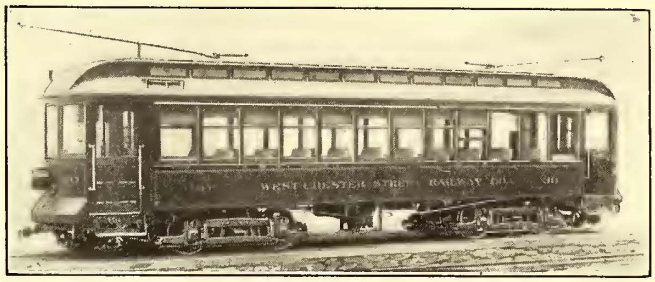
EXTERIOR OF CENTER AISLE OPEN CAR



INTERIOR OF CENTER-AISLE OPEN CAR

NEW CARS FOR WESTCHESTER STREET RAILWAY CO.

A number of combination passenger and smoking cars of the grooveless post, semi-convertible type recently were supplied by the J. G. Brill Company, of Philadelphia, to the West Chester Street Railway Company, of West Chester, Pa., to be placed in service on the company's line between West Chester and Coatesville, passing through Downington. Kennett Square may also be reached from West Chester over the company's southerly branch, a distance of about 13 miles. The total trackage of the system is 28 miles. The rolling stock now comprises eighteen semi-convertible cars, the standard car measuring 28 ft. over the body.



EXTERIOR OF SEMI-CONVERTIBLE CAR FOR WEST CHESTER

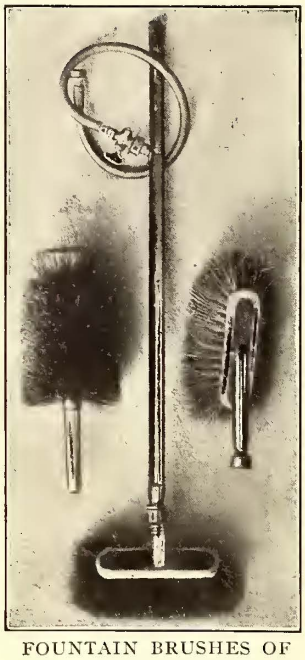
The vestibule window rail in the new cars is a continuation of the side window rail, which gives a well-finished appearance to the car ends. The accompanying illustration shows a heavy molding running alongside the car to which the canvas of the roof is fastened; this feature also is a new departure for interurban cars of this type. The smoking compartment occupies the space of three windows.

INTERIOR OF SEMI-CONVERTIBLE CAR FOR WEST CHESTER

The seats in both compartments are of Brill make. The interior finish is of cherry, with ceilings of birch. The trucks are the No. 27-E1 type with 6-ft. wheel-base; four motors, of 40 hp capacity each, were installed on each car. The weight of car, including trucks and full electrical equipment, is 46,900 lbs. The chief dimensions are as follows: Length over end panels, 33 ft. 4 ins.; over crown pieces and vestibules, 42 ft. 9 ins.; width over sills, including sheathing, 8 ft. 2 ins.; size of side sills, 4 ins. x 7¾ ins.; end sills, 5¼ ins. x 6 ins.; sill plates, ⅜ in. x 12 ins.

A FOUNTAIN BRUSH FOR GENERAL CLEANSING

The advantage in cleansing operations of any kind where the cleanser is a liquid of a system which insures a continuous and fresh supply of the cleansing agent are well known. In street railway work generally, and in car cleaning especially, does a system of this kind make for speed and thoroughness, which are the great essentials. With the considerations in mind just mentioned, the Baumruk fountain cleaning brush, manufactured by the Fountain Cleaning Brush Company, of Chicago, was designed. This brush is made in a variety of sizes and shapes, to meet all requirements, and needs only to be attached to the source of supply by means of a hose to be ready for use, the water being delivered through the hollow chamber of the brush to the bristles. In this way the brush is available for hand use or can be mounted on the end of a long pole to reach a considerable height, and is very handy for exterior car cleaning, it being possible to scour and wash down the exterior of a car very rapidly. Where a hydrant is not available as a source of supply, a pail of water or liquid cleanser properly hung will afford the desired pressure, but the company has a small portable pressure tank for special service. The brush permits the flushing of curves and special work, after which they can be readily cleansed.



FOUNTAIN BRUSHES OF VARIOUS STYLES

The City Council of Columbus, Ohio, has passed an ordinance prohibiting the use of T-rails by any street or interurban railway company with lines entering the city over improved streets. The interurban companies opposed the passage of the measure, because of the difficulties that attend the operation of their cars over girder rails.

PLANS FOR THE BROOKLYN TUNNEL

On Tuesday, June 11, Chief Engineer Rice, of the New York Rapid Transit Commission, announced that he will have the plans and specifications of the Fourth Avenue and Coney Island subway ready for the last meeting of the commission, which will be held June 28, three days before the public utilities law goes into effect. Mr. Rice says the contract will probably be advertised in thirteen sections. The last function of the present commission in this matter will be to set a date for a public hearing which will be held by the new utilities commission. That body then will approve the plans and specifications and form of contract.

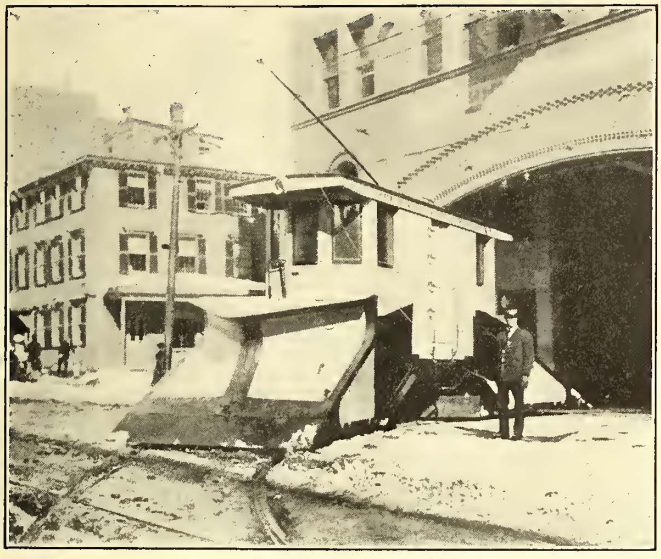
SOME NEW CARS FOR CHICAGO

A few months ago a variegated assortment of cars was in use in Chicago. Some of them dated back almost to the horse-car days, and between the most ancient ones and those of modern type were several intermediate types, each typifying an epoch in street car construction. However, many of these antedated cars have given place to cars of modern design and the remaining ones are fast disappearing. Of the cars replaced some recently constructed for the Chicago Union Traction Company by the St. Louis Car Company are intended for operation in either direction and embody a number of interesting features. They measure 28 ft. over corner posts and 41 ft. over bumpers, and are 7 ft. 10 ins. wide over sills and 8 ft. 4 ins. wide over all. The height from the track to the trolley board is 11 ft. 3½ ins. The side sills, of 4-in. x 7¾ in. yellow pine, are reinforced with a ⅜-in. x 15-in. steel plate, and the white oak end sills, which measure 5 ins. x 9⅞ ins., are stiffened with a ¾-in. x 6-in. steel plate. The interior is finished in mahogany. The seats are of the St. Louis Car Company's reversible type. The double side sashes are glazed with D. S. A. plate glass, and wire glass is employed in the ventilator windows. The cars are provided with headlights, drawbars and signs on each end. The vestibule doors are provided with an automatic folding device. The steps are of a folding spring type, so designed that when the step on one side of the car is down the opposite one is folded. The car is mounted on No. 47 trucks having a 4-ft. 6-in. wheel-base. The wheels are 33 ins. in diameter and have a ⅛-in. tread and ¾-in. flange. They are mounted on 4½-in. axles. The car is provided with four G. E. No. 80 A motors.

A NEW CHICAGO TYPE INTENDED FOR OPERATION IN EITHER DIRECTION

RADIAL SNOW PLOW

An account was published in the STREET RAILWAY JOURNAL of Sept. 2, 1905, of a novel type of snow plow invented by W. E. Wilder and put in service during the previous winter by the Worcester Consolidated Railway Company. In this plow the plow portion, instead of being mounted,



RADIAL PLOW ON 45-FT. RADIUS

as usual, on the car body, is carried on and forms a part of the truck, while the body portion extends only to the truck bolster. This construction permits the plow portion to turn with the trucks and follow exactly the curvature

A DRIFT MORE THAN 1000 FT. LONG AND FROM 5 FT. TO 6 FT. HIGH, CLEARED BY PLOW

of the track, even in curves of 25-ft. radius. The plow, which was built by the Wilder Snow Plow & Manufacturing Company, of Boston, has been in use in Worcester ever since that time, or for the last three winters. During the first two the snow fall was so light as practically to offer no test of the working qualities of the plow, but last year the fall of snow was the heaviest in ten years. As this is the time of year during which plans are being perfeeted by electric railway companies for snow-fighting equipment, an account of the performances of this plow last winter will be of interest.

The plow was assigned to division No. 3, or the Leominster section of the Consolidated System in Worcester, where during the heavy storms it took care of 22 miles of interurban track. On Feb. 5, 1907, it ran 156 miles in 13 hours, an average of 12 miles an hour, through drifts from 3 ft. to 6 ft. deep and several hundred feet long. On Feb. 25 the plow had much harder work to do, yet took every drift and winged out both sides, making a 12-ft. wide cut at all times. In cuts not over 10 ft. deep the plow would throw the snow to the top of the cut. On this date the plow ran 172 miles in twelve and one-half hours (an average of over 14 miles an hour), through drifts from 3 ft. to 6 ft. deep and from 200 to over 1000 ft. long.

As will be seen from the engraving, a shovel-nosed plow is used as in steam railroad work, a point which is considered of great advantage. The upper curved flanges of the plow throw the snow clear of the track on each side. On a double-track road these flanges would be shaped so as to direct the snow to one side. Owing to this form of construction there is no tendency to pack the snow, and the greater the drift the less the chances of derailment and the better the traction. The toe of the plow has a slight vertical movement to clear any obstruction which there may be on the track, and side wings are used; but as both these parts are moved pneumatically they can be operated by the motorman, who is thus the only operator really required. The plow in Worcester is equipped with four 50-hp motors, but for very severe work a heavier equipment would undoubtedly be desirable.

NOTIFYING PASSENGERS OF TEMPORARY CHANGES IN ROUTES.

Failure to notify passengers of temporary changes in car routes is an operating defect which should receive attention on more than one system. It is not an easy matter to correct this difficulty on a large road handling a heavy traffic, but there is no reason why some sort of modification should not be made as soon as the conductor and motorman are informed that their car will proceed to its destination over other than the usual tracks. Such cases often occur owing to blockades of various kinds, and where a connection has to be made at the other end considerable inconvenience may result from a delay. No car can be diverted from its route on a well-organized system without orders from a car house foreman, inspector of traffic or division superintendent, and it should not be difficult in such case to give oral or printed advice to the passengers to the effect that the car will not follow its normal route, so far as the motorman and conductor are advised. There are many unforeseen delays in street railway operation on the crowded thoroughfares, but every change in route is foreseen, at least as far as the next track junction or car house. At least a simple sign marked, "Route Temporarily Changed," could be hung in or on the car, and it ought to be an easy matter for the motorman to announce his destination "via A or B Street" whenever a prospective passenger approaches.

