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Of this issue of the Street Railway Journal, 8,500 copies are printed. Total circulation for 1906 to date, 286,100 copies, an average of 8,175 copies per week.

Trolley Frogs and Troubles

Closely allied to the subject of trolley wheels, to which we alluded in a recent issue, is the proper erection of curves, switches and turnouts in the overhead construction. The importance of careful attention to these features is fully appreciated by the engineers of high-speed interurban trunk lines. The extension of city lines into interurban territory, however, is not always accompanied by due consideration of the requirements of high-speed service, and the standard

urban construction which has previously sufficed is carried out into the surrounding country. A particularly frequent oversight is in the selection of trolley frogs not best adapted to the radius of curvature of the turn-out and the installation of ordinary city frogs with wide divergence angles and short pans. With such construction it is necessary to take each switch and turn-out at a very slow speed or have the trolley jump the trolley wire. A track switch with a record of one derailment a month would receive energetic attention and probably occasion "executive" correspondence between superintendent and track master. A few trolley wheels leaving the wire at the same place each day will aggregate much more in time lost, will give annoyance to perhaps thousands of passengers a month, and will create an undesirable sentiment in the community, yet will not be greatly criticised by any department because it only momentarily interrupts the schedule. As this continued petty annoyance to public and platform employees and the not infrequent overhead repairs directly due to it have been so easily avoided on a great many roads by the proper selection and location of trolley frogs, it is to be regretted that practical improvement in this direction is not universal. Simple rules obtained by trial and practice fix the best location and frogs with varying divergence angles, and different lengths of pans can be purchased in gradations which fit every class of service. The keeping of accurate and complete records of delays caused by trolley wheels leaving the wire can readily be obtained if the car crews are obliged to report the time and place of each occurrence. The weeding out of the bad spots is then a simple matter.

Branch Line Service on Interurban Roads

The kind of branch line service which it is desirable to give on interurban roads is a question of considerable local importance on some systems. On steam railroads it is almost without exception the case that the farther one gets from the main trunk lines the poorer the service grows in respect to quality of rolling stock, comfort in riding, speed and frequency of trains. Every change seems to be for the worse. It is usually accepted that with its relatively infrequent passenger, freight or mixed trains, a steam road cannot afford to give first-class service on a branch line, where the traffic density is far below that of the main routes. Consequently one may start out in a Pullman from a great terminal station in an important city entered by a steam road and bring up at night on a narrow-gage branch line of the same system in an antique car attached to the end of a milk train.

On a branch electric line the situation is entirely different. The rolling stock is almost always superior to some of that run in even fairly important main-line service on steam roads; cars are run once an hour in the vast majority of instances, against two or three times a day on the steam lines; and there is seldom much difficulty in making as good or better time than the branch steam train offers. The fares are usually high on the steam branch lines, and frequently mileage

books and other reduced rate transportation is not good upon them. There are therefore several excellent reasons why the electric line should capture most of the steam railroad's branch passenger business, and experience has certainly shown this to be the case. Very high speeds and fast schedules are not as a rule necessary on branch lines, but connections with the main line ought to be as carefully made as the schedules of the latter are punctual. It is much better to allow plenty of time for the branch schedule and connect with the main-line cars than to attempt speeds which are too great for the roadbed and track without excessive cost of maintenance and power. On many branch lines a maximum speed of 20 or 25 m. p. h. is ample for all the requirements of the territory, and the superior acceleration of the electric motor will do much toward maintaining a better schedule than the more or less antiquated steam locomotives of the branch can turn out. Thanks to the concentration of power generation and the continuity of its distribution on electric railways, the service on the different parts of the same system seldom varies as much as it does on a steam railroad, and this advantage of the electric road is easily pressed home to the local patron if he is given a thoroughly reliable schedule that is maintained from month to month with reasonable accuracy and economy of price.

Street Car Etiquette

A note on this topic bears a whimsical resemblance to the famous chapter on the manners and customs of the Fiji Islanders written by a returned sailor: "Manners, none; customs, beastly." One cannot take a trip on a crowded car in almost any large city without his mind instinctively reverting to Gulliver among the Wahoos. It is a case of the survival of the strongest relieved by no more compunction than Nature shows among her grim struggles—a five-o'clock reminder of the ferocity of the strife for the dollar during the eight previous hours. In every crowded city the case has gone year by year from bad to worse, until the situation in many cases has become fairly indecent and intolerable. It is no longer a question of the end-seat hog, but of the generalized, indiscriminate hog whose offensiveness is limited only by his activity. It is time for street railway managers and the public to take counsel together and to seek for means of relief. Evidently the natural courtesy of the average crowd cannot be counted on for assistance when the rush hour begins. At bottom the problem is dealing with extreme congestion of traffic, but thus classifying does not help the matter much. The diagnosis is clear enough—what we want is the remedy. In New York, for example, shops close and business ceases at or very near a prearranged hour, and the entire working population of the metropolis starts for home simultaneously. As it nears the cars it degenerates into something little better than a mob, a fairly respectable and well-dressed mob to be sure, but none the less insensate in its disregard of the ordinary amenities of life.

What can be done to help the situation? It is in New York and in most other cities physically impossible to run enough cars to handle the whole working population at once. The best course would seem to be two-fold—first to relieve the acute symptoms, and then to get as far as may be actively at the causes of the disease. As to the former matter, we would recommend first at certain points enough policemen

with authority and willingness to make arrests for disorderly conduct, combined with co-operation on the part of the courts in the way of visiting punishment to the offenders when they are arraigned the next day. This course may seem drastic to some of our police justices, judging from their recent lenient treatment of similar cases, but offenses of this kind demand just that sort of treatment, and it would not take a long course of it to bring people to some sense of their mutual responsibilities.

Beyond this the most hopeful remedial measures would seem to be those directed toward lengthening the traffic peak. This can be done to a very material extent by keeping up the peak schedule before and after the terms of the ordinary peak. People soon learn that by shifting their hours very slightly they can be accommodated, and while many workers are held to definite times, the number who can get away a little earlier or later than the usual time is enough to help the situation. And in connection with this extension of the time of extreme schedule we are inclined to think that the often suggested plan of putting on platform gates and thus limiting the passengers allowed to board a car may have to be taken up by some roads which have not yet adopted this plan. With the schedule pushed to its utmost for a somewhat longer period, and a definite effort to lengthen the peak, overcrowding can be checked without injury to any one. Possibly something might be done through the various trade associations in an effort to scatter as it were the termination of the working day over a small extra period. Something, too, can be done by adroit routing of cars so as to scatter traffic over more lines. The exigencies of the situation are such in every large city as to demand active work. You cannot reform the manners of an indiscriminate crowd, but it is at least possible to punish sheer brutality and in some measure to remove the causes that promote it.

Wire Locations on Pole Lines

Until one stops to consider the matter, it is surprising to find what a variety of circuits is usually carried upon the pole line of an interurban railway of sufficient length to use high-tension transmission and low-tension distribution. It is evident that the design of the pole line and the location of wires in such a case is a question of no little importance. On a representative road of this sort bare wires carrying potentials of 13,200 volts and upward for transmission, 600-volt feeders, trolley circuits, lightning arresters, ground wires, local lighting loads, telephone and signal wires must all be installed in such a way that they will not interfere with one another in any wise, or introduce excessive personal hazard into the work of the line maintenance crews.

The order of location which good practice considers desirable depends somewhat upon the use which the company makes of its transmitted power, and also upon the high-tension line voltage. In case a company does a combined railway, power and lighting business and is likely to wish to make frequent transformer taps along its route for local distributing centers, it may be a good plan to put the telephone and signal wires on the upper cross-arms, the high-tension circuits being run either in the middle or on the lower arms. With this construction the high-tension connections can be made freely without having to interfere with or pass relatively high-voltage wires up through the telephone and signal cir-

cuits. In cases where the latter are more numerous than the heavier wires, where the transmission voltage is not much in excess of 13,200, where the company sells large quantities of power at scattered points en route, and where extra long cross-arms are installed to permit a safer passage of linemen up the pole, there may be some cases where this construction will appear preferable to the plan of putting the higher voltage wires at the highest point above the ground.

The latter practice is certainly the better in the great majority of cases. Mechanically the high-voltage line is, or ought to be, stronger than any other circuit on the pole; it is much less liable to break and needs, as a rule, much less attention than either the feeders, trolley signal or telephone wires. High-voltage power lines for railway service generally run directly from the power plant to the sub-stations, and except in special instances it is not common for taps to be made in a railway transmission line for power outside sub-stations or special switching stations. There is no reason why low-tension direct-current feeders should not be carried below the telephone and signal wires if convenience serves that way, but the consensus of opinion at the present time favors placing dangerous wires above non-dangerous circuits. Of course, the installation of a large amount of heavy copper on the upper part of a pole line reduces the factor of safety against breaking strain, and calls for more substantial poles, cross-arms, pins and insulators, other things being equal. On a very high-voltage line, say from 30,000 to 60,000 volts, it is a grave question if the wisest plan is not to build a separate transmission line well beyond the reach of the low potential circuits. In most cases ground wires can be safely brought down the poles in iron pipes extending well into the earth, so that if a ground load breaks, the discharge will still be carried off in safety. A fair specification for an a. c.-d. c. wire location, proceeding from the top of the pole, is: Transmission line, 13,200 volts; d. c. feeders, 600 volts; telephone circuits, trolley bracket and tops, signal lines and local lighting circuits, 600 volts. On a single-phase alternating railway the problem of wire location is a much simpler one. If the catenary trolley carries full transmission potential, then the poles may be utilized in any convenient order for wire locations. In case the voltage is high enough to require transformers between the transmission line and the trolley, there is little doubt that the non-dangerous circuits should be placed well below the high potential wires. Thorough construction, inspection and maintenance are important, wherever telephone, signal and other small-wire circuits may be located.

Testing Motor Fields

When motor troubles arise and the cause is not at once apparent, the conclusion is often reached that the armature is at fault. In cases of undue sparking, flashing over between brushes and similar troubles, the armature is usually removed and tested. If the winding is found O. K., the person whose duty it is to locate the trouble often assumes that it is the commutator which is at fault; he turns this down or polishes it, and in addition may groove out the mica between the segments. The armature is then put back into the motor and the sparking is less severe than before, and although the motor does not run satisfactorily the car is put in service, only to be turned in within a few days because of the blowing of fuses. In some instances the sparking of motors is so severe that men are put on the road to clean and polish com-

mutators, as it is found that by giving the commutators attention every few hours some of the trouble is avoided. During all this time the fact that the fields may be the cause of all the trouble is evidently forgotten. If proper attention were given to the testing of fields, it is safe to say that those mysterious troubles of motors that baffle solution would be fewer in number. Frequently attempts to test fields end in failure because the work is not done properly. Often attempts are made to test them with a voltmeter and an ammeter while they are in the motor. These tests are frequently unsatisfactory because not enough current is used to get an appreciable voltmeter reading or the current is not allowed to flow a sufficient length of time to heat the fields thoroughly. A heated field will often indicate the presence of shorted coils when the same field while cool and under a drop of potential test will show up O. K. When possible, coils should be tested while clamped in position in the motor, but if this is not possible and they are tested on the floor of the shop, pressure should be put on them when the readings are taken. Sometimes standing on them or jumping up and down on them will cause a variation in the reading of the voltmeter; if so, the chances are great that the field is defective. In addition to the drop of potential method with direct current, fields may be tested when out of the motor by means of a transformer. A special transformer is required built in such a manner that the field to be tested may be slipped over a core and be made to serve as the secondary of the transformer. A short-circuited coil in the field makes itself evident by an increase in the primary current, by the heating of the field and by the sound given out from the transformer. As with direct-current tests, it is best to apply pressure to the coil in order to develop any shorts that would occur if the field were thoroughly heated and clamped in position in the motor shell.

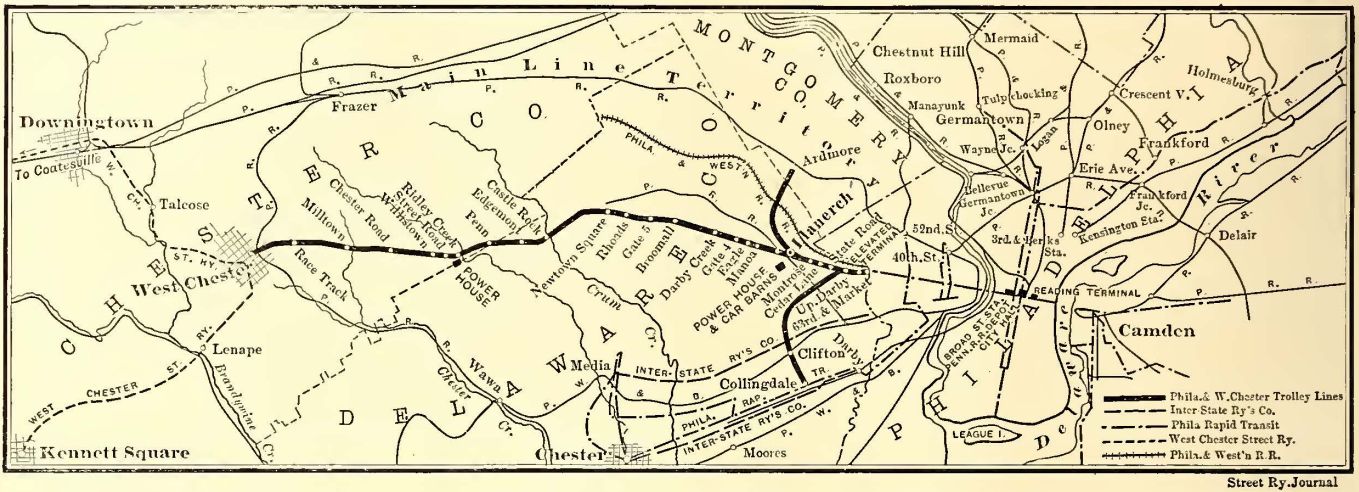
Several field coil testing devices especially adapted for testing fields while they are clamped in the motor have also been developed within the last few years. When properly used, these devices usually give good results and, further, the tests are made in a very short time. The machines are usually constructed on the principle of a Wheatstone bridge, a telephone or a galvanometer being employed to indicate when the known resistance is equal to the resistance of the field being tested. But in many instances where these instruments have been purchased, the shop man who is assigned to test the fields does not operate with the instrument long enough to get familiar with it. He seems to regard it as too complex to be understood. But if an earnest effort is made to test fields in this way it will not be long before satisfactory results can be secured. When the testing of fields is begun in shops in which it has not been carried on before, records of all tests should be kept and the condition of the fields when torn up should be noted. By so doing the proper resistance for a perfect coil may be obtained for each type of motor in use. When starting out, if there are no figures as to what the readings should be, the resistance of one field of the motor may be compared with that of another.

The difficulties in obtaining satisfactory results in testing field coils is no doubt largely responsible for the general inattention given them when the causes for the faulty action of a motor are being considered. But as there is such a great likelihood of the fields being the cause of motor troubles, certainly more attention should be taken to ascertain their condition whenever the trouble cannot be located elsewhere.

THE REHABILITATION OF THE PHILADELPHIA & WEST CHESTER TRACTION COMPANY'S PROPERTIES

Through the courtesy of the management of the Philadelphia & West Chester Traction Company, it is possible to give here considerable interesting and valuable data on va-

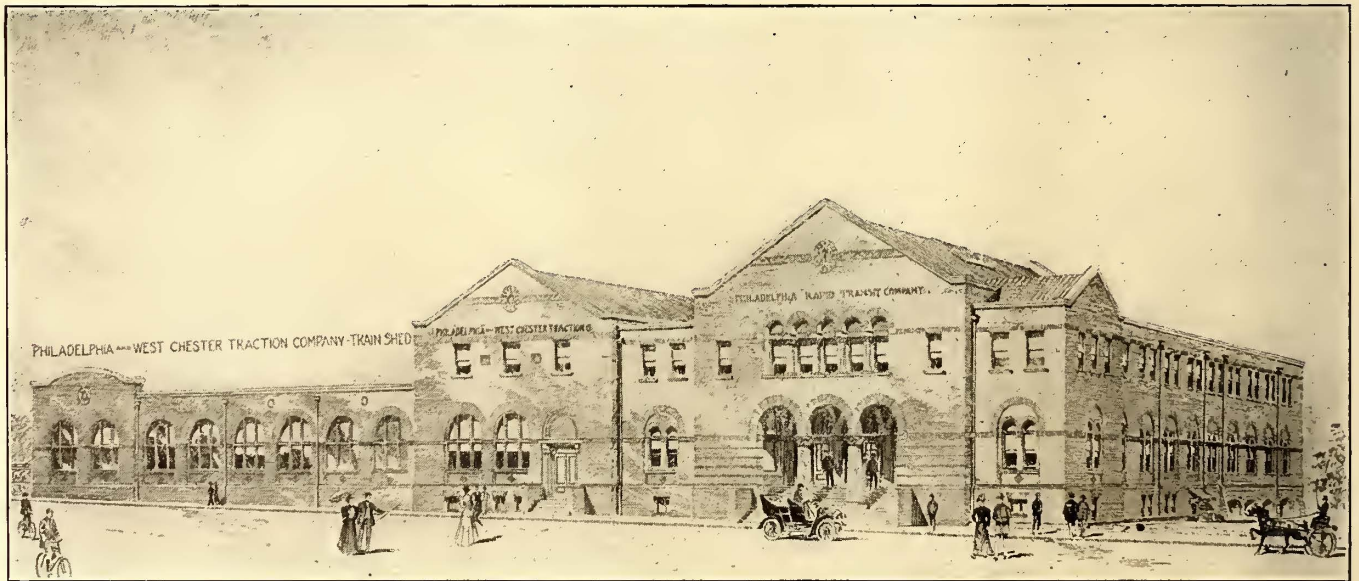
terurban electric railway, where the plans can be laid out completely from the first, according to later-day practice; it is quite another thing to take an older property, built according to earlier standards, or, as is all too frequently the case, built without regard to any standard or future requirements and with the old as a basis, produce an up-to-date property.



