

Street Railway Journal

Vol. XXI.

NEW YORK, SATURDAY, JUNE 13, 1903

No. 24.

PUBLISHED EVERY SATURDAY BY THE
McGraw Publishing Company

MAIN OFFICE:

NEW YORK, ENGINEERING BUILDING, 114 LIBERTY STREET.

BRANCH OFFICES:

Chicago: Monadnock Block.

Philadelphia: 929 Chestnut Street.

Cleveland: Cuyahoga Building.

London: Hastings House, Norfolk Street, Strand.

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

TERMS OF SUBSCRIPTION

In the United States, Canada and Mexico.....\$4.00 per annum
Single copies, first issue of each month, 25 cents; other issues, 10 cents.

To all Countries outside of the United States, Canada and Mexico....

	\$6.00
	£1-5s
	M 25
	Fr. 31

Single copies, first issue of each month, 40 cents; other issues, 15 cents.

Subscriptions payable in advance, by check or money order. Remittances for foreign subscriptions may be made through our European office.

Entered as second-class matter at the New York Post Office.
Copyright, 1902, McGraw Publishing Co.

EDITORIAL NOTICE

Street railway news, and all information regarding changes of officers, new equipments, extensions, financial changes and new enterprises will be greatly appreciated for use in these columns.

All matter intended for publication must be received at our office not later than Tuesday morning of each week, in order to secure insertion in the current issue.

Address all communications to

THE STREET RAILWAY JOURNAL,
114 Liberty Street, New York.

Pension System in Denver

The Denver City Tramway Company, as announced elsewhere in this issue, has made a striking departure among the Western street railways in the establishment of a pension fund. Very few railway companies, even including steam railroad companies, have undertaken the outlay which a plan of this kind entails, so that it is particularly interesting that a company so far West as that in Denver should have commenced the practice. The establishment of the pension fund is made concurrent with that of a mutual benefit association. But the two are kept entirely distinct, and the company has wisely undertaken to defray the entire cost of the pension fund itself, at the same time generously undertaking to contribute one-fourth as much to the treasury of the Mutual Aid Society as is paid in by the members. It is yet too early to give a satisfactory opinion as to the practical benefits to be derived from paying old-age pensions. The plan must be a popular one with the employees, and their consequent greater loyalty and more efficient service for this reason, and also from the retirement of superannuated employees, have undoubtedly a pecuniary value to any company. Whether this benefit reaches the point at which it is worth the annual disbursement required for the pensions is a question which each company must determine for itself. There is, and can be, no obligation, direct or implied, between the employer and the employed by which the former should pay for services which the latter does not or cannot render, but if a company should decide to establish such a fund, the fact certainly constitutes a very important incentive for continuing

loyally in its service. The pension which the Denver company agrees to pay to employees, who at their retirement have been receiving average monthly wages of \$80 or more, is \$25 a month. If we capitalize this we find that it is equivalent to the interest at 4 per cent on \$7,500. As 4 per cent is about the maximum interest paid by savings banks and other investments available to the average employee, the receipt of a pension of \$25 a month is equivalent, so far as the employee himself is concerned, to an increase of his capital to the extent of \$7,500, an amount which is certainly not to be despised.

The Street Car Bouncer

Staid New England is in a bad way these days. Here we have stories from Boston about disorderly scenes enacted by drunken men on the night cars running into suburban districts. So great has become this nuisance that it is proposed to employ as conductors vigorous young men who are proficient in boxing and bouncing, and who will be capable of preserving order or expelling unruly passengers. This burst of honest indignation is refreshing and reassuring after the record of the last year in such New England towns as Providence, Pawtucket, Bridgeport and Waterbury, and it goes far toward restoring confidence in the Hub, but for our part we would hesitate before adopting this suggestion. In the first place, the public is fickle and so are the newspapers, and both would be liable to open their batteries upon the company and the conductor should some highly respected resident of Dorchester be ejected for carrying in his capacious midst excessive baggage not in the original package.

It would be asking altogether too much of conductors on the owl cars to make nice distinctions between a tipsy literator returning from an evening with Emerson or Browning, and a patron of art who had been "Down Where the Würzburger Flows." All drunks act alike, in that they are public nuisances, and should be suppressed, but public sentiment is not strong enough, even in Boston, we fear, to uphold in all cases a vigorous enforcement of the regulations proposed as an outcome of the recent disturbances. It would certainly be a great relief to the trolley companies if such a state of affairs could be brought about, and would be welcomed by them as well as by the public.

Interurban Terminal Facilities

An examination of the plans of the interurban electric railway, which forms the subject of the leading article in this issue, discloses the fact that the projectors of this enterprise realized the importance of providing ample terminal facilities for handling freight as well as passenger traffic in competition with steam roads. Aside from the interest that will be excited among engineers on account of the high standard of construction and equipment that marks this system throughout, it will attract universal attention because of the provision that has been made for doing business according to methods approved and used by the leading steam railroads of the country.

One of the most serious drawbacks that early interurban electric lines encountered in the development of a large volume of business, was their lack of facilities for handling freight

quickly and economically so as to compete with established steam roads. Most of these interurbans were extensions of the local systems of the points which they connected, and they entered the cities they reached through the principal streets and over the tracks of the local company. This gave them access to the heart of the business district, but it precluded the possibility of making high speed through the town, and it prevented them from handling heavy freight. Moreover, it is out of the question to secure adequate space in the center of the city for freight yards and switching tracks necessary for a proper development of this branch. For this reason many of the Western interurban roads have found it advisable to change their original plans, and not a few of them have already established stations outside of the retail district, some on the outskirts of the principal towns, so that it will not be necessary for them to pass through the congested business district. Besides, they can thus secure much more yard room, and they will not be compelled, as heretofore, to restrict their operations to the handling of package or fast freight.

The preparations at Scranton, Wilkesbarre and other points on the Lackawanna & Wyoming Valley Railway, however, are on a much more comprehensive scale than anything that has thus far been attempted elsewhere, and compare favorably with the provisions made by the best steam trunk lines. It is evident that the management will make a serious effort to control the freight as well as the passenger business in the section which this line traverses. Accommodations have been provided that are far superior to those of any of the competing steam lines, so that much quicker and more frequent service may be furnished. The terminal facilities have been very carefully planned, and their location is in every way adapted to the service for which they are intended. At the present time only one division of the road is in operation, namely, the section extending from Scranton to Pittston, but the patronage which this branch has already received indicates an appreciation on the part of the traveling public and the business interests that is certainly encouraging. The development of this enterprise will be closely watched, and the degree of success attained will have a direct bearing upon the future of interurban properties, and in determining the lines which these projects will follow, as well as the extent of their field of operation.

Noiseless Car Wheels

There was an interesting discussion at Indianapolis recently before a learned society on the effect of the din and confusion of city streets upon the temperament of the people, and it has been taken up by laymen in other cities. Some of the contributions on the subject that have appeared in the daily press would seem to indicate that the noise from traffic had produced a very serious condition, disturbing the mental equilibrium of the people who complained about it and threatening to deprive them of whatever reasoning power they may have formerly possessed. The speakers at the Indianapolis convention were particularly solicitous of the welfare of those who were suffering from nervous troubles, on the ground that the constantly increasing noise of city traffic tended to aggravate their condition, and a petition was addressed to the boards of health throughout the United States to secure the attention of street railway and steam railroad companies for an early consideration of the sanitary, therapeutical value of noiseless car wheels. The petition urged the boards of health in large cities to investigate the subject, with a view to bringing about a reform in the matter, and a resolution was adopted saying: "Thousands in our hospitals and homes who are ill need this courtesy,

as they are rendered more ill by the din and clatter of the cars as they pass along the streets."

This action on the part of the exponents of the several ologies represented in the learned assemblage, commendable in spirit as it was, seems to have had an unfortunate effect in several communities, as it has been eagerly seized by those who are seeking an excuse for criticising local transportation companies. These self-appointed guardians of the public weal seem possessed of the idea that street railway companies take a peculiar delight in using "flat wheels," and a campaign has been started against them. Of course, the idea is simply absurd, but a gullible public has been found in many places to take the charges seriously. If it were not for the annoyance to which the companies are subjected this campaign would be simply ridiculous. As it is, the operating companies may be depended upon to co-operate with any practical plan that may be proposed, and they are always ready to take the initiative when conditions require improvement. But it is much easier to recommend "noiseless car wheels" than it is to provide them. The term is used, of course, to cover the rolling stock; which, from its very nature, is bound to make more or less noise, even under favorable circumstances. This is due to the condition of the track, trucks and motors as well as the wheels themselves, and where the noise is excessive the source of trouble can very often be traced directly to the failure of the municipality to pave the streets properly, thus contributing directly to the conditions complained of. When the pavement is poor the entire traffic is done over the street railway tracks, and this naturally plays havoc with the roadbed, the deterioration extending gradually to all parts of the equipment.

The fact of the matter is that the greatest part of the noise from the streets, certainly from those paved with Belgian block or brick, comes, not from the street railway cars but from vehicles traveling over the rough pavement. The most effective reform in such cases would be to afford such facilities to the railway companies as would encourage the general transportation by them on rails of the merchandise which is now carted from one part of the city to another with so much noise and confusion. Such a plan would not only produce the remedy sought, but would relieve the taxpayers of a large part of the maintenance of the pavements at the public expense. If the critics of the street railways would press their investigation a little farther and not be so ready to lay the blame on the transportation companies, they would find that the municipality and the public are the chief offenders. Reform, like charity, should begin at home.

Railway Papers at the Institute Meeting

Following the plan which worked so successfully last year at the Great Barrington meeting, the American Institute of Electrical Engineers has assigned an entire session of its general meeting at Niagara Falls this year for the reading and discussion of papers upon electric railway subjects. The list of subjects to be considered and the selection of members to whom they are assigned leave no room for doubt as to the value and interest which this feature of the gathering will have. Last year Railway Day was the most important part of the Great Barrington meeting, and this year it is evident that the committee in charge of the Niagara gathering is determined to continue the good work so auspiciously begun. The fact that President-elect Arnold has been so closely identified with electric railway engineering, and is at present devoting the greater part of his time to this department, is an additional assurance that the electric railway will continue to receive its

share of attention in the work of the Institute during the term of the new administration.

Tailings from the Berlin-Zossen Mine

Although it is now nearly two years since the notable tests on the Berlin-Zossen line were initiated, there has, as yet, been no complete account of the results obtainable. This seems somewhat strange in view of the official character of the tests through government assistance in them and the great interest possessed in the results by the railway world. We have published, from time to time, such information as became available, but the sum total of it all is far less than we could wish. A bulletin of the International Railway Congress just published contains an article by M. Gerard, inspector-general of the Belgian railways, which throws some additional light on this most interesting subject. Although much of the material will be old to our readers there are not a few points remaining which are well worthy of comment.

The present report is fully confirmatory of the earlier ones as regards the satisfactory operation of the current collectors. Apparently complicated as the triple bows were they are reported as working in the most satisfactory manner at all speeds up to 100 m. p. h., and with very little sparking until the voltage on the working conductors reached 13,500. It is, therefore, safe to say that current collection is not to be counted among the material difficulties of working at very high speeds with high voltage on the trolley wires. Every difficulty thus disposed of is a clear gain, and if a single phase rather than a polyphase system be used, the question of trolley contacts becomes of even less moment.

Another important matter on which some new light is thrown is the performance of the cars in themselves, as regards steadiness and comfort. Knowing that the final limitation of the speed obtained was chargeable directly to the track, one might fancy that the running of the cars was somewhat rough, but it appears that while at a speed of about 62 m. p. h. there was some pitching of the cars, this passed off as the speed increased, and at 75 m. p. h. to 80 m. p. h. the motion was remarkably smooth. This bears out in a most interesting fashion the statement which we have frequently made in dealing with such matters that there is a marked steadying action at high speeds which probably materially lessens the tractive resistance, and presumably accounts for the discrepancies between the resistance found at 50 m. p. h. or 60 m. p. h. and that above and below such speeds. Of course, the conditions with respect to this must vary with the track and the construction of the train, but it is certain that the tractive effort required, apart from air resistance, at great speeds is astonishingly small. Whether, as the report intimates, the cars could have been very materially lightened without causing trouble is another matter, on which, it seems to us, the evidence is somewhat insufficient.

By far the weakest point disclosed in the tests was the feasible acceleration. We are by no means fanatics of the subject of acceleration; in fact, we think that overmuch importance is often attached to it, but the maximum rate of acceleration in the Zossen runs was about 8 ins. per second per second. This is much too low for anything but long, continuous runs, for it means that the cars must run between 3 miles and 4 miles in order to reach a speed of even 70 m. p. h. or so, and proportionately further for higher speeds. This acceleration might have been increased greatly, the report states, had the power station been able to back up the motors to their full power, which is doubtless correct, for the motors even in acceleration were not pushed even to their normal output for

continuous running, but, as we shall presently see, the starting conditions in these motors were drastic.

As to braking, the results were rather more satisfactory, but still not as good as were desirable. At 75 m. p. h. the car required about three-quarters of a minute and about half a mile for stopping, and, as already reported, the heating of the brake-shoes was very severe. At 88 m. p. h. to 90 m. p. h. the time required for a stop was nearly a minute and a quarter, and the space about a mile. As generally happens the brake retardation was materially less effective at the higher speeds. At the full speed contemplated, 125 m. p. h., braking would be still more difficult, and this is evidently one of the points to which especial attention must be directed in future work at very high speeds.

With respect to the absolute power required at the car the final results were, as is now well known, most encouraging. At the highest speeds attained the failure of the track interfered with instrumental observations on the cars, but at 87 m. p. h. the input at the car was only 520 kw. The efficiency curves of the motors are open to some question, but it hardly seems likely that the output was more than about 500 hp. In other words, at this high speed the motors were only half-loaded, which accounts in part, at least, for the low power factors observed. These ranged in general from 0.60 to 0.50. Motors designed for railway service, with rather wide air gaps, cannot be expected to show as good results as motors designed for stationary service, and their weakness in power factor shows especially at low loads. In starting the power factor conditions must have been still more unsatisfactory, and the actual efficiency of the car equipments is stated to have been 43 per cent and 48 per cent for the respective cars during the period of acceleration. This accounts fully for the trouble encountered at the power station.

At full speed the efficiencies would have been considerably increased, and it is only fair to say that at no time during the tests were the conditions such as to give the electrical equipment a chance to appear at its best.

The story of the air resistance has already been told. It proved to be rather less than was anticipated from the earlier experimental data, and it was fully evident that the normal output of 1000 hp provided in the motors would have been ample for the projected speed of 125 m. p. h. It is worth noting that the coasting experiments, somewhat unsatisfactory, as all coasting experiments are, gave the total mean resistance from a speed of 66.8 m. p. h. to rest, as 8.3 lbs. per ton, while if any confidence is justified in the speed variation during the coast, the resistance, from 66 m. p. h. down to 33 m. p. h., was 16.8 lbs. per ton. From the somewhat varying results in power required about 300 kw was demanded at the higher speed just named, while the demand at 75 m. p. h. to 80 m. p. h. was only about 100 kw more.

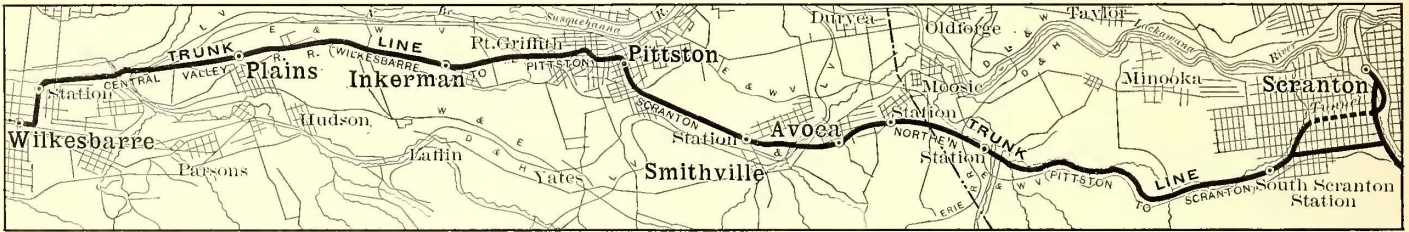
As a whole, this latest report tends to confirm the opinion justified by the earlier ones that the difficulties in the way of high speed have been generally overestimated, and that they pertain to the mechanical rather than to the electrical part of the problem. The first consideration is most unquestionably the track, which must be of the very best construction to stand speeds of 100 m. p. h. and upwards. Next come the brakes, and the deliberate judgment of the commission in charge of the Zossen work is that the air brakes, as used, were insufficient, and that other means of checking the speed must be adopted. And so the matter stands—with the electrical difficulties reduced to insignificance, and the speed in full grasp when commercial conditions require it.

ELECTRIC INTERURBAN FOR FREIGHT AND PASSENGERS

The formal opening of the first section of the Lackawanna & Wyoming Valley Railway between Scranton and Pittston, on May 20, was an important event in that district and for the interests identified with the interurban electric railways of Pennsylvania. The new line is an important addition to the railway facilities of the valley, and it makes a radical departure, in many respects, from the practice that has been very

among so large a number of people, and none whatever to encourage or stimulate travel.

In considering the project of a new road to enter this territory the existing competition made it necessary to offer better service than that supplied by any of the other roads. High speed and ability to handle heavy traffic were considered to be of great importance, and, although the district to be traversed is rugged, it was possible to secure low grades and easy curves, in addition to a line as direct as possible between the two ter-



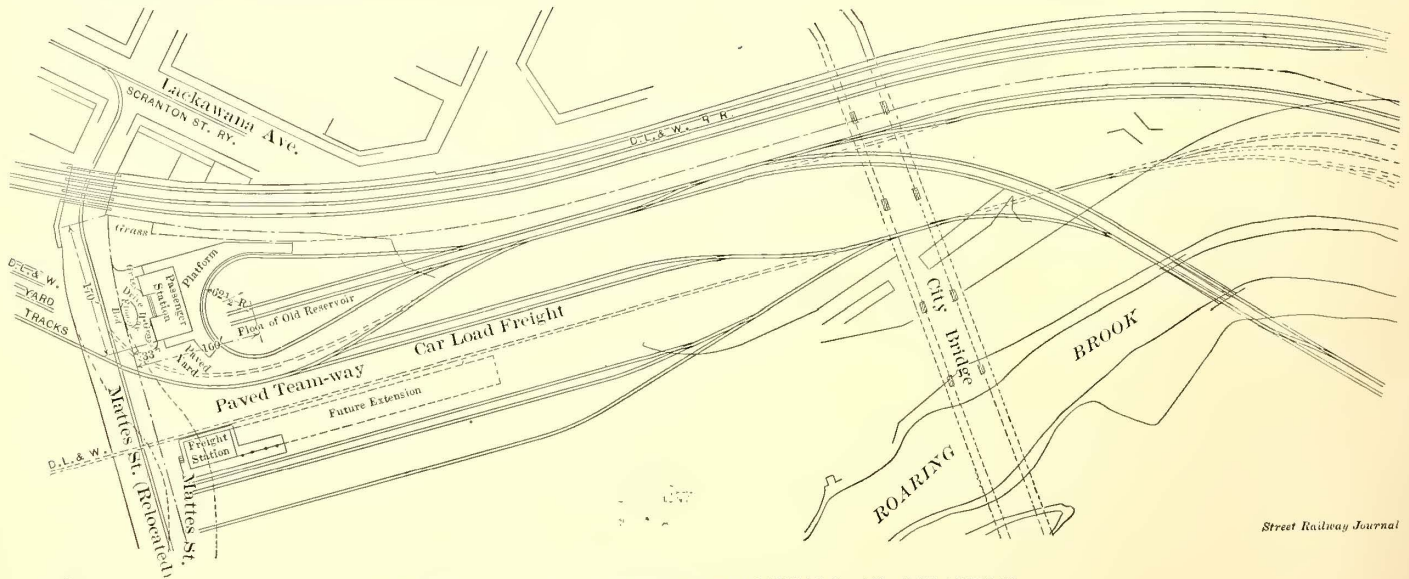
MAP OF MAIN LINE BETWEEN WILKESBARRE AND SCRANTON

generally followed in the building of interurban properties in other parts of the country. The facilities which this railway will have for developing freight as well as passenger business, the character of construction and equipment throughout, and the connections which it has established, distinguish it from any other electric railway that has thus far engaged the attention of transportation experts and engineers. The road, when completed, is intended to carry passengers, baggage and merchandise between the cities of Wilkesbarre and Scranton and towns of considerable magnitude in the Lackawanna and Wyoming Valleys in their immediate vicinity. An extension will also be built to Carbondale.

The terminal cities are about 20 miles apart; Scranton having a population within 8 miles of its city hall of about 150,000, and Wilkesbarre with more wealth per capita than any other city in Pennsylvania. Between these cities and in the territory

minals and passing en route through the most important intervening towns. The engineering and legal obstacles were finally overcome in spite of the fact that local opinion held that desirable avenues for high-grade railroad building in the district had already been exhausted.

A route passing through Pittston, the principal intervening city, was laid out, and the necessary property was secured by purchase, so that the road had its own private right of way the entire distance. It was then determined to continue it beyond Scranton to the city of Carbondale, 17 miles distant. General railway charters were obtained under the laws of Pennsylvania for the Northern Lackawanna Railroad from Scranton to Carbondale, the Scranton & Northeastern Railroad from Scranton to Pittston, and the Central Valley Railroad from Pittston to Wilkesbarre. The Transit Contract Company was also formed to construct the properties.



FREIGHT AND PASSENGER TERMINALS AT SCRANTON

immediately surrounding them are thriving communities, varying in size from Pittston, with 25,000, and Carbondale, with 15,000 inhabitants, down to several with a population of from 7000 to 1000, all of which are dependent upon the two larger cities for commerce and pleasure. Both cities are on trunk lines running from New York city and Philadelphia to the north and west, but as the region was developed principally on account of its coal deposits, comparatively little attention has been given by railroads to its commercial needs beyond those relating to its mining interests, so that little effort was made to accommodate the intercourse that naturally would take place

Extensive terminals were obtained at Scranton and Wilkesbarre by purchase, a central location was secured through the heart of Pittston, and a perpetual right to enter Wilkesbarre extending from a point near the city line to the Wilkesbarre terminal.

THE SCRANTON TERMINAL

In Scranton the terminal adjoins the principal street, and immediately abuts upon and connects by tracks with the freight terminal of the Delaware, Lackawanna & Western Railroad. This city is the county seat of Lackawanna County, and it ranks third in size in the State. There are 40 miles of electric

street car lines within the city limits and 75 miles of similar lines extending beyond the city. It has many fine public institutions and 125 incorporated manufacturing establishments, representing \$25,000,000 of investments, attracted by the cheapness of fuel.

The property belonging to the company in Scranton consists of about 98 acres of land, which formerly comprised the site of the Lackawanna Iron & Steel Company's "North Works." It has a frontage of 1000 ft. on Cedar Avenue, and extends back about half a mile in a southeasterly direction. This plot of land was covered by buildings suitable for the manufacture of steel, but they have been removed, and approximately 70,000 cu. yds. of earth have been used in grading. Close to the property runs Roaring Brook, a stream which, about 5 miles further up, serves in part as a source of water supply to the city of Scranton. Two reservoirs are formed by dams on this property, and the water thus conserved is utilized about the yard. An 18-in. water main, starting at the upper reservoir, runs through the full length of the yard, and is tapped at intervals to serve feed water to the power plant and fire protection at other points. A water main from the city also enters the grounds and supplies water for these and other purposes.