It is reported from London under date of June 11 that an agreement has been reached by all the underground and electric railways in London for an advance in fares on July 1, and that the motor bus companies are expected to follow suit.

EXHIBITS AT THE ATLANTIC CITY CONVENTION OF THE MASTER MECHANICS AND MASTER CAR BUILDERS

As announced in the Street Railway Journal of June 8, the Atlantic City meetings of the Master Mechanics' and Master Car Builders' Associations were scheduled for June 12-14 and June 17 to 19, respectively. The great steel pier was selected for the exhibits, which are not only arranged more harmoniously than at previous conventions, but are also notable for the increased display of heavy electric railway material. Through the courtesy of the exhibitors mentioned below, it is possible to present the following notes regarding their efforts to instruct and entertain the delegates:

THE SPRAGUE ELECTRIC COMPANY, New York, is represented by Allan C. Bakewell, president; W. A. Treat and E. E. Ruete of the armored hose department, and A. E. Braddell of the conduit department. Mr. Braddell is present in the interest of the well-known flexible steel conduit and flexible steel armored conductors, which the Sprague Electric Company is supplying to railroad companies for the wiring of cars and car buildings. The company is exhibiting its flexible steel armored hose in booths No. 1812 and No. 1814. This consists of armored air brake hose, armored air brake and signal line hose, armored car heating hose and armored hose for pneumatic tool service, also samples of nipples and clamps. The flexible steel armored hose is a radical departure from other types of protected hose, as the rubber lining is entirely enclosed in the steel armor. Thorough protection is thus afforded either in case of external injury or internal deterioration. It also binds the hose so tightly that if a rupture occurs sufficient pressure of air or steam is retained still to operate the mechanism.

The primary object to be attained in car wiring, as in all electric wiring, is obviously the reduction of the fire hazard to a minimum, which can only be accomplished by the use of well insulated conductors which are given a thorough mechanical protection. For this purpose the Sprague Electric Company's Greenfield flexible steel conduit or flexible steel-armored conductors are claimed to offer an ideal system for car wiring. All the cars of the Interborough Rapid Transit Company operating in the subway are equipped with this conduit in which are installed all insulated wires for the electric lights and heaters. The new cars for the electrically-operated division of the New York Central are equipped throughout with the same manufacturer's conduit, and this practice is being followed by many car builders. These conduits and conductors, of course, are equally applicable for the safe and convenient wiring of car houses and other buildings on New York properties.

THE GEO. W. LORD COMPANY, of Philadelphia, has on exhibition samples of its various combinations of chemicals sold under the trade mark "Lord's Boiler Compounds."

THE SHERWIN-WILLIAMS COMPANY'S exhibit shows a wider range of paint and varnish finishes for railroad equipment than any gotten together before. For outside coach work, much of which is directly applicable to street car work, it shows primers, surfacers, colors and varnishes; it also exhibits various operations of combining these into a complete, practical shop system. An important part of this feature are the exhibits on steel of surfacing materials and enamels, which the company believes will be the sort of material used in the future for the steel sides of coaches. This is of importance, because all signs point to a large increase in steel cars. There is also a complete exhibit of varnishes and dry colors, together with the materials used on locomotives and finishes for box-cars, gondolas, stock cars, refrigerator cars and other rolling equipment. There is also a complete line of interior finishes, such as wall and ceiling colors for baggage, mail and caboose cars, floor paints, seat-arm enamels, rattan seat enamel, etc.

An important feature is the entirely new line of material for painting headlinings, particularly adapted for use on fiber boards. A very extensive exhibit of these fiber board finishes is in the booth of the Indestructible Fibre Board Company. There is also a complete line of coach roof paints, truck colors, hand-rail enamel, etc. In addition to these practical exhibits the company expects to show an interesting demonstration of the facilities for manufacturing and distribution of the largest group of paint and varnish factories in the world. The booth is located in the entrance hall to the steel pier directly opposite the entrance. The representation includes W. B. Albright, E. M. Richardson, J. H. Eames, Thomas Madill, F. A. Elmquist and E. M. Williams.

THE GALENA SIGNAL OIL COMPANY, Franklin, Pa., does not intend to have any exhibit, but arranged a reception booth at the steel pier, spaces 391-399, where it is welcoming its railroad friends and others. The following representatives are on the ground: E. V. Sedgwick, Alex. Turner, P. H. Stack, J. A. Roosevelt, W. J. Walsh, Wm. Holmes, E. W. Grieves, W. O. Taylor, E. G Johnson, John S. Patterson and J. S. Seeley.

THE PHILIP CAREY MANUFACTURING COMPANY, Cincinnati, Ohio, has an extensive exhibit at Atlantic City, among which were the following: 85 per cent magnesia sectional steam pipe covering, 85 per cent magnesia boiler covering, 85 per cent magnesia sectional locomotive lagging, all-asbestos train pipe covering, asbestos moulded coverings, asbestos moulded and felt pipe coverings, Nonpareil cork coverings for refrigerating pipes, asbestos fibers, paper, millboard, wick and rope packing, asbestos metallic gaskets, piston and sheet packing, asbestos cold water paints and miscellaneous asbestos materials, flexible cement roofing and roofing paints and cements

THE OHIO BRASS COMPANY'S exhibit is in space 1322, in charge of J. S. Hamlin, Nathan Shute, F. A. Strail and R. M. Campbell. The principal features are the Tomlinson automatic radial car coupler, the Lintern car signal system and the Nichols-Lintern supplementary sander valve. The various forms of the Tomlinson coupler are exhibited and the coupler mounted to demonstrate its operation, the method of attachment of draft rigging and also the spring draw-bar gear. There is also on exhibition the M. C. B. knuckle for attachment to the Tomlinson coupler, making it possible to intercouple automatically with M. C. B. couplers. The Lintern car signal system is shown in operation. This system is intended for classification and rear end signals on electric cars, and is operated from the car lighting circuit. An auxiliary battery of dry cells furnishes necessary current should current from the trolley fail. The battery also prevents fluctuation of the signal lamps and keeps them burning at normal voltage at all times. The various lamps adapted to this system are also exhibited, together with dummy car ends upon which are mounted the various styles of lamps and upon which will also be shown diagrams of connections for the combinations which may be made with these signals. The Nichols-Lintern supplementary sander valve, which is used with the Nichols-Lintern pneumatic sander, is shown attached to different styles of engineers' brake valves. An important feature of these styles is that the sander is at all times under instant control of the motorman. When the engineers' brake valve handle is moved to the emergency position the sander acts automatically.

THE HALE & KILBURN MANUFACTURING COMPANY, of Philadelphia, is located in spaces 1491, 1493, 1495, 1497. The representatives are: A. F. Old, H. T. Bigelow, B. F. Pilson and S. A. Walker. In addition to car seats of all kinds for steam railroads the company has samples of seats for heavy electric railway cars as used in the eighty-five large electric coaches of the Pennsylvania Railroad to Atlantic City; also the all-steel and fireproof seat used in the 185 steel coaches in the New York Central electric zone. The exhibit is particularly interesting to officials having in service steel or wood electric railway cars, owing to the rapid progress made by the company in the past year in seating for these modern cars, making such seats practically unapproachable in points of comfort and durability.

THE YALE & TOWNE MANUFACTURING COMPANY is showing portable electric hoists, equipped with graduated speed controllers for careful handling of material and close adjustment of parts, when assembling or placing machines; a 20-ton triplex chain block, enabling one man to lift a 20-ton load; a 1-ton triplex, duplex and differential block in operation under service conditions; quick-speed chain blocks for rapid handling of light loads; overhead "I" beam trolleys for use with hand and electric hoists; crane models and photographs of installations. The representatives in attendance are: F. A. Hall, E. J. Ford, H. E. Dickerman, William Hazelton, R. T. Hodgkins and C. W. Beaver.

H. W. JOHNS-MANVILLE COMPANY has the following representatives: H. O. Fettinger, Altoona, Pa.; E. C. Sawyer, Norfolk, Va.; John H. Trent, St. Louis, Mo.; W. F. Taylor, Milwaukee, Wis.; F. M. Gilmore, Chicago, Ill.; J. C. Younglove, Chicago, Ill.; C. E. Murphy, Indianapolis, Ind.; J. W. Allan, Minneapolis, Minn., and F. G. Corbin, New York. It also displays the following products: Asbesto-sponge felted sectional pipe covering, fire felt, fire felt train pipe covering, 80 per cent magnesia pipe covering, vitribestos pipe covering, vitribestos smoke jacks, asbestos fire felt and 85 per cent magnesia locomotive lagging, asbestos cement felting, 85 per cent magnesia cement, high and low-pressure, hot and cold water pipe covering, J-M asbestos roofings, air pump packings, asbestos steam packings, asbestos sheet packings, asbesto-metallic flange gaskets, vulcabeston packings, all kinds of fire resisting cements, electrical insulating materials, Noark fuses, fire extinguishers, refrigerator and produce car insulating material, Perolin and Portland sectional conduit for underground steam heating systems.

THE NORTON COMPANY, of Worcester, Mass., is represented by George C. Montague, Arthur C. Scott and George A. Stone. The exhibit consists of Norton grinding wheels made of alundum, oil stones and other abrasive specialities. The Norton Grinding Company, with whom this company is closely allied, exhibits a plain grinding machine with gap table, specially adapted for the grinding of locomotive piston rods with pistons in place, and any other cylindrical work on which there are projections requiring more than the normal swing. This machine is also adapted for grinding street car axles. In addition to this the latter company shows specimens of grinding and distributes literature particularly interesting to superintendents of motive power connected with electric railways. This literature relates to a machine especially designed for grinding car wheels. This machine will grind car wheels perfectly round and true very quickly. While a great many companies have rigged up means to grind their car wheels, many of them have been so light that it has been practically impossible to grind a wheel round. This machine is a very heavy tool, designed to remove large amounts of material rapidly. While the original machines were made for the Pennsylvania Railroad to grind steam car wheels, they can be adapted for grinding electric car wheels. While this machine may be of more interest to the electric railway men than anything else in connection with the company's exhibit, its grinding wheels also deserve attention.

THE SCHOEN STEEL WHEEL COMPANY'S exhibit this year is somewhat larger than last year's, as it is showing its present method of manufacturing the wheels from the slab to the first and second forging and the finished wheel. The wheels exhibited are those from steam and electric railroads that have been in service, and also new wheels for similar service. They include wheels for both steam and electric service.

THE CHICAGO RAILWAY EQUIPMENT COMPANY is showing its roller side bearings for street car service. This bearing is designed to reduce wheel flange wear, save rail wear and improve the riding of the cars, with the attendant advantages of reducing the cost of transportation, increasing life and capacity of the bolsters, and lessening the cost of truck repairs. The bearing cannot become clogged with dirt or be rendered inoperative in any way, and the construction admits unlimited travel as distinguished from bearings in which the travel of the rollers is limited.