RAILROAD MAP SHOWING STEAM AND ELECTRIC LINES IN THE TERRITORY SERVED BY THE PHILADELPHIA & WEST CHESTER TRACTION COMPANY

rious phases of modern high-standard interurban practice. A study of this particular property is especially interesting, as it is representative of a class of roads, which perhaps may be defined best by the term "rehabilitated properties." In other words, it is a noteworthy example of what can be done

Conservative financing requires that the original investments be not wholly disregarded and new investments must be made in proportion to the economies to be secured and the new business that will be created thereby. By analyzing some phases of the Philadelphia & West Chester Traction system, it is



ARTIST'S ELEVATION OF THE TERMINAL AT SIXTY-THIRD AND MARKET STREETS, PHILADELPHIA, TO BE USED JOINTLY BY ELEVATED TRAINS OF THE PHILADELPHIA RAPID TRANSIT COMPANY AND INTERURBAN CARS OF THE PHILADELPHIA & WEST CHESTER TRACTION COMPANY, AND PHILADELPHIA & WESTERN

in making over a dilapidated, non-paying country trolley road, built a decade ago, into a successful, modern, interurban property. This making over of older systems and putting them upon a profitable basis in conformity with present-day standards, is a class of work that has attracted investment-seeking capital in the past and will continue to do so in the future.

Ventures of this nature usually offer attractive possibilities, but they bring to the front engineering and operative problems of their own. It is one thing to build a city or in-

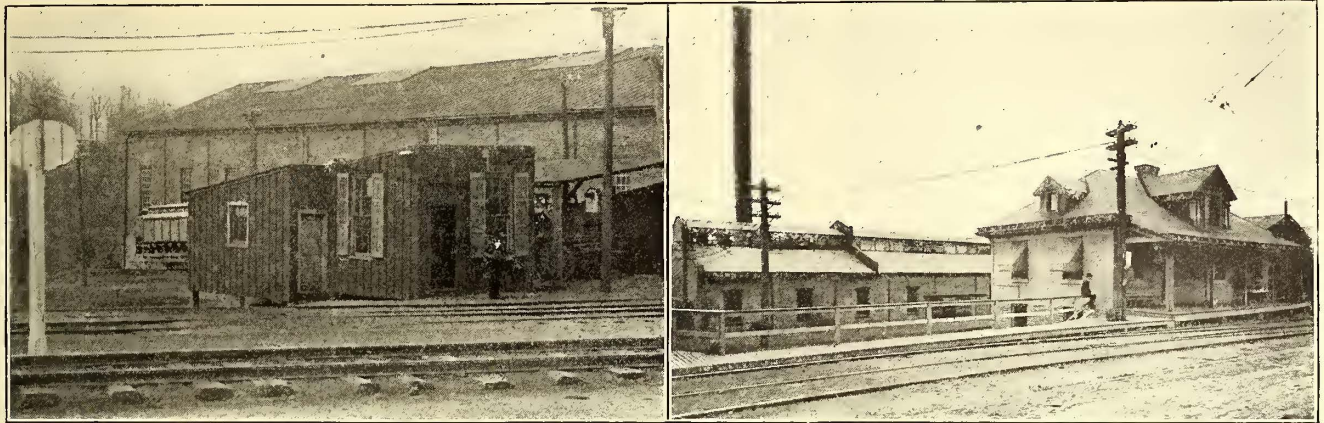
the purpose of this article to outline how certain important results have been achieved.

THE OLD AND THE NEW

The original line was built along the West Chester turnpike, first as a mule line, then as a steam dummy line for a portion of the distance and afterward as a single-track electric road, extending from Sixty-Third and Market Streets, Philadelphia, to West Chester, a distance of 20 miles. The road passed into the hands of the present management in

1899, and the new company started in upon the reconstruction work and the building of extensions in accordance with certain well formulated policies. Briefly summarizing the net results as regards the physical property, the execution of these

original power house has been replaced by modern generating apparatus, to which extensions are now contemplated and a new power house has been built on the western end of the line, thereby increasing the power house capacity to per-

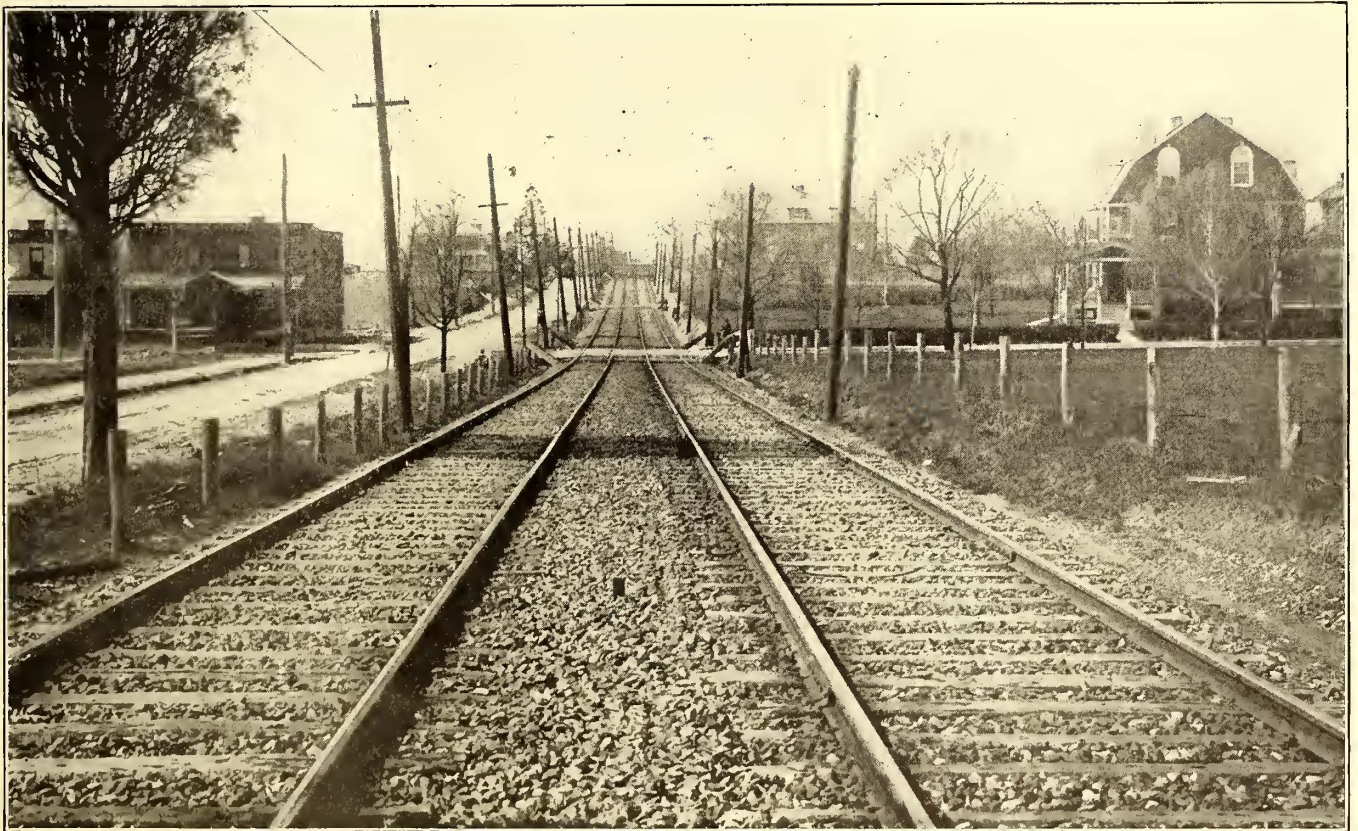


THE METAMORPHOSIS OF AN ELECTRIC RAILWAY. THE VIEW AT THE LEFT SHOWS THE OLD CAR BARN AND OFFICES OF THE PHILADELPHIA & WEST CHESTER STREET RAILWAY, THE "OFFICES" CONSISTING OF THE SHANTIES IN THE FOREGROUND. THE VIEW AT THE RIGHT SHOWS THE PRESENT SUBSTANTIAL OFFICES AND POWER HOUSE

policies has, within the last two years, brought about the following changes:

The original West Chester line has been, as far as possible, rebuilt in accordance with the best "steam railroad practice." A portion of the line at the eastern end, where

mit of properly handling the large increase in business. New cars of the latest approved interurban type have been added and the schedules have been quickened. Attractive and comfortable way stations have been erected along the line. New car house, store room and office facilities have been provided



A STRETCH OF DOUBLE TRACK ON THE PHILADELPHIA & WEST CHESTER LINE

traffic is most dense, has been double-tracked. Careful attention has been paid to drainage. An efficient system of block signals has been installed, and the overhead construction and distributing system have been rebuilt and extended along ample lines. No. 0000 trolley wire has been substituted for the original No. 00 wire. The machinery in the

and plans are now finished in the rough for a new shop and car house of ample capacity, which will be built of brick and reinforced concrete, thereby decreasing insurance expenses and cost of maintenance. A private telephone system, which connects all turnouts with the dispatcher's office and all departments of the organization, has been installed and up-to-

date despatching methods have been adopted; a first-class accounting system has been established along the lines of the standard recommendations promulgated by the American Street and Interurban Railway Accountants' Association. New terminal buildings have been built, one at the terminal of the Ardmore branch and one, an elaborate layout, at a point 3700

for moderate price residential purposes within the suburban district of the city of Philadelphia. Philadelphia cannot grow to the eastward, because of the Delaware River. There is little land available for development to the south, owing to



TYPICAL SINGLE-TRACK CONSTRUCTION, SHOWING DRAINAGE DITCHES AND ROADBED



TYPICAL CONSTRUCTION AT A TURNOUT

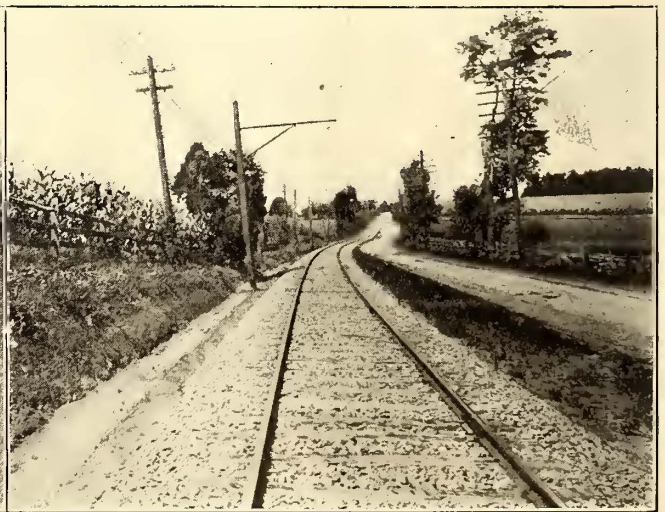
ft. west of Sixty-Third and Market Streets, which will be the main transfer point for traffic between the Philadelphia & West Chester Traction Company, the new Market Street elevated of the Philadelphia Rapid Transit Company, and the new Philadelphia & Western Railroad Company; the more important features of these improvements will be described later in this article.

TERRITORY SERVED

The Philadelphia & West Chester Traction Company oper-

low and marshy ground, and the city is built up solidly for a distance of 10 miles to the north. Therefore, the present great development of the city is to the westward.

Recognizing this direction of development, the Philadelphia Rapid Transit Company has built a four-track subway from the City Hall to the Schuylkill River under Market Street, from which point the road continues as an elevated structure out Market Street to the western city limits near Sixty-Third Street. The subway and elevated were built in re-



THE METAMORPHOSIS OF AN ELECTRIC RAILWAY. THE VIEW AT THE LEFT SHOWS THE OLD TRACK OF THE PHILADELPHIA & WEST CHESTER STREET RAILWAY, WITH UNCERTAIN SURFACING AND ALIGNMENT, SCANTY BALLAST AND ABUNDANT WEEDS ON THE ROADBED. THE VIEW ON THE RIGHT SHOWS THE PRESENT ROCK-BALLASTED TRACK

ates 33.17 miles of track; the distance from Sixty-Third and Market Streets to West Chester is 20 miles; the length of the Ardmore division, which extends from Llanerch on the main line to Ardmore, is $3\frac{1}{2}$ miles, and the length of the Clifton division, which extends from the eastern terminal to the borough of Clifton Heights, is 3.25 miles.

The territory served includes the most promising territory

response to the development in the western suburbs, and when completed will at once give added impetus to this natural trend of development.

This western trend of traffic is the key note of the enterprise in course of development by the Philadelphia & West Chester Traction Company, and it is the foundation upon which the large improvements are being made. The comple-

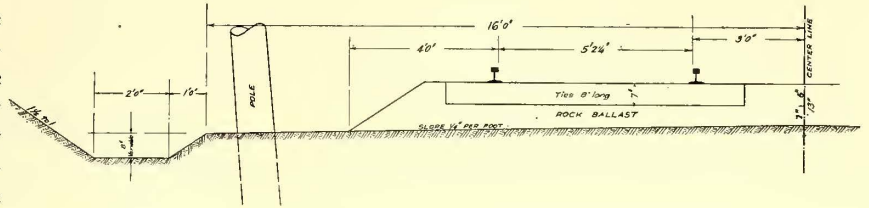
tion of the elevated will at once bring the western limits of the city 15 minutes nearer the City Hall, as the running time of the elevated trains will be 20 minutes or less, instead of 35 minutes for the present surface service. Moreover, the influence of well lighted, well heated trains, with large seating capacity, operated on fast and frequent schedule, immune from the necessary delays of surface travel in a congested city will be an important factor in increasing the western movement. The Philadelphia & West Chester Traction Company will take passengers at the Market Street terminal, and with the improvements made in all departments will distribute them comfortably, quickly and cheaply throughout a high, healthful and exceedingly beautiful suburban district hitherto undeveloped because of lack in transit facilities. The map on page 316 shows the territory served.

The territory served by lines operated by Philadelphia & West Chester Traction Company is in part very well built up; the main line taps the borough of West Chester, which has a population of 10,000 and also a large tributary population that is brought in touch by an electric line which extends in a northwesterly direction from West Chester to Downingtown and Coatesville, and which is now being connected up with the Lancaster County system; another electric line extends from West Chester to Kennett

intersects the railway running from Angora to Media at Clifton, and will also connect with the Philadelphia, Morton & Swarthmore line, control of which was recently acquired by the Philadelphia Rapid Transit Company, at Collingdale.