Four principal buildings occupying this property are devoted to the operation of the railroad, namely, the passenger station, the freight depot, the power house and the car house and repair shop. These buildings were not limited in size by the encroachment of any others or by the service of other departments in the organization of the road, and, consequently, are ample in their design, not only for the present but for

future development, and the possibilities have also been considered of further extensions. In design they may be described architecturally as an adaptation of the Tudor-Gothic type, and



FRONT OF SCRANTON PASSENGER STATION

are in appearance not only handsome but particularly appropriate to the character of the service for which they are intended. They are of brick, with all sills, lintels, quoins, cornices, belt courses, copings, etc., of concrete moulded into



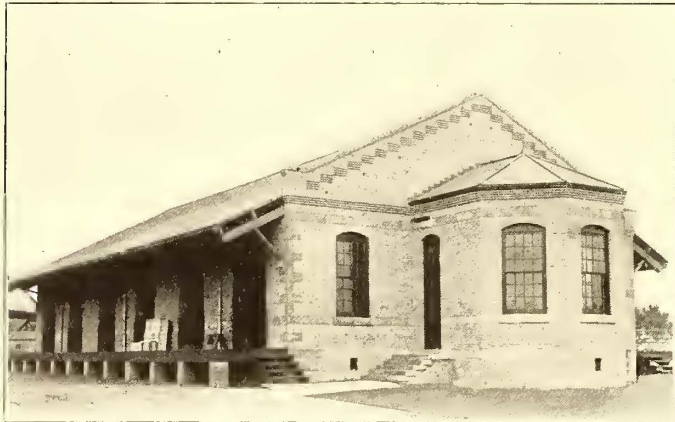
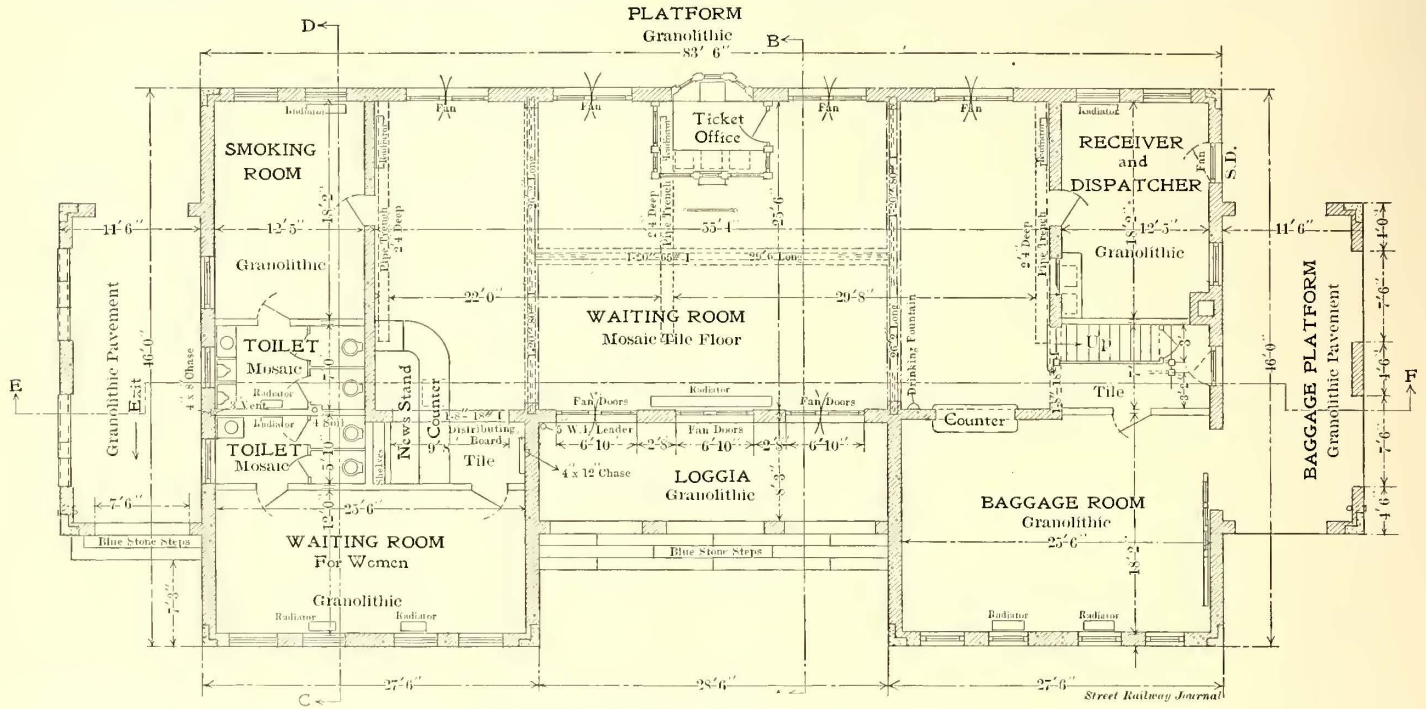
LOOP AT THE SCRANTON PASSENGER STATION

blocks made on the grounds. The footings and foundation walls are all of concrete, and "granolithic" floors have been put in, except where otherwise required to serve special purposes.

PASSENGER STATION

This building is an E-shaped structure, 83 ft. 6 ins. long,

engineer and his force of assistants and draftsmen. A fire-proof vault, 25 ft. 6 ins. x 10 ft., serves as a receptacle for records at one end of the hallway, and ample toilet facilities are provided at the other end. The basement serves the janitor for storage and general purposes, and contains also the apparatus for the hot-water system used in heating the



FREIGHT HOUSE AND OFFICE AT SCRANTON

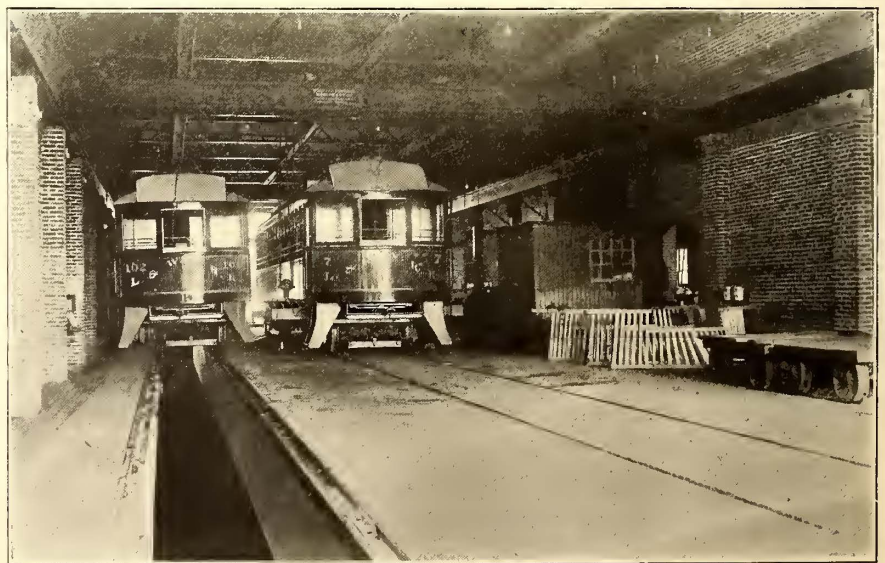
building. A flat roof extends over the front steps and the side loggia, and a sloping roof covers the curved platform in the rear and is shaped to accommodate the track loop immediately contiguous to the station. A wide plaza, with asphalt pavement, serves as an approach, and every consideration has been given to avoid inconvenience on occasions when large crowds have to be handled.

FREIGHT DEPOT

The freight station is located about 350 ft. south of the passenger station, and is one-story high, rectangular in shape, 100 ft. x 50 ft., with an office extension 20 ft. x 20 ft. at the western end. The floors of this building are of heavy mill construction, with 10-in. x 14-in. girders, 10-in. x 12-in. joists and 3-in. splined plank, all of Southern yellow pine. All doorways are protected on their edges by steel angle-irons, and steel con-

and 27 ft. deep. It has a basement and is two stories in height. On each end a loggia, 11 ft. wide, forms a covered passageway from the street to the platforms in the rear. The central part of the ground floor is occupied by the main waiting room, which contains a ticket office booth and news stand. The floor of this room is of mosaic tile, and the woodwork is of dark paneled oak. Electric lights, let into the ceiling, give a pleasing effect to this feature of illumination. The left wing contains the men's and women's waiting rooms, and the right wing is reserved for the baggage room, the receiver's and dispatcher's offices and the stairway leading to the second story.

The second floor is occupied by the offices of the executive department of the road. A hall running the length of the building separates the offices. In front are the offices of the general manager and auditor, and in the rear the superintendent, the paymaster, the



REPAIR SHOP, SHOWING INSPECTION PITS AND METHOD OF RAISING CAR TO REMOVE TRUCK

nections are used in the roof truss connections and elsewhere, as demanded in that type of construction.

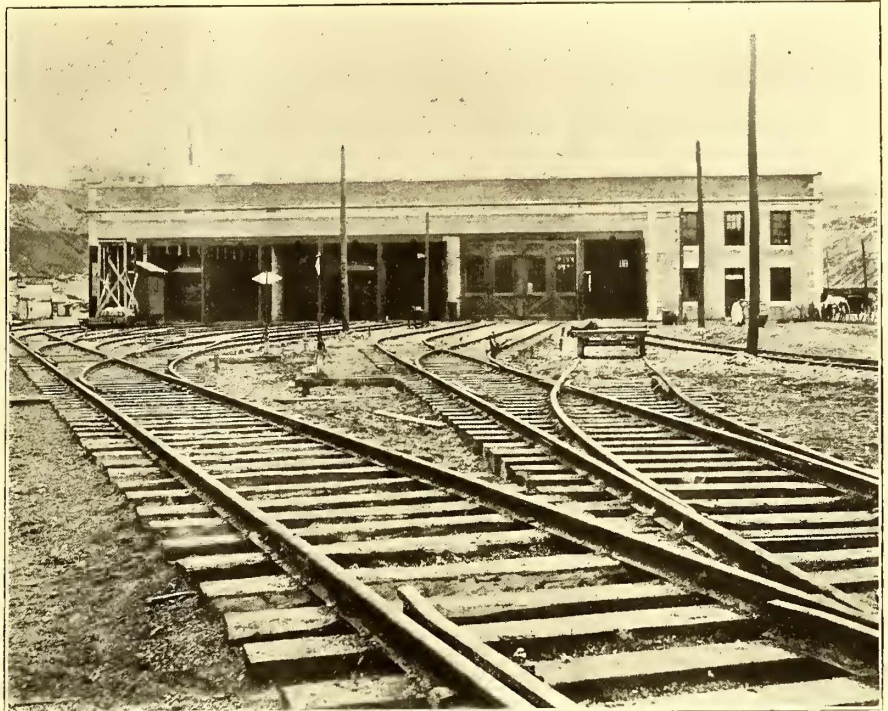
A covered platform, 8 ft. wide, runs on each side of the building and across the rear end, and it is extended along the track for 100 ft. A wide roadway, paved with belgian blocks, opens from Cedar Avenue, and on this the receiving platform faces.

CAR HOUSE AND REPAIR SHOP

At the extreme south end of the yard are located the car house, on the yard level, and adjacent to it, but 12 ft. lower, the power house.

The car house has a frontage on the yard of 146 ft., and is 177 ft. long and 28 ft. 6 ins. high in the clear. It is divided into three bays by brick fire walls running the entire length of the building. Each of these bays contains three tracks and each track can accommodate three cars. While all of the bays can be used for the storage of cars, two are designed for that purpose exclusively, and the third is provided with special arrangements to facilitate repairs, which are accomplished in an extension to the main building that has been specially equipped for the purpose. Fireproof construction has been adhered to throughout the building. The walls are of brick and concrete, the roof trusses are steel lattice girders; the floors are of hard-burned brick, and the inspection pits in the repair bay are of concrete. This bay is provided with two 15-ton traveling cranes, moving on runways supported by pilasters in the side walls, and an overhead trolley track with a pneumatic hoist co-operates with these cranes in the transportation of apparatus from this bay into the repair extension. The compressed air to operate this hoist as well as pneumatic

in service. The repair shop extension runs the full length of the building, and is divided into a blacksmith shop, 30 ft. x 14 ft., at the rear; a machine shop, 72 ft. x 30 ft., immediately in front, and an armature repair room, 30 ft. x 30 ft., with a



CAR HOUSE AT SCRANTON

drying oven, 5 ft. x 7 ft., connecting, and oil, sand, salt and tool rooms each about 14 ft. square. These rooms are all fully supplied with tools and machinery suitable for repairs.

Immediately in front of the repair department is the office of the storekeeper, 31 ft. x 14 ft. and 12 ft. high, with his



MAIN POWER PLANT, CAR HOUSE AND REPAIR SHOP AT SCRANTON

tools in the repair shop and for cleaning motors, car seats, etc., is furnished from the adjacent power house. By keeping on hand duplicate trucks, armatures, etc., this repair equipment allows of immediate interchange of parts in case of accident, thus allowing the full complement of cars to be kept constantly

supply room and fireproof vault, 5 ft. 6 ins. x 12 ft. x 6 ft., and in a second story, which has been provided over the office and which runs back over the armature room, is space for the convenience of the motormen, containing waiting room, locker room, wash room, etc.

The building is lighted by electricity and is heated by a hot-water system, the supply for the latter being furnished from the adjacent power house.

DWELLINGS

Convenient of access to the ear house, and situated between the yard proper and the Delaware, Lackawanna & Western



VIEW OF PIPING ABOVE BOILERS

Railroad, are six dwelling houses for the motormen and other employees whose presence may be needed promptly in case of emergency. Four of these dwellings are of brick, and accommodate two families each. The fifth is a frame building and will house eight families, and the sixth house is also of wood but intended for one family only. These houses are nicely located on a private street and have ample front and back yards.

MAIN POWER HOUSE

The power house is rectangular in shape, 90 ft. 2 ins. wide, fronting on the yard, 133 ft. 6 ins. deep and 42 ft. high in the clear to the roof of the engine room. A semi-octagonal extension on the engine room side relieves the uniformity of this frontage.

The building is divided vertically by a brick fire wall, which separates the boiler and engine room. This wall contains the pilasters which act as supports to one of the runways for the traveling crane in the engine room. Each of the two departments has a basement and main floor, and the extension before mentioned has a second floor to accommodate part of the condensing apparatus and also automatic lubricating mechanism. The first floor of this extension is occupied by the engineer for office purposes.

THE STEAM PLANT

The boiler room is 128 ft. 10 ins. long by 42 ft. wide and 26 ft. 6 ins. high. It is arranged to accommodate seven Babcock

& Wilcox water-tube boilers, five of which are installed and the others to be supplied when additional power is needed.

The normal capacity of each of the boilers is 400 hp, and each is capable of developing 50 per cent additional power without overcrowding. Each boiler has 189 tubes, and all are held in position by cast-iron headers connected with three 42-in. steam drums. The latter are provided with 4-in. nickle-seated pop safety valves, set to a working pressure of 160 lbs.

The boilers are grouped in four batteries, three of two each and one single, and all have foundations of concrete. The settings are of standard design, except that the front columns, which ordinarily serve as supports to the boilers only, have been made heavier and are designed to act in addition as supports to the coal bunkers overhead.

Roney mechanical stokers are used, and they are operated by Standard stoker engines, as shown in the illustration on this page.

Coal is delivered to the station in cars upon a track which parallels the side of the building adjacent to the boiler room, and extends beyond the grade line of the yard 12 ft. above the boiler room floor level on a wooden trestle. Under this trestle, which has an open floor, are bins lined with steel, with chutes directed toward a hopper over a Robins belt conveyor, both of which are protected from the weather by a housing. This conveyor is driven by a motor having a capacity of 25 tons per hour, running at 350 ft. per minute.



BOILER ROOM AND STOKERS

Receiving the coal from the hopper and carrying it up an incline the conveyor enters the boiler room above the boiler level and automatically distributes its contents the whole length of the coal bunker, which is situated above and in front of the boilers, with a holding capacity of 250 tons. This coal bunker, which is supported by steel columns, consists of a trough-shaped steel skeleton surrounded by concrete and masonry so that no iron work comes in contact with the coal,

thereby preventing corrosion and the transmission of heat in case of fire accidentally occurring in the pockets into which the bunker is divided. Each pocket is provided with a hopper-shaped floor to which is attached a cast-iron outlet box and steel chute, which delivers the coal by gravity directly into the stoker hoppers, the supply being regulated from the fire room floor by cut-off grates inserted in the coal chutes.

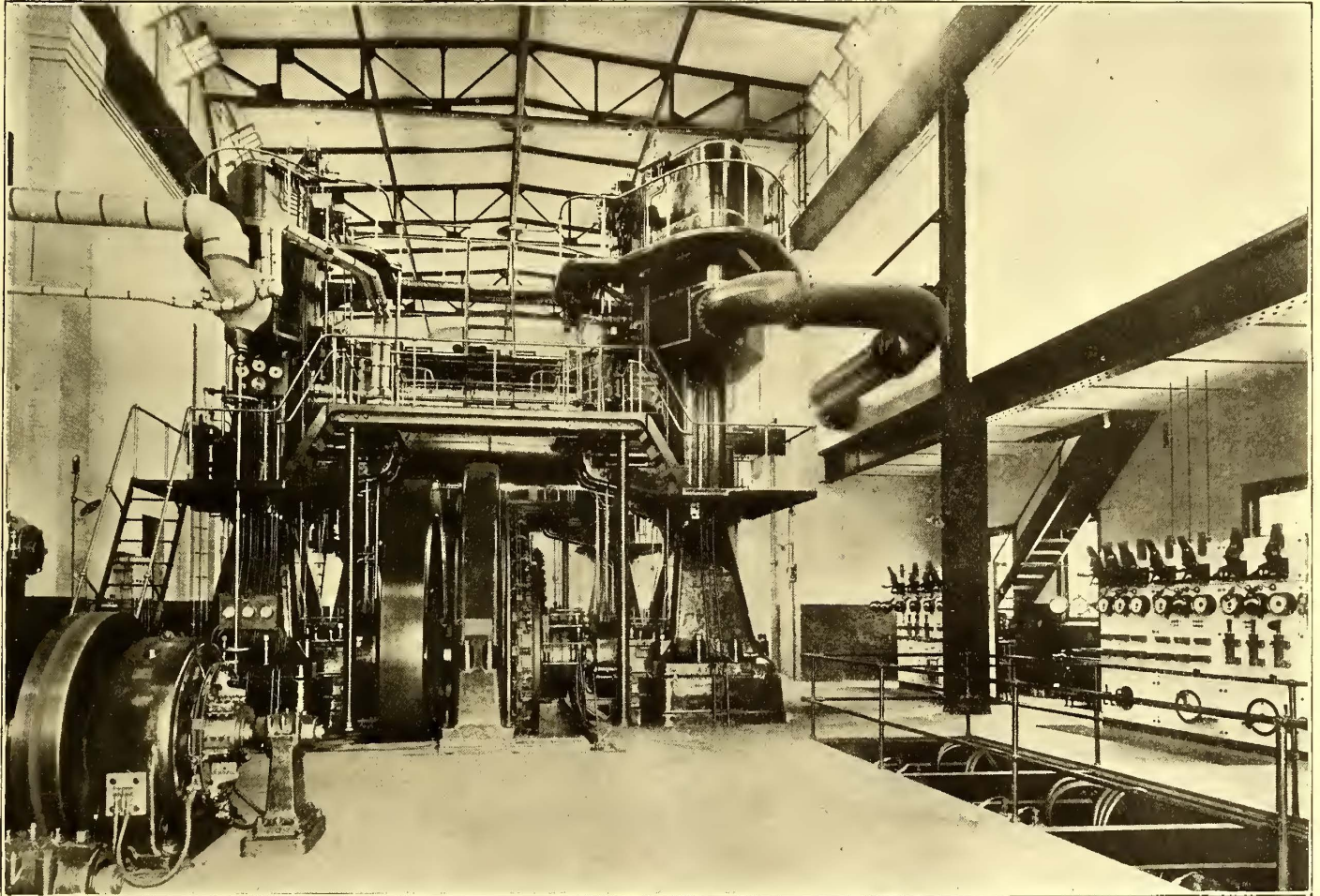
The ashes from the fires fall into hoppers underneath the grates, and are dumped into an ash-car, running on a track of 20-in. gage underneath the boilers the full length of the boiler room. This track runs onto the platform of a hydraulically operated hoist at the end of the building. The car, filled with ashes, ascends to the yard grade and is transported wherever it may be desired.

The draft caused by the chimney, although ample when the

back connection of the boilers through dampered ducts into a flue formed by the division wall between the boiler and engine room on the one side and rear wall of the boilers on the other, the former being protected by a 2-in. air space. The roof of this flue is formed of steel T-beams, which carry a double row of firebrick. This flue is provided with a suitable damper for use whenever necessary.

The flue leads outside of the building and there connects with a chimney of Alphons Custodis construction 118 ft. high, 9 ft. 10 ins. diameter inside in the clear, resting on a concrete foundation 20 ft. 9 ins. square. A cleaning door has been provided in the base of the chimney for convenience of access to its interior, and a ladder of $\frac{3}{4}$ -in. galvanized round iron steps runs from the ground to the top both inside and out.

Two Worthington pumps of the outside end-packed plunger



Exciter

2000-hp Generating Set

Direct-Connected Switchboard Alternating-Current Switchboard

GENERAL VIEW OF ENGINE ROOM IN MAIN POWER HOUSE

larger sizes of fuel are burned under the boilers, is not designed to be sufficient when culm is used. To supplement it two 140-in. "three-quartered housed" blowers with top horizontal outlets and self-oiling bearings are provided. These are installed in a one-story extension to the boiler house on the basement level. The capacity of these blowers is ample for the entire boiler plant, so that one blower may be held in reserve. Each blower is direct-connected by means of a flexible belt coupling to a Standard engine. These blowers take their supply from the boiler room through gratings in the floor and discharge directly into the air tunnel, running the full length of the building in front of the ash pit. From this tunnel separate cast-iron air connections provided with suitable hand-controlled dampers open to the space below the grate bars under each boiler, which has been designed so as to close tight against the resultant air pressure. The products of combustion from the fires pass from the

type stand on the floor at the north end of the boiler room. The suction ends of these pumps are connected in duplicate with the 18-in. main from Roaring Brook, the city main, the hot well of the condensing system and an in-take well located by the side of Roaring Brook reservoir contiguous to the power house.

This in-take well, 8 ft. in diameter and 18 ft. deep, is connected to Roaring Brook by a concrete conduit, 38 ins. in diameter. The suction inlets at this source of supply are protected by foot valves and strainers of standard make, and the connection with the hot well of the condenser system is also provided with proper arrangements for excluding dirt and oil. All of these duplicate connections are guarded by valves so that either pump may be repaired without interrupting the service of the other, and the water supply may be obtained from either the suction well or the water main when the condenser is out of service.

The high-pressure water piping from the pumps to the boilers is of extra heavy quality and has extra heavy fittings. The water passes through an especially designed horizontal closed feed-water heater on its way to the boilers, provision being made so that it may be by-passed in case of accident or to facilitate cleaning or repairs.

The blow-off pipe of each boiler is provided with an angle-valve and a flanged gate-valve. In addition a similar valve is provided in the main blow-off line between the boilers and the free end leading to Roaring Brook, with a cross con-

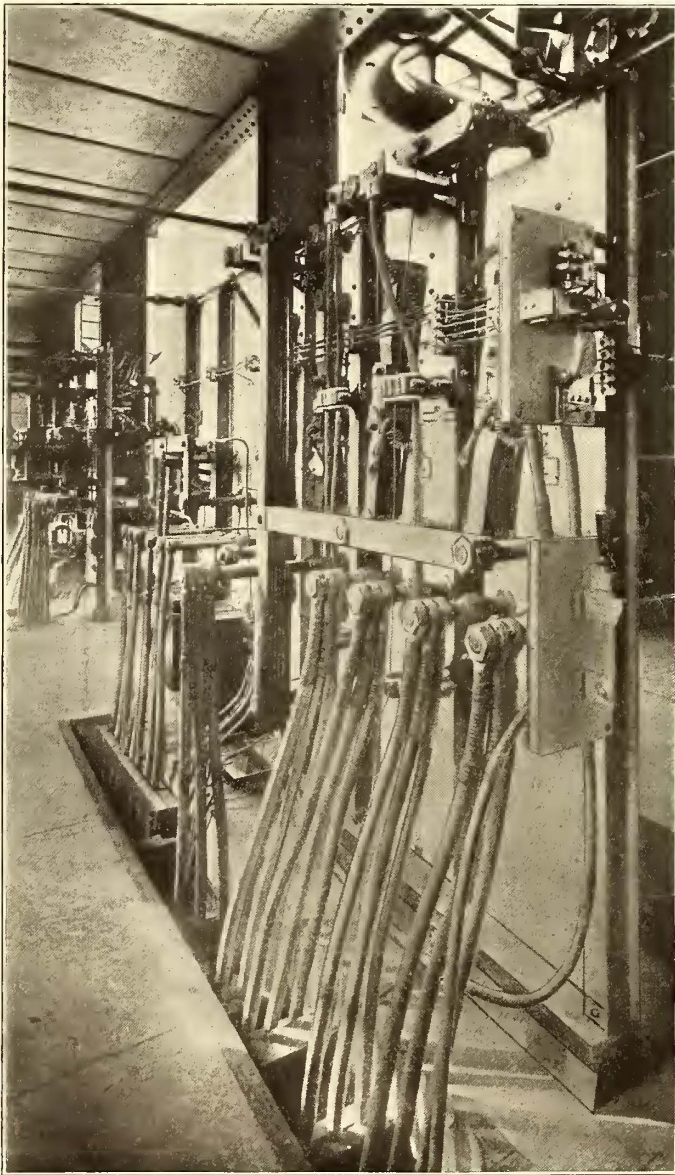
nection to the feed-water system. All gaskets in the main line of piping are of corrugated copper.

The first auxiliary steam header, 5 ins. in size, serves to supply steam to the stoker engines, the condenser, circulating pump and the rotative dry vacuum pump.

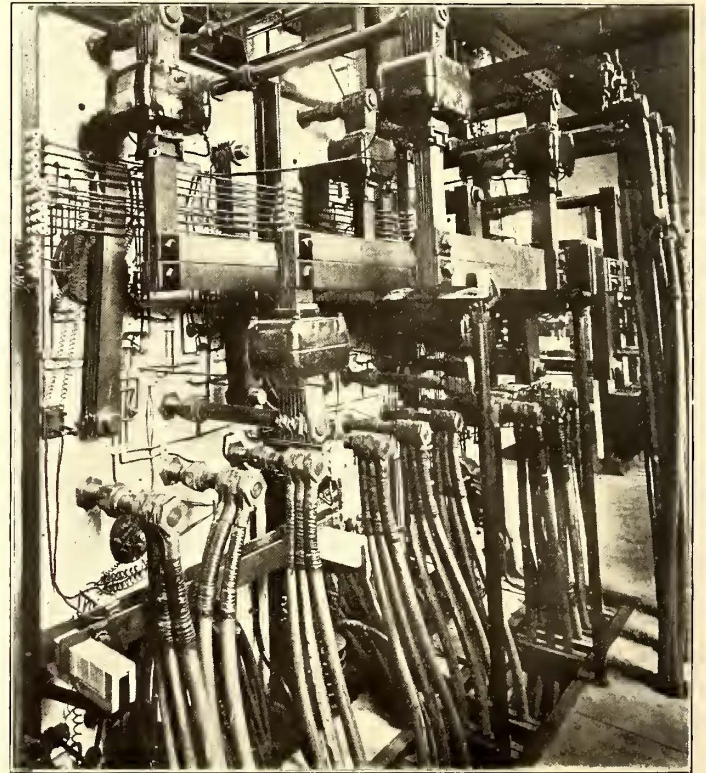
The second auxiliary header, 8 ins. in size, supplies steam to the boiler feed-pump and the blower engines, to the exciter engines through steam separators of special design, to the air compressor for the cleaning system and to the steam pump for the car house hot-water heating system.