THE WILMARTH & MORMAN COMPANY, of Grand Rapids, Mich., is exhibiting its nearly fifty styles of the New Yankee drill grinders. These are style "J A point," style "P" wet grinder" and style "J D." The latter machine is direct connected motor-driven drill grinder, and may be seen in operation. Chas. E. Meech is in charge of the exhibit.

THE JOHN DAVIS COMPANY, of Chicago, shows a comprehensive line of valves in addition to its armor-covered hose.

THE PERRY SIDE-BEARING COMPANY, of Chicago, has an excellent exhibit of bearings for steam railroad service, but there are also several styles adapted for street railway cars.

THE T. H. SYMINGTON COMPANY, of Baltimore, Md., is represented by T. H. Symington, president; E. H. Symington, J. F. Symington, D. Symington, C. J. Symington, W. W. Rosser, A. H. Weston, H. W. Baldwin, Carll Tucker and T. C. de Rosset. The exhibit comprises a full line of Symington journal boxes for freight and passenger cars and electric trucks of M. C. B. and special design, together with Baltimore ball bearings for steam cars, electric passenger cars, locomotive tenders and heavy freight service.

THE CONSOLIDATED CAR-HEATING COMPANY, of New York, exhibits and demonstrates the action of a new steam coupler with slide gasket and fitted with automatic lock. It also shows its hot water drum system, standard direct steam heating system, new low pressure steam heating system and the McElroy automatic car lighting system, consisting of an axle-driven generator and automatic regulator. For electric railways the company exhibits the cross-seat, truss plank and panel types of electric heaters and special switchboards; also a new automatic cab heater switch. The representatives are Francis C. Green, general manager; Cornell S. Hawley, general sales agent; W. S. Hammond, Jr., district manager, Western territory; S. Butler Keys, district manager, Eastern territory, and T. M. May from the New York office.

THE ATHA STEEL CASTING COMPANY, of Newark, presents its "Titan" steel railway motor gears and cast steel body and truck bolsters adapted for electric railway service. It is represented by C. W. Gennet, G. T. Paraschos, R. N. Barrows, C. W. Owston and Louis A. Shepard, acting vice-president.

THE U. S. METAL & MANUFACTURING COMPANY, of New York, is offering in spaces 1612 and 1614 its perfect pressed steel car replacers, Victor cast steel car replacers, Columbia lock nuts, "Ideal" draw bar centering device, Western malleable iron brake jaws, "Almetl" lumber stake and the Cliff and Guibert automatic fire hose reel. A car on the exhibition track is equipped with the company's Dunham hopper door device, Columbia lock nuts, "Ideal" draw-bar centering device, feasible drop brake staff and "Almetl" lumber stake. The representatives are: B. A. Heggeman, Jr., Thomas Beaghen, Jr., F. C. Dunham, M. Jackson Crispin, E. D. Hillman, John Varian and Fred Atwater.

THE AMERICAN BRAKE SHOE & FOUNDRY COMPANY has an exceptionally large number of representatives on hand, its interests being cared for by the following: W. S. McGowan, F. W. Sargent, H. S. Bradfield, E. L. Janes, E. B. Smith, L. J. Hibbard, F. L. Gordon, J. S. Thompson, C. C. Higgins, L. R. Dewey, Chas. Herron, B. H. Grundy, F. H. Coolidge and E. J. Searles. The exhibit consists of steel-back brake-shoes for steam railway service in particular, covering driver, coach and car-shoes, and such steel-back flanged coach-shoes with wrought-attaching lugs as are used in connection with electric equipment on interurban lines operated in connection with steam railroads, such as the New York Central, West Jersey & Seashore, Long Island, the heavy equipment on the interurban and elevated lines of New York and Chicago as well as the long distance electric roads in the Middle West. The company has sections 1410 and 1416, inclusive, on the steel pier. The reception headquarters are in the Marlborough-Blenheim, where the door is always open for friends desirous of rest and refreshment.

THE O. M. EDWARDS COMPANY, of Syracuse, N. Y., has models showing thirty designs of window fixtures and four designs of extension platform trap door fixtures, all of which are standard and in extensive use upon the leading steam and electric railway systems. In addition, it is showing samples of tin barrel spring rollers for both shade and sash balance use, including the ratchet design especially adapted for railroad car curtains and open street car awnings. The company is just commencing the manufacture of metal window sash in connection with its window fixtures, samples of which will also be shown. The following gentlemen will receive the visitors: O. M. Edwards. Edw. F. Chaffee, Franklyn M. Nicholl, George G. Norris, C. H. Rockwell and C. L. Eddy.

THE G. DROUVE COMPANY, of Bridgeport, Conn., has an exhibit consisting of a booth 10 ft. x 20 ft. with skylight of anti-Pluvius construction on roof and swinging sash on three sides operated with Lovell apparatus. Inside the booth the company has models of different styles of skylight construction.

THE NATIONAL LOCK WASHER COMPANY, of Newark, N. J., presents models of its curtain fixtures, sash locks, sash balances and lock washers. The representatives in attend-

ance are: F. B. Archibald, Daniel Hoyt, John B. Seymour and William C. Dodd.

THE WHEEL TRUING BRAKE SHOE COMPANY, of Detroit, Mich, has an extensive display of different styles of abrasive brake-shoes. It is represented by J. M. Griffin, president and general manager.

THE CURTAIN SUPPLY COMPANY, of Chicago, Ill., has a very handsome display this year, consisting of two circular booths, located in the open arcade. Among articles displayed are Forsyth roller tip fixtures, ring fixtures, Keeler eccentric fixture and also the ring fixture with projecting pins. The latter device is intended where it is desired to have a curtain which cannot be taken out of the groove. The company also has its usual full line of curtain material. The representatives are: W. H. Forsyth, general manager, and Messrs. Whipple and Hayes.

THE HARRISON DUST GUARD COMPANY, of Toledo, Ohio, has a dust guard adaptable for and in use by many electric railways. It also manufactures car journal lubricators, which are also adaptable to electrical equipment.

H. B. UNDERWOOD & COMPANY, of Philadelphia, are represented by A. D. Pedrick, C. O. Ralph and F. E. Emery. The tools displayed are the following: Portable boring bar outfit for cylinders 12 ins. to 26 ins. diameter, two-cylinder steam or air motor to drive the foregoing, and a portable rotary planing machine for flat valve seats on locomotives.

THE GRIP NUT COMPANY, of Chicago and New York, is offering a full line of square and hexagon shaped grip nuts, United States standard threads from ⅜ in. to 1¾ ins.; also a line of semi-finished hexagonal nuts for locomotive use. It is represented by E. R. Hibbard, president, Chicago; J. W. Hibbard, secretary, New York, N. Y.; R. S. Wickersham, general manager Chicago, and T. F. DeGarmo, general sales agent, Chicago, Ill.

THE INDESTRUCTIBLE FIBER COMPANY, for which Wendell & MacDuffie are the sole agents in the transportation field, has issued a booklet relating to "Fibrite," "Durite" and "Kantlite" and the purposes for which each of these is best adapted. The publication also shows the interior of an electric car with fiber-board head-linings and roof.

THE AMERICAN WATER SOFTENER COMPANY, of Philadelphia, Pa., shows a complete working model of its water softening and purifying systems.

THE J. H. WAGENHORST & COMPANY, of Youngstown, Ohio, have their usual exhibit of electric blue printing machines. The Wagenhorst Company claims three special features for its machine: The roller curtain, which does away with all clamps, hooks, etc., for fastening the curtain and makes filling the machine a matter of a second; the speed regulator, noiseless in operation, by which the lamp descent can be adjusted to meet the strength of any printing paper; and the automatic cut-off, by which the light is automatically extinguished as soon as the print is complete. This relieves the operator of the responsibility for shutting off the current.

THE INDEPENDENT PNEUMATIC TOOL COMPANY, of Chicago, has a complete working layout of its Thor pneumatic tools and appliances in space Nos. 989, 991, 993 and 995. The following representatives were in attendance: From New York, James B. Brady, W. O. Jacquette, J. A. Porter, J. P. Bourge and R. S. Cooper; from Pittsburg, R. D. Hurley, R. T. Scott and J. H. Davis; from Chicago, J. D. Hurley, A. B. Holmes, Vernon Job, George A. Gallinger and Campbell Mathie; from Boston, F. A. Barbey; from St. Louis, Charles Parsons, and from San Francisco, H. H. Hale.

THE STANDARD METAL MANUFACTURING COMPANY, Inc., of Chicago, presents its line of car-journal bearings. The company also sells filling-in pig form for electric railway companies to fill the shells. It is asserted that this bearing gives one-third more mileage than solid brass.

J. H. WATTERS, assistant master mechanic of the Georgia Railroad, Augusta, Ga., has a pneumatic track-sanding device, which he is showing at booth 1115 on the steel pier. This device is shown working in a glass case. It is designed for both electric railways and steam roads. One sander sands both rails.

THE GOLDSCHMIDT THERMIT COMPANY'S showing comprises samples of welded work made by the Thermit process, such as street car rails, wrought iron pipes, locomotive frames, steel castings, etc. The company also exhibits its new fire-brick molds, which greatly simplify the process of welding locomotive frames, as they do away entirely with the services of molders and pattern makers. In addition to these are shown samples of nickel thermit, manganese, chromium, manganese copper, manganese tin, ferro-vanadium, ferro-titanium and other rare metals which the company supplies. A. M. Guenther and W. R. Hulbert will have charge of the exhibit.

THE CROCKER-WHEELER COMPANY, of Ampere, N. J., has on exhibition one of its Form I-F field-weakening motors with speed variations of 3 : 1. It will be in constant operation during the exhibition. It has in addition a large supply of photographs showing motors and generators of their various lines from 1/10 hp to 4000 kw. Among the representatives who may be seen during the conventions will be: Hamilton R. Gilder, F. B. DeGress, H. J. Sage, L. S. Horner, A. L. Doremus, H. L. Patteson and R. J. Randolph, Jr., of the Eastern branch offices of the company.

THE NATIONAL BRAKE & ELECTRIC COMPANY, of Milwaukee, has the following representatives present: R. P. Tell, S. I. Wailes, J. T. Cunningham, W. H. Goble, C. N. Leet and Bert Aikman. The exhibits are in space No. 1030. They include the new type of National portable blowing outfit, which consists entirely, with the exception of the truck and hose receptacle, of standard National air brake apparatus, the sectional National air slide type motorman's valve (the latter also in section) and several framed enlargements of the company's apparatus.

THE GENERAL ELECTRIC COMPANY, while not presenting a regular exhibit, has attractive reception quarters in spaces Nos. 1384 and 13386 on the steel pier, adjoining the American Locomotive Company's exhibit. The company's representatives are as follows: W. J. Clark, manager traction department, New York office; W. B. Potter, engineer railway department; L. R. Pomeroy, New York office; R. E. Moore, Philadelphia office; C. C. Pierce, Boston office; J. J. Mahony, New York office; J. O. Barry, railway department; E. D. Priest, A. W. Jones and F. H. Gale.