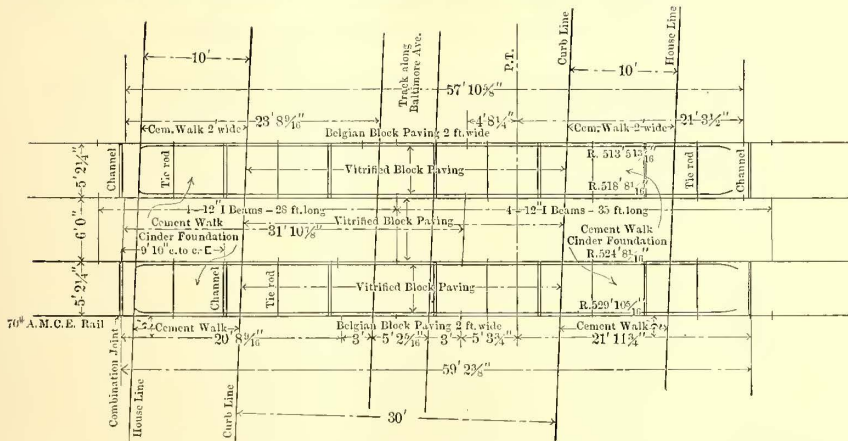
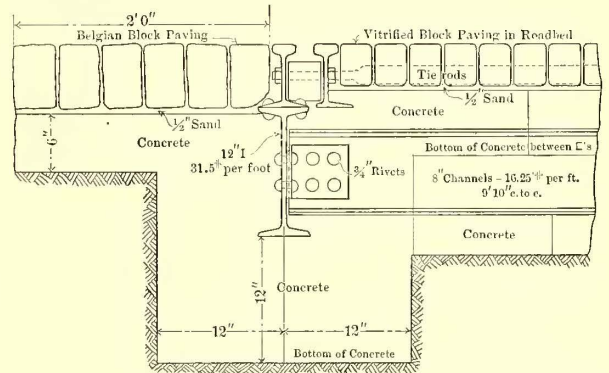
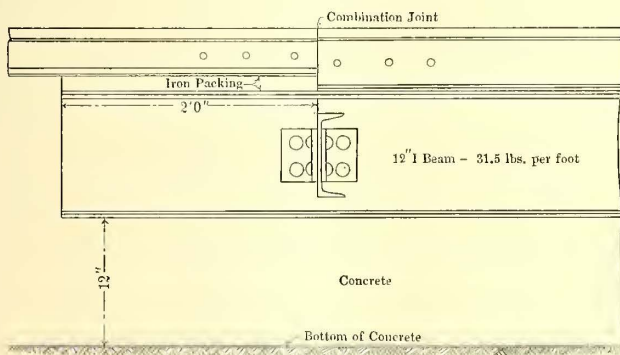
THE COMPANY'S POLICIES

The investment necessary to carry out the improvements has been large, but the expenditures have already been justi-



STANDARD SECTION OF DOUBLE-TRACK ROADBED

fied by the returns. The company has built for the future, content for the present to take a moderate return upon the invested capital, and freely to invest new capital when the expenditure seems justified and prudent, in the expectation of reaping greater benefits and returns in the future development of its territory. This is exemplified by the fact that the management was satisfied with gross receipts of 22.4 cents per car-mile, \$8,000 per mile of track, and \$3.25 per car-hour,

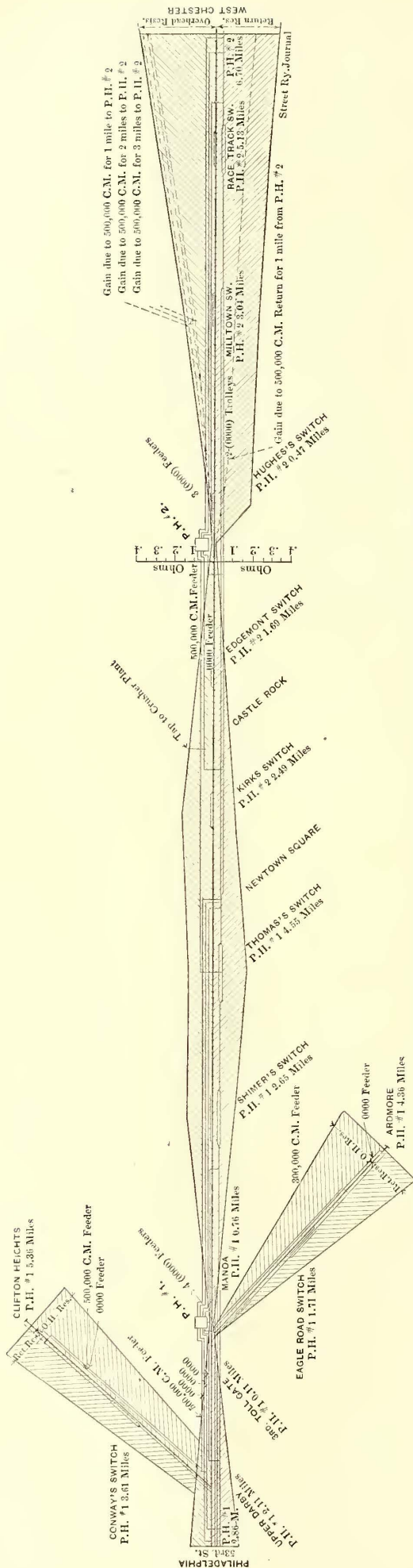


PLAN SHOWING THE METHOD OF CONSTRUCTION OF THE P. & G. STREET RAILWAY CROSSING AT BALTIMORE AVENUE, CLIFTON HEIGHTS, PA.

Square to the southwest, at which latter point connection is made with two other electric lines, one extending westward to Avondale and the other extending southward to Wilmington, Del.

The Ardmore division taps a population of 7500 in Ardmore and passes through a growing territory. The Clifton division taps a population from Clifton and Aldan of between 3000 and 4000 and when completed on south to Collingdale (which extension is now under way), it will have a tributary population of over 5000; the Clifton division also

the returns for 1905. The receipts per mile of track are high, but the receipts per car-mile and per car-hour are low, because of the liberal service given. Cars are operated at certain times of the day with many empty seats, and a better showing could be made by curtailment in the present schedules, but the management adheres to the present frequent and fast service, confident in the belief that the "empty seat" question will work out its own solution, and the proportion of unoccupied seats to total carrying capacity, which may now seem extravagant, will gradually be reduced by the very fact



PLAN SHOWING FEED SYSTEM AND GRAPHIC ANALYSIS OF RESISTANCE ON TRANSMISSION LINES AND RETURN. ON THIS DIAGRAM DOTTED LINES WERE DRAWN TO INDICATE POSSIBLE ECONOMIES, AND FROM THEM IMPORTANT IMPROVEMENTS HAVE BEEN MADE EVIDENT

that the public is rapidly realizing that comfortable empty seats are available. In other words, the assurance of a comfortable seat in an attractive and substantially built car, run on a well-built and well-maintained roadbed at frequent intervals and on time, will create the travel necessary to fill the seats. Again, although the giving of a liberal schedule results in somewhat low return per car-mile and per car-hour receipts now, the policy of giving frequent service will produce infinitely better results in the future, because it is the all potent factor in developing the territory.

The company is working out another policy and one that is all too often neglected, namely, it is planning to develop a large winter traffic by giving in winter the same attention to frequency in schedules and inducements to travel as in summer. The management believes this matter of creating winter business deserves more attention than it usually receives. In summer, energetic efforts are directed towards inducing the public to ride for pleasure by providing cool, open cars, frequent service and various outdoor pleasure attractions. The management of the Philadelphia & West Chester has taken the position that the same energy, properly directed during the winter months, namely, in the providing of luxurious, well-heated cars, operated on a frequent and reliable schedule, and in advertising good restaurant facilities at terminal points, and the beauties of winter scenery, will induce the people to use the cars when in search of recreation and pleasure in winter as they do in summer, especially in winter when the opportunities for outdoor pleasures are limited. Thus the volume of winter travel will be more nearly equal to that of summer with the resulting advantages which accrue when traffic is well distributed throughout the year.

THE TRACK

The high standards followed in track construction are well shown on page 317. All rail installed in the past seven years is 70-lb. A. S. C. E. T. section. The ties are chestnut, 6 ins. x 8 ins. x 8 ft. laid on 2-ft. centers. The entire right of way on the main line and branches is graded and drained for double track. About 30 per cent of the total mileage is on private right of way, and the West Chester line is located along side of the West Chester turnpike, which is controlled by the Philadelphia & West Chester Traction Company.

The roadbed is rock ballasted throughout, with from 6 ins. to 8 ins. of stone under the ties. Provision is made for drainage by ditches at the side of the track and by iron or vitrified-pipe conduits at crossings and other points. All grade crossings are planked and are protected with crossing signs.

The track is bonded with 9-in. No. 0000 Mayer & Englund bonds. In a recent bond test of the road, made by Albert B. Herrick, the bonding was found to be in unusually good condition, the figure of merit for all sections averaging something better than 95 per cent, and in his report Mr. Herrick states that, exclusive of the switches on the inbound track from West Chester, this road is the best bonded interurban road he has tested in the last 8000 miles of test runs.

SPECIAL WORK

As showing the high-grade standard adopted for track work, and also as exemplifying the company's policy in building for the future, plans are reproduced on page 319, illustrating a crossing that is being installed at Baltimore Avenue, Clifton Heights, where an extension to the Clifton line crosses the tracks of another electric railway. The special work is of the Wharton manufacture with manganese centers, and is supported on a bridge formed of 12-in. I-beams, embedded in concrete. This construction makes an absolutely rigid and permanent crossing. The details are shown on the drawings.

CURRENT RETURN AND TRANSMISSION LOSSES

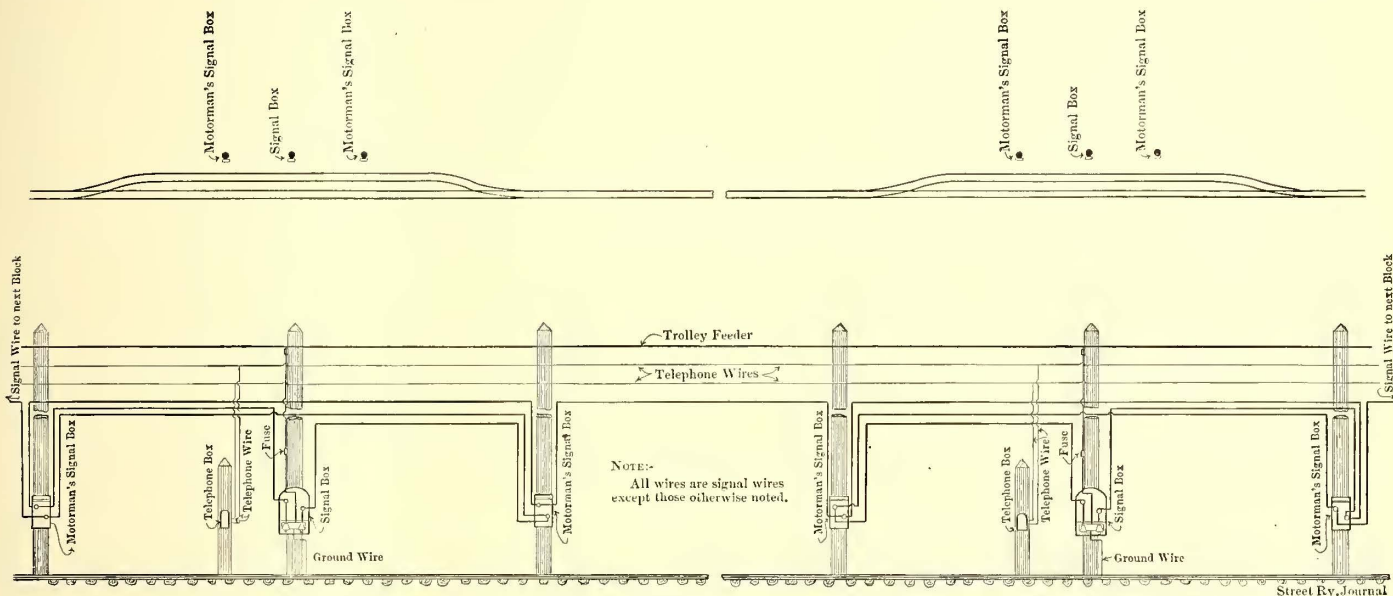
In order to analyze the effect on the current return system of the defective bonds and their relative importance in regard to the current return to power station, Mr. Herrick prepared the graphic illustration which is reproduced on page 320 for the double purpose of showing the exact condition on the road under consideration, and for illustrating the ingenious method by which the record is plotted graphically.

For instance, the record shows at a glance that west of power station No. 2 there is a large drop between the power station and Hughes switch, in fact, on the rail this drop is greater than all the rest of the bonding to West Chester. From the autographic record of bond tests it was found there were four defective bonds and one open bond in these rails, which affect the drop of the entire return current; the condition of the ground return, although exceptionally

All masonry used in the piers and abutments is first-class rubble and is lined with Hummelstown brown stone. All of these structures are capable of supporting cars weighing 50 tons, coupled together in trains of two or three cars and traveling at a speed of 50 miles per hour.

SIGNAL LIGHT SYSTEM

The signal light system is a modification of what is known as the Ramsey system. Briefly described, its principle is as follows: A westbound car, for example, running in block No. 2 is protected at turnout No. 1 by the signal lights burning in the east end of the signal light boxes, and at turnout No. 2 by the signal lights burning in the west end of the signal light boxes. Likewise, an eastbound car running in block No. 3 is protected at turnout No. 2 by the signal lights burning in the east end of the signal light boxes, and at



WIRING AND DETAILS OF SIGNAL SYSTEM FOR TWO BLOCKS

good, has since been still more improved by the replacement of the defective bonds.

BRIDGES AND VIADUCTS

In the work of eliminating grades and curves and improving the roadbed, a number of elaborate bridges and viaducts have been built. The more important of these are as follows:

There is one bridge of importance on the West Chester division. This bridge, which is situated at Ridley Creek, is 202 ft. x 2 ins. long, and is a four-span, single track, deck, plate-girder bridge, each span being 50 ft. long. Three spans of the bridge are built on a 5½-degree curve. The masonry of this bridge is constructed of stone, found in the immediate locality. The bridge seats are of concrete and are 18 ins. thick. Piers and abutments have been built for double track.

There are two bridges on the Clifton division—the Naylor's Run bridge and Darby Creek bridge.

Naylor's Run bridge is a double track, deck, steel-plate girder viaduct, 577 ft. 6 ins. long with sixteen spans, varying from 20 to 60 ft. in length. The viaduct is supported by six steel towers with an average height of 18 ft.

The footings of the steel towers rest on concrete pedestals capped with Port Deposit granite.

Darby Creek bridge is a double-track steel deck bridge 341 ft. 4½ ins. long, with a truss span 120 ft. long crossing a stream, and with plate girder approaches, the spans of which vary from 40 to 60 ft. in length.

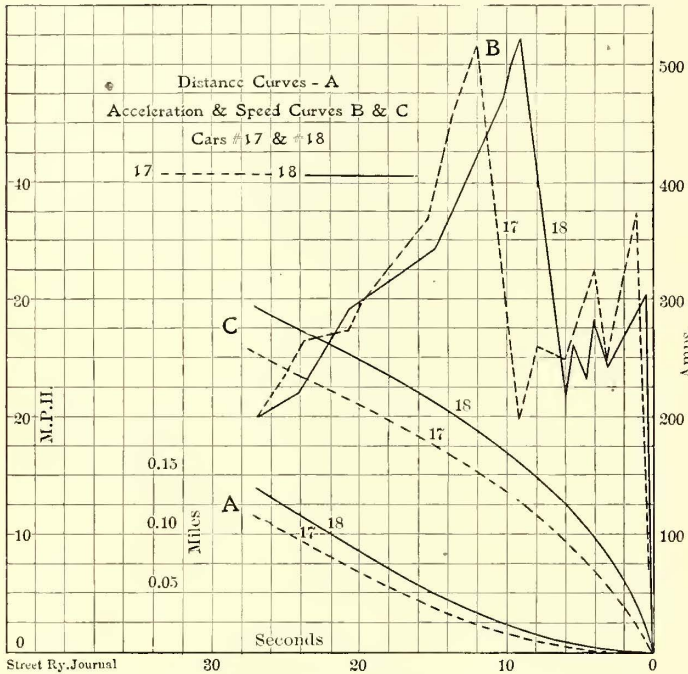
turnout No. 3 by the lights burning in the west end of signal light boxes. Provided these two cars should pass at turnout No. 2, they simply trade blocks, the eastbound car being protected by the same signal lights that had been protecting the westbound car, and the westbound car being protected by the same signal lights that had been protecting the eastbound car. The accompanying plan shows the complete wiring for two blocks. Each turnout is provided with a set of three signal light boxes, consisting of one main box enclosing the signal lights and switches and two check-light boxes. The signal lights in the check-light boxes are wired in series with those in the main box and their purpose is to permit the motorman to check the operation of the lights by the conductor without having to leave his position at the front end of the car. The motorman is held equally responsible with the conductor for proper operation of this signal system. The check-light boxes are located on each side of the main box and at a distance of about one car length therefrom. The signal light switches are enclosed in the main box which is kept locked—all trainmen being provided with keys.

This system gives six lights, wired in series. This adds greatly to the life of the lamps, thereby eliminating most of the trouble usually experienced from lamps burning out when they are wired five in series. At the same time, due to an adequate trolley feeder system, which keeps the voltage fairly constant at all times, these lights burn brightly enough for signal light purposes.

A telephone is provided at each turn-out—this telephone being connected to private telephone wires leading to the dispatcher's office.

THE EFFECT OF GRADES ON COST OF OPERATION

The work of remodeling the roadbed with special reference to the elimination of curves and grades has been deliberate and along lines of securing certain definite economic results. As outlining the conclusions upon which the work of elim-



SPEED-TIME CURVES FOR THE 44-FT. CARS

inating grades has been carried out, and as containing data of value on this subject, a summary is here given of a report prepared by Albert B. Herrick, of New York, who has recently made careful tests and an exhaustive report on the subject.