All drips from the live steam system are connected with a Holly receiver, and the water of condensation is automatically returned to the boilers by the Holly gravity return system.

The main exhaust pipe of each engine, 24 ins. in diameter, is of cast iron. A 30-in. condenser entrainer is set in the middle of the extension to the engine room, and with easy bends the two main exhaust pipes lead to this. A gate-valve, hydraulically operated from the engine platform, cuts off each engine from the condensing system when the latter is not in operation, and a multi-ported 20-in. relief valve is connected in on the engine side of each gate-valve, which, in case of loss of vacuum, automatically opens to the atmosphere, relieving the exhaust system and allowing the engines to run uninterruptedly at



Back of Direct-Connected Switchboard



Back of Alternating-Current Switchboard

WIRING OF SWITCHBOARDS IN MAIN POWER HOUSE

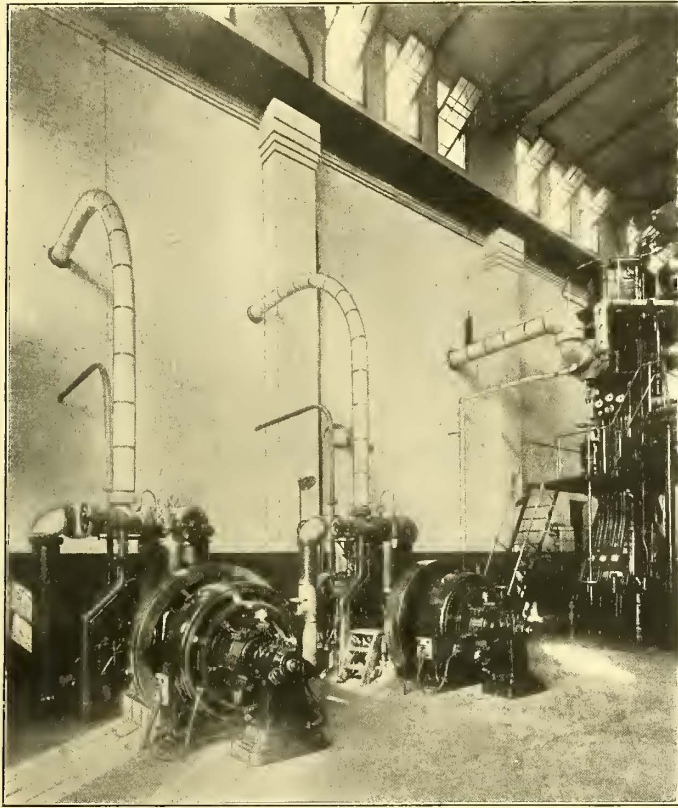
nection to the feed-water system, so that in the event of failure of any individual feed line any boiler may be temporarily fed through the blow-off connection.

The steam piping is all of standard full-weight wrought-iron pipe with extra heavy flanged fittings and extra heavy Chapman gate valves with outside yoke and screw. It is arranged at the boilers, in a system of manifolds having a main and two auxiliary headers, all interconnected and supplied with valves, so that any part of the system may be isolated for repairs without interfering with the running of the rest of the plant. The main header is connected with the boilers by flanged 12-in. wrought iron pipes having large radius bends, and is dripped automatically to the boilers by the Holly Gravity return system. Steam is supplied to each main engine through a 10-in. pipe, in which a steam separator of special design is located before

atmospheric pressure. For this connection the main exhaust pipe extends directly to the roof, where it is capped by an exhaust head, properly dripped to protect the roof. From the entrainer the main exhaust pipe, of cast-iron, to accommodate the exhaust from two pipes, rises vertically and joins an elbow connecting with the top of the condenser.

The exhaust steam from the exciter engines, the stoker engines, blower engines and boiler feed pumps passes through the feed-water heater previously mentioned, which is situated above the boilers at the end of the boiler room near the engines and pumps. A back pressure valve, suitably located in the free exhaust pipe, insures sufficient pressure and corresponding temperature for heating the water. The exhaust header with which these exhaust pipes connect before entering the heater is furnished with a gate-valve and by-pass to the roof, and the

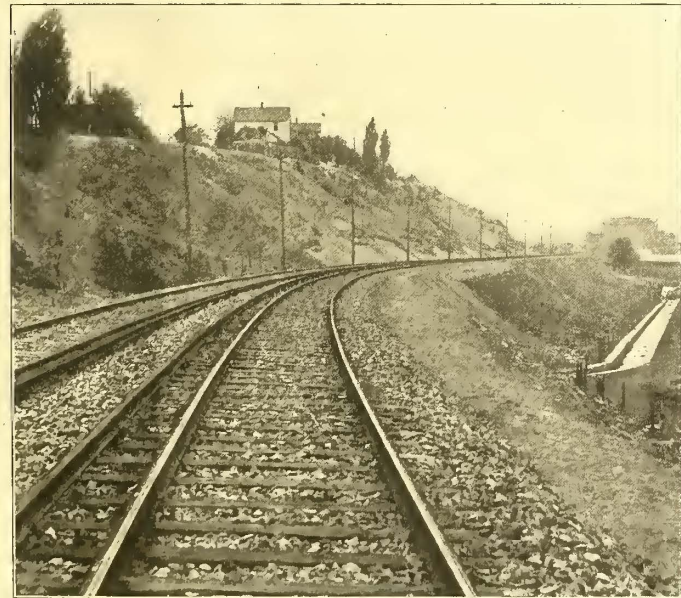
plant may be run with free exhaust in case of accident to the heater. A branch from this exhaust header leads also to a coil heater in the basement of the boiler room, which serves to heat the water for the hot-water heating system in the car



EXCITER SETS IN MAIN POWER PLANT

house. Another branch carries the exhaust steam beneath the grates of the boiler for cooling purposes.

A semi-octagonal bay, 19 ft. 6 ins. x 15 ft. 9 ins., at the middle of the side of the engine room accommodates the condensing apparatus on its basement and second story. The central feature of this system is a 30-in. standard Worthington



LINE AND TRACK CONSTRUCTION

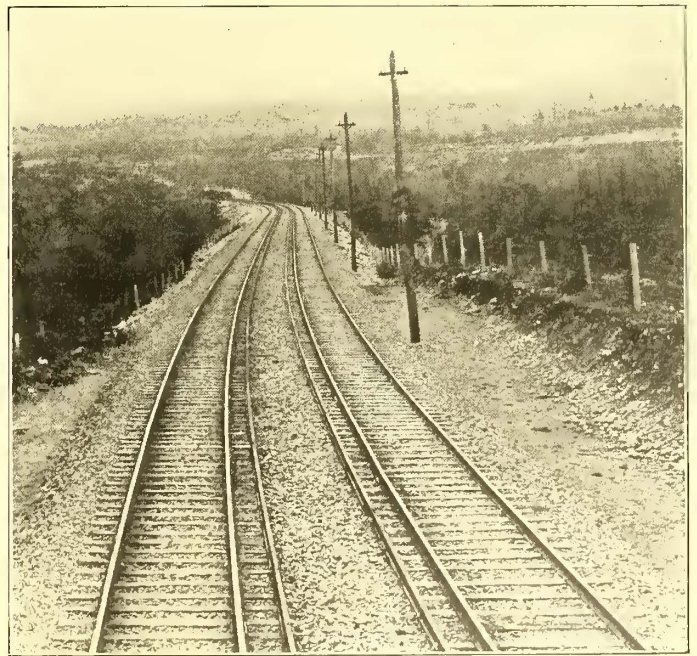
elevated jet condenser having a normal capacity to condense 75,000 lbs. of steam per hour and maintain a vacuum of 26 ins. of water with condensing water at 80 degs. F. The main circulating pump is of the Worthington turbine type. It is located in the basement, and is directly connected with a Junior engine,

mounted on a common bed-plate. This pump will deliver 6000 gals. of water per minutes against a 30-ft. head while operating at a speed not to exceed 320 r. p. m., and under these conditions is capable of developing an efficiency of not less than 65 per cent of the power delivered on the pump shaft. An air cooler and a 10-in. x 18-in. x 18-in. Worthington rotative dry vacuum pump serve to abstract all saturated air vapor from the spray chamber of the condenser. The water for condensing purposes is obtained from the in-take well connected with Roaring Brook reservoir, and, after passing through the condenser, is discharged into a 36-in. concrete conduit which leads down the bank of Roaring Brook and empties into it a half-mile below, where the dam, which forms the reservoir, is located. Thus, in times of low water the reservoir acts as a large storage basin for condensing purposes, the cool water being supplied from the upper end and discharged hot into the lower end, half a mile away. In its passage back to the upper end ample time has elapsed for the temperature to fall.

All live steam piping, including the flanges and heads of steam drums, is covered with the best quality of magnesia moulded blocks, securely wired to the piping and plastered with 1/2-in. thickness of magnesia cement, which, in turn, is covered with a thickness of resin-sized paper. A canvas jacket encircles the whole. The auxiliary exhaust system and the hot feed-water piping and heater are covered with asbestos sectional covering 1 in. thick.

ENGINE ROOM

This room is 128 ft. 10 ins. long and 44 ft. high in the clear. The front end is 54 ft. 8 ins. wide, while the rear end is 10 ft. narrower; the additional space in front accommodates the switchboards and accompanying apparatus. The view of this room, given on page 869, shows one of the large direct-connected generating sets in the center, an exciter set to the left of the picture and the alternating-current switchboard and direct-current switchboard on the right, the alternating-current board being in the foreground. Views of the backs of these boards, showing the wiring connections are also presented.



CHARACTERISTIC CURVE

The enclosure is spanned by a traveling crane of 35 tons capacity and of 42-ft. span. It travels on runways 34 ft. 6 ins. high from floor to base of rails, supported by brick pilasters in the building walls. The room is arranged to house three main engines, two of which are in operation, and the third can be

furnished on short notice when the traffic on the road increases sufficiently to require its service.

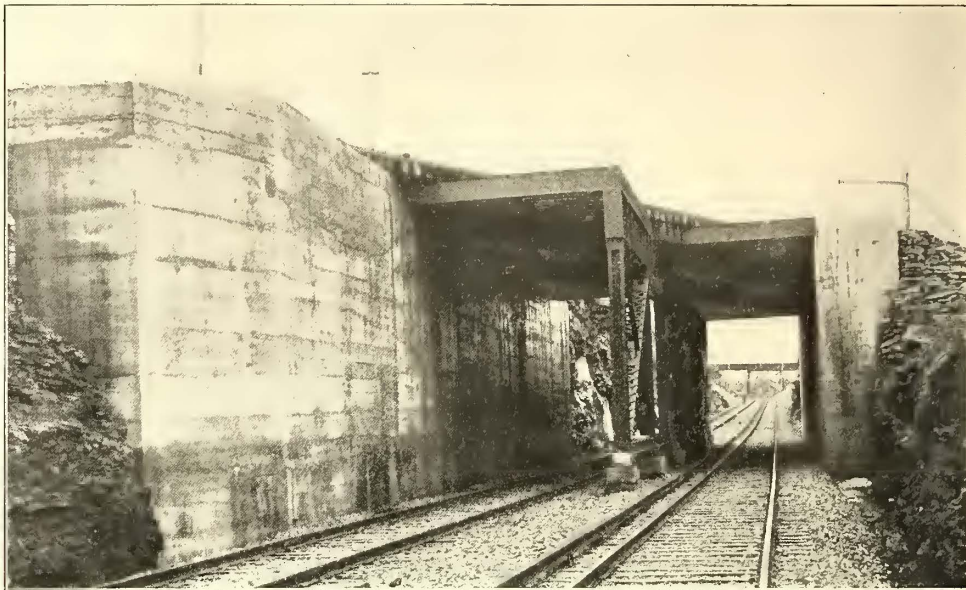
The two engines now running are duplicates, and either is capable of furnishing sufficient power to operate the road for the present. Each engine is of the Westinghouse vertical cross-compound type fitted with Corliss valve gear. Both of the cranks are overhung, and the cylinders are sufficiently apart to allow the fly-wheel and rotating parts of the generators to be mounted on the engine shaft between bearings. The high-pressure cylinder is 30 ins. in diameter, the low-pressure cylinder 60 ins., with a 48-in. stroke. The normal capacity of each engine, at 94 r. p. m., when running under 160 lbs. steam pressure and condensing, is 2000 ihp, with a capacity for 60 per cent overload at higher pressure.

These engines are arranged to operate the generators in multiple and are synchronized from the main switchboard. A switch controls a motor on each engine, which alters the position of a weight on a lever connected with the lay shaft of the engine governor, thus increasing or decreasing the weight on the governor spindle and giving the desired speed control for synchronizing the machines and also for dividing the load evenly when the machines are running in parallel.

There are two gage boards attached to each engine, one on the floor level and the other on the upper platform. Each

the basement floor directly to this tank by compressed air, and thence it descends by gravity to the cylinder lubricating oil pumps on the main engines.

An 8-in. Westinghouse steam air compressor with automatic control is located on the engine room wall, and is connected with



CUT THROUGH ROCK TO CROSS UNDER ERIE TRACK

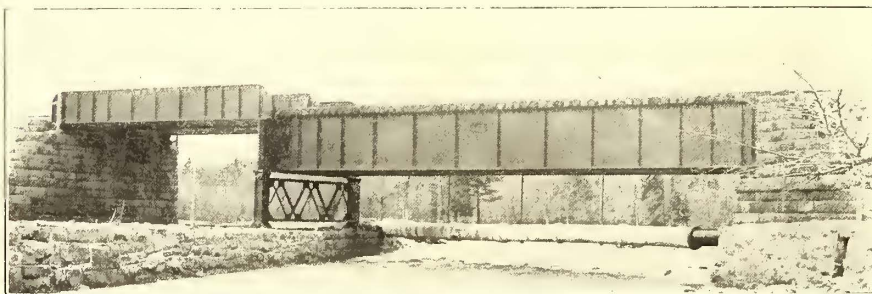
a standard receiver tank. Pipe connections run from the latter to the generators and switchboard for removing dust from contact surfaces of switches, etc. A pipe runs also to the car house to facilitate the cleaning of motors and plush car seats, etc., and to the repair shop for the operation of pneumatic tools, hoists, etc.

Double-current generators, of 1250-kw capacity each, were adopted for this plant, because of the requirements of the service. The alternating-current end of the terminals supplies current at a voltage of 390, and the direct-current end at 650. The generator fields are wound for a 125-volt exciter current.

Two units have been supplied to the exciter service, each consisting of a 130-hp Westinghouse compound engine with out-board bearing and extended shaft for receiving the armature of the exciter generator of 62½-kw capacity. Each unit is capable of supplying ex-

citer current corresponding to the maximum load, and hence one unit may stand as a relay.

Two switchboards have been installed, and provision is made to accommodate another when the third engine and generator are installed. They are of white Italian marble, 2 ins. thick, set in a steel frame, and present an attractive appearance.



BRIDGE CONSTRUCTION OVER MEADOW BROOK

board contains a steam gage, a receiver-pressure gage and a vacuum gage. The upper boards also have an indicator and connection for controlling the hydraulically-operated valve on the exhaust pipe at the condenser. There is also a push button on this board for operating the Monarch safety engine stop, which stands upon the floor in front of each engine. This engine stop can be operated by hand at the electric switchboard, and in addition it is connected by a belt to the engine shaft so that when the engine attains a higher speed than that for which the stop was set it automatically closes the throttle valve and shuts off steam.

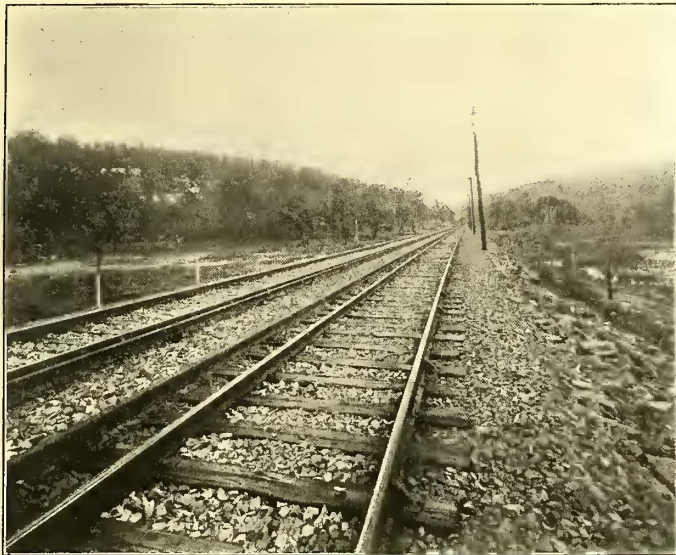
The oil drips from the main engines, the main generators, the exciters, the circulating and vacuum pumps are all piped together so as to bring the oil to a filter located in the basement under the engine room. From this filter the oil runs by gravity to a storage tank adjoining it, and from there it is pumped by a Dean duplex steam pump to a receiving tank at the top of the condenser extension at the side of the engine room. From this tank the oil descends and is distributed by a piping system of polished brass. A separate tank for the cylinder oil stands by the side of the machine-oil tank in the attic of the condenser extension. Cylinder oil is forced from the original barrel on



TYPICAL CROSSING STATION

These switchboards accommodate the connections from the direct-current and alternating-current terminals of the alternating-current-direct-current generators respectively. The direct-current board has six panels, namely, two generator panels, two feeder panels and two exciter panels. The generator panels are connected to the direct-current side of the generators, the feeder panels to the third rail, and the exciter panels to the exciter units. The generators are protected from casualties on the line by Westinghouse brush type automatic circuit breakers mounted on both the generator and feeder panels. The alternating-current board consists of two generator panels and a transformer panel, equipped with Westinghouse round dial instruments, an indicating wattmeter, a direct-current ammeter for the field circuit and an alternating-current ammeter, which can be cut in on any one of the three phases.

Two alternating-current voltmeters are mounted on a swinging bracket on one end of the board, and on the opposite end is another bracket on which is mounted the synchronizer and a power factor meter. On the alternating-current generator panels are mounted two non-automatic circuit breakers to enable the machines to be cut off without burning the main switches. The alternating-current side of the generators is



TYPICAL VIEW OF ROADBED

protected from the results of short circuits by three Westinghouse brush-type automatic circuit breakers mounted on the transformer panel. This panel carries also three 4000-amp. alternating-current meters.

The transformers, four in number, one of which is held in reserve, are of the water-cooled type of 800-kw capacity each. They are located on the basement floor under the engine room. The floor above them has been left open, but it is protected by a substantial railing, allowing free access to them from above by the traveling crane to facilitate dismantling and assembling in case of repair. These transformers raise the current from 390 volts to 22,000 volts before it passes through bayonet switches for the purpose of isolating a defective or damaged transformer, and then passes through the Westinghouse static interrupters to the high-tension pole-type fuse switches, and thence to the upper gallery, where low-equivalent lightning arresters are placed. To these are connected the outgoing wires of the transmission line.

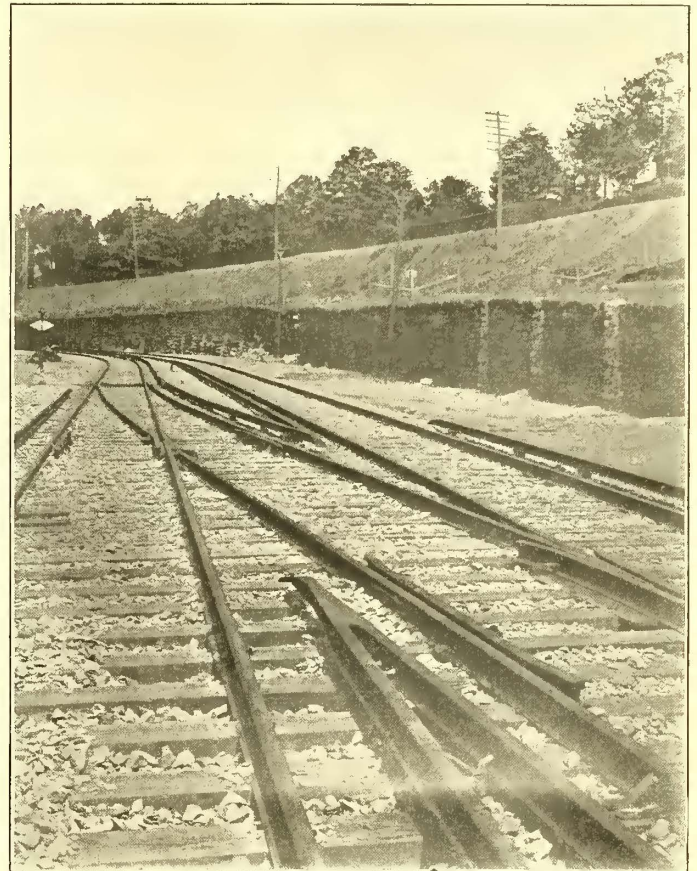
TRANSMISSION LINE

The line consists of three No. 4 B. & S. hard-drawn bare copper wires arranged in equilateral triangle and transposed once in transit to the sub-station now being erected at Hancock, 14 miles distant. Umbrella-type glass insulators, mounted on

1½-in. wooden pins, are supported on wooden brackets, and the line is carried on 30-ft. to 35-ft. cedar poles, set 5 ft. in the ground and spaced 100 ft. apart.

SUB-STATION AT HANCOCK

This station is a building of the same general type of construction as those at the Scranton terminal, and will be arranged and equipped for traffic service with passenger and freight rooms along the same general lines as the main stations of the road. It is, however, intended to have a fireproof tower, 21 ft. x 22 ft. and 40 ft. high, in which it is proposed to isolate all the high-tension current apparatus necessary for lowering the voltage from the line for conversion in the rotaries and ser-



TRACK CONSTRUCTION, SHOWING THIRD RAIL AND CROSS-OVER

vice in the third rail. This equipment is not yet completed, but the plans have all been approved and the work of installation is in progress. In general the wiring plan is as follows:

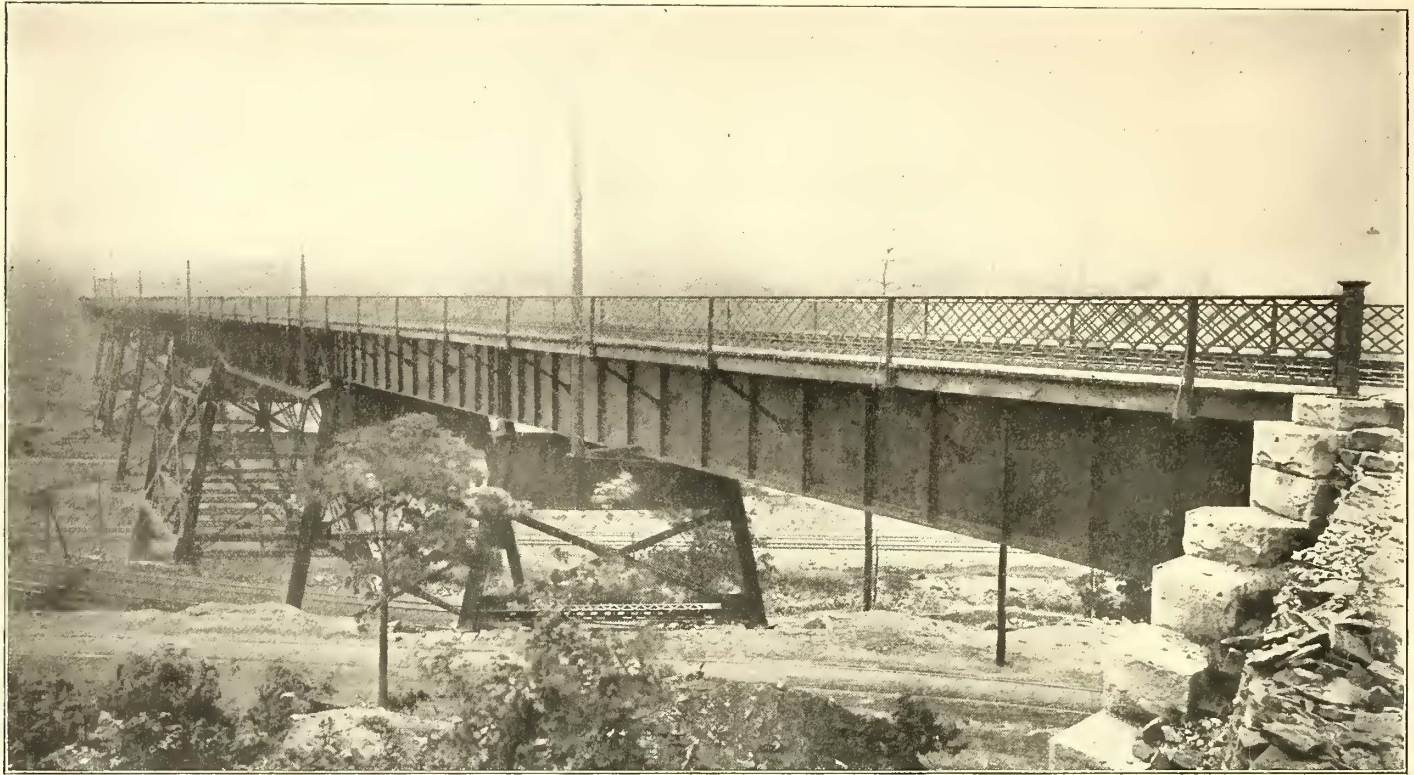
The 22,000-volt current from the line enters the high-tension tower, passing through lightning arresters and high-tension fuse switches to static interrupters. It then passes to two sets of high-tension fuse switches, connected to two banks of static transformers, one containing three 100-kw and the other three 300-kw oil-cooled units, and these are so arranged that they can be used separately or in parallel. The current is lowered to 390 volts, and it passes to the alternating-current panels of the switchboard, thence to two Westinghouse 400-kw rotaries, where it is converted to a direct current of 650 volts, and then goes to the third rail.