THE WESTINGHOUSE COMPANIES exhibit many devices well known to railway men and also some new features developed by the several interests. The Westinghouse Air Brake Company displays a model of its friction draft gear, also working model of Westinghouse cross-compound 8 x 8 x 14½ air pump. The American Brake Company, of St. Louis, shows working models of slack adjusters on brake cylinders varying in sizes from 10 to 18 inches; also a working model of the Westinghouse automatic air and steam coupler, also a working model of the Westinghouse driver brake. For the Westinghouse Machine Company there is exhibited a Westinghouse auto-truck. The Machine Company also exhibits a line of car lighting batteries having a capacity of 280 ampere hours. The Westinghouse Electric & Manufacturing Company exhibits a switchboard used to control a 10-hp variable speed direct-current motor, equipped with a prony brake. The exhibit also includes the new mill type arc lamp for use on 250-volt direct-current and other arcs, meters, motors, etc. The Westinghouse Air Brake Company is represented by John F. Miller, vice-president; A. L. Humphreys, general manager; S. C. McConahey, assistant secretary; W. B. Turner, mechanical engineer; Arthur Johnson, chief engineer; E. A. Craig, Southwestern manager; Joseph R. Ellicott, Eastern manager; W. S. Bartholomew, Western manager; F. M. Nellis, Boston; Porris S. Clark, Los Angeles; S. D. Hutchins, Columbus; C. P. Cass, New York; Fred. Green, New York; Charles Ellicott, New York; T. L. Burton, Buffalo; C. C. Farmer, Chicago; S. J. Kidder and J. P. Kelley. The American Brake Company is represented by E. L. Adreon, vice-president; F. B. Schwentler, superintendent, and C. C. Higham, works manager. The Westinghouse Automatic Air & Steam Coupling Company is represented by N. F. Niederlander, president, and R. E. Adreon, mechanical engineer. The Westinghouse Electric & Manufacturing Company is represented by E. M. Herr, vice-president; J. H. Klinck, Chas. Talbot, R. F. Moon, D. B. Pendleton, John R. Warden, Chas. Robbins, C. F. Street and A. T. Chamberlain. The Nernst Lamp Company's interests are looked after by John Gossler, and those of the Cooper-Hewitt Electric Company by Eugene Hayes. The exhibit is in charge of J. C. McQuiston, manager of the publishing department of the Westinghouse interests.

FINANCIAL INTELLIGENCE

WALL STREET, June 12, 1907.

The Money Market

The monetary situation has undergone no material change during the past week, at least so far as money rates are concerned. Money on call has been in abundant supply at rates ranging from 2½ to 1¼ per cent, but the demand has been extremely small, owing to the inactivity in the securities market. In the time money department business has been practically at a standstill, although a somewhat better inquiry was reported for periods running from five to eight months. Rates for those maturities advanced ¼ per cent, but otherwise the market has failed to reflect the heavy demand upon the local banks. During the early part of the week $3,600,000 additional gold was shipped to Paris, making the total exports to that country on this movement $10,400,000. On Monday last $500,000 was engaged for shipment, but this was subsequently canceled, owing to the advance in the Paris cheque rates and a decline of about 10 points in the local rates for sterling exchange, which made such transactions unprofitable. Whether or not the outward movement of gold will be resumed later in the week is still uncertain, but the indications are that shipments of the yellow metal are over, at least for the present. The fact that the Bank of France failed to bid for the $3,500,000 gold arriving from South Africa in London on Monday, together with the cancellation of the $500,000 gold above referred to, leads to the belief that the immediate needs of the Bank of France have been satisfied. The immediate future of the local money market, however, is rather uncertain. Last Saturday's bank statement showed a decrease in the surplus reserve of nearly $7,000,000, and since last Friday the banks have lost to the Sub-Treasury nearly $4,500,000. In addition preparations must be made for the July 1 interest and dividend disbursements, which are estimated at $175,000,000, the largest on record. These disbursements, however, will be partly offset by the refunding of the Government 4s on July 1. Under the recent offer of the Secretary of the Treasury about $21,250,000 of these bonds have been turned in for redemption, leaving approximately $39,000,000 outstanding and to be refunded on July 1. The demand from railroads and other corporations has been extremely light during the week, but there are rumors that several large loans are contemplated. Later in the month the city of New York is expected to offer for sale $29,000,000 corporate stock. The rate of interest which this stock is to carry has not been decided upon, but it is expected that a rate will be fixed upon to meet the present conditions of the money market. Bankers and other large lenders of money are not disposed to offer with any degree of freedom, the belief being quite general that rates for both call and time money will work firmer in the near future. The bank statement published on last Saturday made a very unsatisfactory exhibit. Loans decreased $1,514,300; cash decreased $9,065,200, or nearly double the amount indicated by the preliminary estimate. Deposits decreased $9,054,100, thus reducing the reserve required by $2,263,675. Deducting this from the loss in cash, the surplus reserve was reduced by $6,801,925. The surplus now stands at $5,980,925, as compared with $7,162,050 in the corresponding week of last year, $9,827,500 in 1905, $35,562,400 in 1904, $9,477,175 in 1903, $13,302,350 in 1902, $13,341,500 in 1901, and $18,374,250 in 1900. The Secretary of the Treasury has decided to call in the $30,000,000 special deposits made with the banks last September.

The Stock Market

Trading in the securities market was upon a somewhat larger scale during the past week, and while the dealings were accompanied by a decidedly irregular price movement, the final figures were in many instances above those prevailing at the close of last week. Speculation was again largely professional in character, the volume of commission house business clearly indicating that the so-called outside public was not taking even an ordinary interest in the market. At the outset prices developed strength, and the upward movement was continued, practically without interruption during the first half of the week. One of the chief influences working for higher prices was the failure of the money market to reflect in appreciably higher rates, the heavy withdrawal of gold by the Bank of France, and even the publication of the bank statement on last Saturday, which revealed a shrinkage of nearly $7,000,000 in the surplus reserve, failed to check the upward tendency in values. Day to day money was in abundant supply at extremely low rates, while money for fixed periods was practically unlendable at the current asking rates. Other important factors were the improvement in railway gross and net earnings, the more conservative attitude on the part of the Administration toward corporations and the decidedly better news regarding the growing crops. The Government June report on cotton, while making the condition the lowest on record, brought out the fact that the acreage under cultivation was considerably larger than in previous years, and indicated a yield of about 11,500,000 bales, or about an average crop. The Government report on grain was likewise more encouraging. According to traffic managers of the large railway systems the amount of business being offered is sufficient to tax the equipment of the companies to their utmost capacity. Activity continues in iron and steel and in many other lines of industries, the best evidence of this being the action taken by the managers of the American Car & Foundry and the American Smelting & Refining Companies this week in increasing the distribution to their stockholders. Toward the close of the week, however, the market yielded rather sharply on profit-taking sales. The heavy losses in cash sustained by the local banks was used by the professional element to bring about a lower range of values. The failure of a large steel manufacturing plant, for want of sufficient working capital, was also used by operators for the fall. The veto of the Two-Cent Fare bill by Governor Hughes brought about a rally in the standard railway shares, but this was followed by another downward movement, and the general tone of the market at the close was weak. The bond market was flat. The feature of this branch of the securities market was the dissolution of bond syndicates, several of which were announced during the week, and in no case have any considerable portion of the bonds been sold.

The traction stocks were practically neglected. The news from Albany late last week of the killing of the 5-cent fare bill started some buying of Brooklyn Rapid Transit and lifted the price several points. Later on the stock was openly accumulated by interests representing control of the company. This buying started inquiries about dividend prospects, and while no definite statement could be obtained an announcement of a dividend within the next three months is considered possible in usually well informed quarters.

Philadelphia

Dealings in the local traction shares continued upon a rather small scale during the past week, but prices with few exceptions ruled firm in sympathy with the improvements in values in the general securities market. Philadelphia Rapid Transit was the overshadowing feature of the trading, upwards of 14,000 shares changing hands. At the outset pressure was brought to bear upon the stock, and consequently the price yielded 1⅜, but during the latter part of the week buying by strong interests resulted in a sharp advance to 24¼, the final transaction taking place at 23⅝, or a small fraction higher than the closing figure of last week. Union Traction advanced to 59 on light purchases. Later the stock sold at 57¾ ex. the dividend of 2½ per cent, but at the close there was a recovery to 58. Consolidated Traction of New Jersey held firm at 72½, and American Railways brought 48¾. Philadelphia Company's stocks were steady, the common selling at 40 and the preferred at 44¾ and 44. United Companies of New Jersey lost a point to 245, and United Traction of Pittsburg preferred lost ½ to 47.

Chicago

The reorganization of the Chicago Union Traction Company is progressing favorably, and it is expected that many matters of importance will be settled this week. The feature of the market for traction shares was a further severe break in Chicago City

Railway stock to 150, an extreme loss of 20 points, but near the close there was a partial recovery to 157½. Otherwise the market was dull and uninteresting. Transactions included Union Traction at 3½, preferred at 16½ and 17¼; Northwestern Elevated at 24 and the preferred at 60.

Other Traction Securities

There was a decided improvement in the traction issues in the Baltimore market. Trading was light, but prices generally made substantial gains over those prevailing at the close a week ago. United Railway issues were conspicuously firm. The incomes, after selling at 50¼ rose to 51½ on moderate purchases, while the new funding 5s advanced from 78⅝ to 80. The 4 per cents brought 86 and 85¾. Other transactions included Macon Railway & Light 5s at 94½ and 95, Lexington Street Railway 5s at 99, Baltimore Traction 5s 108½, Norfolk Railway 5s at 95¼, and Baltimore City Passenger 5s at 101¼. The Boston market was extremely quiet and steady. Massachusetts Electric common moved up to 17, and the preferred stock advanced a point to 58. Other sales were Boston Elevated at 134, Boston & Suburban at 12, Boston & Worcester at 23 and 23½, West End common at 86¾ and 86, and the preferred at 104½.

Tractions were quiet on the Cleveland Stock Exchange the past week, and only a few small sales were made. The last sale up to Tuesday of Cleveland Electric stock was at 48. This security has held steady through the week with 46 bid and from 49 to 53 asked. Lake Shore Electric common has held about 12½, while the old preferred stock stands at 65 asked and the new stock is firm at 60. Forest City Railway stands at 98⅝ bid and 99½ asked. The stock of this company probably holds up because all that has been issued is represented in the property and there are no bonds. Northern Ohio Traction & Light stands at 23 bid and 25½ asked.

Security Quotations

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

	June 5	June 12
American Railways	48	48
Boston Elevated	133	133
Brooklyn Rapid Transit	50¼	53½
Chicago City	160	150
Chicago Union Traction (common)	3	3
Chicago Union Traction (preferred)	16	17
Cleveland Electric	—	46
Consolidated Traction of New Jersey	71	71
Detroit United	66	63
Interborough-Metropolitan	15¾	16
Interborough-Metropolitan (preferred)	45½	46
International Traction (common)	50	45
International Traction (preferred), 4s	66½	68½
Manhattan Railway	134	134
Massachusetts Elec. Cos. (common)	16	15
Massachusetts Elec. Cos. (preferred)	56	56
Metropolitan Elevated, Chicago (common)	23	22
Metropolitan Elevated, Chicago (preferred)	63	
Metropolitan Street	—	
North American	66½	68
North Jersey Street Railway	40	40
Philadelphia Company (common)	40	39
Philadelphia Rapid Transit	23⅛	23½
Philadelphia Traction	91	91¼
Public Service Corporation certificates	64	64
Public Service Corporation 5 per cent notes	92	92
South Side Elevated (Chicago)	84	83
Third Avenue	105	105
Twin City, Minneapolis (common)	91½	91½
Union Traction (Philadelphia)	58½	*57¼

* Ex-dividend.