In the question of limiting or eliminating grades, the solution lies necessarily in the relation between the cost of construction and the decrease in the cost of operation, and it is to be remembered that if \$20.00 can be spent in construction to save \$1 in operating cost, the expenditure is earning interest at the rate of 5 per cent at the point where the expenditure is made and the economy effected. It is the summation or determination of all the economies that can be brought about by careful preliminary engineering considerations which fixes both the capitalization and earning values of any property. But the question of eliminating

In the matter of the effect of grades, assuming the case of a 1000-ft. grade of 3 per cent, as against a 5 per cent grade, and taking the cost of reducing the 5 per cent grade to a 3 per cent grade as \$3,500, the relative value of the two can be computed as follows:

A car going up a 5 per cent grade for 1000 ft. has gained an elevation of 50 ft., and, assuming the car weighs 25 tons, the car's potential energy at the top of the grade has increased 2,500,000-ft. pounds. In order that the motors may produce this 72-hp of energy, there will be required at the power station, under the very best average conditions of conversion and transmission, the capacity to deliver 144 hp for the time that it takes the equipment to surmount this grade, assuming that the equipment is geared to 40 m. p. h. on the level, and a schedule speed of 20 m. p. h., including stops and slow-downs, is maintained. It would require 41 seconds to mount this grade, and during this time the station is exerting 144 hp for this one car, due to this grade alone.

Taking, on the other hand, the 3 per cent grade for the same distance (but as a matter of fact reducing grades reduces the distance between terminal points, as a grade may be considered a curve in a vertical plane) when the car has mounted this grade, it has gained potential energy of 1,500,000-ft. pounds, or 45 hp, and the station has had to produce only 90 hp for this car. The speed at which the car could ascend the 3 per cent grade would be 21 m. p. h., and the time consumed would be 30 seconds. The time gained on the 3 per cent grade compared with the 5 per cent grade would be 11 seconds, and the horse-power output at the station saved would be, by the lower grade, 54 hp for 30 seconds and 144 hp for 11 seconds each time a car mounted the grade. Assuming the cost of power to be .88 cents. Assuming the cost of time at \$4.60 per car hour, this would mean a saving of .0137 cents, as representing the saving in car operation on the 3 per cent grade as against the 5 per cent grade. Assuming half-hour schedules at terminals and a symmetrical grade on each side, there would be a saving of \$2.08 per day, or a return of 21.6 per cent on the \$3,500 expenditure necessary to reduce the grade from 5 per cent to 3 per cent. This grade could be reduced still further with economy, but 3 per cent was taken as the limit because an ordinary equipment will float down a 3 per cent grade at the schedule speed, whereas, on a 5 per cent grade the brakes have to be applied to keep the car within speed limits; but in this consideration other capital expenditures are involved—for instance, the distance of the grade from the power house will have an influence on the amount of copper feeders required in order to maintain the proper potential delivery. If the heavier grade is the maximum grade on the route, it might be necessary to increase the capital outlay in the power station to meet this demand, and this is especially true if the meeting points are at the top of the grade and the maximum demand for both equipments occur at the same time. This would increase the station outlay at least \$90.00 per horse-power, and it would also increase the station operating costs; moreover, most of the interest and maintenance on the additional power station equipment would be a standing loss, for this outfit would be required only for 41 seconds every 15 minutes.

The question involved in these cases is how much it is possible to reduce grades by forming an equation, one side of which is the

DESCRIPTION OF DIFFERENT TYPES OF EQUIPMENT

Type of Car	Seating Capacity	Length Over All	Trucks	Truck Centers	Wheel Base	Type of Wheels	Motors	Motor H. P.	Controllers	Brakes	Weight of Car Complete Empty	Maximum Speed at Zero Grade	H. P. per Ton
A closed..	40	40' 1"	Brill 27 G	15' 4"	4' 0"	33" rolled steel	4 West 68	160	K. 6	Air and hand	31,000 lbs.	25.0 M.H.P.	10.3
B closed..	40	41' 0"	Brill 27-E	17' 6"	6' 0"	33" rolled steel	4 West 68	160	K. 6	"	34,000 "	26.3 "	9.4
C closed..	40	41' 0"	Brill 27 E	17' 6"	6' 0"	33" rolled steel	4 West 68	160	K. 6	"	34,000 "	26.0 "	9.4
D17 closed	48	44' 4"	Baldwin M. C. B.	25' 6"	6' 0"	34" rolled steel	4 G. E. 73	300	Type M Automatic	"	68,000 "	29.5 "	8.8
D18 closed	48	44' 4"	Baldwin M. C. B.	25' 6"	6' 0"	34" rolled steel	4 G. E. 73	300	Type M Automatic	"	68,000 "	29.5 "	8.8
E open...	84	41' 7 1/2"	Brill 27 G	21' 4"	4' 0"	33" cast	4 West 68	160	K. 6	"	27,000 "	25.5 "	11.8

grades is a broader one than this, especially on certain critical lengths of road. For example, there may be taken a road between 17 and 20 miles long, on which is given an hourly schedule from each end of the line. Here, if heavy grades and sharp curves exist, two cars cannot make or maintain this schedule with safety, and three cars will be required, which will immediately increase the cost of operation from 18 to 28 per cent, due to the necessity of operating the third car to maintain the schedule, and yet the passenger revenue is no greater. The same is true with half-hour schedule. A greater number of stops will reduce the critical margin between two or three cars performing hourly service between terminal points.

cost involved in the reduction of the grade and the annual charge for this cost, the other side of the equation being the saving effected in power, time and maintenance. For each particular case the rate of interest for the cost of greater reduction can be equated against the operating expense in surmounting the proposed grade as against the reduced grade. The same argument applies with respect to avoiding curves. The saving in car mileage on a tangent track as compared with a track taking a sinuous course to reach the same terminals can be easily computed. In making the computation, regard should also be paid to the matter of slower schedules and increased accident hazard when operating on curves.

As showing how practical application was made of these conclusions it was found, for instance, that by cutting down from a 5 per cent grade to a 3 per cent grade for a distance of 4700 ft. outbound, the allowable investment would be \$10,470. That is to say, the economy in car operation secured by cutting down the grade would be equivalent to 10 per cent on that amount. In the same way the allowable investment was determined for all of the grades on the line, and where the work can be done for the allowable investment, the grades are being reduced accordingly.

COST OF STOPS

The question of the cost of making stops has been thoroughly investigated, as this has an important bearing on the

COST OF STOPS IN FRACTION OF A CENT ON VARIOUS GRADES

Platform time taken at 40 cents per hour and cost of power at the motor at 1.5 per kw h

TYPE OF CAR*	GRADES IN PER CENT							
	0	1	2	3	4	5	6	7
A.....	.19	.21	.23	.25	.28	.31	.34	.42
B.....	.18	.19	.21	.24	.25	.27	.30	.39
C.....	.21	.22	.24	.25	.27	.30	.37	.45
D17....	.24	.25	.27	.29	.32	.36	.44	.59
D18....	.25	.26	.29	.31	.37	.39	.45	.57
E.....	.13	.14	.15	.16	.17	.19	.22	.27

* See table describing each type.

elimination of grades. The accompanying table prepared by Mr. Herrick gives the cost (in cents) of making stops on various grades with the different equipments. These costs were derived by first calculating the cost of a stop when run-

ROLLING STOCK

In the selection of the later types of equipment, the management has had in mind two important considerations; first and foremost, the advertising feature secured by general appearance, finish and substantial design, and second, engineering considerations, based on efficiencies in grade climbing, power consumption and ability to serve the schedules. As to the first feature, a very decided policy has been formulated. Expressed in non-technical language, the idea has been to create a tendency on the part of the public along the line and in the terminal cities to ask, "Have you ridden in the new interurban cars of the Philadelphia & West Chester?" If this question becomes general, the management is content to take its chances on obtaining and retaining the business desired.

In designing the new cars now on order, engineering considerations have, to some extent, been subordinated to appearance and substantial construction. The argument in substantiation of this decision is: Assuming that the heavier car will cost 2½ or 3 cents more per car-mile to operate, this is equivalent only to the receipts from two additional passengers per trip and it is believed the traffic-drawing power of

COST PER CAR MILE IN CENTS

Type of Car	Kw per Car Mile	Cost per Car Mile
A.....	2.7	4.05
B.....	2.9	4.35
C.....	3.8	5.70
D17....	4.5	6.75
D18....	4.2	6.30
E.....	2.6	3.90

FRICTION COEFFICIENT IN PER CENT OF DIFFERENT TYPES OF EQUIPMENT

TYPE OF CAR	WEST CHESTER LINE				ARDMORE LINE				CLIFTON LINE			
	Outbound		Inbound		Outbound		Inbound		Outbound		Inbound	
	Power Applied Per Cent of Time	Float Per Cent of Time	Power Applied Per Cent of Time	Float Per Cent of Time	Power Applied Per Cent of Time	Float Per Cent of Time	Power Applied Per Cent of Time	Float Per Cent of Time	Power Applied Per Cent of Time	Float Per Cent of Time	Power Applied Per Cent of Time	Float Per Cent of Time
A.....	62.8	37.2	75.4	24.6	69.0	31.0	68.0	32.0	75.0	25.0	65.2	34.8
B.....	58.7	41.3	62.8	37.2	73.8	26.2	60.2	39.8	67.8	32.2	54.4	45.6
C.....	64.7	35.3	55.6	44.4	70.8	29.2	52.2	47.8	70.0	30.0	65.0	35.0
D17....	70.5	29.5	59.5	40.5	61.5	38.5	64.6	35.4	62.7	37.3	64.0	36.0
D18....	56.0	44.0	66.0	34.0	65.0	35.0	55.2	44.8	66.0	34.0	70.5	29.5
E.....	68.0	32.0	50.7	49.3	65.3	34.7	51.6	48.4	70.5	29.5	51.3	48.7

CURRENT CONSUMPTION OF DIFFERENT TYPES OF EQUIPMENT FOR VARIOUS GRADES

CAR	0		1 Per Cent		2 Per Cent		3 Per Cent		4 Per Cent		5 Per Cent		6 Per Cent	
	Amp.	M. P. H.	Amp.	M. P. H.	Amp.	M. P. H.	Amp.	M. P. H.	Amp.	M. P. H.	Amp.	M. P. H.	Amp.	M. P. H.
A.....	110	25.	130	23.5	145	22.5	155	21.5	180	20.0	215	18.0	290	15.0
B.....	96	26.3	100	26.0	108	25.5	110	25.0	115	23.5	160	22.0	220	20.0
C.....	160	26.0	180	25.0	185	24.5	210	23.5	230	22.3	270	21.0	370	18.5
D17....	180	20.5	190	27.5	200	27.0	220	25.0	255	22.5	300	10.5	500	15.0
D18....	170	20.5	100	28.0	195	27.8	200	26.8	255	25.0	300	23.5	360	21.0
E.....	95	25.5	110	24.5	130	23.0	140	22.0	170	20.2	240	18.	320	15.5

ning at a uniform speed of 20 miles per hour; then interpolating for the speed and time at the given grades from the speed-time curves. The report points out that the cost factor of a stop consists of two elements, the increase of time which adds to the platform expense and the increase in use of energy, due to the acceleration of the car.

Platform expense was taken as 40 cents per hour and the cost of power as 1.5 cents per kw-hour at the motors.

the more substantial and finer finished car, with the added assurance of ample seating capacity and safety, are sufficient to create far more than the additional business required to offset the slight increase in cost in operation.

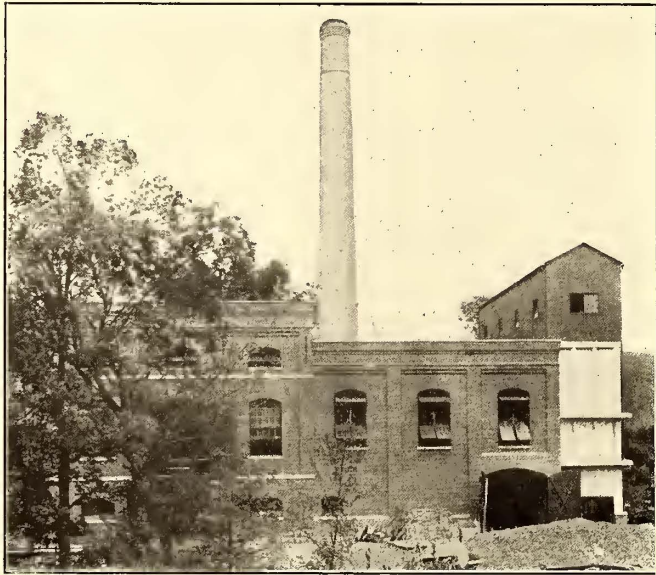
The latest cars placed in operation on the road are built with solid steel underframing, upon which is laid corrugated galvanized iron supports for the floor, which is composed of layers of asbestolith with interlocking rubber tile laid thereon.

The interior finish of the cars is very handsome in design and is secured by the use of vermillion wood. The seats are covered with leather; all windows are plate glass, and, as it is intended to run these cars in trains, the vestibules are arranged so that passengers may readily pass from one car to the other.

EFFICIENCIES OF CAR EQUIPMENT

To determine the relative efficiency of the various types of equipments, tests were carried out by Mr. Herrick on each type of rolling stock, for the purpose of securing autographic records of the current demand, voltage, delivery and speed-time curves, as well as for determining the efficiencies in climbing grades.

The friction coefficient was derived for each type of equipment in the following way: The total time required for the power to be applied to operate the car, and the time which the car floated without the application of power, were brought



POWER STATION NO. 2 AT RIDLEY CREEK, SHOWING REINFORCED CONCRETE COAL BUNKER ON THE RIGHT

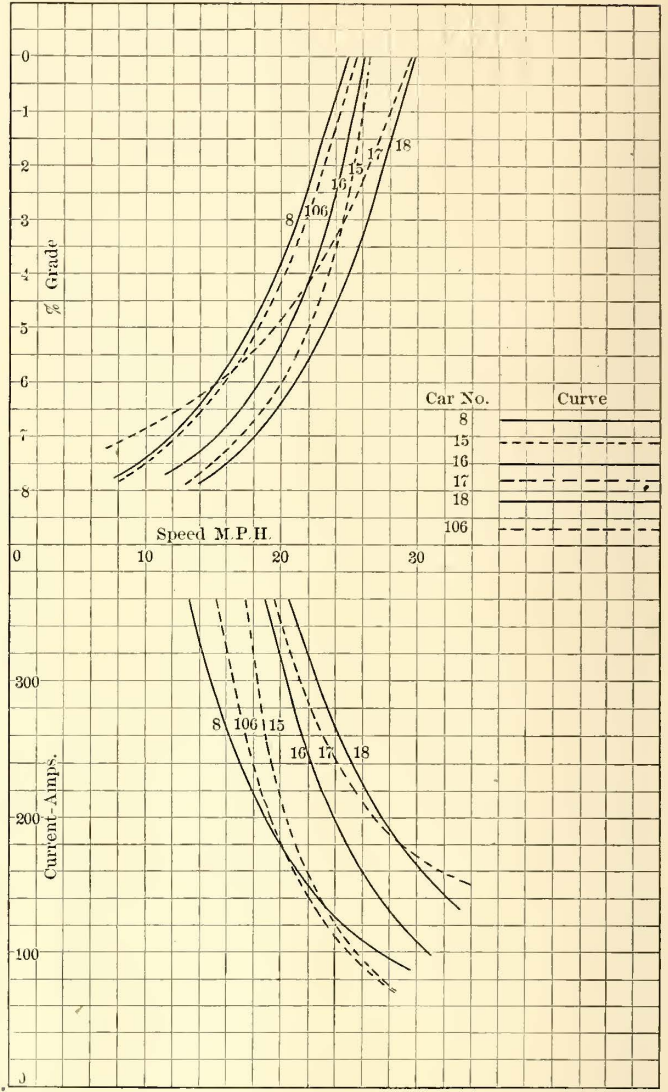


DIAGRAM SHOWING SPEED AND POWER REQUIRED ON DIFFERENT GRADES BY DIFFERENT EQUIPMENTS

TRANSPORTATION SHEET

DATE *Thursday, July 5* 190*b.*

West Chester Division						Ardmore Division					Clifton Division								
Time	WEST BOUND					Time	EAST BOUND				Time	WEST BOUND		EAST BOUND					
	63rd St.	Eagle	Newtown Square	Penn Hotel	Milltown		West Chester	Milltown	Penn Hotel	Newtown Square		Eagle	63rd St.	Ardmore	63rd St.	Clifton			
A. M.						A. M.				1	A. M.		A. M.		A. M.				
						5 15				6			5 42		5 23				
4 40			3	4	7	5 45	34	42	42	52	59	5 31		13	5 35	5	5 50	10	
5 25						5 54				15	21	5 40	24	9	5 50		6 05		
5 10	1	1	3	4	5	6 15	30	34	30	35	38	5 55	31	6 18	14	6 05	19	6 20	28
5 30	27	24	21	25	30	6 45	22	30	31	37	49	6 10	47	6 33	14	6 20		6 35	
6 00	54	28	24	26	27	7 15	19	16	14	24	37	6 25	78	6 48	29	6 35	26	6 50	35
6 15						7 30						6 40	57	7 03	28	6 50		7 05	
6 30	44	21	15	16	16	7 45	18	18	19	29	37	6 55	36	7 18	25	7 05	19	7 20	17
6 45						8 00						7 10	48	7 33	28	7 20		7 35	
7 00	29	33	20	18	14	8 15	29	31	32	47	55	7 25	33	7 48	17	7 35	6	7 50	12
7 15						8 30						7 40	18	8 03	19	7 50		8 05	
7 30	24	17	11	15	17	8 45	24	17	20	30	35	7 55	25	8 18	26	8 05	9	8 20	13
7 45						9 00						8 10	18	8 33	12	8 20		8 35	
8 00	15	14	11	13	13	9 15	34	34	35	47	48	8 25	14	8 48	15	8 35	10	8 50	14
8 15						9 30						8 40	20	9 03	19	8 50		9 05	
8 30	26	20	12	8	8	9 45	26	26	28	34	37	8 55	16	9 18	23	9 05	6	9 20	17
8 45						10 00						9 10	14	9 33	26	9 20		9 35	
9 00	27	28	24	26	26	10 15	34	32	32	37	37	9 25	21	9 48	34	9 35	15	9 50	18
9 15						10 30						9 40	14	10 03	15	9 50		10 05	

PART OF TRANSPORTATION SHEET FOR THURSDAY, JULY 5

to a percentage basis, and the length of time which the car floated was taken as a criterion of all friction elements which tend to stop the car. The higher the percentages of floating,

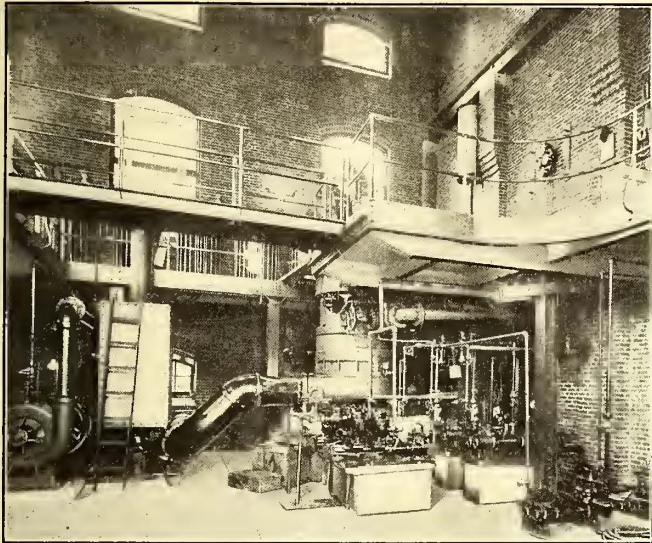
the less will be the friction involved in the operation of the equipment.