ROADBED

The permanent way is of the very highest grade of steam railroad construction, and is, therefore, well adapted to high-speed service and heavy traffic. It has a double-track equipment over the whole line with cross-overs at intervals. The running rails for the short line to Carbondale are of 75-lb. A. S. C. E. section. In the main line to Wilkesbarre the running rails are of 90-lb. A. S. C. E. section. Spring frogs and long point switches are provided at all cross-overs and rail braces

and guard rails are provided at all curves. The ballast is of broken limestone throughout, with a depth of bed under the ties of 6 ins. to 15 ins. throughout the line. Protected rail-bonds are placed under the fish-plates. These have terminals $\frac{7}{8}$ in.

8 ft., 2640 to the mile, and every fifth tie is 8 ft. 6 ins. long, to support the third rail insulating pedestal, which raises that rail above the running rails. These pedestals are of reconstructed granites, and rest on iron chairs securely spiked to the ties.



VIADUCT, 682 FT. LONG, AT AVOCA



UNDERNEATH THE AVOCA VIADUCT

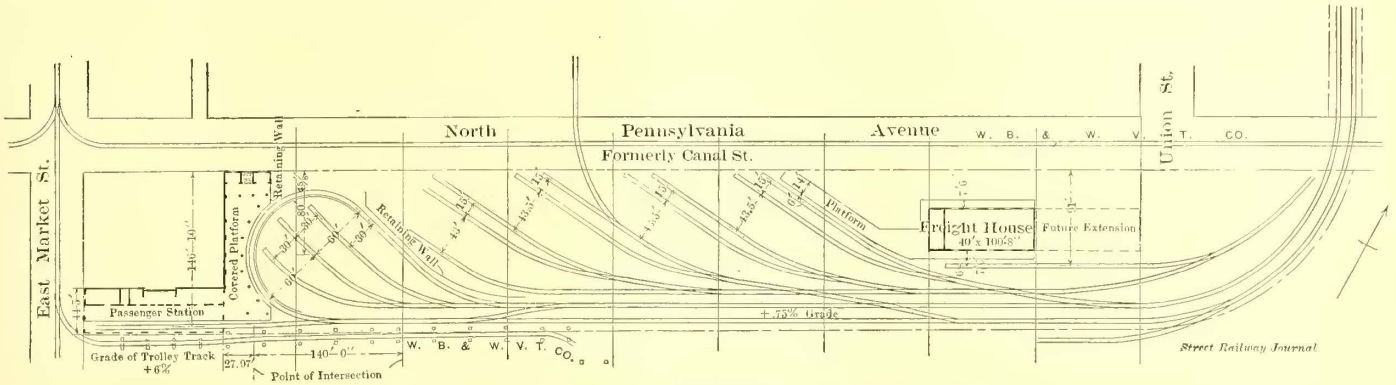
The third rail is of 75-lb. A. S. C. E. section on both lines, and is placed between the tracks to be out of reach of the passengers when boarding or alighting from the cars at the stations. This third rail is bonded with two 400,000 circ. mils foot bonds. The holes in the rails are punched with a 100-ton hydraulic punch and the bond terminals are expanded in place by 30-ton hydraulic presses. At the few grade crossings that occur at country roads and at stations the third rail is broken, and the ends are connected by two 300,000-circ. mils cables, placed in creosoted wooden conduits filled with pitch. At these points the ends of the third rails are provided with approaches to release the shoe from contact and to re-engage it.

The right of way varies in width from 60 ft. to 150 ft., depending upon the nature of the fills or cuts in the vicinity, and is protected along the entire route by a wire fence of No. 12 open-mesh galvanized iron wire on white cedar posts, 5 ins. in diameter, 8 ft. long, and set 3 ft. in the ground, 15 ft. apart. At grade crossings the fence approaches the track and such openings as are necessary are protected with cattle guards of terra-cotta. All grades have been kept as low as possible, and excepting on a temporary cut-off none exceed 2 per cent. The line has been run as straight as practicable; there is only one curve of 12 degs., and such others as exist have been made easy by spiralizing to facilitate speed and comfort. This type of construction has necessitated some heavy engineering work with heavy cuts and extensive fills. The banks in some of these cuts had to be supported by retaining walls to make them secure. Wagon roads and residences had to be moved, and in some instances steam roads were shifted to prevent sharp diversions and curves. In the crossing of wagon and steam roads by going either underneath or overhead, and in the crossing of streams many steel bridges were built, supported on either stone or concrete abutments of the most solid character. At Avoca the longest of these bridges was built. It is, in fact, a viaduct 682 ft. long, spanning the tracks of the Lehigh

in diameter, and are expanded in place by a screw compressor. Cross-bonds of 250,000 circ. mils are placed every 500 ft. along the line. The ties are of Southern yellow pine, 7 ins. x 9 ins. x

Valley Railroad, the Delaware & Hudson Railroad and the trolley line of the Scranton Traction Company. This structure is composed of eight deck spans, seven of which are plate girders, varying in length from 50 ft. to 102 ft., and having a maximum height of about 60 ft. The pedestals are pin con-

with the city of Hazleton to the southwest, at a distance of a little over 26 miles. This road runs through a prosperous mining region, the inhabitants of which are dependent upon and visit Wilkesbarre for social and commercial purposes, and as facilities for travel are presented it is only reasonable to



FREIGHT AND PASSENGER TERMINAL AT WILKESBARRE

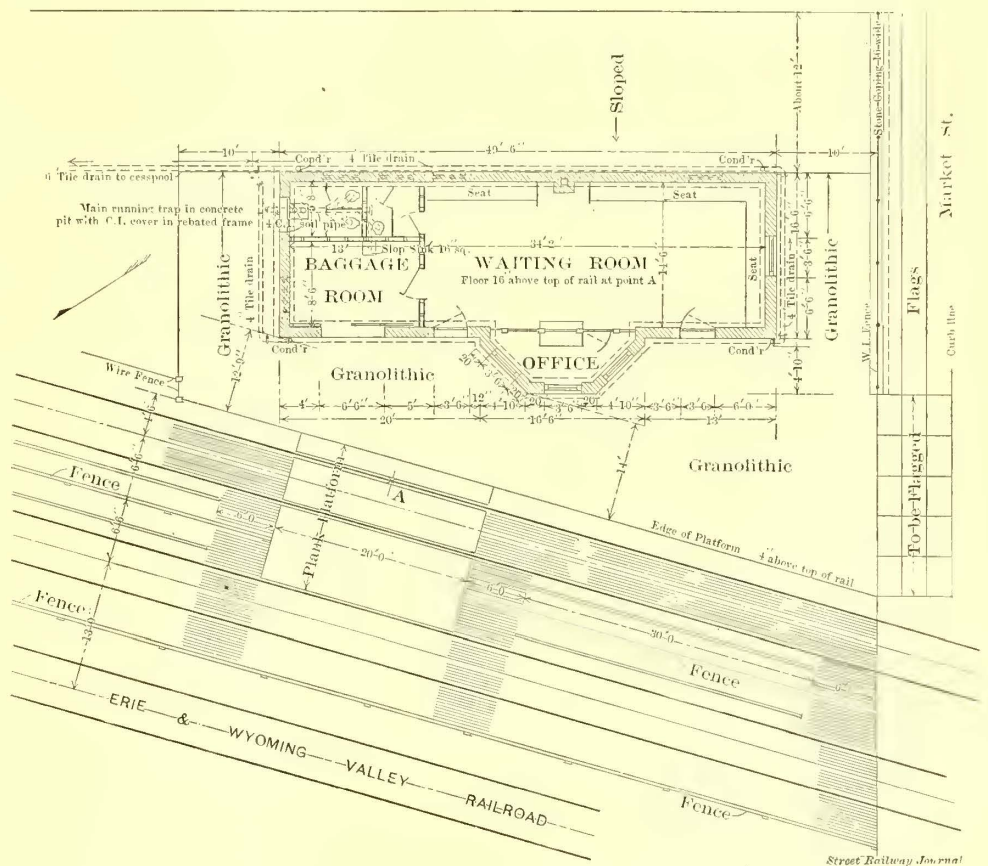
nected, and are supplied with roller bearings at all expansion points. The roadbed is finished and all equipment installed on the division between Scranton and Pittston, and in this run of 12 miles there are fourteen bridges, varying in span from 26 ft. to 93 ft., and twenty-one box culverts of concrete masonry. From Pittston to Wilkesbarre the roadbed has been largely graded, and the general character of construction is similar to that on the section already completed. At the approach to Wilkesbarre a viaduct, 554 ft. in length, is being constructed, which embraces as difficult engineering features as any encountered along the line. At this point the grade is carried 30 ft. above the ground, to carry the road over the highway, the Wilkesbarre Traction Company's trolley line and several tracks of the Lehigh Valley and Jersey Central Railroads. The wagon road and the trolley tracks have had to be moved nearly 30 ft. towards the river, and an embankment has been built across the old highway to bring the roadbed to the viaduct. The embankment south of the viaduct stretches for about 1000 ft. along the banks of the Susquehanna River, passing under the bridge of the Wilkesbarre & Eastern Railroad, the first span of which is being rebuilt on a different design to allow sufficient room for the purpose. From there the roadbed will be carried as a fill, protected from the river current by crib work and rip-rap, crossing over Mill Creek on a four-span steel bridge 120 ft. long. At least 12,000 cu. yds. of concrete will be used in the construction of abutments for the viaduct, and 800 tons of steel will be required in the bridge work.

TERMINAL FACILITIES AT WILKESBARRE

The southern terminal of the road is located at Wilkesbarre, the county seat and commercial center of Luzerne County, with a population of 65,000 inhabitants. It contains a system of urban and suburban street railways comprising 65 miles, and has recently been connected by a third-rail electric road

anticipate that they will continue their trips farther up the valley towards Scranton.

The station is located on Market Street and Canal Street, the former being the main street of the city, running north and south, and stands immediately across the street from the Union



PLAN OF STATION AT PITSTON

station, into which run the Pennsylvania, the Lehigh Valley and the Delaware & Hudson Railroads. Its frontage on Canal Street is 1200 ft., and for this distance it parallels and is in contact with the yards of the three steam roads mentioned.

The passenger station, which will have a frontage on Market Street of 50 ft., will be a handsome granite structure of three stories. The lower floor will be devoted to the convenience of passengers and the upper stories divided into offices. Ample accommodations will be provided for the receiving and delivering freight on the Market Street front.

PITTSTON STATION

Besides that at Hancock, already described, there is another complete intermediate station equipment at Pittston, which is a city of 25,000 inhabitants about $8\frac{1}{2}$ miles from Scranton. This station is located on Market Street a short block from Main Street, the principal street of the city, and is in every way central and convenient of access.

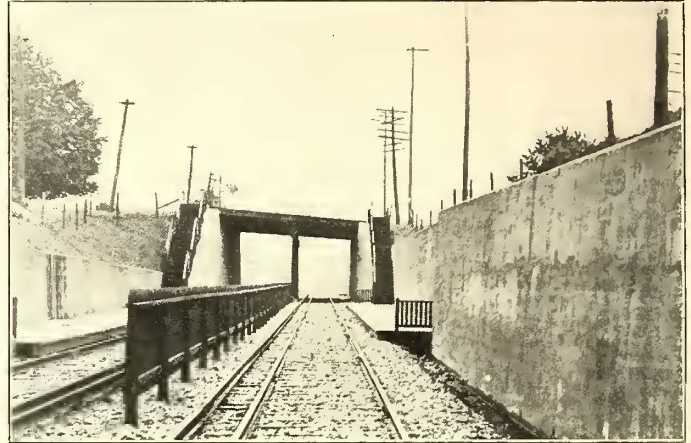
The character of the building is similar to that of those of



PASSENGER STATION AT PITTSTON, FREIGHT DEPOT AT THE RIGHT

the Scranton terminal, and the accommodations for the public are as complete in every respect. The building is 46 ft. 9 ins. long facing the road, and 16 ft. 6 ins. deep on Market Street. A curved roof projects over the platform 7 ft. 6 ins. on all sides, for protection of passengers from the elements. Just back of the passenger station and abutting on Market Street is the freight station, a building 108 ft. x 24 ft., harmonizing with the main building. It is provided with an office and ample platform facilities to meet the demands of the freight service which is confidently expected at this point. Station platforms have been built at frequent intervals along the right of way at

over platforms, with a width over sills of 9 ft. 8 ins., and a height from bottom of sills to top of deck of 10 ft. The platforms are 5 ft. long. The passenger car bodies weigh 32,000 lbs. and the combination car bodies 35,000 lbs. The trucks were made by the Baldwin Locomotive Works, and are of the M. C. B. swing-motion equalized bolster type, and those at the rear have mounted on them, with Gibbs cradle suspension, two single-reduction 50-F Westinghouse motors of 150 hp. The

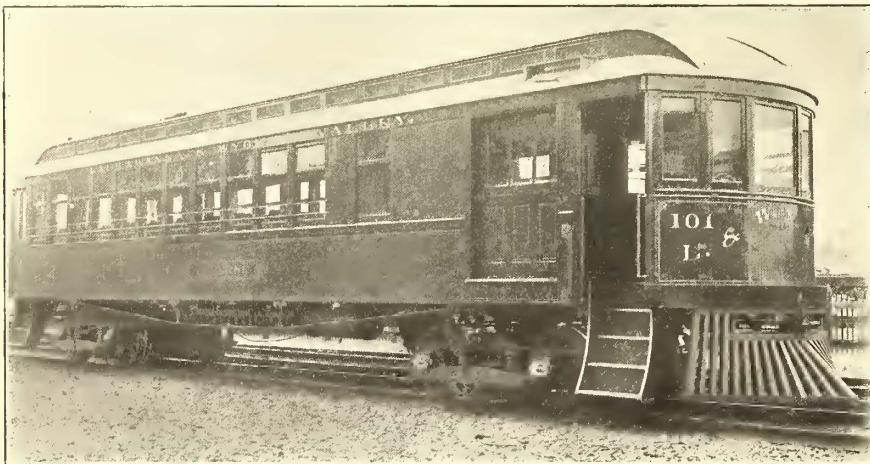


PASSENGER PLATFORMS AT WILLIAM STREET, PITTSTON

axles are of steel, and the wheels are of cast-steel with steel tires and M. C. B. flanges.

The entire length of the interior of the passenger car is devoted to seats, the car being divided by a wooden and glass partition to segregate smokers from the other patrons of the road. The end reserved for smokers accommodates twenty-five, and there are seats for thirty-four in the general compartment. Double sliding doors are provided in the end and middle partitions, and vestibule side doors are hinged to the post next the car body. These doors, when closed, are secured by the lowering of the trap-door forming the extension to the

platform covering the steps. There is double French plate glass in the partitions and in the front and rear vestibules. The windows are of double thickness American glass, and are protected when open by two polished brass rods running the full length of the car outside. Pantasote curtains operate on springs. As loops are established at each terminal the backs of the seats have been made stationary, and the motorman's cab is permanently at one end of each car. The interior finish of the cars is in natural mahogany, handsomely inlaid with holly. The window curtains are dark green and the car seats of red plush. The fan lights in the clerestory are of green opal glass, and the general harmony of color is pleasing. The height of the first step from the top of the rail is 10 ins., and there are five 8-in. steps leading to the car floor. There are eight elec-



COMBINATION CAR

trains will stop for the convenience of the patrons of the line. The permanent location of these stopping points is not as yet determined, pending experience with the traffic and an endeavor to meet the convenience of the majority of those who use the road.

ROLLING STOCK

At present the electric car equipment consists of ten regular passenger cars, three combination passenger and baggage cars, four freight cars and one construction and repair car, all furnished by the American Car & Foundry Company. All of these cars were built from special designs, and are practically of the same dimensions, 42 ft. long over end panels and 52 ft. long

tronic lights of 16 cp on each side of the car and one light in each vestibule. Each car has twenty electric heaters, furnished by the Consolidated Car Heating Company.

The combination car has its passenger compartment equipped similar to that of the passenger car proper. It is provided with seats for forty-two people, and in the baggage compartment there are adjustable seats at the sides for thirteen people. This compartment is 12 ft. 9 ins. long, and is supplied with sliding doors at each side for handling baggage.

The freight cars have a length of body of 46 ft. 6 ins., and are built of straight grain long yellow pine with oak sills, strengthened with $\frac{1}{2}$ -in. angle-irons and oak cross-timbers. The in-

terior is sheathed with 5/8-in. whitewood, tongued and grooved 1 3/4 ins. wide. They have a platform in front only, and this is equipped for the motorman with the same electrical outfit as the passenger and combination cars. They have sliding doors in the middle of each side for the handling of freight and one at the rear. A swinging door opening inward leads to the front platform. The heating apparatus is the same as that supplied to the passenger cars.

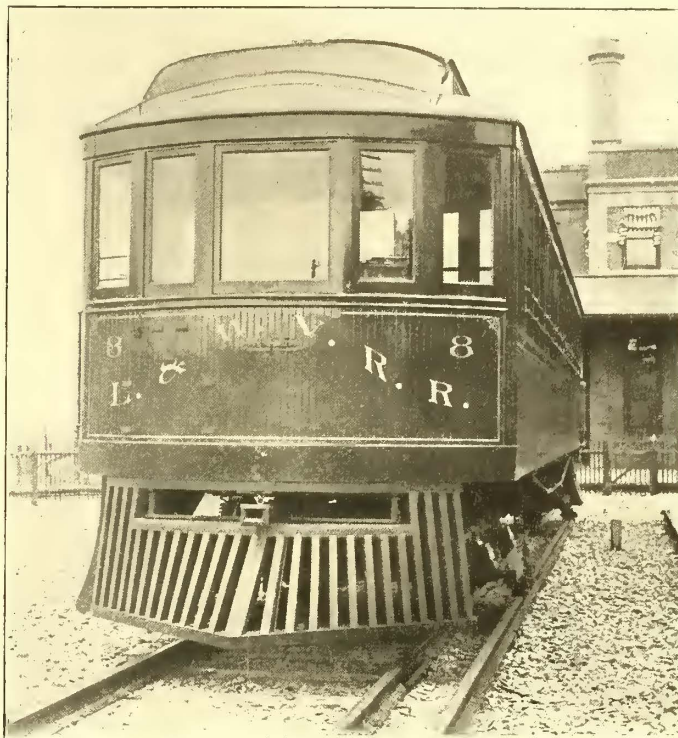
The construction car is a standard flat car with movable sides, 40 ins. high. It has wooden pilots on the front and rear trucks of the locomotive cow-catcher type, and these trucks are provided with two single reduction-type No. 76 Westinghouse motors of 75 hp, thus enabling the car to make emergency runs and perform all kinds of heavy duty, such as wrecking, hauling gravel cars, performing snow-plow work, etc.

All cars are supplied with trolley poles, by which they are operated in the car house and in the yards, where danger would attend the presence of the third rail on the ground. The front of each car is provided with a wooden fender of locomotive "cow-catcher" type, foreshortened to avoid interfering with the coupling, which, upon freight and express cars, is of the M. C. B. automatic type, and is attached to standard radial draw-bars. They are all supplied with Westinghouse automatic air brakes, supplied by type-D motor-driven reciprocating air compressors placed under the car body, as well as a vertical hand-wheel brake, and both are operated from the motorman's vestibule. All of the trucks for these cars are provided with cast-steel wheels and steel tires and axles except the construction car, which has chilled cast-iron wheels. The equipment also includes fourteen standard box cars and four flat cars and one steam locomotive of 50 tons weight. The rolling equipment is painted chrome orange color with gold lettering and trimmings.

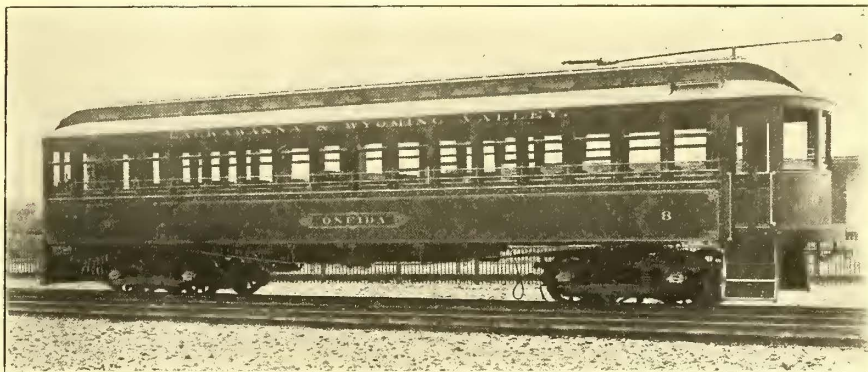
GENERAL FEATURES OF THE ROUTE

The right of way of the Lackawanna & Wyoming Valley Railway covers in all about 35 miles of double-track railway. At present the road to Carbondale extends only 1 1/2 miles in the direction of Dunmore. This part of the line is now made use of temporarily pending the completion of a tunnel at Scranton, which, when finished, will shorten the line considerably and avoid all grade crossings within the city limits. The road to Wilkesbarre by way of this temporary cut-off

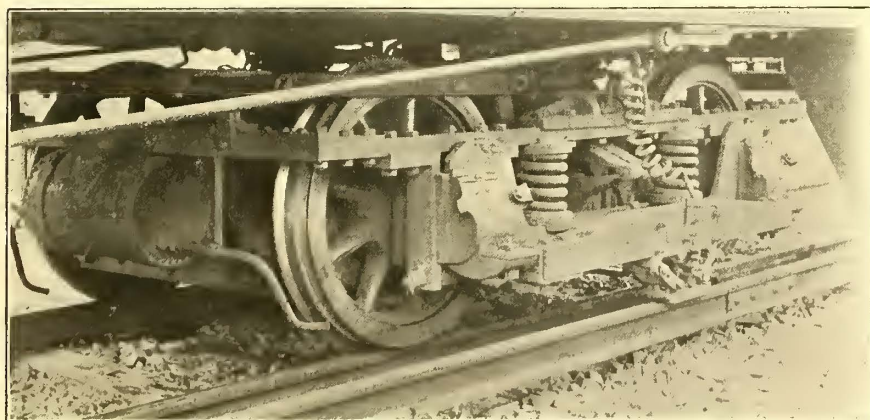
wards towards Scranton, as the road rises, several magnificent views may be obtained of the city with its background of hills and the river winding through the valley below. At the top of



FRONT OF CAR, SHOWING COWCATCHER



PASSENGER COACH



MOTOR TRUCK AND CONTACT-SHOE

is approximately 20 miles long, and this distance will be shortened more than a mile by the route through the tunnel. Leaving the Scranton terminal by this cut-off the route skirts a rocky gorge, at the bottom of which, 150 ft. below, Roaring Brook winds its way towards the Lackawanna River. Looking back-

the hill, 1 1/2 miles from the terminal, the road turns to the south towards Wilkesbarre. A branch, however, has been started to the north and will intercept Nay Aug Park, an outing resort for the people of Scranton, and proceed to Dunmore, where a substantial station for freight and passengers will be built. Later the road will be continued to Carbondale through the same character of mining territory as exists between Scranton and Wilkesbarre. Returning to the road where it turns towards Wilkesbarre, two platform stations have been erected at Maple Street to accommodate people living on the south side of Scranton, in a section not reached by any line of the local trolley road. These stations will, in all probability, be used

by the people in Scranton who desire to continue further up the hill to Scranton Lake, a large artificial body of water kept in a reservation for the city's water supply. This place is rapidly becoming a resort on holidays, and many handsome residences are being built in the neighborhood by wealthy people from

Scranton, attracted there by the natural beauty of the environs and the magnificence of the distant scenery. Leaving the south side of Scranton and descending the grade, junction is made with the main line about 2.4 miles from the terminal. This road follows the bank of Stafford Meadow Brook, the course of which had to be moved, and the new banks of which required masonry walls to support the roadway for a considerable distance. From this point the road runs by easy grades, not exceeding $1\frac{1}{2}$ per cent, and level stretches through a beautiful section of country with scenery varied from rugged hills to rural meadows. The old planes of the Pennsylvania Coal Company's gravity railroad can be seen from time to time paralleling the road, and these scenes lend interest to the trip to those who have ridden over that historic coal road. The road then enters the mining town of Moosic, claiming 1200 people in its limits, many of whom are possessed of considerable wealth. The next two stops are at South Street and Plane Street in Avoca, a town of 4000 inhabitants. From the road at these points may be seen the breakers of the coal mines, with their enormous accumulated culm piles, which are ever a source of wonder to visitors. Some of these culm piles have been purchased by the road and will be used as fuel for power generation.