Metals

According to the "Iron Age" the blast furnaces did not do quite as well as expected during May. The production of that month of coke and anthracite furnaces footed up to 2,294,005 tons, as compared with 2,219,242 tons in April. The pig iron markets throughout the country are quiet but steady. Sellers have contracted their output far ahead, and buyers generally are well taken care of.

Copper metal holds firm at 25¼c. for electrolytic and 25½c. for lake.

REPORT OF CONSOLIDATED RAILWAY FOR TEN MONTHS

The report of operations of the Consolidated Railway of New Haven and its controlled lines for ten months ended April 30, 1907, shows as follows:

Total gross earnings from operation		$4,989,607
Less operating expenses		3,181,448
Net earnings		$1,808,159
Add income from other sources		851,647
Total income		$2,659,806
Deductions from income:		
Taxes	$299,608	
Rentals of leased lines	756,608	
Interest on current liabilities	85,492	
Interest on mortgage debt	394,421	
Interest on debentures	823,465	
Discounts on debentures	11,283	
Guarantee N. E. I. & S. Co.	145,701	
		$2,516,578
Net income*		$143,228
*Against net income there was charged:		
Six months' dividend paid Dec. 31, 1906		$200,000
Accrued dividend for January to April, 1907		100,000
Total		$300,000

The Consolidated Railway's general balance sheet, eliminating investment, interest and other inter-company accounts, as of April 30, 1907, compares with that of Feb. 28, 1907, and Oct. 31, 1906, as follows:

Assets	April 30, '07	Feb. 28, '07
Cost of road and equipment	$52,481,397	$35,044,129
Due from leased companies	732,067	589,074
Miscellaneous investments	2,101,936	948,367
Material and supplies	850,217	545,673
Cash and current assets	15,128,819	13,391,800
Discount on debentures	652,653	654,900
Inter. Tr. Co., trustee	.....	22,132
R. I. Hospital Trust	5,000	5,000
Waterbury Gas working capital	31,927	.....
Marine disaster account	182,784	.....
Imp. susp. acct	1,809,837	1,011,140
Total	$73,976,639	$52,212,214
Liabilities		
Capital stock:		
Consolidated Railway	$30,000,000	$10,000,000
Leased and controlled lines	76,658	76,758
Mortgage debt	10,644,666	10,706,667
Consolidated Railway debenture	28,500,000	23,500,000
Hartford Street Railway debenture	310,000	310,000
Current liabilities	2,330,754	5,751,396
Accrued liabilities	971,477	697,741
Res. for disc. on ltg. accts	26,720	25,189
Accident and casualty fund	68,339	58,258
Skg. fund Wor. & Web. bonds	.....	22,232
Ct. Ry. & Lt. cont. liab	260,548	262,747
Profit on sec. sold	71,012	71,012
Profit and loss surplus	159,701	730,314
Capital res. acct	556,763	.....
Total	$73,976,639	$52,212,214

Of the item "cash and current assets," $9,369,243 is a note of the New England Investment & Security Company, given in payment for securities of certain street railways in Massachusetts. The item also includes notes for advances made to controlled companies.

THE CLEVELAND SITUATION

City Clerk Peter Witt and a force of city employees, including thirty or forty patrolmen, have been at work all week securing consents for a street railway on Central Avenue. The paper which people are asked to sign states only that the signer is willing to have a street railway built in front of his property and has no appearance of a consent, but it is said that the City Council will consider them as consents. It is claimed that many people do not understand this at all, and have signed the papers thinking that they were only making a statement of their willingness to have a road. It is reported that enough consents have been secured to make a franchise good on that street.

The franchise granted the Low Fare Railway Company on Monday evening of last week, giving it the right of joint use of tracks with the Cleveland Electric on Euclid Avenue, between the Public Square and East Fourteenth Street, and on Superior Avenue and Detroit Avenue west to West Twenty-Eighth Street, does not differ from the first ordinance passed for that purpose, with the exception that it contains a provision that the two companies shall agree upon the compensation to be paid the Cleveland Electric for such use, or, in case of disagreement, the matter shall be settled by the City Council. The first ordinance fixed the compensation, and this the court declared was illegal. This ordinance will probably open the way to litigation, as it is believed that the Cleveland Electric will not agree to any sum that the Low Fare Company will pay.

In the William R. Raynolds case, the Supreme Court of Ohio has rendered a decision to the effect that a renewal of a franchise cannot be granted to any other company than the original holder of the franchise in case the grant is made before it expires. The City Council had given the Forest City Railway Company renewal grants on Central Avenue and Quincy Street, and this suit was brought to test the question. However, it does not affect the present situation, as grants have been made since that time covering this point.

TRANSIT BILL REPORTED FAVORABLY IN PHILADELPHIA

After adopting a number of important amendments to the Street Railway bill as originally proposed by the Retail Merchants' Association, the members of the sub-committee of Councils of Philadelphia on Thursday, June 6, reported the measure favorably to the joint committee on finance and street railways, which at once sent it to Councils with a favorable recommendation. Every member of the two committees concurred in the recommendation, and from the unanimity of opinion shown by the Councilmen after several weeks of public hearings, it would seem that its final passage is practically assured. Among the changes to the bill is one in the city's representation on the directorate of the Rapid Transit Company, a yearly payment fixed on a sliding scale in lieu of the company being relieved of responsibility for street paving, license fees and the removal of snow, and an agreement that the City Hall loop of the Rapid Transit Company can be used by any company that may in the future construct the Broad Street subway. The city at the present time receives from the company about $415,000 annually, and the sum fixed by one of the amendments raises the annual payment for the next ten years to $500,000. According to a sliding scale arranged the annual rental at the end of ten years will be increased $50,000, and a like sum each succeeding ten years, making the payments during the last ten years of the agreement $700,000 per year.

According to the original suggestion, the city's representation on the directorate of the Rapid Transit Company was to consist of the Mayor, the president of the Board of Education and the president of the Board of City Trusts, but under the amended plan this representation shall consist of the Mayor and two men to be elected by Councils. The new arrangement will give Councilmen an opportunity of placing as a director an engineer and a business man instead of the two officials first suggested. Still another provision made by the committee is that the company shall pay the city 7 cents a square yard for the extension of its lines on macadam streets, 8 cents a yard for asphalt and 6 cents a yard for all others, in addition to the lump sum fixed for general charges.

CHICAGO TRACTION AFFAIRS

The objections of the underlying stockholders to the plans of reorganization of the Union Traction Company is said to be based on the discovery of a trust agreement, which it is claimed gives to the Chicago Railways Company (the corporation into which it has been planned to reorganize the Union Traction Company and its underlying companies) practically the power to veto any decision of the arbitrators, Judge Grosscup and Prof. Gray, of Harvard.

John F. Bass, secretary for the protective committees of the underlying companies, has issued this statement:

"The original agreement in the ordinance provided that the arbitrators should be sole and final judges of the distribution of securities of the Chicago Railways Company among the old companies.

"Since the passage of the ordinance the committee representing the underlying companies has discovered that two new elements had been introduced into this arbitration. The committee has been reliably informed that the people who are furnishing the new money and who are closely affiliated with Messrs. Krauthoff and Wickersham, will not agree to furnish that money until they know definitely what the distribution of the securities of the railway company to the old companies is to be.

"Secondly, the trust agreement under which the stock of the railways company is held provides that no plan of reorganization, even though approved by the arbitrators, shall be operative unless it finally meets with the approval of the railways company. This company is controlled by the Union Traction and North and West lines, who are closely affiliated with Messrs. Krauthoff and Wickersham.

"The underlying stockholders feel strongly that all questions at issue be left to the arbitrators, that all stocks may be deposited and the ordinances accepted without delay."

Regarding the situation, special traction counsel, Walter L. Fisher, is quoted as saying:

"It always has been distinctly understood that the Chicago Railways Company was to be obligated to accept and carry out any plan of reorganization approved by the arbitrators, and that it should not be controlled by any one or more of the Union Traction interests as against any other." Attorneys Krauthoff and Wickersham, who came to Chicago last week to announce the plans of reorganization, in view of the objections of the underlying companies, returned to New York without making any announcement.

Judge Grosscup will enter into negotiations with the various warring factions with the hope of bringing them together. He feels reasonably confident that the difficulties will be removed. His plan, it is understood, is to have left to himself and Prof. Gray the plan of reorganization and to have their decision as arbitrators final and binding.

The new Council committee on local transportation, at its first meeting, June 5, re-elected Walter L. Fisher special traction counsel at a salary of $10,000. The committee rejected former traction expert Doty's schemes for regulating traffic.

OPENING THE BRIGHTON BEACH LINE

The embankment section of the Brighton Beach improvement has been thrown open to regular passenger traffic. Stations along the embankment section of the Brighton road will exactly correspond with those along the former line at grade, and with those that were temporarily established along that section of the Long Island road. They are located at Fiske Terrace (Avenue H), Manhattan Terrace (Avenue J), Greenfield (Avenue M), Kings Highway, Avenue U, Neck Road and Sheepshead Bay. All these stations are local stops, the stations at Kings Highway and Sheepshead Bay being express stations in addition. For the present only two tracks will be in use along the embankment. Within a few weeks the two remaining or express tracks will be ready and then the schedules on the Brighton Beach line will be entirely changed and the service increased. The various attractions and the Brighton Beach Hotel open June 15, and an increased train service will be operated on and after that day. The Brighton Beach improvement was described in the Street Railway Journal of May 11, 1907.

BOSTON & EASTERN HEARINGS RESUMED

At a continued hearing before the Massachusetts Railroad Commission on June 10, John H. Bickford, of Boston, outlined the plans of the Boston & Eastern Electric Interurban Railway in connection with his petition for a certificate of approval of the road between Beverly and Boston. Mr. Bickford stated that the territory is divided into three zones: Salem, Peabody, Beverly and Danvers, averaging 17 miles from Boston, with a population of 80,000; Lynn and Swampscott, averaging 11 miles from Boston, with a population of 90,000; and Chelsea, Everett and Revere, 4 miles from Boston, with a population of 81,000. The territory has a population of 2855 per square mile against 361 in the State as a whole. The percentage of growth in the district is 11.58 against 7 in the whole State. Mr. Bickford estimated that in 1910 or 1911, when the road is in operation, its tributary population will be 221,000.

Mr. Bickford criticised the present trolley service between Boston, Lynn and Salem as essentially of a street railway rather than an interurban character, and also pointed out the traffic congestion on the Boston & Maine's double-track line between these cities. The steam road is trying to do a suburban business with through trains, and while the population along its eastern division has grown from 15.7 per cent in Salem to 103.8 per cent in Revere, only four stations in sixteen show an increase in train stops, two have the same number, and the others show a decrease. Lynn has grown 33 per cent in thirteen years, and the train service has increased only 13.5 per cent. The Boston & Maine is greatly hindered by the limitations of the Salem tunnel, and the trains are often behind time. Mr. Bickford stated that the Boston, Revere Beach & Lynn line, a narrow gage steam road, will soon reach the limit of its capacity.