The accompanying curves give the grade climbing efficien-

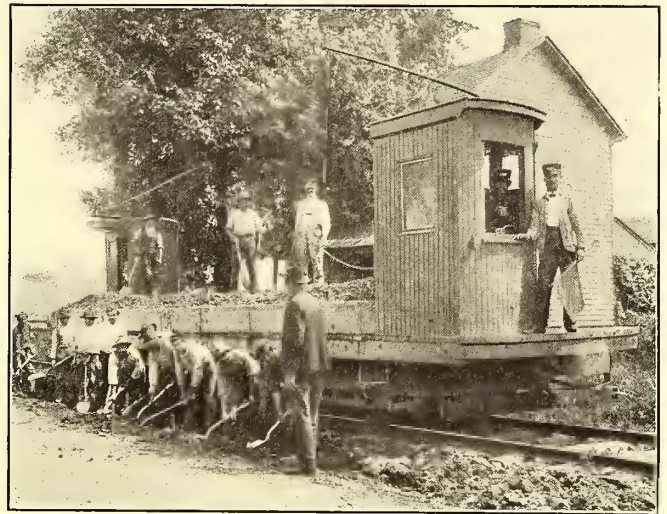
cies, current consumption and speed-time curves for the different classes of equipment.

As showing the use to which data of this kind can be put, it will be observed that the efficiency of car type D18 is better on grades than car type D17, but on the level they run about

trains on the schedules, and the new cars are equipped with multiple unit control for this purpose. The rates of fare are: Twenty-five cents between Sixty-Third Street and West Chester, a distance of 20 miles; 5 cents between Sixty-Third Street and Ardmore, a distance of 2 miles, and 5 cents between Sixty-Third Street and Clifton, a distance of 3.2 miles.



ONE OF THE 500-KW, D. C. TURBO-GENERATORS IN POWER STATION NO. 2



CONSTRUCTION CAR, PHILADELPHIA & WEST CHESTER TRACTION COMPANY

the same. This indicates that the brakes do not release well, and also indicates a continuous friction which consumes energy that should be more usefully applied to the operation of the equipment.

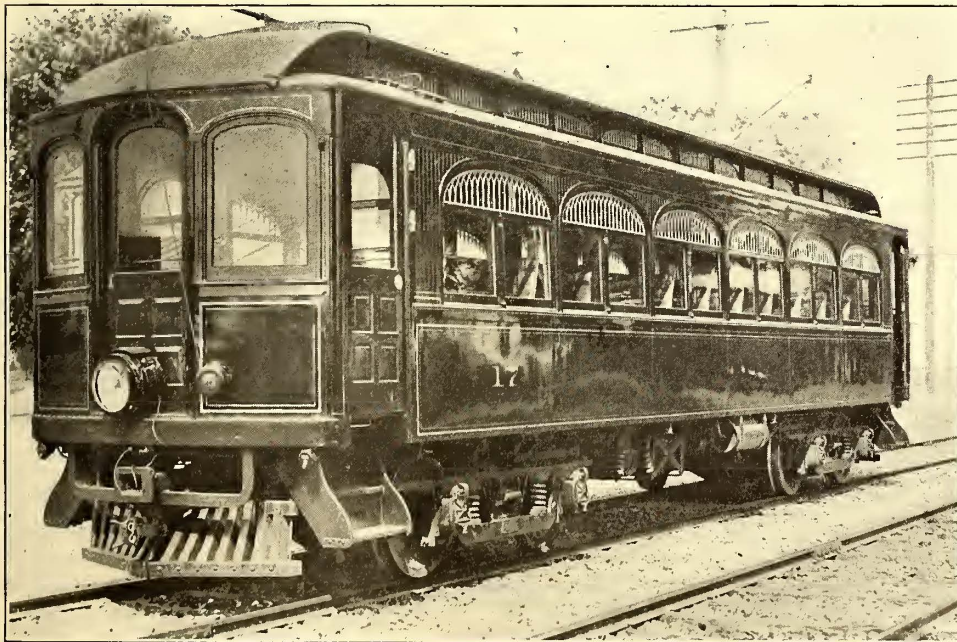
SCHEDULES AND FARES

At present a half-hour schedule is given on the West Chester line between West Chester and Sixty-Third Street.

The fares are based on the zone system, and a separate 5-cent fare is collected from each passenger at each zone.

For watching the efficiency of the schedules, the record, shown on the opposite page, is kept. On this is entered the number of passengers carried on each trip, in each fare zone, and as the seating capacity of the cars is known, it becomes a simple matter to determine if the cars are properly serving the travel at each hour of the day. In this sheet the number of passengers is entered in red, if the car carried at the given point more passengers than could be seated.

This record is watched carefully every day, and if the red figures appear in any way too frequently for any trip, a larger type of car is immediately substituted on that trip, as it is the intention of the management, as pointed out before, to advertise this service by the assurance, in so far as possible, that seats will be available for all passengers at all hours.



STANDARD INTERURBAN CAR WITH STEEL UNDERFRAME OF THE PHILADELPHIA & WEST CHESTER TRACTION COMPANY

POWER STATIONS

The original power station was located at Llanerch, not far from the eastern terminal. The entire apparatus in this station has been replaced, and the plant, which is known as Station No. 1, now contains the following: Two 400-kw Westinghouse double-current generators,

A 15-minute schedule is given on the Ardmore line from Sixty-Third Street to Ardmore. A 15-minute schedule is given on the Clifton line from Sixty-Third Street to Collindale. The service is given with single-car units. As soon as the elevated trains are placed in operation it is proposed to give these same schedules, but it is believed that at certain hours of the day, at least, it will be necessary to run two and three-car

direct connected to two 650-hp Hamilton Corliss engines. Each of these machines will deliver either 575-volt direct current or 350-volt alternating current, or each can be arranged to deliver both kinds of current simultaneously. Up to this year the western section of the line was served from a rotary sub-station located at Ridley Creek, taking alternating current from the

double-current machines at Station No. 1. This current was stepped up to 10,000 volts at the generating station, and was

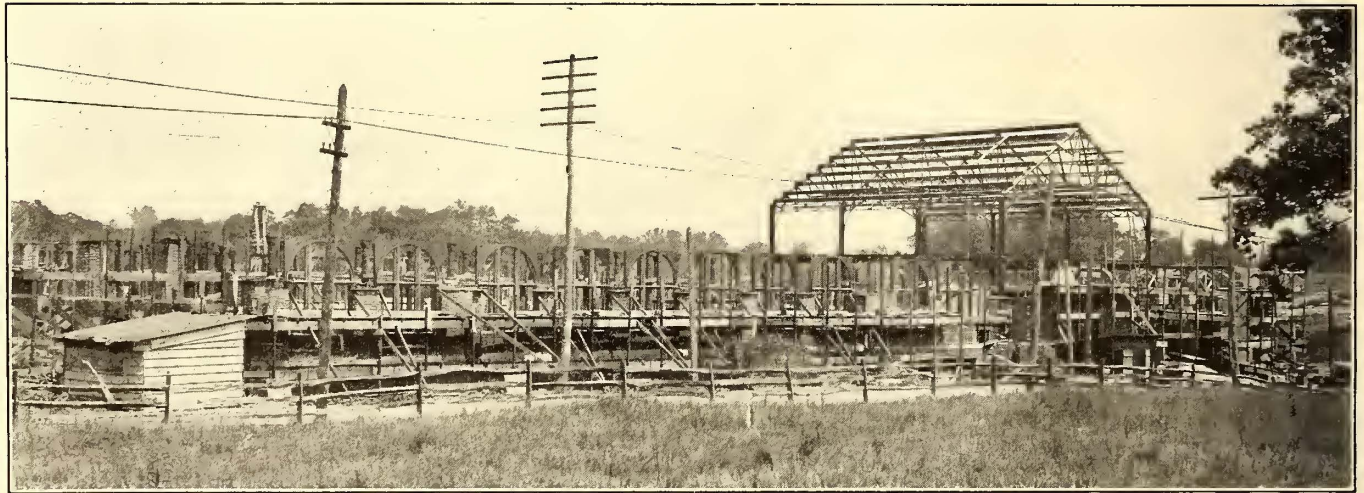


INTERIOR OF A STANDARD CAR OF THE PHILADELPHIA & WEST CHESTER TRACTION COMPANY

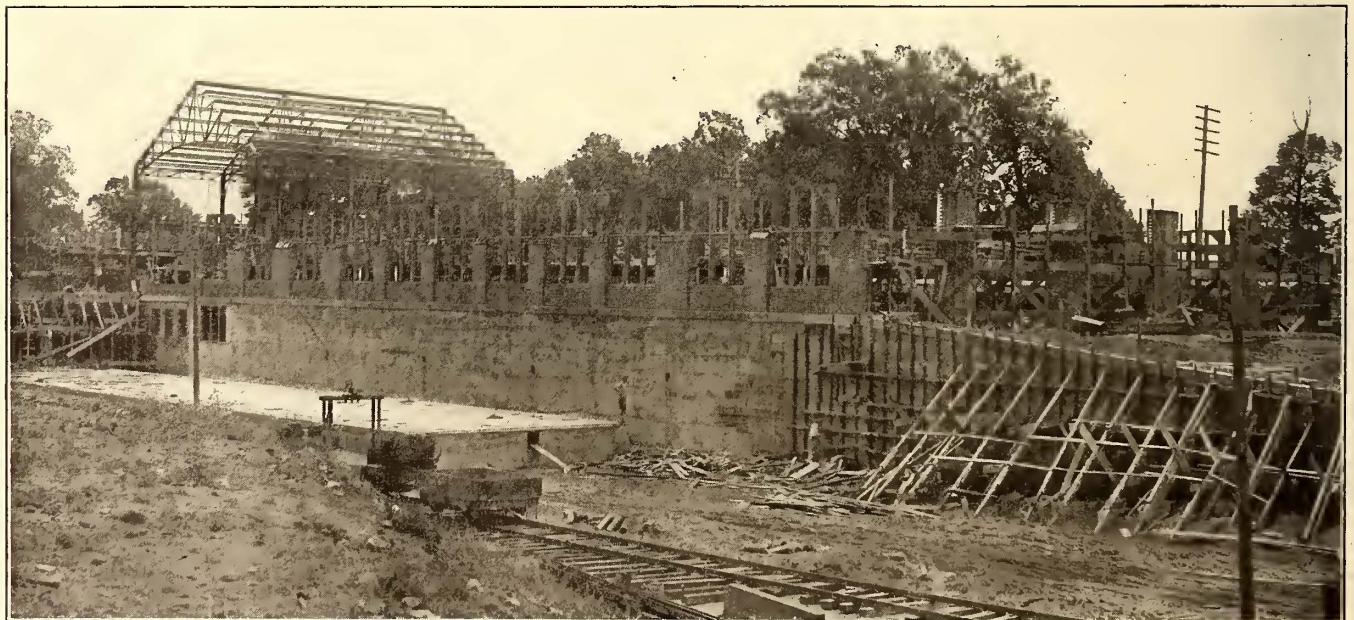
transmitted at this voltage over a high-tension line located along the line of the railway.

It is interesting to note that this high-tension line never gave satisfaction, owing to the great number of trees along the route, and short circuits were constantly occurring, due to the contact with trees, or caused by falling twigs or branches. For this reason the management became convinced that it was impossible to operate a high-tension line where trees overhang the line in great numbers, owing to the interruption to schedules due to short circuits.

Accordingly, an entirely new power scheme was laid out. This included the erection at Ridley Creek of a new direct-current station, now known as Station No. 2. The generating apparatus at this plant consists of two 500-kw Curtis steam turbines, direct connected to General Electric direct-current generators. This station supplies current to the line from West Chester east to Newtown Square, and Station No. 1 supplies current from Newtown Square east to the Sixty-Third Street terminal, and also to the Clinton and Ardmore branches. The two stations are tied together, and the current from both equalizes on the line, the dividing point fluctuating, according to the load, about a mile each way. The feeders from the two stations are joined at the dividing line

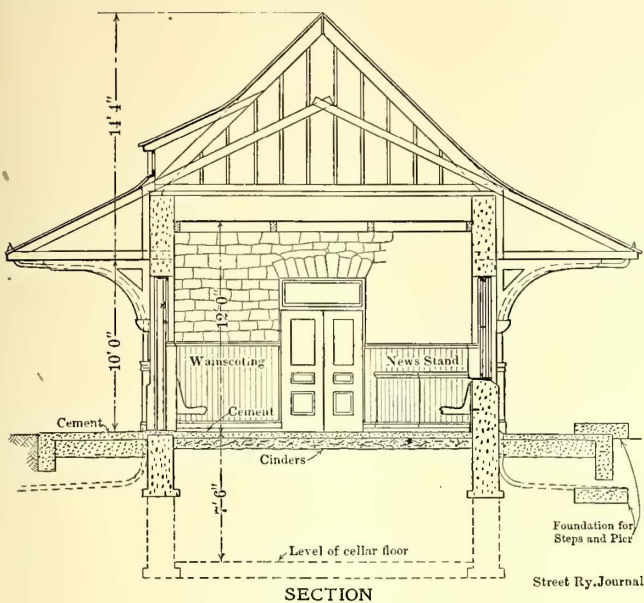


SOUTHERN ELEVATION OF TERMINAL BUILDINGS. THE PORTION OCCUPIED BY THE PHILADELPHIA & WEST CHESTER RAILWAY EXTENDS FROM THE HIGH STEEL STRUCTURE WESTWARD



NORTH ELEVATION OF EASTERN TERMINAL, SHOWING LOADING PLATFORMS OF MARKET STREET ELEVATED

by a disconnected switch, which provides for cutting the line into two sections if desirable. The original high-tension line and the sub-station apparatus at Ridley Creek are held



SECTION OF A WAY STATION

in readiness to be used in case of breakdown in the direct-current units.

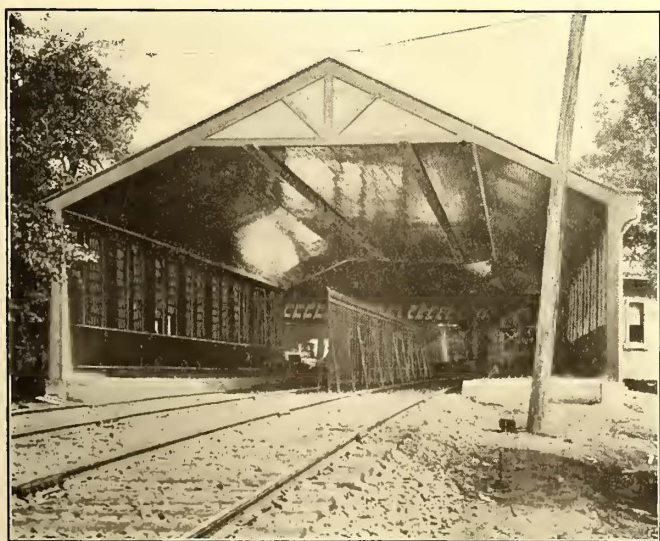
At the Llanerch power house there are three 450-hp Edge

DATA OF POWER STATIONS

	Total Rated Capacity of Engines in hp.	Total Rated Capacity of Generators in kw.	Total Rated Capacity of Boilers in hp.	Rated Output Capacity in kw.	Maximum Output Capacity in kw.	Rated Capacity in kw per Mile of Track Served
Sta. No. 1, Llanerch	1,300	800	1,350	800	1,200	40.2
Sta. No. 2, Ridley Creek	1,340	1,000	900	1,000	1,500	75.2

Cost of current at switchboard, excluding interest on depreciation, .09c.