At the Heidelberg breaker, between Avoca and Pittston, is another platform station, and the people living in the eastern part of Pittston will be accommodated by a stop at William Street, the terminal of the road for the present being in Pittston, at the Market Street station already described.

A telephone system has been installed for furnishing communication between stations, and also for train despatching, for controlling the operation of work trains during construction work. A temporary running schedule has been inaugurated between Scranton and Pittston averaging 40 m. p. h. with seven stops, and the present headway of twenty minutes will be shortened as necessitated by the requirements of passenger traffic. The above schedule between Scranton and Pittston is easily accomplished in twenty-five minutes, and with five-minute lay-overs at terminals, one hour is consumed

in making the round trip. An express run has, however, easily been accomplished in less than eighteen minutes, which is at an average speed of 50 m. p. h.

ORGANIZATION

The project was inaugurated in 1900 by New York, Boston and Philadelphia capitalists, prominent among whom was George A. Lee, of Philadelphia, who appreciated the urgent necessity of increased transportational facilities in this district.

The officers of the company are: President, George C. Smith; vice-president, Charles F. Conn; secretary, Dudley Phelps, treasurer, Carl M. Vail. Board of Directors, George Westinghouse, George C. Smith, John W. Hollenback, Elisha A. Hancock, Walter C. Kerr, Frank K. Sturgis, Thomas B. Simpson, Joseph Seep, Dudley Phelps, George A. Lee, Paul D. Cravath, William Connell, Charles A. Terry, Thomas F. Penman, Henry J. Conant, L. A. Watres. The executive officers are: Vice-President, Charles F. Conn; traffic manager, B. F. Wyly, Jr.; superintendent, Chester P. Wilson; train despatcher, E. E. Vicker; chief engineer of power plant, Edward Hutchens; master mechanic, Sherman Lincs; auditor, H. E. Yost.

The Westinghouse interests have been closely identified with the enterprise throughout, and Westinghouse apparatus has been extensively used. At an early stage in the proceedings Westinghouse, Church, Kerr & Company were appointed chief engineers, auditors and contractors, and the entire work of design, construction and equipment, which followed extensive preliminary operation of the Transit Contract Company, has been done under their direction.

SAFETY GATE FOR TROLLEY CARS

The Twin City Rapid Transit Company is equipping its cars with a new style of gate that has many advantages, according to the management. Fig. 1 shows this gate in a 40-ft. vestibule car. It is controlled through a crank handle located in the motorman's vestibule, adjacent to the brake handle, by a system of levers and cranks connected rigidly with the swing-

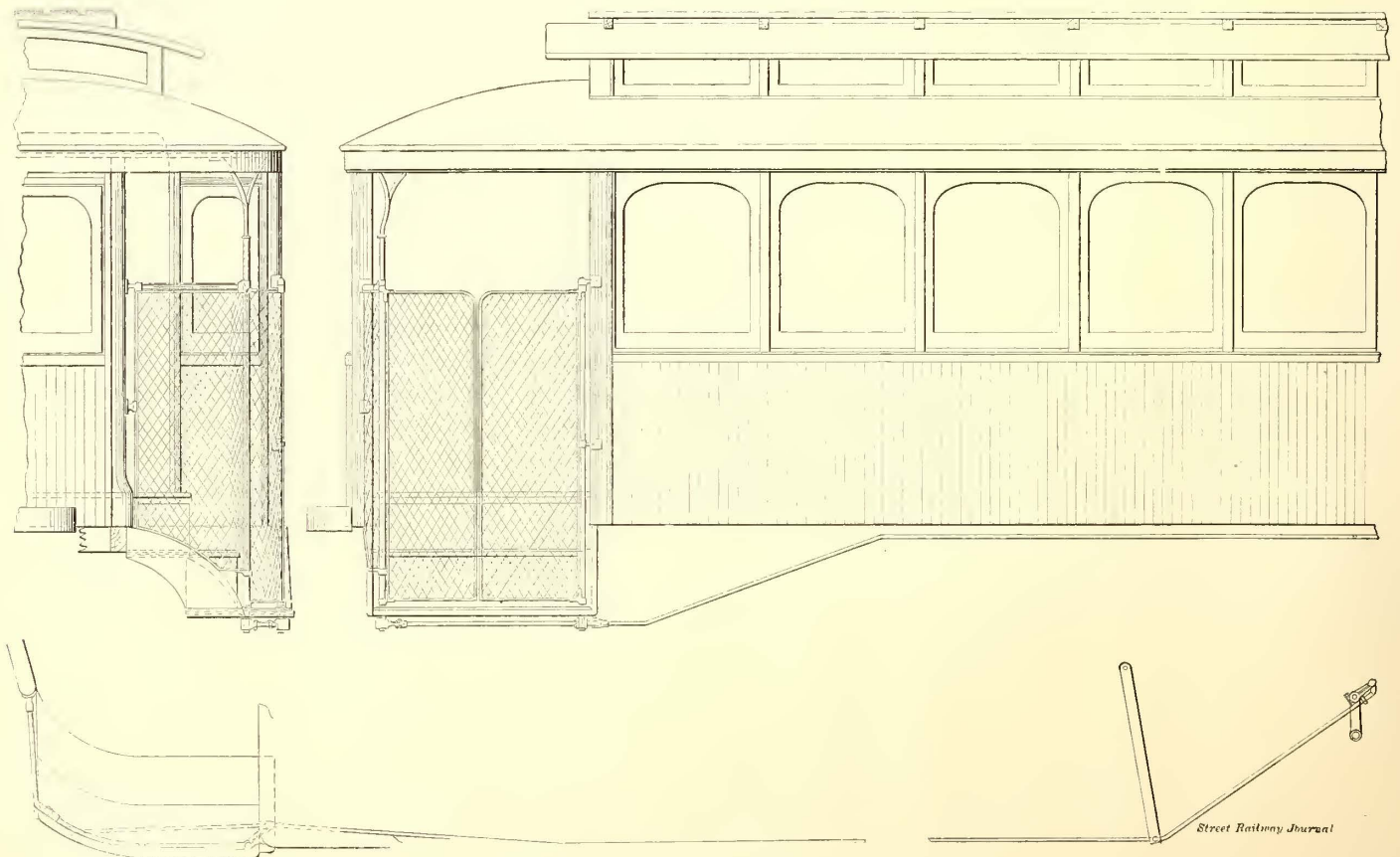
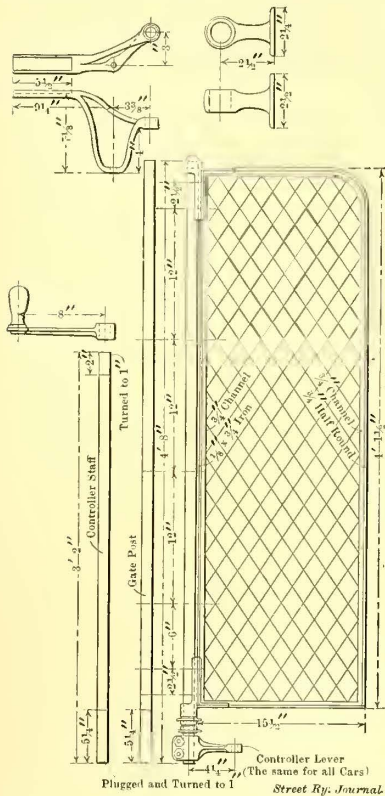


FIG. 1.—SAFETY GATE FOR 40-FT. VESTIBULE CAR

post of the gate and connected in the position shown in the cut; these gates close on the lower step of the car and cannot be opened by passengers. They are practically locked in this position, and are secured from interference, as they can only



DETAILS OF GATE FOR SINGLE-TRUCK CLOSED CARS

be opened by the motorman, who is instructed to keep them closed while the car is in motion. The construction of the gate, as applied to single-truck closed cars, is shown in Fig. 2.

The officers of the company report that accident cases growing out of injuries to passengers while attempting to leave or enter cars in motion are very rare occurrences on the systems covering St. Paul and Minneapolis and several interurban lines controlled by the Twin City Company.

The instructions for operating these gates direct the motorman first to bring his car to a standstill, then open the gates, and only close them after the conductor has given the signal to start. As the gates swing open, as shown, they do not interfere with the ingress or egress of passengers, but prevent crowding against the body of the car. When a gate stands open at right angles passengers are obliged to enter in an orderly manner, and this gives the conductor more control over crowds of passengers.

PENSION SYSTEM IN DENVER

The Denver City Tramway Company, on May 16, announced that it proposed to establish a pension system and mutual aid association for the benefit of all employees of the company. The general scheme was described in a bulletin issued by the manager, and details of the pension system and the by-laws of the mutual aid association are now being drawn up. Before deciding on the step the directors of the company made a very careful and thorough examination of the working of some of the most prominent similar associations in the United States, and intend to incorporate in their plan the best features of each.

As will be seen from the synopsis, published below, the pension system is entirely distinct and independent from the mutual aid association. The company is the sole contributor to the pension fund, while the employees are the chief contributors to the mutual aid association fund; the company contributing \$25 for every \$100 paid in by the employees. The company also guarantees the payment of the insurance and sick benefits in the aid association fund, thus making it better than any form of fraternal insurance.

Should all of the 786 present employees of the Denver City Tramway Company avail themselves of the opportunity to join this association it is estimated that it would entail upon the company a total liability of \$626,625 on account of life insurance. The average expectation in life, based on the American insurance tables of mortality, of all present employees is 30.28 years. The total payments made by the employees during their

average life period would amount to \$253,785. The difference between the amount paid in by employees and the total amount of insurance liability would be some \$372,000, which would be partially made up by the interest on premium payments; the balance would be borne by the company.

The announcement issued by the company is given below:

DENVER, COL., May 16, 1903.

To the Employees of the Denver City Tramway Company, and all Companies Operated by or in Connection Therewith:

It is proposed to establish for the benefit of the employees of The Denver City Tramway Company, and its allied companies, a system of pensions, and also to organize an association to be known as The Tramway Mutual Aid Association, the latter having for its objects and purposes the payment of weekly indemnity to an employee incapacitated by reason of sickness or accident and the payment of a fixed sum to the beneficiary or beneficiaries of such employee in case of his death.

While the two plans are entirely separate and distinct, and neither is dependent upon the other, there are certain features in each plan so closely related to provisions of the other, that a brief synopsis of the two is herewith given:—

PENSION DEPARTMENT.

The company creates a pension department and establishes certain rules and regulations governing the granting of pensions to employees of the company, which may be briefly stated as follows:

CLASSIFICATION

Retirement from the service of the company upon pension has been divided into two classes, the first compulsory, and the second in the discretion of the Pension Board, as follows: Employees attaining the age of seventy years, who shall have been twenty-five years or more in the company's service, shall be retired; employees sixty-five years of age to sixty-nine years of age, who shall have been twenty-five years or more in the service may be retired, if, in the opinion of the Board, they shall have become physically disqualified.

Exception: An exception, as far as length of service is concerned, is made in favor of all present employees of the company who shall be members in regular standing of The Tramway Mutual Aid Association. The length of service of such employees is reduced to fifteen years, as a qualification for retirement and pension.

CONTINUOUS SERVICE

The service defined as "continuous" is that service which has continued from any given date upon or in connection with any works of the company, whether prior or subsequent to their control or acquisition by The Denver City Tramway Company, and in computing the length of service it shall be reckoned from the date of entry in the service to the date when relieved, deduction of the actual time out of the service being then made and eliminating any fractional part of a month.

AMOUNT OF PENSIONS

The following classification has been made of the employees, in determining the amount of pensions to be paid:

To all uniformed employees in the regular train service the sum of \$25 a month pension.

To all employees who shall have received average monthly wages of \$80, or more, during the ten years immediately preceding retirement, the sum of \$25 a month pension.

To all employees whose average monthly wages during the period of time last mentioned shall have been \$60 to \$79, the sum of \$20 a month pension.

To all employees whose average monthly wages during the period above mentioned shall have been less than \$60, the sum of \$15 a month pension.

OTHER EMPLOYMENT

The acceptance of a pension allowance shall not debar any former employee from engaging in other business, but such person cannot re-enter the service of the company.

NEW BASIS OF PENSION ALLOWANCES

It has been estimated that pensions upon the basis above outlined may be paid the employees of the company and will not exceed in the aggregate the sum of \$18,000 per year; but the company reserves the right to establish a new basis, ratably reducing the pension allowances, whenever it shall be found that the present basis creates demands in excess of \$18,000 per year.

THE MUTUAL AID ASSOCIATION

It is proposed to organize an association which shall have a Board of Trustees of nine members, four of whom shall be elected by members of the association and five by the directors of the company.

This association shall enter into a contract with The Denver City Tramway Company, whereby the latter shall guarantee to the members of the association the payment of all benefits and indemnities provided for.

ELIGIBILITY

Any officer or employee of the company may become a member of the association, upon complying with the requirements thereof. In the case of present employees, the requirement with reference to a physical examination shall be waived for the period of thirty days from the organization of the association.

CLASSIFICATION

Members of the association are divided into three classes, as follows:

Class First. All members whose monthly earnings are \$80 or over.

Class Second. All members whose monthly earnings are at least \$60 and less than \$80.

Class Third. All members whose monthly earnings are less than \$60.

CONTRIBUTIONS

The members are required to contribute each month as follows:

Class First. \$1.00 each month.

Class Second. \$0.75 each month.

Class Third. \$0.50 each month.

These contributions shall be made each month during the receipts of benefits from the association and also each month when the member is in receipt of a pension, as well as each month when the member is engaged in his employment.

INDEMNITY IN CASE OF DEATH

In case of the decease of a member, there shall be paid to the beneficiary or beneficiaries of the deceased member the sum provided for membership in his class, as follows:

Members of the first class, \$1,000.

Members of the second class, \$750.

Members of the third class, \$500.

Provided, however, that members of the association who shall join between the ages of 41 and 50, inclusive, shall only be allowed 75 per cent. of the full amount for members of their class as an indemnity to their beneficiaries in case of death, and members who shall join over the age of 50 years shall only be allowed 50 per cent. of the full amount for members of their class. This is provided for the purpose of protecting the funds of the association against loss and depletion on account of the advanced age of many of the company's employees at the present time. (Increased indemnity, see below.)

DISABILITY BENEFITS

Disability of a member, arising through accident or sickness, shall entitle the member to receive the following benefits, for a

any occupation in the service of The Denver City Tramway Company.

(c) Members are disqualified for receiving benefits, and indemnity shall not be paid in case of the death of members, where the accident, sickness or death is caused, in whole or in part, directly or indirectly, by reason of certain prohibited acts and practices, among which are the use of alcoholic liquors as a beverage, intoxication, acts of immorality, fighting, except in self-defense, voluntary and unnecessary exposure to danger of injury, contagion or infection, unless in pursuance of duty as an employe of the company, etc.

(d) The Denver City Tramway Company enters into a contract with the association, whereby the company guarantees the contracts made with the members, agrees to pay for the running and operating expenses of the association, and, further, agrees to contribute to the funds of the association the sum of \$25 for every \$100 contributed by the members. In consideration of this contract, members in case of sickness or accident, and beneficiaries in case of the death of members, shall receipt to the company in full, upon payment of benefits or indemnity, for all liability on the part of the company.

HOSPITAL DUES

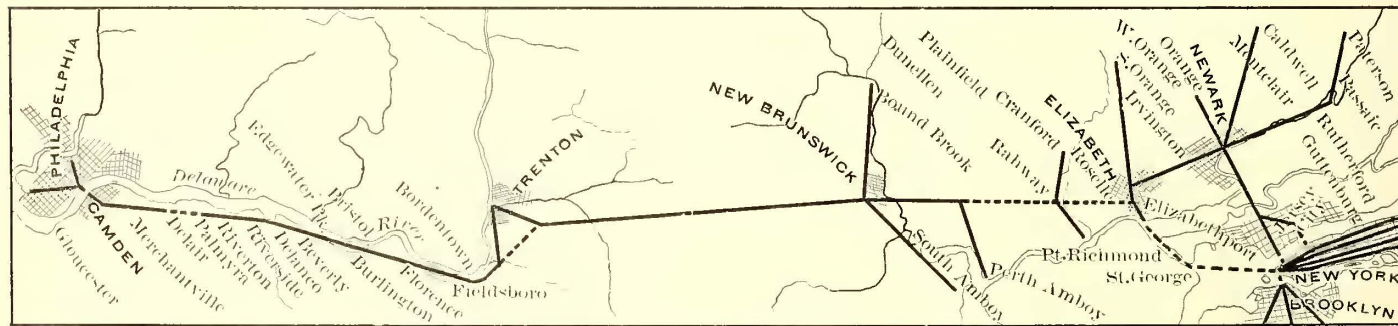
All employees joining the association shall have the privilege of exercising the option of continuing to pay hospital dues, as at present, and receive the same benefits therefor as are now received, or of discontinuing the payment of said hospital dues and thus ceasing to participate in the benefits derived from the hospital fund.

INCREASED INDEMNITY

Members will be permitted to increase the indemnity to be paid to their beneficiaries, in case of death, to twice the amount provided for their class and age, upon making application for such increased indemnity at the time they shall become members, and being approved therefor upon a satisfactory examination by the physician selected by the trustees for that purpose, and thereafter paying to the association twice the contribution required from members of their class.

POPULATION STATISTICS RELATING TO PROPOSED NEW YORK-PHILADELPHIA ELECTRIC SYSTEM

In view of the discussion of the relation of population to the support of an interurban electric railway system, the prospectus recently prepared by a syndicate engaged in promoting electric transportation between New York and Philadelphia



MAP OF PROPOSED TROLLEY LINE BETWEEN NEW YORK AND PHILADELPHIA

period of at least fifty-two weeks (if the disability shall continue so long), and longer if the trustees shall so elect,—that is,

Members of the first class shall receive \$6.00 per week;

Members of the second class shall receive \$4.50 per week;

Members of the third class shall receive \$3.00 per week.

CONDITIONS

In order to safeguard the funds of the association, it has been deemed necessary to provide certain conditions and restrictions, especially with reference to the receipt of benefits in ease of disability, the principal conditions being:

(a) No benefits shall be paid for the first ten days of sickness not produced by bodily injuries arising through external, violent and accidental means. In the ease of what are commonly termed "accidents," the disability benefits shall be payable from the time disability arises, provided notice thereof is given within two days after the accident occurs; otherwise, from the time of receipt of notice.

(b) "Disability" is defined to be total incapacity to carry on

may prove valuable, and it certainly furnishes some interesting data regarding the growth of population, not only in the terminal cities, but in the intermediate district through which it is proposed to build the line. A map has been prepared showing the nine leading cities of the world with a population exceeding 1,000,000 each, also a diagram showing the relative distance and the actual mileage between these cities. By reference to this diagram the proximity of New York and Philadelphia is very graphically impressed, and it is shown that there are no other two cities of such magnitude similarly situated.

The accompanying chart shows the tremendous increase in population that has been steadily making for the last hundred years in New York and Philadelphia and the intermediate territory. It will be observed that at the beginning of that period the population of Philadelphia (then the larger city) and New

York was approximately the same as that of Camden and Trenton to-day.

Another point of interest is that the increase in population of New Jersey in the last decade has been greater than that of any other State except a few far Western States. The percentage of increase has been New Jersey, 30 per cent; Illinois, 26 per cent; Massachusetts, 25 per cent; California, 22 per cent; New York, 21 per cent; Pennsylvania, 20 per cent; Missouri, 16 per cent; Indiana, 14 per cent; Maryland, 14 per cent; Ohio, 13 per cent; Maine, 5 per cent, and Kansas, 3 per cent. Conse-

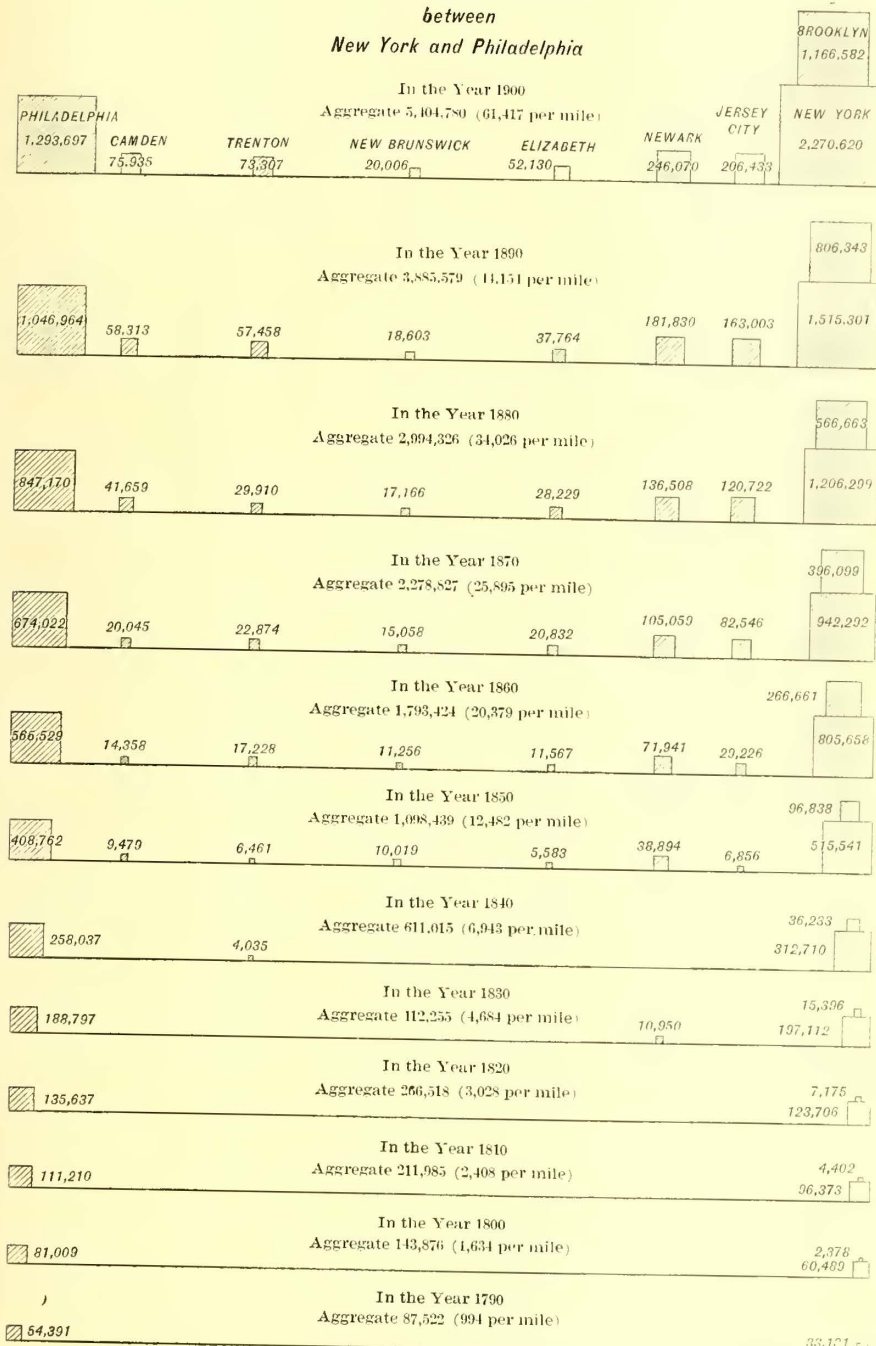
quently, New Jersey has had the greatest increase of population relatively of any State that has settled conditions. The population of Manhattan Island, New York city, increased 35 per cent, and Philadelphia increased 24 per cent in the same period.

These statistics, together with the chart and diagram, are reproduced directly from the prospectus mentioned without verification or modification. It is assumed, owing to the character of the gentlemen identified with the syndicate, that this data is approximately correct; in fact, that is as exact as can well be obtained for such purposes, but it is likely to be mis-

leading unless it is clearly understood that the population of the terminal cities should not be taken as the basis upon which to determine the probable traffic of such a system after the manner of city and suburban or ordinary interurban service.

While this is admitted by the promoters of the line, it is also claimed that there are many special conditions favoring the development of large passenger traffic between New York and Philadelphia, and that considerable support will be received from the intermediate towns. While it is true that very few New Yorkers would be attracted to Trenton, New Brunswick or smaller points, a low fare and frequent service would induce many residents of the smaller towns to visit the Metropolis often, and that a large, steady business could thus be depended upon. Moreover, it is pointed out that the traffic between the terminal cities, already amounting to fully \$5,500,000 per annum, has been obtained apparently without any appreciable effort to stimulate it, either by reduction of fares or otherwise, and, consequently, it represents only a small portion of the possible movement. In the matter of fares, too, it is said there is no territory in the United States where so few concessions have been made as between Philadelphia and New York. This has precluded the possibility of anything like a natural growth of the traffic that might reasonably be expected between these cities, as the policy of the steam roads has really restricted development. This is explained by the fact that the steam roads have not had facilities for handling more business between these points without crippling the regular service and overcrowding the tracks. It is proposed to follow the line shown in the accompanying map, and make use of existing trolley franchises wherever possible, and, consequently, the projected line will not be a high-road in any sense. Electric roads already built are indicated on this map, and others are now in course of construction. The Trenton & Brunswick Railroad Company will form the nucleus of the proposed system, and will serve as the connecting link between the suburban trolley lines extending from the terminal cities.