The Boston & Eastern plans for a service entirely different from either steam or street railway traffic. It plans for a private right of way, no grade crossings, block signals and automatic stops. The power is to be distributed from a single power house through three sub-stations to a third rail; the cars will be of steel with four doors on each side, and may be run singly or in trains. Express and local service are planned, the speed of the former trains being 47 m. p. h, and the latter 30 miles. The maximum gradient of the main line is less than 3 per cent, except at stations, where it is 3.24 per cent. Four tunnels are planned, the longest being 2500 ft., and in Lynn it is proposed to build a semi-subway 6600 ft. long.

THE SAN FRANCISCO SITUATION

Disorder has almost ceased and travel on the cars in San Francisco is constantly increasing, more than 150,000 passengers being carried daily, with 215 cars in service. North of Market Street, the travel is becoming heavier than before the strike, due to the fact that many people are moving from other sections of the city into the Western Addition and the Richmond districts. The cars of the Sutter Street line are so crowded that many are unable to board them and are compelled to use other lines. This condition prevails in spite of the fact that the number of cars on the line has been increased 50 per cent since the strike. The Eddy, Ellis, Haight and Masonic lines are doing the normal amount of business for the number of hours that the cars are running.

Two new lines are now operated—the San Mateo and the Powell Street cable line. The Union Street line, which is an independent system, is operating with non-union men. The company started to run its cars with union men, paying them $3 for 8 hours. As the line has a transfer arrangement with the United Railroads, however, the union men refused to issue transfers for the Polk Street line, acting under orders from the president of the union. They were then discharged and their places filled with non-union men.

The car service has now been extended from 5:30 a. m. to 9:00 p. m., and the evening time will be gradually extended until the former service is in force. The company is enforcing rigid discipline among its new employees, and many discharges are occurring every day for various causes. In this connection an official said:

"Heretofore we have been unable to enforce discipline. No matter what a man did we could not discharge him without reckoning with the officers of the union and, rather than be engaged in a constant turmoil with them, we passed over many offenses and infractions of the rules of the company. Under present conditions we shall not be compelled to tolerate any violation of our rules, and we shall not do so. There will be no more 'skidding' of cars on dangerous grades nor passing crossings without stopping. We shall insist on courteous treatment of passengers, and all complaints will be investigated. We may have some difficulty in establishing discipline, but, once established, it will not be difficult to maintain. Dealing directly with our men we shall be able to give the public a better and safer service than heretofore."

NEW WORK IN PENNSYLVANIA

The Harrisburg capitalists who are backing the proposed electric railway between Lebanon and Mt. Gretna and Bismarck, made a trip over the route last week, and appointed an agent to secure the necessary rights of way. They anticipate no difficulty in securing grants from township commissioners and 51 per cent of the property owners.

President C. P. Northrop, of the Corry-Columbus Electric Railway, announces that rights of way are now being secured for a new line from Columbus to Ashville via Bear Lake, Panama and Blockville. It is expected that the Corry-Columbus line will be completed to Columbus by July 4. It is proposed to extend the line through the picturesque Brokenstraw Valley, northward to Panama, N. Y. All the grades are comparatively easy and the road would be easy to construct. At Ashville, N. Y., it is proposed to connect with the Chautauqua Traction Company and will afford another feeder to Chautauqua Lake from Northwestern Pennsylvania.

Charters were granted at the State Department last week to the Bellebridge Street Railway Company and the Crucible Street Railway Company, both of which are controlled by the same promoters. The Bellebridge line will be 4 miles long, extending from Glassport to Elizabeth, while the Crucible line will be 2½ miles long, extending from State Street in Clairton to First Street in West Elizabeth and the Aliegheny-Washington County line. The capital stock of the Bellebridge company is $24,000, and of the Crucible company $15,000. The president of both companies is D. B. Neagley, and the directors are D. B. Neagley, E. L. Kern, J. K. Neagley, George McKain and N. F. Bicking, all of Pittsburg.

ORGANIZATION OF INTERBOROUGH-METROPOLITAN LEGAL STAFF

President Shonts, of the Interborough-Metropolitan system in New York City, announced last week a reorganization of the legal staff of the company. The organization is now constituted as follows: Paul D. Cravath, general counsel, New York City Railway Company and subsidiary companies; George W. Wickersham, general counsel, Interborough Rapid Transit Company and subsidiary companies; James L. Quackenbush, formerly general attorney of the New York City Railway Company, is now general attorney for all companies; A. A. Gardner, formerly attorney for the Interborough Rapid Transit Company, has been appointed general solicitor for all companies; Charles A. Gardiner, formerly general attorney for Interborough Rapid Transit Company, has been appointed solicitor for Manhattan Railway Company; Henry A. Robinson remains as solicitor for the New York City Railway Company, and has also been appointed solicitor in charge of the bureau of real estate and taxes for the various companies in the system; Van Vechten Veeder, formerly attorney of the New York & Queens County Railway Company, has been appointed attorney and solicitor for the litigation of all of the companies in the Borough of Queens and in Nassau County; Ambrose F. McCabe, formerly attorney and solicitor for the Union Railway Company, retains that position and has also been appointed attorney and solicitor for the litigation of all the companies of Westchester County.

The office of Theodore P. Shonts, president of the Interborough-Metropolitan Company of New York City, was moved last week from the Park Row Building, New York City, to the United States Realty Building, 115 Broadway, seventeenth floor. H. M. Fisher, secretary of the company, W. Leon Pepperman and H. H. Smith, also of the Interborough-Metropolitan Company, will have their offices at this place.

COMLIMENTARY DINNER TO J. N. SHANNAHAN

A complimentary dinner in honor of John N. Shannahan, of Gloversville, N. Y., who, as announced in this paper, has recently resigned the management of the Fonda, Johnstown & Gloversville Railway Company to accept that of the Washington, Baltimore & Annapolis Railway Company, occurred June 7. It took place at the Ten Eyck, Albany, and about seventy of Mr. Shannahan's friends, mostly from the central part of New York State, were present. The banquet was given in the large dining hall of the hotel, and the guests were seated on the outside of four tables, which were arranged in the form of a rectangle. The space between the tables was beautifully banked with flowers, palms and other potted plants, with a fountain in the center. After an excellent dinner, Mr. Klein, of Amsterdam, an old friend and business associate of Mr. Shannahan, acted as toastmaster. The speakers included Messrs. Shultz, of Utica; Burton and Mills, of Gloversville; Fassett, of Albany; Harrington and Lewis, of Utica; Schermerhorn, of Schenectady, and C. Loomis Allen, of Syracuse. All of the speakers had been associated with Mr. Shannahan either at Troy Polytechnic Institute, in the New York Central service, on the Fonda, Johnstown & Gloversville Railway or in New York State Association work. They spoke in the highest terms of Mr. Shannahan's ability and attractive personal traits, and extended their best wishes to him for success in the new enterprise in which he is to be engaged. At the conclusion of the speeches Mr. Shannahan replied in an appropriate way, expressing appreciation of the cordial friendship manifested by those present, and their expressions of interest in his future career. The committee in charge of the dinner consisted of H. N. Ransom, E. S. Fassett and E. F. Peck.

THE D. & H. TO PASS TO NEW YORK CENTRAL?

According to the New York "Tribune," the Delaware & Hudson Company will soon pass to the control of the New York Central & Hudson River Railroad. "It is understood in well informed Wall Street quarters," says the "Tribune," "that negotiations already have begun between the New York Central and some of the chief interests in the Delaware & Hudson for a transfer of Delaware & Hudson stock to the New York Central in exchange for stock of the latter company, and it is said the general plan for the merger will involve an offer on the part of the New York Central to all Delaware & Hudson stockholders for an exchange of stock on a basis that will return to the Delaware & Hudson holders a dividend income equal to that which they are receiving at present. In the last two years a large amount of Delaware & Hudson stock has been concentrated in the hands of banking interests in Wall Street, who have bought the securities in expectation of turning them over to the Vanderbilt road."

Cornelius Vanderbilt, it was announced Tuesday, June 11, had been elected a member of the board of managers of the Delaware & Hudson Company, taking the place of Frank E. Smith, who was elected a director of the company at the annual meeting of the shareholders a little over a month ago. It had been determined at that time to elect Mr. Vanderbilt a manager of the road, so it is said, but he was absent from the city, and it was deemed best not to elect him until his consent had been obtained. Mr. Smith was elected with the understanding that he should fill the vacancy caused by the resignation of Alexander E. Orr until such time as the management could obtain the consent of Mr. Vanderbilt to serve.

In connection with Delaware & Hudson Company affairs it is rumored that A. I. Culver, recently vice-president of the Delaware & Hudson, will remain with the company in control of its trolley interests. It is planned, according to report, to consolidate the Schenectady, Hudson Valley and United Traction Companies into one corporation, with Mr. Culver at its head.

CHANGE IN OUR CHICAGO OFFICE

The Chicago office of the McGraw Publishing Company and of the STREET RAILWAY JOURNAL has been moved from the Monadnock Block to room 590 Old Colony Building, Chicago. A supply of current copies of this paper, as well as of other papers and books published by the McGraw Publishing Company, will be found at the new office and visitors will be welcomed by our representatives.

WISCONSIN'S ASSEMBLY PASSES UTILITIES BILL

Wisconsin's public utility bill, which has the support of the two committees of the Assembly and Senate, was passed by the Assembly June 7 without change from the committee draft. The measure puts all public utilities, except the telegraph and telephone, under the control of the State Railroad Commission. This Commission will have power to direct the nature of the service to be rendered, the rates to be charged, and the bill even goes so far as to give the Commission the right to say whether or not new companies shall be allowed to begin business. The corporations favor the measure, declaring that it will enable them to keep out of politics.

EXTENSIONS AT RIO DE JANEIRO

The conversion of the electric railway system at Rio de Janeiro, Brazil, by the Rio de Janeiro Tramway, Light & Power Company, Ltd., is being carried forward. The road possesses at present fifty electric cars equipped with Siemens & Halske motors, the rest of the system being operated by animal power. These electric cars are now being mounted on Brill trucks equipped with Westinghouse 101-B motors and magnetic brakes. Eventually about 3000 cars will be required to supply the city service.

The operating company is a New Jersey corporation, and as its name implies owns the tramway, light and power franchises in the city. Since the company acquired the property a year or so ago it has been busily engaged in laying new tracks, standardizing the gage and installing conduits and wire for city and house lighting. The company is also developing a large water power plant at Rio des Larges, 40 km, or 25 miles from the city. Two transmission lines, capable of carrying 20,000 kw, are now being built over the mountains separating the falls from Rio de Janiero. The plans at present provide for the increase of this power capacity to 80,000 kw, but as the power is practically unlimited all that is required in the city will eventually be taken from this source.

The work of construction and reconstruction in Rio de Janeiro has been in charge of Norman Berry, as superintendent of motive power, and F. A. Koziel, assistant superintendent. The New York office of the Rio de Janeiro Tramway, Light & Power Company is at 25 Broadway.