Moor boilers. At the Ridley Creek power house there are two 450-hp Edge Moor boilers.



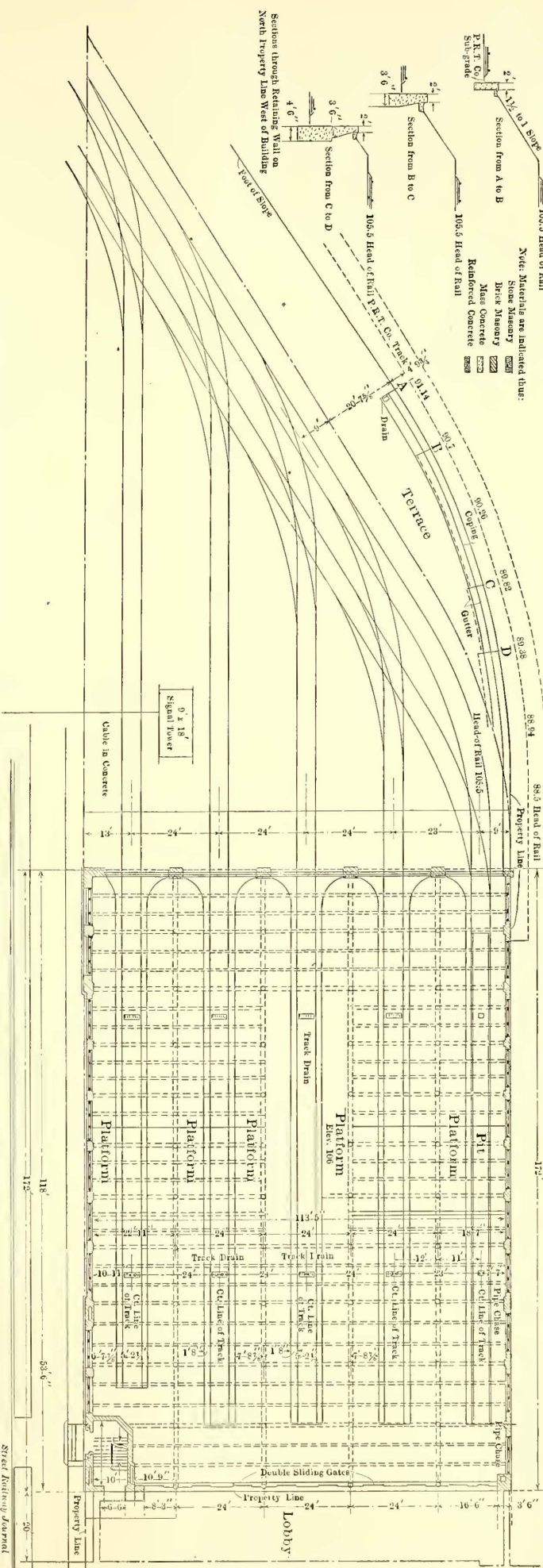
LOOKING INTO TRAIN SHED, ARDMORE TERMINAL STATION

The table above gives certain interesting data concerning the two stations.

CONDENSING WATER AT STATION NO. 2

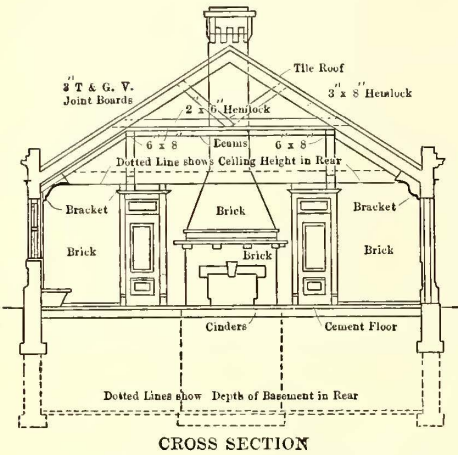
One of the interesting features at Station No. 2 is the arrangement for securing condensing water supply.

TRACK PLAN OF EASTERN TERMINAL STATION OF THE PHILADELPHIA & WEST CHESTER TRACTION COMPANY



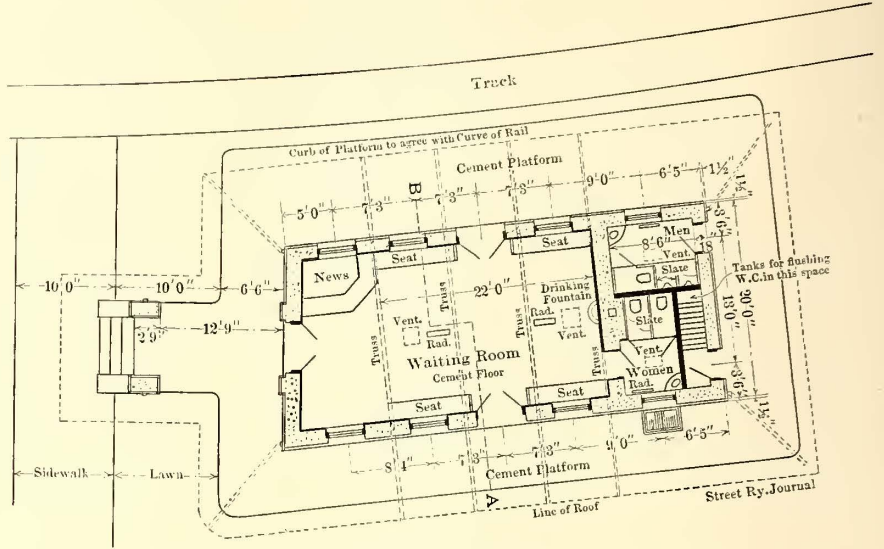
This power house is located along the bank of Ridley Creek. The water used in the power house is taken from a concrete dam located about 1000 ft. up stream, and is led

two duplex steam pumps of the Worthington type. The water for the condensers is also taken from this reservoir by means of two condenser pumps. One of these is a centrifugal pump direct connected to a 35-hp, 550-volt Westing-



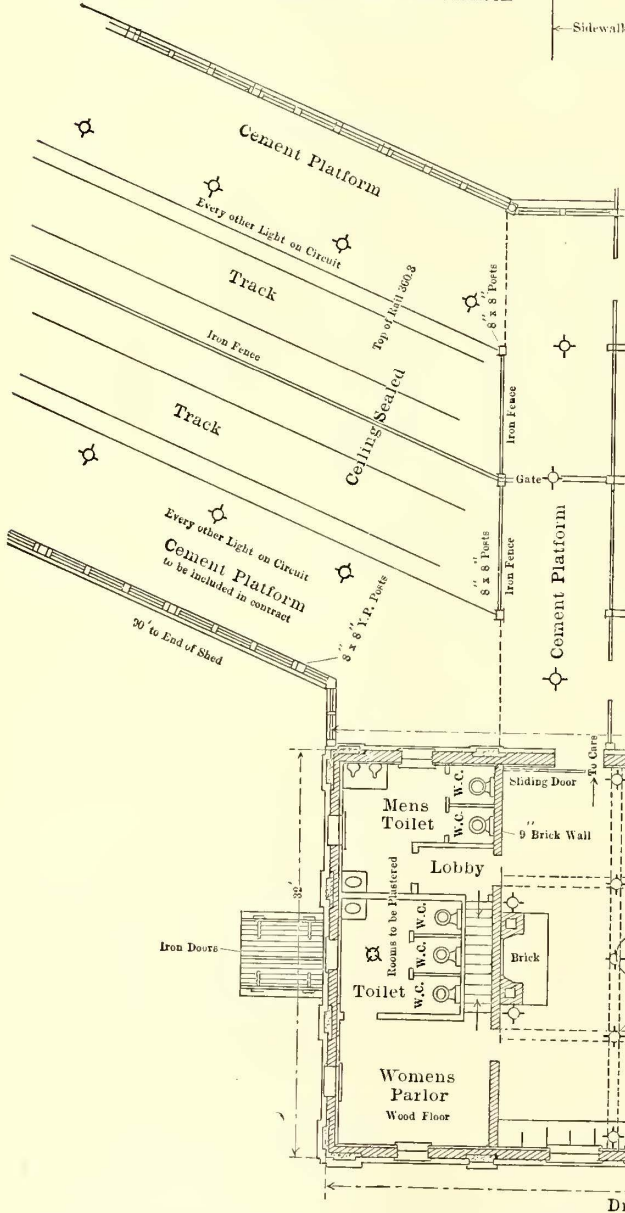
CROSS SECTION

CROSS SECTION OF ARDMORE TERMINAL



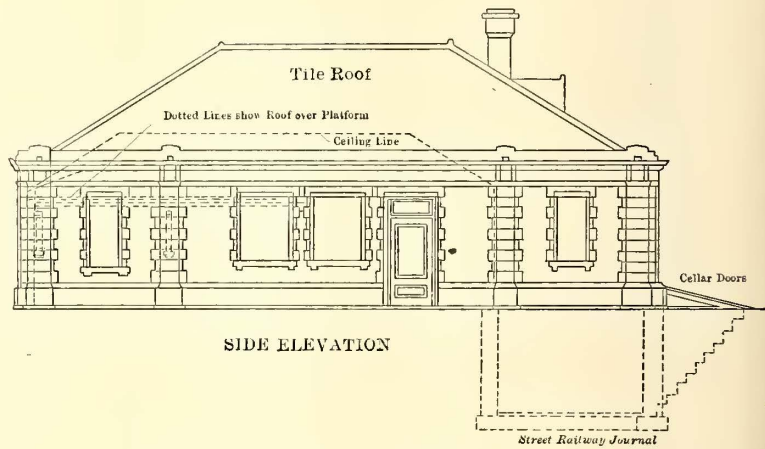
GROUND FLOOR PLAN.

GROUND FLOOR PLAN OF TYPICAL WAY STATION



FIRST FLOOR PLAN

FIRST FLOOR PLAN OF ARDMORE TERMINAL AND TRACK APPROACH



SIDE ELEVATION

SIDE ELEVATION OF ARDMORE TERMINAL

house motor; the other is a Bulkley steam pump, 12 ins. x 20 ins. x 24 ins.

The piping is so arranged that either pump can supply water to either or both of the condensers. The overflow pipe from the hot-well leads back into the creek, and it is also provided with tee and gate valves, so that, if desired, part or all of the water from the hot-well can be made to flow into the reservoir. This is done in cold weather to prevent the water from freezing in the reservoir.

CONCRETE COAL BUNKER

Another interesting feature at Station No. 2 is the concrete coal bunker. Coal is taken from the steam railroad tracks by means of a siding, and is dumped into the coal bins situated in front of the boiler room. The coal bins at Llanerch

through an open race to an open concrete reservoir in front of the power house. The water used for the boilers is pumped from the reservoir through feed water heaters into boilers by

through an open race to an open concrete reservoir in front of the power house. The water used for the boilers is pumped from the reservoir through feed water heaters into boilers by

are of wooden structure with steel-lined bottoms, and have a capacity of approximately 1,000,000 lbs. The coal for Ridley Creek power house is hauled from the coal bins at Llanerch by means of work cars, and is emptied into the coal bins at Ridley Creek by means of a siding leading over the same. The bins at Ridley Creek are of concrete construction and have a capacity of 1,000,000 lbs. of coal. The chutes from these coal bins are located in the boiler room directly in front of the boilers.

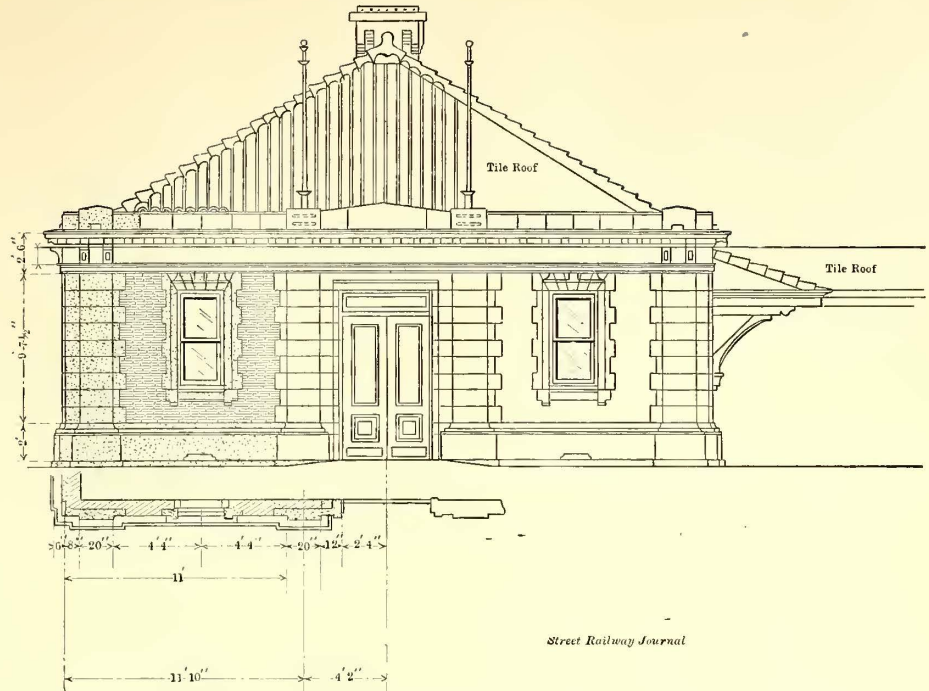
The coal at Station No. 1 is received and stored in a steel-lined bunker.

CRUSHING STONE

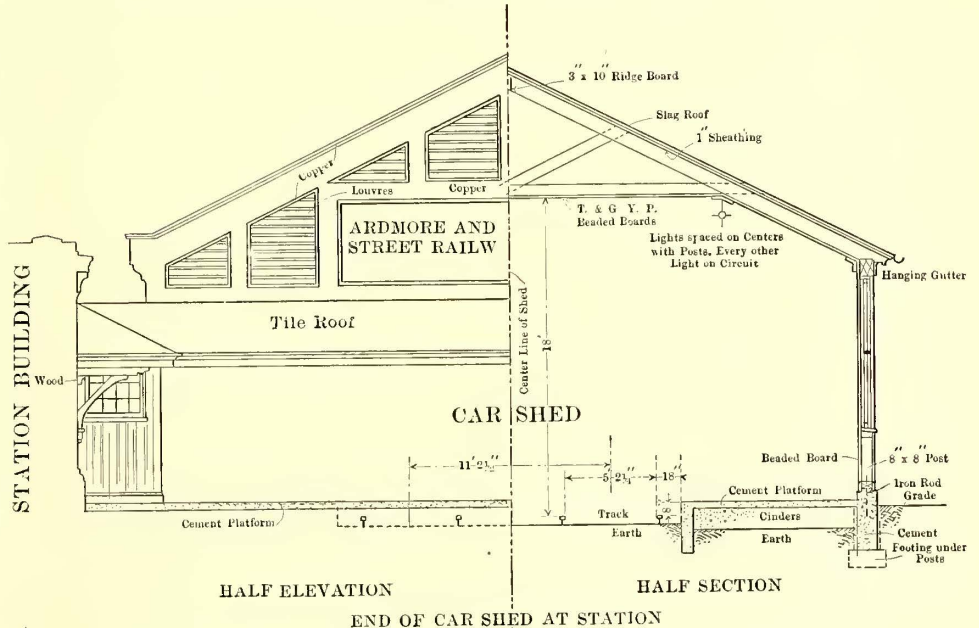
As the company has need for large quantities of crushed stone for its turnpike work, and also for ballast, it has secured a stone quarry about 9 miles from the West Chester terminal, where a complete stone-crushing plant has been erected.

The plant is operated by 550-volt direct-current railway motors, and comprises one 36-in. x 18-in. B. Farrell crusher and one 24-in. x 13-in. B. Farrell crusher, both having manganese steel jaw plates. The apparatus also includes one 18-in. steel bucket belt elevator, 45-in. centers, complete with belt, buckets, etc., and driven by a pair of miter gears. The screen, which is 45 in. in diameter x 16 ft. long, is made of 1/4-in. hard steel plates with 2-in. holes, and includes a dust jacket of 3/4-in. steel plate, with 3/4-in. holes, which is attached to the first section of the screen.

The apparatus is arranged in an elevator type of building, as shown in the illustration. The stone is carried from the quarry directly into the top of the crusher over a trestle. The stone then falls through the



ARDMORE TERMINAL STATION BUILDING. FRONT ELEVATION AND HALF PLAN OF FRONT WALL



HALF ELEVATION AND HALF SECTION OF ARDMORE TERMINAL



THE ARDMORE TERMINAL

crusher and screen, and passes out through a chute in the bottom of the building, directly into the construction cars. The plant is capable of producing 300 tons of broken stone, between the size of 3/4 in. and 1 1/2 ins. in ten hours.