Schedule showing Population between New York and Philadelphia



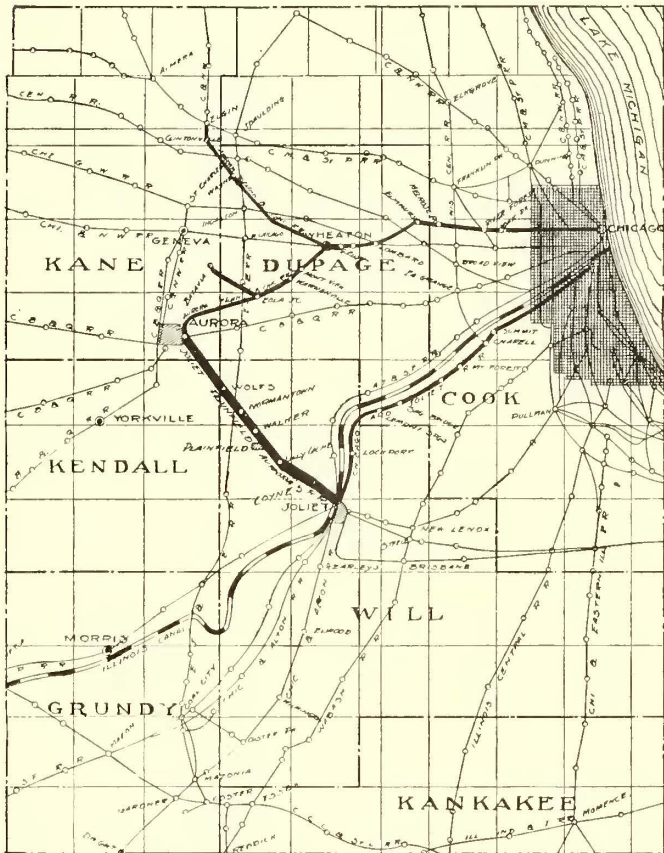
POPULATION CHART, 1790 TO 1900

London—Paris	250 miles
Berlin—Vienna	131 miles
London—Berlin	722 miles
Paris—Berlin	731 miles
New York—Chicago	837 miles
Paris—Vienna	852 miles
Berlin—St. Petersburg	1084 miles
N.Y.—Phila.	88 miles

NEW LINE BETWEEN JOLIET AND AURORA

Ground was broken during the last week for the construction of a connecting link between two of the most important electric roads in Illinois, besides joining with electric traction two of the largest cities in that State. The Aurora, Elgin & Chicago and the Chicago & Joliet electric lines are classed among the best built and equipped traction lines in the country, and they have enjoyed an excellent business from the day they opened to the public. The former extends from Chicago to Aurora, due west a distance of 35 miles; the latter from Chicago southwest to Joliet, an equal distance; the terminal cities, Joliet and Aurora, being about 20 miles apart.

The line referred to will connect these two cities, and the



MAP OF INTERURBAN LINES JOINING CHICAGO, JOLIET AND AURORA

company has been chartered under the name of the Joliet, Plainfield & Aurora Railway Company. The triangle thus formed will include 90 miles of interurban road, affording exceptional attractions for excursions and tourist travel, as the route traverses the most interesting portion of the State, besides a most populous one. The line is estimated to have a tributary population of over 2,000,000 local inhabitants, not counting the enormous transient population of Chicago. As a local line between the cities mentioned, the road should prove very prosperous, Aurora and Joliet having about 35,000 each and the village of Plainfield about 1500. There are also several smaller towns along the proposed route, and the whole district is thickly settled with prosperous farmers. It will be seen, therefore, that the line from a purely local standpoint will have an average population of over 4000 to the mile, which is considerably above the average, while from the standpoint usually adopted in figuring tributary population it will enjoy the proud distinction of 200,000 population to the mile, since the completion of the triangle above described makes Chicago directly tributary.

The proposition is being built and financed by the Fisher Construction Company, a corporation recently formed in Illinois with \$50,000 capital stock. H. A. Fisher, of Columbus,

who has been identified with the building of a number of leading roads in Ohio, is president of the company. Mr. Fisher is at present general manager and one of the owners of the Columbus, Delaware & Marion Railway, and he was prominently identified with the building of the Columbus, London & Springfield and the Columbus, Grove City & Southwestern lines, having been one of the promoters and general manager of these Ohio properties before taking up the promotion of the Columbus, Delaware & Marion. F. E. Fisher, general manager of the Chicago & Joliet Electric Railway, is vice-president and general manager of the construction company. He has had many years experience in steam and electric railway building and management. Lee D. Fisher, who is chief engineer of the company, was assistant engineer in charge of the construction of the Columbus, London & Springfield, the Columbus, Grove City & Southwestern and the Columbus, Buckeye Lake & Newark lines, and is now chief engineer of the Columbus, Delaware & Marion.

The Joliet, Plainfield & Aurora is to have first-class construction work, principally on private right of way, all of which has already been secured. Entrance to Joliet will be over the tracks of the Chicago & Joliet Electric Railway, owned by the American Railways Company, from whom power will be rented. General offices have been established at Joliet, and it is stated that the line will be in operation as far as Plainfield by Aug. 1, and will be completed late in the fall.

CAR PAINTING METHODS

At a recent meeting of the Northwest Railway Club, of St. Paul, Minn., A. J. Bishop, master painter of the Northern Pacific Railway, presented a paper on "The Principles Underlying Car and Locomotive Painting."

Regarding painting the exterior of passenger cars, Mr. Bishop said that he had secured successful results by the use of a method which he called the A B C system. "A" is the first coat, the priming, the wood preservative applied directly to the wood. This should be freely applied, well brushed into pores and nail holes, the painter knowing whether or not the preparation is becoming heavy or fat, and tempering it accordingly before applying. "B" is the second coat, second priming, or the loading surfacer, and is freely applied and evenly brushed, forced into pores and nail holes, and given the same attention as to the priming. It should not be applied until the "A" has had time to dry, which should be from seventy-two hours to ninety-six hours. The "B" dries in twenty-four hours. The puttying is to be done on the "B" surface. The putty is to be composed of 20 lbs. dry white lead, 12½ lbs. dry English filler, 10 lbs. keg white lead, 1 lb. dry lamp black, equal parts coach japan and inside rubbing varnish, well mixed and thoroughly pounded. The "C" surfacer is the leveling coat, and is the same as rough stuff, two or three coats being applied, followed by the guide coat, rubbed with stone and water, then colored, ornamented and varnished; good surfaces being produced in twenty-three to twenty-eight days. In the knifing and sandpapering process the time is reduced to fifteen days in some cases and eighteen days in others, but at a sacrifice of finish, as the plane marks, grain of wood and other indentations are not always obliterated and show after varnishing.

Mr. Bishop said that to hasten the work it is necessary to hasten the drying, and to do this a part of the oil must be eliminated in making formulæ, substituting some less durable vehicle, one that is less impervious than oil, and so obtain less durable service. He did not believe, however, that it would pay to go back to the old lead and oil process of car painting.

In concluding, Mr. Bishop called attention to a catechism of car painting by Frederick S. Ball, printed in the October issue, 1894, of the "Railroad Car Journal," stating that it contained valuable information on this subject.

ELECTRIC RAILWAY TELEPHONES

The American Electric Telephone Company, of Chicago, Ill., manufactures an improved self-contained telephone which is

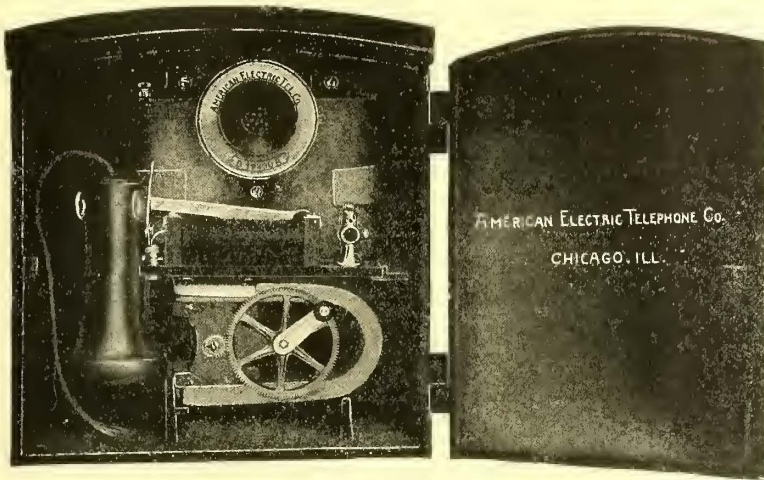


FIG. 1.—TELEPHONE FOR ELECTRIC RAILWAY SERVICE

adapted for outdoor use, and should, therefore, prove especially valuable to electric railways using telephones for despatching cars and for other purposes.

This type, which is shown in Fig. 1, is made thoroughly damp and moisture proof. The telephoning apparatus is enclosed in a cast-iron case and with an iron plate with a rubber gasket to protect the working parts while the telephone is in service. When not in use the closed door affords double protection.

The receiver has a pure rubber, self-contained shell, is double-pole, non-adjustable, because it cannot get out of adjustment, and is not affected by heat or cold. The transmitter is constructed of very hard, black diamond carbon. It has a moisture-proof electrode cup and has never been known to pack. The switch hook has platinum contacts.

As shown in Fig. 2 the generator is of the five-bar type, with laminated armature. It receives current from two American dry batteries. Ringer coils are mounted when desired. To prevent the absorption of moisture, all coils are built in paraffine.

The equipment is all provided with American patent heat coil protection. All apparatus is mounted on iron plates. The telephones are fastened to the poles by means of two lag screws entering within the box.

CARS AND TRUCKS FOR VERY HIGH SPEED

Some cars and trucks for extremely high-speed service on the Long Beach line of the Pacific Electric Railway Company running out of Los Angeles are being turned out at the works

of the St. Louis Car Company. Although these cars are intended for a speed of over 70 miles per hour maximum, the California type of car has been selected, as can be seen from the accompanying engraving. This car has one end open, although entrance can be made only from the platform, as the open part of the car is surrounded by wire netting up to the sash line. The car has a seating capacity of

fifty-six people, a length over all of 48 ft. and height from bottom sills to top of roof of 9 ft. 4 ins. The truck centers are 27 ft. 6 ins. apart.

The trucks under this car are designated by the St. Louis Car Company as No. 23-B. They are practically an M. C. B. type of truck on the same lines as the other trucks of

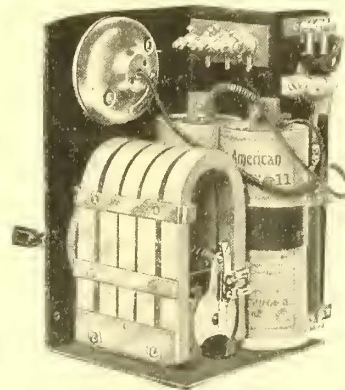


FIG. 2.—GENERATOR

this company of the No. 23 series. In this truck all the flexibility of a regular M. C. B. steam-road passenger truck is afforded, as the construction of the frame does not materially reduce the space available for the spiral springs which rest on the equalizing bars. The side frames are of bar-irons, arranged in a truss and bolted to angle-iron ends. Elliptic springs are used on the bolsters. The swing of the bolsters is cushioned by spiral springs, as seen. This truck complete weighs 9000 lbs. The weight of the car body is 42,900 lbs., making the weight of car and two trucks 60,900 lbs.

SARATOGA MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

At the meeting of the American Society of Mechanical Engineers, to be held at Saratoga, N. Y., June 23 to June 26, a number of papers of interest to railway men will be presented. H. G. Manning will read a paper on "The Mechanics of Air-Brake Systems." He will give a short historical account of air-brake systems, followed by an explanation of the three principal systems now in use. A. H. Eldredge will discuss "Positive Governor Devices for Corliss Engines," advocating the use of gearing or sprocket and chain to replace belts for governor drives. In his paper on "The Steam Turbine from an Operating Standpoint," F. A. Waldron treats in detail the Westinghouse-Parsons turbo-generator outfit installed for Yale & Towne. John Balch Blood, in a paper entitled "A Rational Train Resistance Formula," will outline a rational formula which he has developed for calculating train resistance.



HIGH-SPEED EQUIPMENT FOR CALIFORNIA

ENGINE TYPE RAILWAY GENERATORS

The accompanying cut (Fig. 1) illustrates an S. K. C. direct-current railway generator direct connected to a cross-compound Corliss engine. This generator is representative of a type which the Stanley Electric Manufacturing Company has designed to meet the severe conditions met with in railway service.

The armature laminations are dove-tailed into the arms of a cast-iron spider and are clamped between two end rings drawn together by bolts passing inside the laminations. The supports for the armature winding are cast in one piece, with the end rings. The construction of the ventilating ducts by which the laminations are thoroughly sub-divided deserves special atten-

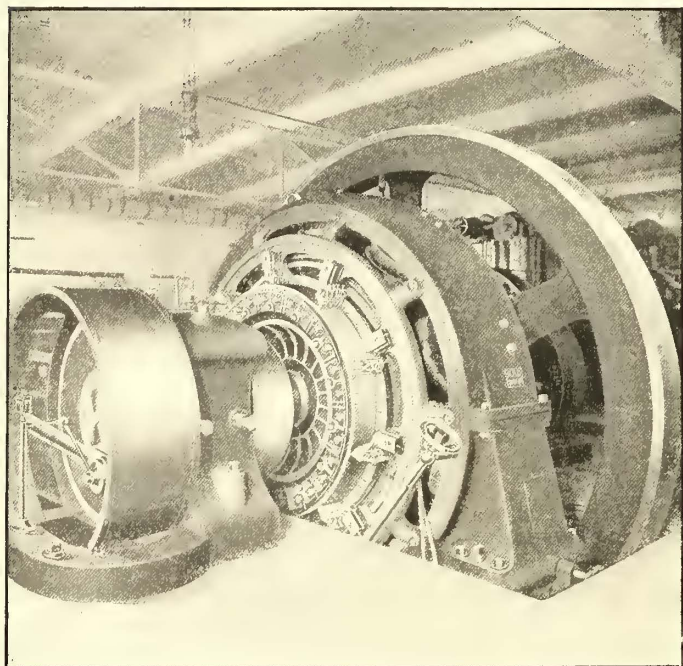


FIG. 1.—DIRECT-CONNECTED RAILWAY GENERATOR SET

tion. The steel fingers are held between supports bent up from the punchings in the manner shown in Fig. 2, and thus the space is entirely open for the free circulation of air. Ventilating ducts are also placed at each end of the core between the laminations and the end plates.

The armature winding is all in the same cylindrical surface, and, with but few exceptions! is of the multiple type. Equalizing rings are placed on the ends of the core, and are connected to the winding at proper intervals. These rings equalize any difference of potential under the different poles due to any slight electrical or mechanical dissymmetry. The coils are held in place by wedges in the slots and by bands over the ends. These bands are in sections, and may be easily taken off and replaced.

The commutator is built upon a separate spider, which is mounted on a projection of that of the armature. The clamping rings are held together by bolts, which pass completely through the spider. The end ring is in sections, so that one part may be removed without dismantling the whole commutator.

The field yoke is made of cast-iron and is horizontally parted. The inside of the ring is turned out smooth, and where the steel poles fit against the yoke the pole is extended. The pole is made of cast-steel and the pole-shoe of cast-iron. The pole is bolted to the yoke with two bolts, and the shoe is held against the pole-core by screws through its face. This allows of easy removal of the field coils or poles.

The poles are of rectangular shape with rounded ends. The field coil is round, and this leaves a ventilating space on each side of the pole core, into which air is forced by the rotating armature.

The shunt and series windings are wound separately, and are kept apart and from the poles by fiber strips.

The temperature rise of any part of these machines after a continuous run at full load for twenty-four hours, is said not to exceed 35 degs. C. It is claimed that these generators will carry 25 per cent overload continuously with a rise not exceeding 50 degs. C., and will carry 50 per cent overload for two hours with a rise not exceeding 55 degs. C.

The standard sizes of these machines range from 200 kw to 2000 kw, and the number of poles from six to thirty. The efficiency has been made high at light loads, and is said to be nearly uniform up to 50 per cent overload.

MOMENTUM RAILWAY BRAKES

T. E. McCollum, of Toronto, Can., has invented a brake which is now in use on several Canadian electric railways. The energy of this brake is derived from the momentum of the car.

By reference to the accompanying cuts it will be seen that the brake consists of two friction discs with a drum between, and a sleeve carrying these parts; one of the friction discs is integral with the sleeve, which carries the brake proper; the other friction disc on the opposite side of the drum slides longitudinally on a feather-key; on the hub of this disc is an adjustable taper ring; a similar ring is screwed on the ex-

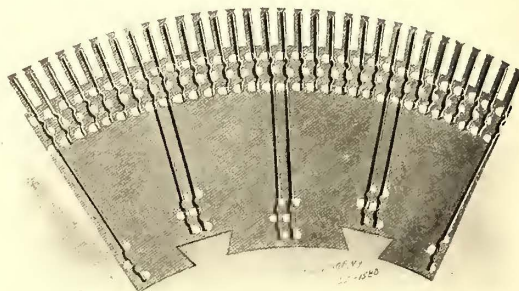
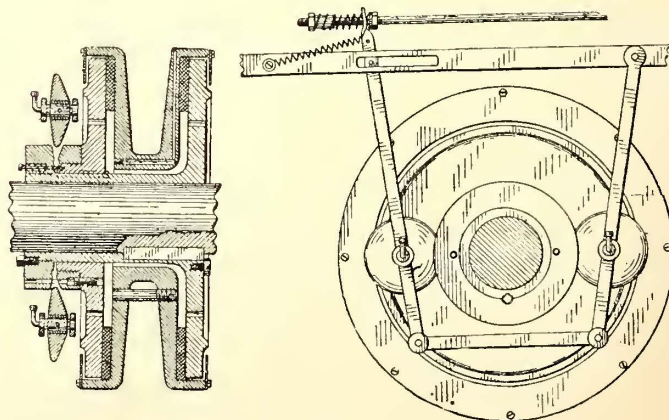


FIG. 2.—ARMATURE VENTILATING DEVICE

trinity of the sleeve, thus making with the former ring a V-shaped groove, as shown in cross section. The friction surfaces, being composed of special wood fiber and iron or steel running in a bath of oil and enclosed in a dust-proof case, run smoothly together without cutting. The taper wheels, by their rolling contact with the surfaces of the V-shaped groove, are claimed to cause the best possible wear. The brake is constructed with a compensating spring in the controlling device, so as to make the skidding of wheels practically impossible.



MOMENTUM RAILWAY BRAKE

Motormen who have handled this brake state that very little sand is required to avoid skidding. The Toronto Railway Company is using twenty-five of these brakes, and it is claimed that none of the cars so equipped has had flat-wheel trouble.

In this brake the connections between the brake mechanism

and brake staff have been so arranged that by reversing the movement of the latter, back-roll will be prevented while on a grade. The weight of the equipment for either single or double trucks is about 300 lbs. Several of the Toronto equipments have been arranged so that both motor and trail cars are braked by the motorman.

This brake is manufactured by the Momentum Brake Company, Ltd., of Toronto, Can.

◆◆◆
THE FLOOD AT KANSAS CITY

Recent reports from Kansas City indicate that the flood which occurred there last week occasioned more destruction of property and widespread discomfort than has been generally realized. The river reached its highest elevation at about noon of June 2; since that time it has been receding gradually. Of the seventeen bridges over the Kaw River one only, the Missouri Pacific Railroad Bridge, remains. This bridge was saved by the forethought of the superintendent of terminals, who covered it with locomotives from end to end. Three of those carried away were owned by the Metropolitan Street Railway Company, of Kansas City. The bridge carrying the



VIEW OF UNION DEPOT FREIGHT YARDS, KANSAS CITY, DURING FLOOD

main water supply line was also carried away, and the city water works pumping plant was forced to close down on Sunday afternoon, leaving the entire city without water from Sunday until Thursday night.

The Metropolitan Street Railway Company suffered severely. Both of the company's power houses, which are located upon opposite sides of the Kaw, were rendered useless, and will doubtless remain so for some weeks, as nearly all of the machinery was covered by the flood. A conservative estimate places the loss to the Metropolitan Street Railway Company at \$1,000,000. The gas and electric light service was shut off for two nights, and the street railway service was interrupted for a considerable period, although the cable stations were kept going when it was impossible to operate the electric cars.

Elevations taken of the highest water show that at Union Depot the Kaw River was 10 ft. higher than the Missouri, one-half a mile below the Hannibal Bridge, showing that the waters of the Kaw were dammed back by the buildings and freight houses in the West Bottom nearly that much.

SEMI-CONVERTIBLE CARS FOR AKRON

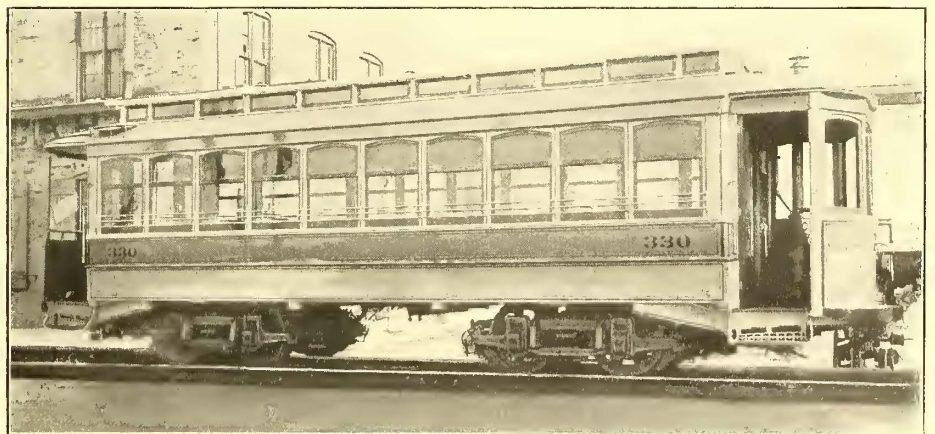
The Northern Ohio Traction Company has received ten semi-convertible cars from the American Car Company, of St. Louis,



INTERIOR OF AKRON CAR

for use at Akron, where the company operates a system of 90 miles of track, owns and operates a fine park and reaches several popular excursion points. The cars of this order are the Brill semi-convertible type. This car is largely used in Ohio owing to the many interurban systems, to which form of service it is especially adapted.

It will be seen in the illustration that one end only is furnished with a vestibule, and that the entrance is from but one side. This is, of course, on account of running in but one direction. The vestibule ends are sheathed with steel and wainscoted on the inside. The four sash are made with a single light to each and arranged to drop. The length of the cars over the end panels is 28 ft., over the platforms, 37 ft. 2½ ins., and over the bumpers, 38 ft. ½ in. The width over sills 8 ft. ½ in., and over posts at belt, 8 ft. 4 ins. The sweep of the posts is 1¾ ins. The thickness of corner posts 3¾ ins., and of side



EXTERIOR OF AKRON CONVERTIBLE CAR

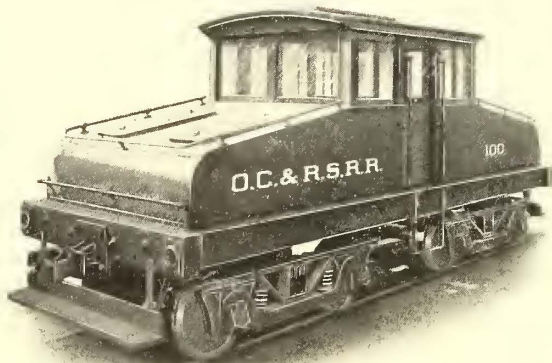
posts 3¾ ins. The stringers are of long-leaf yellow pine, 3½ ins. x 4⅞ ins.; the side sills, of the same material, are 4 ins. x 7¾ ins., plated on the inside with ⅜-in. x 12-in. steel. The end sills are of white oak, are 5¾ ins. x 5⅞ ins., with center crossings of the same, 3½ ins. x 4⅞ ins., and intermediate

crossings $4\frac{3}{4}$ ins. x 8 ins., also of white oak. Inside trusses, $\frac{1}{2}$ in. x $1\frac{1}{2}$ ins., with $\frac{7}{8}$ -in. round ends, are placed high and fastened to seven posts and secured to the second post from each with iron shoulders, over which they pass to their anchorage underneath the sills. The platform timbers are reinforced with angle-iron. The interiors are finished in cherry, handsomely carved, with ceilings of three-ply veneer bird's-eye maple. The inside trim is of solid bronze, including four parcel racks on each side. The trucks are Brill No. 27-F, equipped with two motors, each of 40 hp.

NEW TYPE OF ELECTRIC LOCOMOTIVE

The accompanying cut illustrates an electric railway locomotive which the Taunton Locomotive Manufacturing Company has designed for the Oneonta, Cooperstown & Richfield Springs Railway Company, of Oneonta, N. Y. The design presented is for a locomotive only, no facilities being provided for carrying freight. There is a house in the center of the machine for the operating force, while the ends are covered by a structure of sheet steel and angle-iron, which furnishes room for the secondary appliances needed in a machine of this character.

The principal dimensions of this locomotive are as follows: Length of locomotive from tip to tip of foot-board, 28 ft. 4 ins.;



ELECTRIC LOCOMOTIVE FOR ONEONTA

height from rail to the top of the trolley board, 11 ft. 3 ins.; width over all, 8 ft. 4 ins.; height from rail to side angle-iron which forms running board, 49 ins.; distance between truck centers, 14 ft. 6 ins.; wheel base of trucks, 6 ft. 4 ins.