MEETING OF CENTRAL ACCOUNTING CONFERENCE

At the second meeting of the Central Electric Accounting Conference, held in the Claypool Hotel, Indianapolis, Ind., representatives were present from some twelve companies, in addition to which a number of traffic men were in attendance by special invitation. The question of the plan of settlement of interline accounts was continued from the meeting of March 2, at Dayton, and the further subjects were discussed of the method followed in checking Central Electric Railway Association and other mileage coupons, the recording of interline way bills, freight accounts, etc.

All roads check mileage coupons daily, separating the collections by lines and making a recount of all coupons at the end of each month before forwarding them to the issuing lines. In discussing the method of recording interline billing it developed that most lines have a system for recording interline way bills passing junction stations, using a record book. It was the opinion of those present that all interline waybills passing junction stations be reported in triplicate. This would afford a copy for the accounting departments of both the receiving and the forwarding line and a copy for the agent. A form embodying this arrangement will be printed, and it will be adopted by a majority of the lines handling interline billing.

Different systems are used for caring for freight and express shipments from non-agency points. There was, however, a full discussion of freight accounting forms and methods. As a result of the discussion, a committee was appointed to secure copies of all freight accounting forms in use on the various roads, and will report at the next meeting. Members of the conference are asked to forward to C. B. Baker, the secretary, who is freight auditor of the Western Ohio Railway Company, of Lima, Ohio, samples of all freight accounting forms in use on their respective roads and to make suggestions.

REPORT OF THE PARIS METROPOLITAN RAILROAD

At the last annual meeting of the Paris Metropolitan Railway, on May 18, it was stated that during 1906 the company has added 12.5 km, or 7.6 miles, to the Metropolitan system. The new lines are the Passy-Italie divisions of the South belt line and the Italie-Lancry section of the North and South line. Other sections are under construction. The power of the Bercy generating station has been increased to 14.400 kw, and four new sub-stations have been built. The rolling stock at present in operation includes 327 motor cars and 379 trailer cars; 254 other cars are in course of construction.

The total length of lines covered by franchise is 80 km (50 miles); the length at present in operation is 44.242 km (27.65 miles); the gross receipts in 1906 in round numbers were fr. 29,000,000, the expenses were fr. 12,000,000. Of the net receipts the city receives fr. 9,000,000, leaving fr. 8,000,000 for the company. This is an increase of fr. 2,000,000 over last year.

PRESIDENT LOWRY OF THE TWIN CITY RAPID TRANSIT EXPRESSES HIMSELF ON LOW FARES

Thomas Lowry, president of the Twin City Rapid Transit Company, who has been in the Southwest through the winter and spring, has returned to Minneapolis, and expects to give attention to business during the summer. Mr. Lowry says that while the general decline in securities has had its effect on the issues of his company, the real reason for the lower quotations for Twin City lines is the recent agitation for fare reduction and the unfavorable attitude of the municipalities through which the lines run.

"The six-for-a-quarter agitation," Mr. Lowry is quoted as saying, "affects our stock and our ability to borrow money and everything else. I have full faith, however, in the validity of our franchise and our ability to maintain fares."

For Minneapolis and the territory served by the Twin City lines, Mr. Lowry expects a year of continued good business, despite the somewhat more conservative tone to general reports. The comparative quietness in real estate in Minneapolis and St. Paul is due, he believes, to the fact that the decline in securities affected the purchasing power of a good many holders of stocks, who would otherwise be found more active in real estate, now that the spring season is opening.

ELECTRIC RAILWAY LECTURE AT WORCESTER POLYTECHNIC INSTITUTE

The annual engineering lecture at the Worcester Polytechnic Institute was delivered by Prof. A. S. Richey, of the Department of Electric Railway Engineering, on the evening of June 11, the topic being "The Development of the Electric Railway." Prof. Richey sketched the progress of the industry from its early days to the present time, showing a large number of lantern slides of cars identified with the experimental phase of the electric traction business and outlined the evolution of rolling stock and motors down to the latest locomotives in use in heavy electrified steam service.

Prof. Richey touched upon the efforts of Davenport, Davidson, Farmer, Hall, Siemens & Halske, Field, Edison, Sprague, Daft, Van Depole, Bentley, Short and Knight in the development of the art, and contrasted the statistics of the 1882 period with the figures of to-day. In 1882 there were 415 companies in the country operating 3000 miles of horse car track, with 35,000 employees and 18,000 cars. The service required 100,000 horses, and as late as 1890 the horse problem occupied the attention of the annual convention of the American Street Railway Association. According to the 1905 figures of the Census Bureau there are now about 33,000 miles of electric railway operated in this country by 200,000 men and 80,000 cars, with a passenger traffic of 7,000,000,000 per annum, and a capital investment of $3,500,000,000. The lecture closed with a sketch of the development of suburban and interurban service, including the limited interline, freight and express business, and concluding with a large number of illustrations of electric locomotives and electrified steam railroad installation work.

A NEW FRANCHISE SOUGHT IN TERRE HAUTE

Hugh J. McGowan, president of the Terre Haute, Indianapolis & Eastern Company, Robt. I. Todd and Ferdinand Winter, have presented to the Board of Public Works and a committee of the Council of Terre Haute, a new contract with the city for the company, and urge that action be taken speedily, as the company desires to make a number of improvements. According to the contract, the terminal station, which the new law requires to be erected at once, is promised within three years. Within two years the tracks in Main Street are to be relaid and sufficient cars are to be provided to equip all lines. It is promised that $850,000 will be expended for permanent improvements and in the building of interurban lines, the terminal station and new equipment. The right is granted to build such switches as are needed for the terminal station. The interurban cars are to be operated independently of city traffic. The fare is fixed at 5 cents for a continuous ride in the local cars and 5 cents for one continuous ride in interurban cars between any point in the city and the terminal station or other terminal points or any intermediate point, but it is agreed that the company may enforce such rules as it may deem to be to the interest of its interurban patrons respecting the use of its interurban cars within the city limits. The city cars are to be operated on "such reasonable schedule as the public convenience may require." The franchise is to continue until 1952, the date of the expiration as fixed in the present franchise.

PHILADELPHIA & WESTERN REORGANIZED

At a meeting of the incorporators and stockholders of the Philadelphia & Western Railway Company, successor to the Philadelphia & Western Railroad Company, last week, the company was formally reorganized. George R. Sheldon was elected president; Thomas Newhall, vice-president; Davies Murdoch, secretary and treasurer; George R. Sheldon, Randolph Rodman, James H. Brewster, Jr., Thomas Newhall, William H. Sims, W. Robinson Molinard and Joseph S. Clark, directors. It was decided to authorize a bond issue of $20,000,000, of which $4,000,000 is to be floated immediately; the remaining $16,000,000 being held for extensions, betterments and permanent improvements. It was also decided to issue $4,000,000 of stock, being $600,000 of preferred stock and $3,400,000 of common stock. Elsewhere in this issue appears an extended description of the property.

CHANGING THE BROOKLYN BRIDGE CAR SERVICE

Bridge Commissioner Stevenson revealed another feature of his plan to increase the traffic facilities of the Brooklyn Bridge at the meeting of the Board of Estimate last week, when he applied for an appropriation of $45,000 for making improvements to the structure. Ten thousand dollars of this appropriation is to be devoted in the installation of a local trolley service across the bridge, to take the place of the local train service which is now in vogue. It is the plan of the Commissioner to use the ground floor of the present terminal on the Brooklyn side for the installation of trolley loops similar to those which are now used at the Manhattan terminal. With the establishment of the new terminal loop station on the site of the "Staats Zeitung" Building, and the temporary terminal across Park Row into City Hall Park, it is the purpose of the bridge department to run through trains across the structure at all hours. This will obviate the necessity which exists at the present time of changing from the bridge trains during the rush hours to the elevated trains on the Brooklyn side. Mr. Stevenson points out that when this new train service is installed it will be impossible to continue the present local service. For the accommodation of the people who are using this service, Mr. Stevenson proposes to establish the local trolley service. Part of the appropriation is also to be used in making the operation of trains across the bridge safer than at the present time. A system of block safety signals will be installed all the way over the bridge, which will keep the trains operating in the same direction at safe distances from each other. The largest part of the money is to be expended in laying new ties for the railroad tracks. Mr. Stevenson's request was referred to Comptroller Metz for a report.

NEW PUBLICATIONS

"Etude sur le Metropolitan de Paris." By J. B. Thierry, Paris Librarie Polytechnique. Ch. Beranger, Paris. 1907. Paper, price, 50 centimes.

This monograph is primarily a study of the subways of Paris with particular reference to their structural features as bearing on the convenience, safety and hygienic features of their operation. As these subways and the methods used upon them are typical to those used elsewhere in the world the conclusions of M. Thierry have a far wider application than the locality to which they are particularly addressed. The author, in fact, uses the Paris conditions as a horrible example to what ought not to be in subway construction, and he writes with a full appreciation of the general faults of such roads. He states frankly that the same inconveniences described found in Paris exist always and have substantially the same cause in other subways, and lays down the fundamental thesis that such faults proceed from practically a single cause, to wit: That the constructors of such lines have treated them precisely as if they were trunk lines upon the surface, and have used the same general methods of construction and operation which would be appropriate to surface lines, entirely forgetting that the conditions of underground operations are in many respects very different. The particular weakness of the Paris subways, from the author's point of view, is their utter disregard of hygienic conditions, both as regards the general public and the employees of the company, and he presents some startling figures as to the loss from sickness to the actual personnel of the Paris subways.

The particular fault common to the Paris and other subways, M. Thierry holds, is a totally unnecessary and unwise use of the ballasted way, with the rails laid upon cross-ties, as is usual in railroad construction. An ordinary railroad runs for the most part at the ground level and over all kinds of country. It is necessary to level up the roadbed and to build it so that it will form a firm sub-structure, solid and well drained, substantial enough to keep the cross-ties permanently in position. The ordinary ballasted structure meets these requirements excellently, and it gives a firm roadbed for the heavy weights that must be carried, sufficiently resilient without being yielding, answering fully the requirements of the traffic which it is intended to carry. In subways the conditions are entirely changed. The walls and floors of the subway are of masonry or concrete, forming a solid and level way in itself. There is no need of ballast for the purpose of giving firm foundation or to provide for drainage. Broken stone such as is generally used for ballast, when employed upon surface track, forms part of the way, locking itself firmly together and into the gravel below. When used on the concrete floor the same ballast simply remains as a surface layer which does not at all unite with its sub-structure, and merely remains in place by its own weight on the smooth foundation. It does not even, under some circumstances, hold the cross-ties with sufficient rigidity against lateral movement.

Structurally, therefore, the use of ballast is not needed and is signally ineffective. The author then remarks: "What is the use of laying cross-ties on this layer of broken stones and at considerable trouble to buttress them against lateral movement due to insufficient cohesion of the ballast, when a foot or so below the ties there is already provided a firm and rigid floor." A more serious indictment brought against ballast is on the ground that its use is unhealthy. A subway is cut off from free access of light and air, and is generally damp without having any of the advantage that comes from the well ordered application of water, and the ballast becomes a trap for filth and dirt of every description, kept conveniently moist for the development and preservation of micro-organisms. Dust, which is formed or finds its way into the subways in so far as it does not join the slime in the moister part of the ballast, finds lodgment in the broken stone to be whirled up and conveyed to the lungs of the passengers by the passage of the trains. M. Thierry calls attention to the fact that subways are at once industrial and public establishments, and as such are subject to the statutes bearing upon hygienic conditions in such places, and that as now constructed they cannot possibly be kept clean, as provided in these statutes.