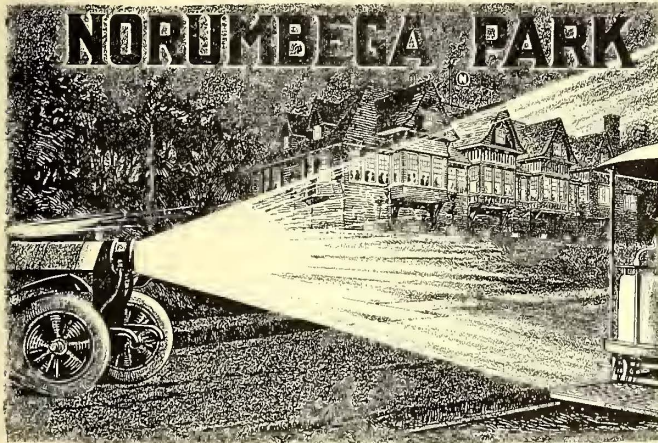
Apropos of the economy effected by an electric railway company in maintaining its own quarry and crushing plant, the management of the Philadelphia & West Chester Traction Company is satisfied that if a

STREET RAILWAY ADVERTISING

BY GEORGE SABIN BRUSH

The subject of advertising to increase the business of street railways is receiving much more attention than ever before, and almost every road of any size now has an advertising department, which devotes its entire time and energy to preparing and issuing advertising matter, aiming to call to the attention of prospective patrons the attractive features of the various roads, and thereby increasing its patronage.

The Norumbega Park Company, situated at Auburndale-on-the-Charles, in Massachusetts, this year has gone into the



THE FRONT OF THE AUTOMOBILE BOOKLET

matter of advertising in a far more comprehensive manner than ever before. Each week a program of the attractions at the theater is printed in large type on a dasher 14½ ins. x 21 ins. Two of these posters are placed on each end of each and every car on the systems of the surrounding towns, also on 100 cars operating in Boston and running to a terminal where cars may be taken directly for the park. This method of advertising attractions has proven very satisfac-

are sold by conductors on the cars for 15 cents. We feel that these cards unquestionably keep before the public the fact that the park is in operation, thus increasing our patronage.

We have placed in the territory through which the park draws its patronage, in drug and other stores, a frame which takes a regular 14½-in. x 21-in. poster. These posters are renewed each week, and, in compensation for the same, we give two tickets for admission to the park and two reserved-seat tickets in the theater, to the proprietor of the store. In two towns (South Framingham and Natick) we have placed a special poster advertising the park, same size as those above referred to, stating that passengers can go from these two points for 35 cents and 25 cents, respectively, including admission and return.

For Lexington Park, situated on the line of the Lexington & Boston Street Railway, in Lexington, we have issued similar advertising matter, except that for all advertisements for the latter we use red as the standard color, while for Norumbega Park we use blue. We run special cars from Woburn, Concord and Maynard to the park certain days of the week.

In the cars of the Lexington & Boston Road cards are placed similar to those in the cars running to Norumbega Park, advertising the 15-cent, round-trip tickets, etc. These are printed in the standard red color.

The Lexington & Boston Street Railway runs through the historic villages of Lexington, Concord, Bedford and Arlington, and, especially to advertise this particular feature, we have placed in windows throughout the territory affected a neat card 28 ins. x 9 ins., at the left-hand end of which is a cut 7½ ins. x 8½ ins. The cut is a drawing of Paul Revere on his horse riding through the streets at night to warn the villagers of the approach of the British soldiers. The remainder of the card is occupied with large printing advertising the Concord, Lexington and Lowell route as the Paul Revere Scenic Short Line. In addition to placing these cards in store windows, they are mounted in a special frame across the center of the cars against the hood lining in the monitor. In compensation for the privilege of placing these cards in store windows, we give to the manager of the store



LOWELL AND LEXINGTON

VIA THE

Paul Revere Scenic Short Line

THE MOST HISTORIC AND BEAUTIFUL RIDE IN AMERICA

CARS LEAVE **TRACK ONE, SULLIVAN SQUARE**

14 and 44 minutes past the hour-Fare 30c-Running Time 2 hours

Send for Beautiful Illustrated Booklet - Passenger Dept., Lexington & Boston St. Ry., Newtonville, Mass. - Phone Newton, N. 780

A REPRODUCTION OF THE SPLENDID PAUL REVERE POSTER—A CLEVER APPEAL TO THE PATRIOTIC ELEMENT

tory, and has unquestionably materially increased the patronage at the park. We find that the patrons of the park watch these posters very carefully to get an idea of the weekly attractions at the park.

We have placed in all cars which run to or near the park two notices on a stiff cardboard 11 ins. x 21 ins. advertising the resort and giving the admission price, hour of performance and hour of opening park, etc. These notices also state that round-trip tickets, including admission to the grounds,

a six-coupon ticket good on any car of the Lexington & Boston Road.

At the time of the well-known "Marathon" race, which is held in the territory west of Boston each year, under the auspices of the Boston Athletic Association, we ran special cars which followed the runners from the beginning to the end of the race. This we believe to be an extremely good move, as our returns proved it.

The foregoing description covers the large poster adver-

tising with the exception of one, three, and twenty-four-sheet posters, which are put on bill-boards throughout the territory affected, and also a large lithograph 36 ins. x 24 ins. for windows wherever allowed.

In addition to this, we get out a small card 6 ins. x 3 ins., printed in white on a blue background, advertising the restaurant at Norumbega Park. We also get out for Norumbega Park a small two-page folder 3½ ins. x 6 ins., on which we print the attractive features of the park, giving a cut of the steel theater on the back page, and a cut of a canoe on the Charles River on the front page, the inside of folder being devoted to a list of attractions and a cut of restaurant. Another small folder is published similar to the above. It is 3½ ins. x 6 ins. in size. The front page carries a cut of the theater, and the rear page, a cut of the grounds, the inside of the folder being devoted to a description of the attractions. A small card, 2¼ ins. x 4 ins., was also prepared, on both sides of which we publish a time table and the routes of all cars going to and from the park, this being meant for a small vest-pocket edition.

We believe that each and every road should have an attractive and significant trade-mark, and, therefore, have designed a trade-mark for all roads and parks under our control in the form of a wheel with eight spokes, each spoke having printed on it the name of a road or park, and the flange showing the name of the principal road and the home office. In the background is shown a cut of an electric car.

In addition to all of the above advertising, we have published three distinct booklets, one having an edition of 50,000 copies, entitled "Country Rides by Trolley, Boston and Vicinity." In this book we give a very extensive description of each of the twenty-two towns through which we operate; advertising matter in regard to our properties, including the parks and railways; a detailed time table showing leaving

and advertisements are also inserted in the papers stating that it will be sent upon the receipt of a 2-cent stamp.

We have published on the Lexington & Boston Street Railway for a great many years a folder of about forty-eight pages entitled "The Route of the Minute Men." This has become quite a famous publication, and is known by all those who have ever visited the towns of Lexington, Concord, Bedford and Arlington. We publish 25,000 copies of this every year, and have continual requests for it from all over the United States. In this book we give first the poem "Paul Revere's Ride," and then a complete detailed description of each of the towns through which the road runs, describing all of the historic points and features which would be of in-



CARS LEAVE NEWTON 12.48 p.m., and every half hour until 6.48, then every 10 minutes (weather permitting) until 7.48, then every half hour until 10.48, then 11.08.
 CARS LEAVE NEWTONVILLE SQUARE 12.59 p.m., and every half hour until 6.59, then every 10 minutes (weather permitting) until 7.59, then every half hour until 10.59, then 11.08.
 CARS LEAVE WEST NEWTON SQUARE 12.59 and every hour until 6.59, then every 10 minutes (weather permitting) until 7.59 then every half hour until 10.59, then 11.14.

SUBJECT TO CHANGE WITHOUT NOTICE

"FOLLOW THE FLAG"

EXPLOITING THE "FOLLOW THE FLAG" EMBLEM

terest to tourists. There are also twenty-six cuts of houses, monuments and other spots which are of particular historic interest. The article in regard to the "Route of the Minute Men" was written by a very able writer of New England, and no advertising matter is allowed to creep into the folder. There is also a map of the Lexington & Boston Street Railway, showing the route of the "Minute Men" and principal points of interest on the route, while the front cover shows the statue of Capt. John Parker, commander of the minute men at the battle of Lexington.

In order to promote the business at Norumbega Park derived from automobilists, a special booklet 6 ins. x 4 ins. was gotten out, on the front page of which is an automobile, the headlight of which illuminates the restaurant. Within the booklet we give five cuts of various attractive features of the park, tell how to reach the park by automobile from Boston; advise our patrons of the means we have for caring for automobiles at the garage, and give a description of the attractive features of the park, the theater, and a description of the restaurant, calling to the attention of our patrons the fact that it is first class in every respect, and that tables and meals can be ordered in advance by telephone. These books are distributed extensively among the garages of Boston and vicinity, and are also sent to owners of automobiles.

We feel that anything which can be done to keep before the eyes of our patrons the fact that we have an attractive park and an attractive railroad system results to our benefit. We have even gone so far as to publish a song entitled "Out to Norumbega Park," on the front page of which is a large cut of the stage of the park steel theater. These songs we sell for less than cost in order to get them into the hands of our patrons.

We also issue a four-colored map 16 ins. x 20 ins., showing our entire system and connecting lines. On the back of this map we have descriptions of Lexington, Concord, Lowell, Lexington Park and Norumbega Park, with three-colored pictures of the different towns and parks. On the trolley poles of all cars going to Norumbega Park we place a blue

NORUMBEGA PARK

TO

**WEST NEWTON
 NEWTONVILLE
 AND NEWTON**

Cars leave 12.18 p.m., and every half hour until 10.33 p.m.

Extra cars will be run from the Park after each performance, and to the Park on the days when travel demands it.



**MATTHEW C BRUSH,
 VICE-PRES. & GEN MGR**

SUBJECT TO CHANGE WITHOUT NOTICE

TWO CHARACTERISTIC CIRCULARS

time, road, fare and running time, on the entire system from any given point to any other point, and sixteen views of various attractive features to be seen on our system. The large center page is devoted to a map of the entire system, with a list of the particular points of attraction. This book contains sixty pages and cover, and is printed on 70-lb. paper with the best printing in a neat and attractive manner. The size of the book is 4¾ ins. x 6 ins. It acts as a guide for trolley riders throughout the entire territory for some 25 miles west of Boston. This book we distribute free in stores or residences throughout the entire territory affected,

We have all got the habit of GOING to

Norumbega Park

At Auburndale
 On-the-Charles

NATURE'S MOST BEAUTIFUL!

What People all over the Country exclaim when speaking of NORUMBEGA.

Have YOU been to NORUMBEGA?

"Prettiest Natural Resort in America."
 "Children Come Unattended."
 "Courteous Treatment to All."
 "Best of Order Maintained."
 "Nothing Objectionable."
 "Patrons as Safe There as at Home."

Can our mothers, our fathers, our sweethearts, or relations, wish for more to be said in praise of this our most Popular Resort? Then "FOLLOW THE FLAG."

flag, on which the letter "N" is stamped in white, signifying that car is bound for Norumbega Park. On the trolley poles of all cars going to Lexington Park we place a red flag, on which the letter "L" is stamped in white, signifying that that car is bound for Lexington Park.

With all our printed advertising, however, we believe that the best advertising in the world is what we term "live advertising," meaning by that a satisfied patron. We do not believe it does any good to advertise a park or a street railway unless you give your patrons their money's worth, and give them exactly what you advertise. Any patrons leaving the park satisfied with the results of their trip will do more good than all the booklets which you can possibly issue.

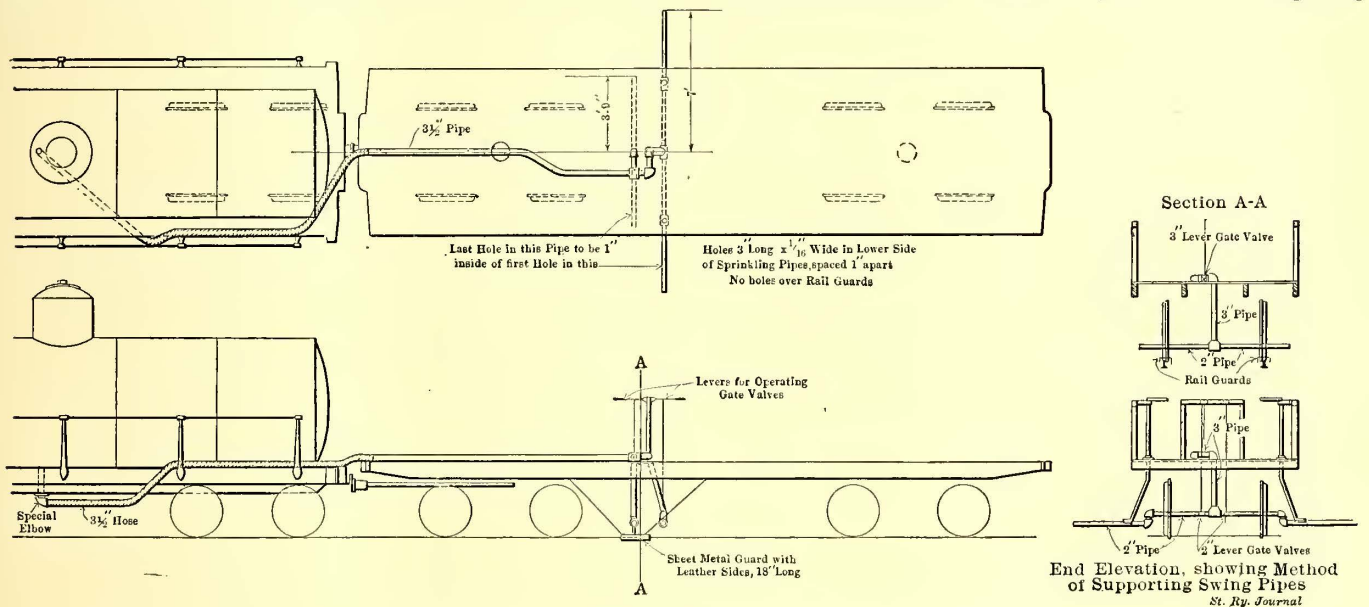
We therefore make a good effort to see that each and every patron riding with us is thoroughly satisfied, and do all in our power to make their visit pleasant.

OILING OF ROADBEDS ON THE BROOKLYN RAPID TRANSIT SYSTEM

For the purpose of preventing dust on its suburban surface lines, the Brooklyn Rapid Transit Company has recently sprinkled a considerable proportion of its track with crude oil. A number of suburban lines, former steam-operated roads, are operated by this company over private rights of way, and in the summer season are devoted to

a motor flat-car of the company's rolling stock, which served both to haul the tank cars in which the oil was received, and also to carry the sprinkler piping by which the oil was delivered to the roadbed. The latter consists of horizontal sections of 2-in. piping which has long, narrow holes on the underside and is hung transversely in two sections from the bottom of the flat cars. These sprinkling sections were supplied from the tank car by a length of 3½-in. hose, which was carried from the outlet opening underneath the tank car up and along the side of the tank car to the delivery piping on the motor flat car, the flexibility of the hose permitting of passing curves without trouble. The two sections of sprinkler pipe are each valved for independent operation. One section is so located as to sprinkle only to a distance of 3 ft. 9 ins. on either side of the center of the track, while the other covers the outer portions of the roadbed from these points to points 7 ft. distant from the center of the track on either side. The latter sprinkler sections overhang some 3 ft. upon either side of the car, are mounted upon swiveling connections and are fitted with handles so as to permit of being swung out of the way of obstruction at the side when necessary. Both sections of sprinkler pipe are operated by 3-in. lever gate valve, the handles of which are conveniently mounted by a framework above the middle of the car platform.

Special precautions were taken to prevent oil from getting



ARRANGEMENT OF OIL SPRINKLER ON SURFACE FLAT CAR

the heavy excursion traffic between New York and the ocean resorts. About 16 miles of these lines, all double-track, have been sprinkled, making in all about 32 miles of single track covered.

For this purpose, a low grade of crude petroleum was used costing about 3 cents per gallon, and about 2000 gals. were used per mile of track, or 4000 gals. per mile of double track. The oil was received in standard railroad tank cars from the Gulf Refining Company, New York, and these cars were utilized as the distributing reservoirs from which the oil was drawn in sprinkling. This oil is one of the very lowest grades, as it has been found that a heavy oil, undesirable for refining purposes, is most suitable for sprinkling on roadbeds, for the reason that such an oil has a large amount of asphalt products, which make refining very difficult, but have an important value as a cementing agency in binding the sand and dust of the roadbed.

The sprinkling equipment was very easily improvised from

onto the running rails, which would result in seriously delaying train movements. For this purpose, rail guards are provided. These guards consist of metal shields with the ends slightly rounded up, and to the sides of which are attached pieces of leather which hang somewhat below the head of the rail on either side. These shields were strongly braced from the under-framing of the car to prevent injury to the sprinkler pipe in case of meeting possible obstruction.