The main and middle sills are of 5-in. x 12-in. oak, strengthened by $3\frac{1}{2}$ -in. angle-iron. This angle-iron, which extends the full length of the main sills, serves as a running board. The frame is tied together transversely at each end by 8-in. x 11-in. oak bumpers, and at proper distances along its length by 1-in. tie-rods. The frame is strengthened longitudinally by $1\frac{1}{4}$ -in. through-bolts in truss form, with turnbuckles. The oak bumpers carry M. C. B. automatic steel coupling castings of any first-class pattern, and on each side push pockets are provided. The frame bolsters are of 10-in. x 5-in. I-beams, with a piece of 6-in. x 10-in. oak sandwiched between them, the combination being firmly bolted together with $\frac{3}{8}$ -in. bolts. All corners are braced by knees of $\frac{1}{2}$ -in. x 7-in. flat-iron securely bolted. Between the main and middle sills space is provided for cast-iron ballast, and this gives opportunity for increasing the weight of the machine from 10 tons to 20 tons.

The house is framed with 5-in. x 5-in. corner posts, and 4-in. x 4-in. door posts of white pine, properly braced and tied together. The space between the posts is utilized for wide sliding windows. The necessary bracing is supplied by side plates and rafters, and the vertical frame is fastened to the steel structure which covers the ends. The roof is of wood, covered with painted canvas, and is provided with a trolley board extending the full length of the roof. The ends and sides of the body are enclosed by a structure of No. 10 sheet-steel,

fastened to the frame work, and 2-in. x 2-in. x $\frac{1}{4}$ -in. angle-iron, all bolted to the main sills. On the sloping surface of the curved ends are to be located headlights, bells, sand-boxes and large trap-doors provided with ventilating hoods. Access to the space at the ends is obtained through the house from the inside or the trap-doors from the outside. Within this enclosed space is ample room for air reservoirs, resistances, sand-boxes and other accessories. The sloping ends and the foot boards are provided with railings of 1-in. gas pipe.

The side frames of the trucks combine equalizing bars of 5-in. x $1\frac{1}{8}$ -in. stock, with a diamond-shaped M. C. B. truck. By this combination a double factor of safety is provided, because the diamond frame alone would be strong enough to carry the weight of the locomotive if the equalizing bars were omitted. A better distribution of load and easier riding, as well as the increased strength and safety, are provided by the use of the equalizing bars. The top frame is of $1\frac{1}{2}$ -in. x 4-in. iron. Both the top and the side frames are rigidly secured by gussets to the ends of the transoms. These transoms are made of 12-in. x 3-in. channels, and this construction keeps the whole frame secure and the journal boxes in line.

The truck bolster is of two channels, 8 ins. x 2 ins., with cast-iron filling-in piece sandwiched between them. This arrangement not only gives an additional weight of $\frac{1}{2}$ ton per truck, but adds strength to the bolster. The bolster is held in the direction of locomotion between the transoms, and is supported by double elliptical springs, which rest on the spring bed, consisting of 15-in. x 2-in. channels. Each spring has a capacity of $6\frac{1}{2}$ tons and a maximum movement of 3 ins. Lateral movement of the spring bed is permitted by the swing of 14-in. links, which support the bed and which are free to move at the spring bed and at the transom. This swinging support accomplishes the same result in the horizontal plane that the springs do in the vertical plane, and enables the body of the locomotive to follow irregularities and curvatures of the track more gradually and easily than do the wheels and truck frames. The weight of the bolster being transferred to the transom, is taken up by the equalizing bar and pedestal springs. The pedestal springs rest on the journal boxes, preventing the tilting of the frame when the brakes are applied or when the locomotive is started. The double equalizing springs are arranged in pairs at each side of pedestals, take the greater part of the load and rest on the 5-in. x $1\frac{1}{8}$ -in. equalizing bars, which, in turn, are supported by the journal boxes. The journal boxes are M. C. B. standard pattern, with $4\frac{1}{4}$ -in. x 8-in. journals; axles, $6\frac{1}{2}$ ins. in diameter; wheels, 33 ins. in diameter; 4-in. tread; pedestals of steel castings.

The locomotive is equipped with a hand-brake outfit, but should, of course, be supplied with air-brake equipment in addition. The brakes are constructed with the shoes on the inside of wheels, and can be easily adjusted without placing the truck over a pit.

The wheel base of 6 ft. 4 ins. allows inside suspension on the transoms of General Electric No. 55 Westinghouse No. 50-C, or equivalent motors.

Power may be supplied either through trolley or third-rail, the locomotive being modified accordingly.

The net weight of the machine, without motors, air brakes or ballast is 17 tons, and when ready for use will have a total weight of 40 tons.

In addition to this style of electric locomotive the company is prepared to design and furnish types adapted to factories, shops, mills and railways.

The Postal Telegraph & Cable Company has strung its wires along the line of the Toledo & Western Railway, and connection has been made with all stations on the system. All station agents are telegraph operators, and cars will be despatched largely by telegraph. The telephone system will be retained for communication between stations.

FINANCIAL INTELLIGENCE

WALL STREET, JUNE 11, 1903.

The Money Market

A rather heavy shrinkage in bank reserves, due chiefly to gold exports, has been the feature of the money situation during the past two weeks. What this sudden outrush of gold has shown clearly enough, is that the situation in the foreign exchanges during the winter and early spring was artificial; that is, that gold would have gone out much sooner had not our bankers made extraordinary effort to prevent it. Our floating debts abroad were extended from time to time until the money market was unable to stand the strain. When the proper time arrived, as it did a month ago, we were compelled to ship very heavily in order to make up for the previous delay. The outward movement during the last four weeks has therefore been abnormally large, and it has drawn very considerably upon the local cash supply. Not only this, but the process of transferring credits from Europe to this market has necessitated fresh borrowings from the local banks, which have prevented the Stock Exchange liquidation from reflecting itself as favorably as it would ordinarily in the current bank statements. Consequently cash holdings have declined, while loans have changed but little, and as a net result surplus reserve has fallen to not far from the lowest of the season. Some advance in money rates under these circumstances was of course inevitable. The time loans quotations are up on an average of half per cent as compared with two weeks ago. Sixty-day money now brings $4\frac{1}{2}$ per cent, and six months money 5 per cent. Money on call, which until recently loaned freely at $2\frac{1}{2}$ per cent and under, now ranges between 3 and 4. These changes, however, are by no means an unfavorable sign. Our relations in the foreign exchange have been unusually strengthened by the paying off of obligations to foreign capital, and the significance of this is that, when assistance is really needed, as it may be next autumn, the local market will be able to attain it easily from abroad. As for the immediate future the chances are that last Saturday marked the low point for surplus reserve for some time to come. Following the rise in money, sterling exchange has fallen well below the level at which gold exports are profitable. Currency is still flowing in from the interior, new gold is constantly arriving from the Alaskan mines, and the Treasury has ceased to show actively upon the market. All this, with the continued liquidation in securities, foreshadows a rapid recovery in bank resources during the next few weeks.

The Stock Market

The fortnight in the Stock Exchange has been another period of violent decline, accompanied by extensive liquidation. There still is a wide divergence of opinion as to the real nature and relative importance of the causes at work. Some critics prefer to regard the whole collapse as due to such specific influences as the labor controversies, damage to crops by rainfall and floods in the West and South, gold exports, and a host of lesser factors. Other cities look upon all these as merely contributory and incidental causes for a decline which is based on more fundamental grounds. They emphasize the view that prices had gone up altogether too high, and are now getting back to a true investment level, and that the cutting down of values has been none too severe to correct the unwholesome condition created by an excessive output of new securities, and by the general inflation of capital and credit which has been going on during the past two years. It is our judgment that this latter analysis is the true one, and that it is vain to attempt to find any new outside reasons for the decline. Even admitting that the labor situation is disquieting, and that crop prospects are not as promising as they might be, prices have certainly discounted liberally whatever there is bad in these two quarters. The decline has gone far enough, moreover, to anticipate any reaction that is now conceivable in the commercial field, for stocks are selling low enough to allow for whatever decrease of corporation earnings might ensue, if during the next few months general business were to fall off. The situation in the stock market simply is that the selling movement has acquired such a momentum that there is no telling just how far it will go. Intelligent observers agree that things look very cheap, but they have to admit that they may be cheaper still. Prices are as certain to go too low under bear operations as they went too high under speculation for the rise, and the investor who is able to pay cash for what he buys can feel pretty

sure that, although he may not get the bottom figures, he is getting some very fair bargains at the present level.

Brooklyn Rapid Transit and Metropolitan have been the weakest of the local traction stocks in the recent dealings. It is reported on good authority that the former stock was held quite largely by the Canadian speculators, who came to grief a week ago, and that it was these holdings thrown overboard which were largely responsible for the break in the price. Metropolitan has been offered down on light transactions, apparently in the interest of people who were short of the stock and did not cover at the time of the recent law suits. Manhattan, as was to be expected, was held better than the others: first, because its floating supply is smaller, and second, because there is a greater inducement to buy on the part of investors who are concerned only with the actual merits of the property. The directors of the new company at their meeting a week ago, made the quarterly dividend $1\frac{1}{2}$ per cent instead of $1\frac{1}{4}$ per cent, as some people had expected. They stated however that an extra dividend of 1 per cent would be paid in the last quarter of the year, provided earnings were large enough to allow of it. There is very little doubt that this condition will be fulfilled, for the report covering the first quarter of the year shows that earnings are running in excess of 8 per cent per annum on the stock.

Philadelphia

Considering the tremendous pressure upon the general markets, the leading traction specialties in Philadelphia have given a good account of themselves during the recent trading. The only two stocks which have really suffered are Philadelphia Company and American Railways. The first-named sold down under rather urgent liquidation from $42\frac{1}{2}$ to $40\frac{1}{2}$. American Railways lost 2 points to 45, but the selling was light and scattered. On the other hand, Union Traction has held steadily around 46, and Philadelphia Traction around $96\frac{1}{2}$, while Rapid Transit declined only $\frac{1}{2}$ per cent to 11. Dealings in all these stocks have been light, indicating that their floating supply is very limited. Other Philadelphia transactions of the last two weeks include Consolidated Traction of New Jersey, which has been very firm at 69, Indianapolis Street Railway at 82, and Rochester Passenger, which rose sharply to 83. Dealings in bonds have developed no particular feature, and prices are generally unchanged.

Chicago

The leading incident of the recent Chicago trading has been the decline in general traction specialties, which until recently have offered pretty fair resistance to the general downward tendency. A break of $8\frac{1}{2}$ points in City Railway, from 201 to $192\frac{1}{2}$, and a 4-point decline in South Side Elevated from 103 to 99, are the particular noteworthy incidents. Other issues which were extremely weak a short while ago have held their ground somewhat better. Metropolitan common, after an extreme decline to 20, rallied to 21, and the preferred recovered from 65 to 67. Northwestern common sold at 20, Lake Street at 5 to $5\frac{1}{4}$, Union Traction common at 5, the preferred at 35, West Chicago at 62 and North Chicago at 124. All of these are about the same prices as prevailed two weeks ago. The transactions in them were too scant to be of any significance. Vice-President Forgan, of the First National Bank, who is a member of the securities committee of the Lake Street Elevated, states that he feels confident that a plan for reorganizing the road will be taken up next month. According to report the company contemplates an extension of its lines through Harlem and River Forests, and the improvements of its service in Oak Park. It is understood that the general committee having the ordinance permitting the building of the Ravenswood extension of the Northwestern Elevated in charge, has decided to report favorably on the matter, and if this is true the company will probably start work on the new line this year.

Other Traction Securities

Among the Boston stocks Massachusetts Electric issues have been particularly weak, the common selling down from $28\frac{3}{4}$ to $25\frac{3}{4}$, and the preferred from 86 to $81\frac{1}{2}$. There is no specific reason for this severe decline, which seems to have occurred entirely in sympathy with liquidation in other quarters. Boston Elevated, after rallying a point to $146\frac{1}{2}$, fell back to 145. West End common lost a point to 90, but the preferred held steady at 112. In the Baltimore market the prevailing tendency toward weakness has only been pronounced in the United Railway issues, all of which have sold at the lowest figures of the season. The stock dropped from $12\frac{1}{2}$

to 113/4, the income bonds from 653/4 to 645/8, and the 4 per cent generals from 93 to 923/4. Here again explanations of a special nature are entirely lacking. A single transaction in United Railways scrip was recorded at 23. Other sales include Baltimore Traction 5s at 115, North Baltimore Traction 5s at 1181/2, Newport News and Old Point Comfort 5s at 100 and 1001/4. Augusta Street Railway 5s at 1011/2, Knoxville Traction 5s at 101, and City and Suburban (Washington) 5s at 98. On the New York curb the feature has been the weakness in St. Louis Transit, which at one time sold as low as 201/2, or 12 points down from the highest of a few months ago. Following this decline the stock recovered to 231/2, but later yielded again to 221/2. There is reason to believe that a few blocks of these shares held by speculators were thrown over upon the market as a part of the forced selling in progress elsewhere. It was this liquidation coming suddenly which caused the decline. New Orleans common, after a rise to 143/8, dropped to 14, while the preferred fell sharply from 441/2 to 41. The 4 1/2 per cent bonds went as high as 837/8, and then eased off to 83. Other curb transactions include Nassau Electric 4s at 83. Interborough Rapid Transit at 1001/2 and 100, American Light & Traction common from 80 to 78, the preferred at 983/4 to 981/2, Rochester Street Railway 5s at 100 and 993/4, Washington Traction preferred at 411/2, and the 4 per cent bonds at 76 and 753/4. Twin City Rapid Transit was one of the sensational features in the Stock Exchange, breaking in less than forty-eight hours from 105 to 871/2. This decline seems to have been due entirely to unloading by Canadian speculators who were caught in the panic which followed the announcement of the Ames failure at Toronto. According to local gossip Twin City shares were picked up quietly by prominent street railway capitalists whose headquarters are in Philadelphia. The stock, however, has regained very little of its loss so far.

Detroit United lead in the activity on the Cincinnati exchange last week. Sales were about 1100 shares. It opened at 75 and advanced to 761/4, dropped to 73 and then rested at 74. Toledo Railway & Light came in for considerable demand, sales being 873 shares, with a range of from 271/2 to 29. Cincinnati Street Railway was unusually quiet, sales numbering 222 shares at the stationary figure of 1331/2. Columbus, Delaware & Marion, Mansfield Railway & Light and Zanesville Railway, Power & Light were the active bond issues, all three selling at the old figure, 101.

On the Cleveland exchange, Cleveland City Railway sold at 971/2, a decline of 5 1/2 points, while Cleveland Electric sold at 75, a decline of 5 points from last sales. Lake Shore Electric, which has been inactive for some time, came into the trading and small lots sold at 10 to 101/2, a decline of 3 1/2 from last sales. Northern Ohio Traction opened at 211/2 and declined to 21; Monday it declined to 201/2. Cleveland & Southwestern preferred sold at 70 for several small lots, which is a decline of nearly ten points since the last sales. A round lot of Detroit United sold at 721/8, which is 7 points below last sales. All of these sales look like forced liquidation, and sharp advances are looked for every day. Brokers express the opinion that the Cleveland board shows more bargains in traction securities than in many months. The new Columbus stock exchange has opened with pronounced activity, total sales last week numbering nearly 6000 shares. The new Columbus Railway & Light stock opened at 32 and advanced with active demand to 35. Columbus Railway common stock has been rather quiet, but within the past few days there has been a disposition among holders of preferred to sell their stock and buy the common stock, which pays the same interest and sells at considerably lower figure. Common stock of the Rochester Railway was very active, and sold at around 82, based on the fact that the company is earning about 9 per cent, although dividends are not yet paid, and there are rumors of a merger of the public utility companies of Rochester. East St. Louis & Suburban Traction also came in for heavy demand at around 65.

Security Quotations

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

	Closing Bid	
	May 26	June 9
American Railways	47	44 1/2
Aurora, Elgin & Chicago	a29	a125
Boston Elevated	145	143
Brooklyn Rapid Transit	61 5/8	56 3/4
Chicago City	200	*190
Chicago Union Traction (common)	3 1/2	4 3/4
Chicago Union Traction (preferred)	32 1/2	33
Cleveland Electric	75	75

	Closing Bid	
	May 26	June 9
Columbus (common)	100	101
Columbus (preferred)	105 7/8	105
Consolidated Traction of New Jersey	67	68 1/2
Consolidated Traction of New Jersey 5s	107 3/4	105 1/4
Detroit United	76 3/4	69 1/2
Electric People's Traction (Philadelphia) 4s	99	99
Elgin, Aurora & Southern	a56	a50
Lake Shore Electric	10	10
Lake Street Elevated	5 1/4	5
Manhattan Railway	137 3/4	135 5/8
Massachusetts Electric Cos. (common)	28 1/4	25 1/2
Massachusetts Elec Cos. (preferred)	85 1/4	81
Metropolitan Elevated, Chicago (common)	21 1/4	21
Metropolitan Elevated, Chicago (preferred)	68	67
Metropolitan Street	122 3/4	122 3/4
New Orleans Railways (common)	—	14
New Orleans Railways (preferred)	—	41
North American	92	85 1/2
Northern Ohio Traction & Light	22	20 5/8
Northwestern Elevated, Chicago (common)	20 1/2	20
Philadelphia Rapid Transit	11 1/2	11
Philadelphia Traction	96 3/4	96 3/4
St. Louis Transit (common)	24 1/2	23
South Side Elevated (Chicago)	102	99
Syracuse Rapid Transit	—	—
Syracuse Rapid Transit (preferred)	a79	a79
Third Avenue	120	110
Toledo Railway & Light	27 1/2	23 1/2
Twin City, Minneapolis (common)	104 1/2	90 3/4
United Railways, St. Louis, 4s	84 1/2	84
United Railways, St. Louis (preferred)	73 3/4	71 1/2
Union Traction (Philadelphia)	46 3/8	*45

a Asked. * Ex-dividend.

Iron and Steel

The position in the pig iron market is still quite uncertain. The association of Southern makers have reduced the official quotation for the number of product at furnace to \$15, this, however, being what the real market level has been for some time past. It now remains to be seen whether consumers will come in and cover their requirements for the second half year, which still largely remain unfilled, or whether they will continue their policy of buying from hand to mouth in hope of negotiating their principal events later on at lower figures. On the solution of this question hangs the immediate future of the market. In steel and the finished branches of the industry tonnage has begun to fall off somewhat, notably in the East. There is no doubt that the disturbances in the building trades are having an adverse effect. But, apart from this, the sentiment among buyers is extremely cautious, with a growing inclination to look for easier prices. Quotations are as follows: Bessemer pig iron \$20.10, Bessemer steel \$30.50 and steel rails \$28.

Metals

Quotations for the leading metals are as follows: Copper 14 3/4 to 15 cents, tin 28 1/4 cents, lead 43 1/8 cents, spelter 5 3/4 cents.

IMPROVING THE STATION FACILITIES ON THE ELEVATED IN NEW YORK

The Interborough Rapid Transit Company has decided to improve and enlarge all the stations where the traffic is great on the Manhattan elevated system. The reconstruction of several stations will begin immediately. Among these stations are Rector Street, Cortlandt Street and Barclay Street, on the Ninth Avenue line. The 116th Street station at Eighth Avenue will be partly rebuilt and new elevators will be installed.

Plans are also being considered for rebuilding the 125th Street station on the West Side, and drawings have been prepared for changing entirely the system of handling passengers at Thirty-Third Street and Greeley Square. One plan has been prepared which calls for a large stairway and an escalader on the northwest corner of Thirty-Third Street. It is also planned to put an escalader in the uptown station so that persons coming up Broadway from the theaters and desiring to take trains down town can do so without crossing the danger point at the junction of Sixth Avenue and Broadway.

Many of the station platforms on the downtown section of the Ninth Avenue line are very narrow. At the Rector Street station the platform adjoining the downtown track will be made ten feet wide. The platform of the Barclay Street station will also be made ten feet wide. Several plans have been prepared for improving the facilities at the Cortlandt Street station. Nearly 3,000,000 passengers use this station yearly. In less than a month there will be a new station at Seventy-Second Street on the Second Avenue line. Last week a new station was opened at 110th Street and Eighth Avenue.

THE OPERATIONS OF THE BUSHNELL SYNDICATE

The proposition which at present is receiving the chief attention of the so-called Bushnell syndicate of Springfield, Ohio, is the Springfield, Troy & Piqua Railway. The syndicate is headed by General A. S. Bushnell, formerly governor of Ohio, and it is the intention to build a system of interurban roads radiating from Springfield, General Bushnell's home city. The syndicate has recently acquired by purchase the Springfield & Xenia Traction Company, and is planning to build several other lines in addition to the road above mentioned. The work of constructing these lines is being done by the Champion Construction Company, an affiliated company, of which Fred. J. Green, formerly general manager of the Dayton, Springfield & Urbana Railway, is chief engineer and general manager, and D. H. Ullery, formerly electrical engineer of the same road, is in charge of the electrical construction. About 6 miles of grading has been done in the Springfield, Troy & Piqua Railway, and several bridges are being built. Contracts have been placed for much of the material and equipment required.

A short distance from Springfield, on a knoll above high water in Mad River, the syndicate proposes to erect a large power station to supply all the roads owned and contemplated by the syndicate, and arrangements will also be made to supply several independent roads in that district. The General Electric Company has prepared preliminary plans for the station, which will be one of the largest in Ohio. The building will front on Snyder Park, a beautiful city park, and the front of the structure will be highly ornamental. The initial installation will consist of two 2000-kw Curtis turbo-generators, supplied by eight 400-hp Babcock & Wilcox boilers. The engine room will be 82 ft. x 46 ft., and the boiler room 52 ft. x 22 ft. Transmission will be at 26,400 volts, in order to provide for possible parallel operation with the Medway power house of the Appleyard syndicate, which was fully described in the *STREET RAILWAY JOURNAL* for May 23.

The plant will be a very modern one. The plans provide for overhead coal bunkers with gravity feed and automatic stokers, automatic ash conveyors, overhead cranes in both engine and boiler room and other interesting features.

THE PENNSYLVANIA TERMINAL IN LONG ISLAND CITY

Although the final details of the plans for the terminal yards of the Pennsylvania Railroad Company in Long Island City have not been determined as yet, President Wm. H. Baldwin, Jr., of the Long Island Railroad, which is controlled by the Pennsylvania Company, told something about the scheme as a whole last week. The Pennsylvania's tunnel under the East River, a continuation of the one running from New Jersey through Manhattan, is to end about a mile and a half from the Long Island City shore line of the river, its portal being just west of Thompson Avenue, at a point that is embraced within the yards of the Long Island Railroad. From the tunnel's portal the switch yards of the Pennsylvania system will extend about a mile, reaching out toward the Woodside district. The yards are to be used simply for the handling of passenger trains, and there will be no station at all, as the Pennsylvania tunnel franchise forbids the road from handling local traffic near New York. Such traffic will be managed, as heretofore, from the old Long Island Railroad Depot, in Long Island City. The terminal yards will be on the south side of the main track of the Long Island Railroad. The land through which they are to extend beyond the present yards has been acquired by the Pennsylvania, and arrangements have been made by the city authorities to have viaduct crossings for the few streets intersected.

One of the principal uses of the yards will be for switching the electric motor cars that will lead the through trains of the Pennsylvania Road through the tunnel from New Jersey. After emerging from the tunnel into the yards the trains will have these motor cars replaced by steam engines, and in keeping these engines in readiness much of the space in the yards will be needed. The motor cars, having been detached from east-bound trains, will remain in the yards until ready to take back a west-bound train toward Jersey. The terminal tracks will be used also for storing cars dropped off of through trains that have got rid of many of their passengers in New York City.

The tunnel, beginning near the New Jersey shore line in the yards of the railroad at Jersey City, runs under the North River to Thirty-third Street, New York, and then cuts under that street across town to the East River, under which it takes the route indicated above. The passenger station in New York is between Thirty-third and Thirty-first Streets, west of Seventh Avenue,

and from that point westward to the North River the railroad has acquired all the city property that will have to be made barren by the tunnel operations.

STRIKE TALK AT RICHMOND

The reply of the Virginia Passenger & Power Company, of Richmond, Va., operating the street car lines in Richmond, Manchester and Petersburg, to the proposal of Division No. 152, of the Amalgamated Association of Street Railway Employees, to submit the proposed articles of agreement to arbitration has been returned to the Amalgamated Association, with a flat refusal of the request. The reply of the company was made through General Manager Huff, and states that "the company must decline to re-arbitrate."

In order thoroughly to understand the situation it must be said at the outset that the present demand is an attempt to repudiate an agreement entered into by the company and its employees nearly ten months ago. At that time the consolidation of the Richmond properties had just been effected. The employees before allowing the new management to become familiar with its duties ordered a strike on a claim of difference as to wages and hours. After twelve hours it was agreed to submit the differences to arbitration. This was done and the report of the arbiters was accepted by both sides and the men returned to work. One of the results of that strike was an agreement on nine hours' work daily at an agreed scale.

About two weeks ago the demands of the men that have just been refused were submitted to the company. These demands were for a general agreement or contract for the settlement of all questions between employer and employee and along with it a request for a new scale of wages. This contract is divided into eight sections, summarized as follows:

Section 1 provides that the company, through its accredited officials, will treat with the men through their accredited organization.

Section 2 suggests a temporary board of arbitration, consisting of five persons, two chosen by the employees and two by the company, and the fifth jointly by the two, to which all differences or agreements which cannot be settled by the two parties shall be submitted.