Further than this, in case of any trouble in the subways, such as has more than once occurred, a ballasted way carrying unprotected third rails, raised but little above its surface, is a very serious menace to many persons who are compelled to make use of it in order to escape the greater danger of remaining. Finally, the ballast, composed as it is of comparatively rigid material, does not sufficiently muffle the vibration of the trains. In point of fact a serious amount of vibration is communicated to neighboring buildings to the damage and inconvenience of the occupants. It does not even suffice to ameliorate what M. Thierry calls "the infernal din" of the trains, which rank with dust and evil smells at the head of the thousand causes of suffering inflicted on humanity in cities. This forms a serious indictment with many counts against the form of subway construction used in Paris, and, for that matter, elsewhere.

The solution of these difficulties proposed by the author is a simple and rational one. Instead of building a subway with a concave floor for the reception of a thick layer of ballast he would provide it with a solid floor of concrete and masonry, slightly convex on the interior and provided at each side with a longitudinal drain. At about the height of the top of the trucks, at each side, he would provide a platform wide enough for persons in single file to walk comfortably, supporting themselves by a hand rail projecting from the side of the subway at a convenient height. The platform itself forms a top of a recess carrying at its bottom the insulators for the third rail and provided with brackets for the feeder cables. In this way all dangerous conductors are safely stowed away under the platform, and the employees or persons leaving the train have always a safe course along the subway.

Instead of supporting the rails upon cross-ties, four deep semi-circular channels are provided in the floor of the subway. These channels carry longitudinal stringers, firmly bedded in asphalt, a thin layer of which covers the entire subway floor. On these stringers are laid the rails with a very ingenious device for further deadening the noise and vibration. Instead of the ordinary type of rails, composed of a head, web and a wide supporting foot, M. Thierry advises the use of a double-headed rail, an upper head forming the usual tread, while a smaller lower head is supported on chairs, placed upon the stringers, being bolted firmly through the web with blocks of hard wood clamped between real-head and chairs on each side of the web. These wood blocks and stringers, and the asphalt beneath, would give ample resiliency and would tend greatly to reduce the noise and vibration which now exist. Rails of this character have been used to some extent, and with at least a fair degree of success. A subway constructed in this manner can certainly be very effectively cleaned, and M. Thierry believes that a simple way of doing this would be to run through the subway at night a sprinkler car, sending through the entire cross section of the subway from the top a copious spray, cleansing the air and surface together. The platforms would shelter the third rails and cables from this purifying shower. The drains would carry off the water thus applied, and comparatively little hand work would be necessary for keeping the subway really clean.

With respect to ventilating the cars M. Thierry holds somewhat radical ideas. He believes in seats running lengthwise of the car so as to leave the interior comparatively free for the circulation of air, and then would provide large ventilating apertures at each end of the car, so there would be a steady stream of air produced by the motion of the train. How employees and passengers would endure the draft thus provided the book does not state. Beyond this the author proposes through ventilation of the cars during their passage around the loops of the ends of the routes or at some analogous point. To secure this he suggests a very powerful artificial current of air derived from blowers and directed obliquely across the track. As cars swing slowly around the loop all available apertures would be open, and in passing through the cross stream of air the cars would be thoroughly blown out while empty, and would start with at least something like adequate ventilation on their next trip. As M. Thierry grimly remarks, this solution is exactly the inverse of the practice usually followed, which consists of running around the loop with all the train doors closed so that in a few moments the cars arrive at the starting point ready for the next trip surcharged with all the infection accumulated on the previous runs.

The matter of noise is taken up at considerable length, especially with reference to the applicability of the form of rail already described with its sub-structure of asphalt. There seems to be little doubt that by skilful application of asphalt and similar substance it is possible greatly to reduce the noise and

vibrations, and while it may be impossible to produce quiet-running fast trains, what M. Thierry suggests would certainly very much relieve the situation.

The author's attacks on the conditions which exist in the Paris subway, substantially as outlined here, is well worth reading, for it gives in considerable detail the reasoning which leads to his somewhat startling conclusions. Certainly an ordinary subway is neither clean, quiet nor well ventilated, and any suggestion, even if an extreme one, in the way of relieving them is well worth reading by any engineer who is interested in subways.

In a postscript M. Thierry adds the interesting information that the engineers of one of the new Paris subways have taken up seriously the study of a project for a line laid out in accordance with the author's suggestions, and after an examination of his manuscript. Should the project be carried out it would certainly prove a most valuable object lesson in the application of new ideas and methods to a new and difficult situation.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED MAY 28, 1907

854,730. Control of Electric Cars; John J. Frank and Jesse S. Pevear, Schenectady, N. Y. App. filed Sept. 19, 1906. The primary of a small transformer is in shunt with the motor circuit and serves to automatically make the proper motor connections when the car passes from a direct-current section to an alternating-current section and vice versa.

854,733. Brake-Shoe; William G. Grant, Suffern, N. Y. App. filed Aug. 31, 1906. Comprises a plate of substantially uniform width having portions of its sides bent in opposite directions transversely across the plate, forming a integral key-lug.

854,759. Trolley Pole; Lee Radcliff, Danvers, Ill. App. filed June 29, 1906. A curved trolley pole having a wheel at either end and hinged at its middle portion on the roof of the car. Either wheel may be impelled upward against the wire by spring-pressed arms.

854,761. Separable Brake-Shoe and Head; Charles A. Remelius, New York, N. Y. App. filed March 30, 1906. The brake-shoe is keyed to the brake head in such a manner that it may be readily removed and replaced when worn.

854,767. Switch Stand; Fred W. Snow, Hillburn, and Wm. C. Kidd, Suffern, N. Y. App. filed Feb. 23, 1907. Details of a switch stand for use in any location where compactness of structure is a desideratum.

854,803. High-Speed Brake Apparatus; John W. Cloud, London, England. App. filed Sept. 20, 1905. A fluid pressure brake apparatus comprising a main brake set, an auxiliary brake set and a speed-controlled valve device for regulating the amount of braking pressure exerted by the auxiliary brake set.

854,804. Trolley Wheel; John C. Cordrey, La Junta, Col., and Patrick J. Brady, Harvey, Ill. App. filed June 30, 1906. The wheel is made up of sections of steel and brass so as to combine the wear-resisting materials of the first metal with the good conducting qualities of the second.

854,828. Car Wheel; Frank Latimer, High Bridge, N. J. App. filed Sept. 11, 1906. Details of a steel-tired wheel, the center of which can be readily retired after wearing down.

854,918. Electric Governor; Herman Weber, Colorado Springs, Col. App. filed April 30, 1906. Provides means for automatically closing an electric circuit and lighting a lamp or visual signal when a car stops to prevent rear end collisions.

854,970. Electrical Block Signal; Elza S. Stotts and Lester O. Dickey, Omaha, Neb. App. filed Aug. 13, 1906. A semaphore signal having a motor for raising the arm and a magnet trip for dropping it to danger.

854,985. Brake-Shoe; Seth A. Crone, New York, N. Y. App. filed Feb. 21, 1907. A brake-shoe having a cast metal body and plate back, the back having at its end portion a transverse inwardly depressed integral loop over which the cast metal extends.

855,053. Railway Rail Fastener; Walter S. Glasgow, Toledo, Ohio. App. filed March 29, 1907. The flanges of a metallic channeled tie are cut away and transverse plates are inserted to which the rails are secured.

855,090. Automatic Street Railway Switch; John A. Boquist, Minneapolis, Minn. A lever in the roadbed is engaged by an approaching car to throw the switch.

855,114. Suspender for the Contact Wires of Electric Railways; Joseph Mayer, Rutherford, N. J. App. filed Feb. 5, 1907. A suspender for electric trolleys adapted to clamp the wire and protect the same from bending strains.

855,183. Sand-Box; Peter S. Keck, Allentown, Pa. App. filed March 27, 1907. A plurality of shafts are mounted in the hopper and each have a series of pins thereon. The shafts are so geared to the discharge lever that they will be rotated when the lever is operated.

855,424. Guard for Switch Frogs, Guard Rails or the Like; Alfred Anderson, Minneapolis, Minn. App. filed May 3, 1906. Consists of a body plate and a longitudinal bar applied thereto and projected from its under side, said bar being toothed so as to engage the ties of the roadbed.

855,265. Rail Splice; James Thomas, Joliet, Ill. App. filed Sept. 7, 1906. The base and one side of one of the fish-plates are integral, the base extending under the rail and having an upturned lug in which is mounted a set-screw for engaging the other fish-plate.

855,323. Strain Adjuster for Contact Wires of Electric Railways; Joseph Mayer, Rutherford, N. J. App. filed Feb. 5, 1907. Relates to a trolley hanger designed to overcome the effects of changes in temperature in the trolley wire.

PERSONAL MENTION

MR. SAMUEL B. McLENEGAN, former superintendent of the Interurban Railroad, of Los Angeles, Cal., has been appointed general manager of the Central California Traction Company, of Stockton, which owns about seven miles of trackage in Stockton, which will be a basis for a larger system.

MR. A. W. Q. BIRTWELL, assistant treasurer of the Houston Electric Company, of Houston, Tex., has resigned from the company to become assistant treasurer of the Northern Texas Traction Company. Mr. Birtwell will be succeeded in the Houston Company by Mr. H. L. Harding, of the company.

MR. WESLEY WENTWORTH has resigned as general superintendent of the Houston Electric Company and will be succeeded by Mr. U. Foss, formerly superintendent of the lines of the Consolidated Railway, at New Britain, Conn. Mr. Foss before becoming connected with the Consolidated Company was with the Connecticut Railway & Lighting Company and the Syracuse Rapid Transit Company.

MR. EDGAR S. FASSETT, general manager of the United Traction Company, of Albany, N. Y., has been elected to the board of directors and made a member of the executive committee of the company. Mr. Fassett takes the place of Mr. William J. Mullin, resigned. Mr. Mullin is traffic manager of the Delaware & Hudson Company, and severed his connection with the traction company because of his many duties with the Delaware & Hudson. Mr. Fassett has been with the United Traction Company for many years.

MR. J. W. SHERWOOD, who recently resigned as assistant general manager of the Mexico City Railway Company, of Mexico City, has just returned to New York. Mr. Sherwood began his railroad career with the New York Central Railroad, with which he was connected until 1895, when he resigned to enter the service of the Brooklyn Heights Railroad Company under the general superintendent. Subsequently he left that position to enter a subordinate place at one of the depots of the company, where he spent more than a year thoroughly familiarizing himself with the details of management in order to fit himself for the position of chief clerk to the general superintendent. In 1902, after several years of service in the capacity just mentioned, Mr. Sherwood left the service of the Brooklyn Rapid Transit Company to become connected with the Public Service Corporation under Mr. W. W. Wheatly, the general manager. In 1903 Mr. Sherwood resigned from the Public Service Corporation to accept the position in Mexico City, which he recently relinquished.