Section 3 provides for the reinstatement of suspended men, with full pay during period of suspension, when the men are found not guilty of charges.

Section 4 provides for a nine-hour day and payment for overtime, according to the scale.

Section 5 proposes that wages of 22 cents per hour shall be paid all motormen and 21 cents an hour to all conductors on the Richmond & Manchester and interurban lines of the company, and that motormen on the Petersburg line shall receive 18 cents and conductors 17 cents per hour.

Section 6 proposes to give motormen free transportation at all times over all lines of the company.

Section 7 proposes that all orders causing extra expense to the employees shall not be effective until fifteen days' notice shall have been given. The last section proposes to perpetuate the suggested general agreement until one or the other party thereto shall give notice in writing of a desire to change the same, and that said notice shall be given thirty days before the end of any year of the agreement.

To these demands the company made a lengthy reply, in the course of which it was set forth that 31 per cent of the total receipts from operation and 44 per cent of the total operating expenses are being paid out in wages to motormen and conductors; that the additional increase of 24.6 per cent in wages now demanded would result in an increase of \$80,000 per year; that it is unreasonable to expect the company to be able to pay such an increase in wages as would enable the men to earn as much per day, working only 9 hours, as they formerly did when working twelve hours; that the plan to submit to a board of arbitration the dismissal and suspension of employees is impossible from an operating standpoint, because it demoralizes discipline; that while local transportation will be granted to its employees in each of the cities in which it operates, the company must refuse transportation to its employees over the twenty-three mile interurban line, which depends mainly on its excursion business for revenue; that there is no cause for complaint as to changes involving expense to the men, the company always giving the men ample notice of impending changes in uniforms, etc.

The reply of the company is closed with an appeal to the men for dispassioned consideration of the facts, it being pointed out that by giving the company their loyal support, the employees will assist the company to that prosperity which will enable it to do more for the men in the future.

THE PUBLIC SERVICE CORPORATION ORGANIZES

The organization of the Public Service Corporation, which has taken over the electric light, power and street railway interests of Northern New Jersey, was perfected at a meeting of the company held on June 4, in Newark. The following were elected directors:

For three years, A. J. Cassatt, John F. Dryden, Thomas Dolan, George R. Gray, Anthony R. Kuser, Randal Morgan, Thomas N. McCarter and John I. Waterbury; for two years, Edward T. Bell, Hugh H. Hammill, William C. Heppenheimer, Lewis Lillie, John F. Shanley, Charles A. Sterling, Leslie D. Ward and P. F. Wanser; for one year, Samuel T. Bodine, Thomas C. Barr, David Baird, Walton Clark, Elisha B. Gaddis, Uzal N. McCarter, F. W. Roebing and E. F. C. Young. The directors ratified the selection of Frederick Evans as secretary, to take office June 15. The other officers, who will begin their duties at once, are; Randal Morgan, first vice-president; A. R. Kuser, second vice-president; A. B. Carleton, third vice-president; James P. Dusenberry, treasurer; Frank Bergen, general counsel, Walter W. Wheatly, general manager of the street railway division; Henry E. Whitcomb, general manager of the gas division; Dudley Farrand, general manager of the electric division; Percy S. Young, comptroller; J. A. Pierson, purchasing agent; Arthur D. Ball, superintendent of supplies; A. D. Hibbs, auditor of railway accounts; M. E. Johnston, auditor of gas accounts; E. J. Allegaert, auditor of electric accounts.

The executive and accounting offices of the corporation will be at 776 Broad Street, Newark, and for the present the public offices of the various departments, the gas, electric light and street railway, will remain where they are. Mr. Wheatly's office will be at 29 Exchange Place, Jersey City.

UNIVERSAL TRANSFERS IN CLEVELAND

Although the consolidation of the Cleveland Electric Railway and the Cleveland City Railway has not been officially consummated, the long talked of plan of universal transfers went into effect on June 1. It was done at this time in order to start at the beginning of a new month, and the innovation lends strength to the report that the consolidation will become effective within a very few weeks. A formal contract for the sale of the Cleveland City Railway to the Cleveland Electric Railway has been signed by Senator Hanna and Secretary Ehrhart for the Cleveland City Railway Company and President Andrews and Secretary Davies for the Cleveland Electric Railway. Prior to the signing of the contract, the boards of the two companies had agreed to the merger and authorized the officials to sign the contract. Special meetings of both companies will be held June 29, to vote formal approval of the purchase and sale. No change in routes will be made until after the consolidation becomes effective. The new transfers are good on all lines in the city and the only restriction is that they shall be used within a certain time limit. Of course, transfers are not given for return trips on parallel lines. The officers decline to discuss the subject of six or seven tickets for a quarter.

WHAT SPRINGFIELD, MASS., PLANS TO EXACT FROM FRANCHISE APPLICANTS

The Aldermen of Springfield have set forth new terms on which they propose to grant franchises, in view of petitions which are before them. They announce that they reserve the right to revoke locations without cost to the city; that the city may buy the fixtures of the company at a fair valuation; that all cost of street alterations made necessary by the laying of tracks must be borne by the company; that for a single 5-cent fare transfers are to be given over other lines of the same or another company with which connections are made; that the company shall clear the streets of snow to the satisfaction of the Superintendent of Streets.

The Aldermen, in adopting a franchise for the Springfield-Suburban Street Railway Company, places among the special conditions that the company shall water the entire street for a portion of the way; that cars enough be provided to make trips once in fifteen minutes; that a waiting room be provided at the terminus of the line in the city; that Summer Street be paved with vitrified brick at the expense of the company, and that a new location be secured for a portion of the way which shall have a roadway 30 feet or more in width paved with vitrified brick, all at the expense of the company. Special provisions in a franchise offered the Springfield Street Railway Company for locations on Worcester Street

provide that the street be widened to a width of 70 ft. and that a bridge suitable to the county authorities be built over the tracks of the Boston & Albany Railroad.

IMPORTANT DECISION IN A TRANSFER SUIT IN NEW YORK CITY

In a suit brought in the Supreme Court as a test case with a view of compelling the Interurban Street Railway Company, of New York, to issue transfers at all intersections of its lines, the company has just won a substantial victory, as Justice O'Gorman has denied the application of James S. Lehmaier, as chairman of the executive committee of the West Side Citizens' Transit Reform Committee of One Hundred, for a writ of peremptory mandamus to compel the company to issue transfers operative at Eighth Avenue and 125th Street. The court handed down this opinion:

If it be assumed that the defendant has violated the obligations imposed upon it by the laws of this State with respect to the issue of transfers to passengers, mandamus, in my opinion, is not the proper or appropriate remedy. The relator should be confined to the specific legal remedy provided by the Legislature. For a failure to perform the duty enjoined by the statute the aggrieved party is entitled to a penalty which may be recovered by action.

Redress may also be had by appeal to the Railroad Commissioners of the State. By Sec. 157 of the General Railroad Law, it is made the duty of the Railroad Commissioners to examine and keep informed as to the compliance by railroad corporations with the provisions of their charters and the law. By Sec. 160 it is provided that, if in the judgment of the Railroad Commissioners, it shall appear that any railroad corporation has violated any law or neglects in any respect to comply with the provisions of any law, the board shall give notice thereof in writing to the corporation; and, if the violation, neglect, or refusal is continued after notice, to present the matter to the Attorney General, who shall take such proceedings thereon as may be necessary for the protection of the public interests. By Sec. 161 it is made the duty of corporations owning or operating railroads to comply with the decisions and recommendations of the Railroad Commissioners, and if they fail to do so the board is required to present the facts in the case to the Attorney General for his consideration and action.

These legal remedies would seem to afford adequate relief to aggrieved passengers upon the respondent road, and, in such a case, resort to the extraordinary remedy of mandamus will not be permitted. Mandamus may issue in a proper case to compel the doing of a specific act, but it may not be invoked to compel a general course of conduct for a long series of continuous acts, as it will be inconvenient, if not impossible, for the court to oversee the performance of such duties. Motion denied.

The gist of the application for a mandamus was:

To compel the said Interurban Company to carry for one single fare of 5 cents any passenger desiring to make one continuous trip between any point on its Eighth Avenue line, and any point upon its 125th Street and Amsterdam Avenue Line, and, upon demand and without extra charge, to give a transfer operative at Eighth Avenue and 125th Street.

STREET RAILWAY ACCIDENTS

The full report of the United States Census Office in regard to the number of persons killed and injured on the street railway lines of the country for the year ending June 30, 1902, has just been made public and differs somewhat from that compiled by the New York Commercial Advertiser, which was reproduced in our issue of May 30.

The official figures are as follows:—

	Killed	Injured
Passengers,	267	26,672
Employees,	122	3,716
Other persons,	827	17,040
Total for the United States,	1,216	47,428

TRUCKS ON THE AURORA, ELGIN & CHICAGO

The high-speed records made on the Aurora, Elgin & Chicago Railway makes the experience of the company with trucks particularly interesting. The cars were first equipped with the Peckham M. C. B. 30 non-tilting truck with a 6-ft. wheel base and gray cast-iron wheels. Ten cars were put in service on August last and ten more on Jan. 1. After a careful trial the company decided to substitute steel wheels for cast iron and to use somewhat heavier spiral and elliptic springs than were originally ordered. With these changes the trucks have given excellent satisfaction. Mr. Bicknell, the general manager, reports that even at speeds of 65 miles per hour the cars ride very smoothly and have developed no weakness of any kind, and that he can recommend them for high speed and heavy electric railway service. The cars make an average mileage of over 50 miles per hour and 600 miles per day.

NEW PUBLICATIONS

The Manual of Statistics; Stock Exchange Handbook, 1903; 1044 pages. Price, \$5.00. Published by the Manual of Statistics Company, New York.

This volume marks the completion of a quarter of a century in the life of this Manual, and shows the same care, completeness and accuracy that has contributed so much to the reputation it has gained among investors. The most notable change in the present volume is the classification of street railway securities among industrials, instead of keeping them distinct in a class by themselves. In last year's issue many of the street railway companies were for the first time included in the department of industrials, owing to the fact that, in addition to the transportation business, they had engaged in furnishing light and power. Thus by a natural evolution, in the view of the publishers of this Manual, they had become more purely industrials than solely railway or transportation companies. The tendency has increased, it is true, but the companies have not lost their distinctive character, as an examination of their business will demonstrate.

ANOTHER CONSOLIDATION OF INDIANA COMPANIES

There have just been filed with the Secretary of State of Indiana articles of incorporation of the Ft. Wayne, Logansport, Lafayette & Lima Traction Company, which is to carry out the consolidation of Union Traction lines mentioned in the STREET RAILWAY JOURNAL for May 23. The companies that will be consolidated are the operating companies in Lafayette and Ft. Wayne and the two systems at Logansport, including the Logansport, Rochester & Northern Traction Company and the Wabash & Logansport and Wabash Valley Interurban lines. The new company's lines will extend from Lafayette to Lima, via Ft. Wayne, where the headquarters of the road will be established. There will also be diverging lines connecting all the important cities in the northern part of the State and around Lima. The road between Ft. Wayne and Lima is well under way, and the other extensions will soon be begun. When completed the road will run through Tippecanoe, White, Carroll, Cass, De Kalb, Noble, Lagrange, Steuben, Grant, Adams and Wells Counties. The officers of the company are: George F. McCulloch, president; James Murdock, vice-president; Stephen B. Fleming, secretary; Henry C. Paul, treasurer. The list of directors shows James Murdock, of Lafayette; Henry C. Payne, Stephen B. Fleming and Henry C. Paul, of Fort Wayne; J. Levering Jones and Morgan Randall, of Philadelphia; Bayard Henry and Samuel Murdock, of Lafayette; George F. McCulloch and Hugh J. McGowan, of Indianapolis.

TORONTO CONVENTION OF THE CANADIAN ELECTRICAL ASSOCIATION

The thirteenth convention of the Canadian Electrical Association will be held in Toronto from June 10 to 12 inclusive. Following the practice of the National Electric Light Association of the United States, a question box will be introduced. Among the papers to be read are, "Long Distance Transmission" by Paul Lincoln, of Pittsburg, Pa.; "Single Phase Alternating Motors as a Means of Increasing Station Earnings," by W. A. Layman, of St. Louis, Mo., and "Transformers for High Voltage Transmission Lines," by J. W. Farley. During the convention the association members will also visit the works of the Canadian General Electric Company and the Canada Foundry Company.

STREET RAILWAY PATENTS

UNITED STATES PATENTS ISSUED MAY 26, 1903

[This department is conducted by W. A. Rosenbaum, patent attorney, Room No. 1203-7 Nassau-Beckman Building, New York.]

728,868. Car Truck Bolster; Edward Cliff, Newark, N. J. App. filed July 23, 1902. A bolster having the usual center bearing-plate and provided in its end portions with vertical recesses inclosing vertically disposed springs upon which are caps projecting slightly above the upper level of the bolster to receive the impact of the car body.

728,880. Automatic Switch; Frederick R. S. Ditmars, Kansas City, Mo. App. filed Sept. 29, 1902. Means for throwing a switch to the main line by a car receding from the switch upon

the main line, also for throwing a switch to the main line by a car receding from the switch upon a side track.

728,910. Life Guard for Vehicles; Albert Hardy & David Voss, New Brighton, Eng. App. filed Jan. 19, 1903. The main feature of this invention is an endless belt revolving in a backward direction and adapted to pick up prostrate persons from the track and convey them backward into a cradle.

729,049. Railway Track Structure; George M. Ervin, Johnstown, Pa. App. filed Sept. 23, 1902. The object of this and the series of inventions following is to provide means whereby wear plates may be rigidly secured in place in such a manner that they will not work loose, but which will permit the plates to be readily removed and replaced without disturbing the remainder of the structure.

729,050. Railway Track Structure; George M. Ervin, Johnstown, Pa. App. filed March 18, 1903. See preceding patent.

729,057. Railway Track Structure; Arthur L. George, Johnstown, Pa. App. filed Nov. 13, 1902. See patent No. 729,049.

729,058. Railway Track Structure; Arthur L. George, Johnstown, Pa. App. filed Nov. 13, 1902. See patent No. 729,049.

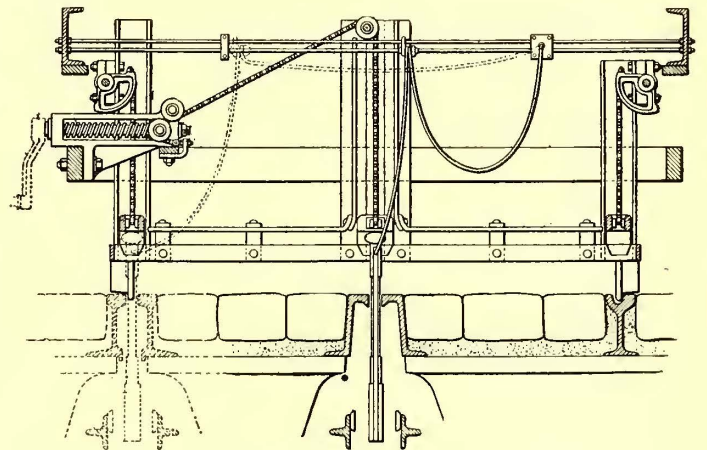
729,059. Railway Track Structure; Arthur L. George, Johnstown, Pa. App. filed Dec. 22, 1902. See patent No. 729,049.

729,060. Railway Track Structure; Arthur L. George, Johnstown, Pa. App. filed Dec. 24, 1902. See patent No. 729,049.

729,061. Railway Track Structure; Arthur L. George, Johnstown, Pa. App. filed March 5, 1903. See patent No. 729,049.

729,067. Railway Track Structure; James Hart, Johnstown, Pa. App. filed Nov. 13, 1902. See patent No. 729,049.

729,082. Trolley Wheel and Holder; Frank D. Moon, Lockport, N. Y. App. filed Aug. 1, 1902. The groove in the contact face of the trolley wheel is formed with convex sides to more easily traverse the trolley wire at the angles of curves and switches.



PATENT NO. 729,137

729,089. Railway Track Structure; George H. Parmelee, Johnstown, Pa. App. filed Nov. 13, 1902. See patent No. 729,049.

729,090. Railway Track Structure; George H. Parmelee, Johnstown, Pa. App. filed Nov. 13, 1902. See patent No. 729,049.

729,091. Railway Track Structure; George H. Parmelee, Johnstown, Pa. App. filed Nov. 13, 1902. See patent No. 729,049.

729,120. Third Rail Electric Railway System; Gustav Bertram, Brooklyn, N. Y. App. filed Feb. 28, 1903. Relates to an inclosed third-rail and improved means for making contact therewith.

729,136. Electric Railway; Albert N. Connett, London, England. App. filed Feb. 21, 1901. Consists of means for moving the cover of the conduit in order that the plow may be removed therefrom, when necessary.

729,137. Plow Raising Means for Conduit Railways; Albert N. Connett, London, Eng. App. filed Feb. 21, 1901. The plow is provided with a chain gearing for raising it out of the conduit when necessary.

729,216. Electric Railway; Jesse S. Pevcar, Schenectady, N. Y. App. filed Jan. 28, 1903. Switches controlling the current to the sectional rails are grouped in a vault, and are made less dangerous by means of a master switch in the vault.

729,366. Trolley; Frederick Lehmann, Turtlecreek, Pa. App. filed April 2, 1903. Details.

729,411. Surface Contact Railway System; William B. Potter, Schenectady, N. Y. App. filed Feb. 11, 1899. Relates to means whereby leakage currents are shunted from the sectional conductors directly through the car to ground.

729,481. Electric Railway; Granville T. Woods & Lyates Woods, New York, N. Y. App. filed Nov. 24, 1900. Details.

UNITED STATES PATENTS ISSUED JUNE 2, 1903

729,523. Safety Guard for Trolley Wires at Railroad Crossings; Charles D. Austin, Amsterdam, N. Y. App. filed April 10, 1903. Electrically charged guards arranged adjacent to the trolley wire, so that the trolley will strike the guards and receive current therefrom when the trolley leaves the wire.

729,543. Automatic Car Fender and Sweeper; Charles P. Cathcart, Kansas City, Mo. App. filed July 14, 1902. Means by which the rotatable guard may be rotated by mechanism connecting the guard with the car wheel or axle.

729,558. Cable Tramway; William Dusedau, Denver, Colo. App. filed Nov. 25, 1902. Relates to improvements in the gripping mechanism.

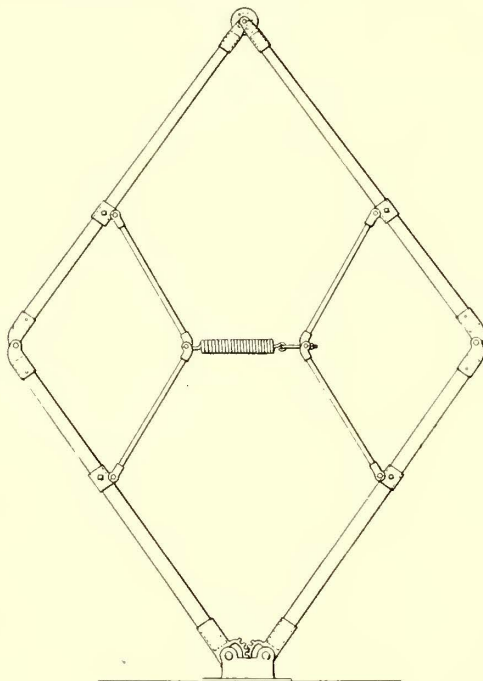
729,620. Trolley Stand; William Magner, Lockport, N. Y. App. filed Nov. 6, 1902. The stand can be adjusted on a track, from end to end, so that it can be brought near the rear of a long car where it will be convenient for the motorman.

729,657. Trolley Catcher; William E. Tettee, Newton, Mass. App. filed Feb. 21, 1901. Details of a spring-actuated reel controlling the trolley cord.

729,658. Brake for Cars; Bertil Von Philp, Philadelphia, Pa. App. filed Jan. 22, 1903. Electric friction disks are clamped and separated by an electro-magnet and a spring.

729,696. Passenger Supporting Strap; John P. Swift, Pawtucket, R. I. App. filed March 26, 1903. A strap having two adjustable loops or handles.

729,734. Braking System; Frank E. Case, Schenectady, N. Y. App. filed Feb. 18, 1901. The brakes are applied with less force on the rear trucks than on the forward, thereby preventing skidding of the rear truck wheels due to the lifting of the car body from the trucks when the brakes are applied.



PATENT NO. 730,116

729,882. Electric Traction; Auguste Megroz, Clarens, Switzerland. App. filed Nov. 25, 1902. A conduit consisting of two parallel iron conductors, an insulating protecting covering on the outer exposed surfaces of the conductor and a strip of metal of higher electric conductivity than iron on each conductor and extending lengthwise of the same.

729,957. Trolley; Miles McBride, Braddock, Pa. App. filed April 3, 1903. Two top contact trolley wheels mounted on each side of the pole, whose spring exerts a downward pressure. The pole may be lifted and reversed, one wheel being used for travel in one direction and the other for the opposite direction.

730,048. Emergency Car Brake; John M. Ross, Venetia, Pa. App. filed April 4, 1903. Details of a track brake.

730,058. Conductor; George E. Tinker, New York, N. Y. App. filed Jan. 9, 1903. The third-rail is inclosed in a rectangular box provided with a narrow slot in one side for the arm of the collector.

730,115. Railway Brake; Paul Hallot, Vincennes, France. App. filed Nov. 5, 1902. A series of compartments arranged around the car axle, each containing a mass adapted to be displaced by centrifugal force, a pulley surrounding the compartments and adapted to be engaged by the masses, the outer surfaces of the

pulley being coned, a cone pulley mounted on the car axle, means for operating the car brakes by the movement of the cone pulley and means for throwing the cone pulley into arrangement with the coned outer surface of the first mentioned pulley.

730,116. Trolley Pole; George W. Hamilton, Philadelphia, Pa. App. filed March 23, 1903. Two sets of arms pivoted together, two sets of links connected to the arms and a spring connecting the sets of links, thereby affording an extended movement of the arms with a limited amount of expansion and contraction of the springs.

730,206. Car Broom or Brush Holder; David Flag; Grayling, Mich. App. filed March 31, 1902. An adjustable bracket in which a broom may be placed to brush snow or dirt out of the groove of the rail.

PERSONAL MENTION

MR. THOMAS REED has been appointed superintendent of the East Liverpool & Rock Springs Railway, of East Liverpool, O., succeeding Mr. James McKinnon.

MR. W. H. MOORE has been appointed assistant to the president of the Toronto Railway Company, of Toronto, Ont. Mr. Moore formerly was secretary of the company.

MR. OTTO MILLER, of Cleveland, has resigned as secretary of the Miami & Erie Canal Transportation Company, and is succeeded by Mr. C. S. Rice, of Cincinnati.

MR. J. H. MURRAY, for five years division superintendent of the Buffalo & Lockport Electric Railway, of Lockport, N. Y., has resigned to accept a position with the Lackawanna & Wyoming Valley Railway, of Scranton, Pa.

MR. JOHN P. FEENEY has been appointed claim agent of the Public Service Corporation, of Newark, N. J. His chief assistant will be Mr. E. H. Holcomb, who was chief claim agent of the North Jersey system. The offices of both will be in Newark. Mr. Feeny has been for some years chief claim agent of the Jersey City, Hoboken & Paterson Railway Company.

MR. J. S. CLARK, for some time purchasing agent of the Toledo & Western Railway, of Toledo, Ohio, has resigned from the company, and the office of purchasing agent has been combined with that of general manager, Mr. C. F. Franklin assuming the duties of both. Mr. John Cunningham, master mechanic, has also resigned from the company. He has been succeeded by Mr. Ira Southwick, heretofore general foreman.

MR. WARREN M. BICKNELL, at present general manager of the Aurora, Elgin & Chicago Railway, of Elgin, Ill., has accepted the appointment to the presidency of the Lake Shore Electric Railway, of Cleveland. Mr. Bicknell's resignation from the Aurora, Elgin & Chicago will become effective Aug. 1, but he will probably take charge of the Lake Shore about July 1. Mr. Bicknell has been prominently identified with several of the leading properties of the Pomeroy-Mandelbaum syndicate. He formerly was auditor of the Southern Ohio Traction Company; later he was general manager of the Miami & Erie Canal Transportation Company.

MR. D. F. CARVER, for the past three years chief engineer of the Cleveland Electric Railway Company, of Cleveland, Ohio, has resigned from that company to accept the position of chief engineer of the railway department of the Public Service Corporation, of Newark, N. J. Mr. Carver is only thirty-four years of age, but his rise has been phenomenal. In 1899 he went as roadman in the construction department of the Pennsylvania Railroad Company, starting in the engineering corps. In 1892 he was made draughtsman, and in 1893 assistant engineer. While with the Pennsylvania he was in charge of the short cut across Pennsylvania from Trenton to Glen Lock, known as the "Trenton Cut-Off." In 1894 he accepted the position of assistant to the chief engineer of the Brooklyn Rapid Transit Company, remaining in this position until 1900, when he accepted the position of chief engineer of the Cleveland Company. Mr. Carver made all the plans of the New York and Brooklyn bridge terminals, on both sides of the bridge, plans covering special work and terminal buildings and all other details. He was in charge of the work until completed. He is the inventor of the Carver switch, many of which are in use on the lines of the Public Service Company. While with the Cleveland Railway Company, Mr. Carver devised and built a 200,000-lb. elevator at the power house in that city, which is in daily use for handling coal and ashes in carloads.