The results of the sprinkling process have been very satisfactory, as the oil cements the dust and sand into a semi-solid mass from which practically no dust is generated by trains passing at high speed. The dust nuisance had proved particularly troublesome on these lines of the company prior to oiling, owing to the large proportion of sand in the soil of the roadbed. The result of the oiling upon the mechanical equipment of trains has been highly beneficial, since considerable less dust has been found to accumulate upon the motors of trains operating over these divisions.

THE NEW OHIO VALLEY ELECTRIC RAILWAY PROPERTIES

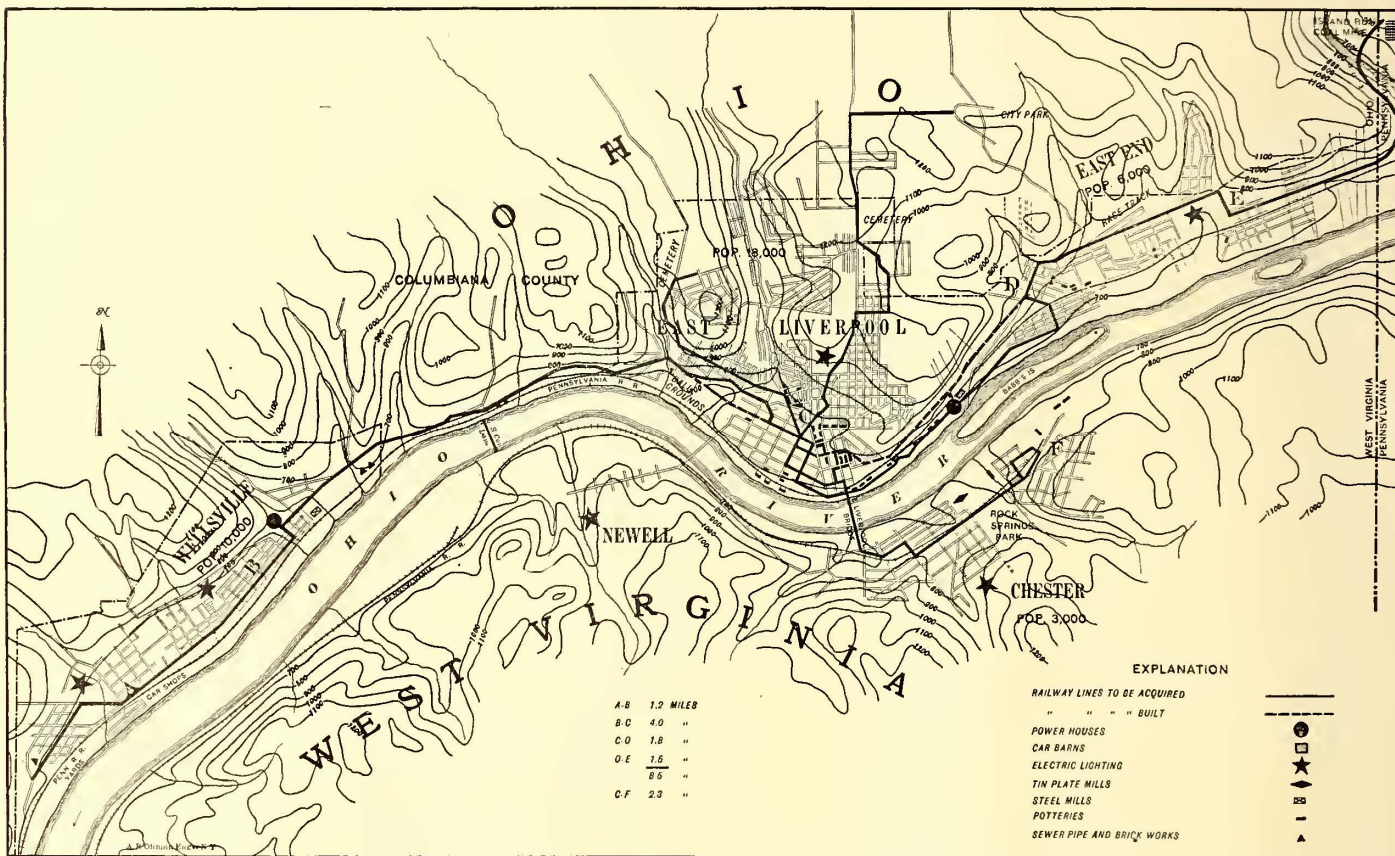
Nature has been kind to the Ohio Valley and particularly so to the section between Pittsburg, Pa., and Wheeling, W. Va. The Ohio River (which here forms the boundary line between West Virginia and Ohio) has hollowed out for itself a deep bed through the heart of an extensive highland bluff, so that the valley proper, comprising the river bed and a strip of rich bottom land on either side, from the river to the bluffs, presents a natural and comparatively narrow thoroughfare through a range of interlocking hills. Because the latter are full of coal, of clay, of natural gas and of oil, the valley through this section has become one practically continuous stretch of industrial plants, wherein is produced a large part of the steel, tin plate, pottery, fire brick, paving brick, tile and the vitrified sewer pipe of America. Because the hills are high on either side and the bottom lands narrow, the villages

miles, never has had adequate interconnecting electric railway facilities. This one past-tense condition is about to be rectified by the Ohio Valley Finance Company, of which W. Caryl Ely is the president and guiding spirit.

SUMMARY OF ROUTE

The following is a brief summary of the route (see accompanying maps):

	Approximate Distance in Miles
Center of Rochester, Pa., to westerly city limits of Beaver, Pa.	4.50
This section will be operated by traffic agreement over lines of the Beaver Valley Traction Company. The route is through business and residential streets.	
Beaver to State line (easterly city limits of East Liverpool, Ohio)	11.17
This is a rich suburban territory. The tracks run through the main streets of the prosperous villages of	

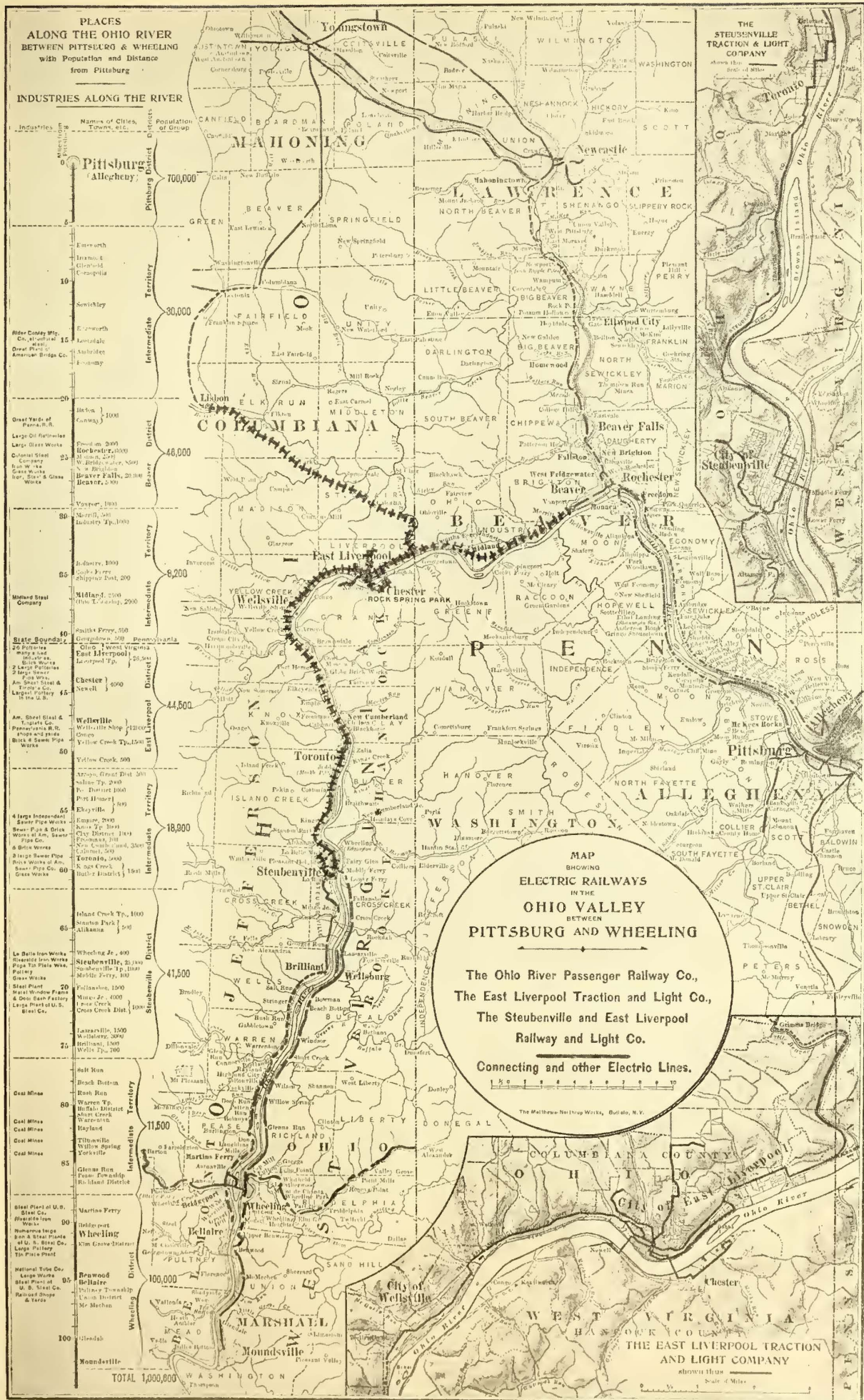


THE EAST LIVERPOOL AND WELLSVILLE SYSTEMS OF THE EAST LIVERPOOL TRACTION & LIGHT COMPANY

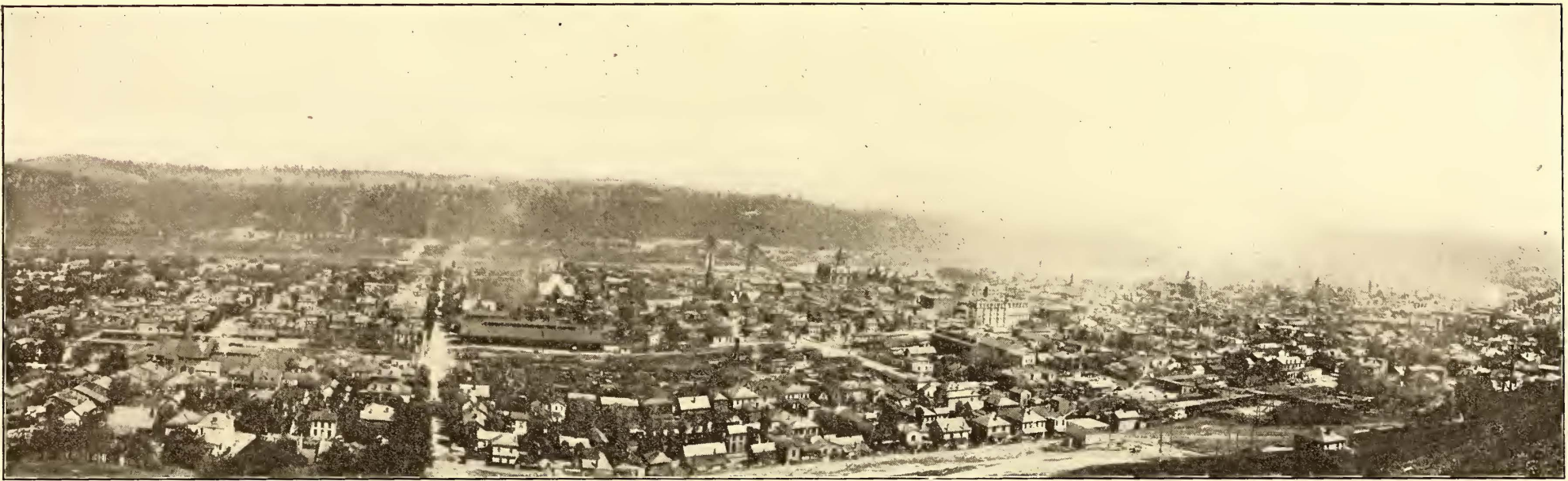
and towns wherein live the two hundred thousand or so of people, dependent upon the manufacturing plants, have been strung out like beads. In the vernacular of the locality these are "shoe string towns." For instance, there is virtually an unbroken succession of densely populated streets located on the strip of bottom land, on the Ohio side of the river, from the easterly city line of East Liverpool to the southerly city line of Wellsville, a distance of 12 miles. This is but typical of the other populous towns in the valley. This strip in no place is over half a mile in width and at many points only one or two hundred yards wide. Even a casual consideration of these conditions reveals the urgent necessity for transportation facilities such as can be given only by an electric railway.

This valley lives in the present tense—the clouds of smoke from a thousand mills and potteries leave no room for a shadow of doubt as to that—albeit the stretch of the valley from Beaver, Pa., on the north, to the enterprising city of Steubenville, Ohio, on the south, a distance of nearly 50

Industry, Midland (a new and promising town site) and Smith's Ferry.	
State line to southerly city limits of Wellsville.	12.00
This entire section with the exception of about a mile is through the main streets of the twin cities of East Liverpool and Wellsville, and of Chester, W. Va., serving a thickly populated residence and manufacturing district.	
Wellsville to northerly city limits of Toronto, Ohio. . .	7.63
This is well populated suburban territory with several villages and many large factories and mills.	
Northerly city line of Toronto to southerly city line of Toronto.	4.00
This route is through the city streets of Toronto—a thriving city, long-drawn-out, with many factories and mills.	
Toronto to the northerly city limits of Steubenville. . .	6.00
This is good suburban territory, with a nearly continuous stretch of houses and mills along the route.	
Northerly city limits of Steubenville to center of city. . .	2.00
This route is through the city streets of Steubenville.	
Total mileage of route.	47.30

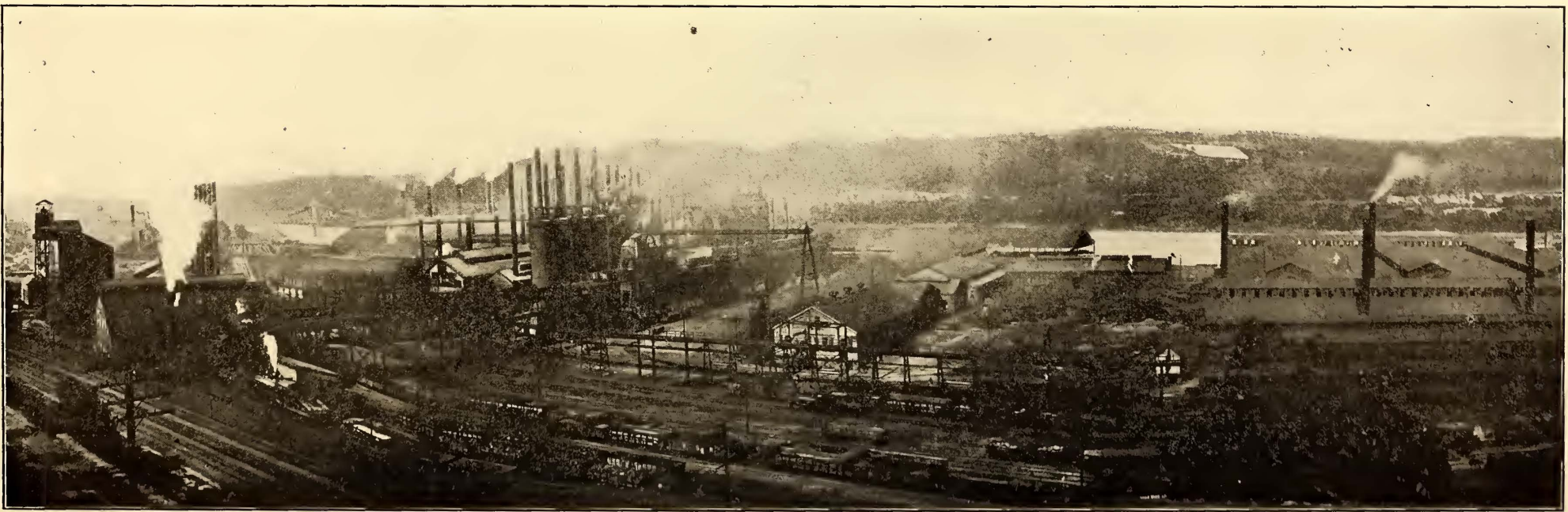


In the large map the properties of the Ohio Valley Finance Company are indicated by the cross-hatched lines.



(Photograph Copyrighted, 1905, by Filson & Son.)

BIRD'S-EYE VIEW OF STEUBENVILLE FROM THE BLUFFS BACK OF THE CITY. THE PANORAMA SHOWS HOW THE CITY IS BUILT ALONG THE NARROW STRIP OF BOTTOM LAND BETWEEN THE RIVER AND THE BLUFFS



(Photograph Copyrighted, 1905, by Filson & Son.)

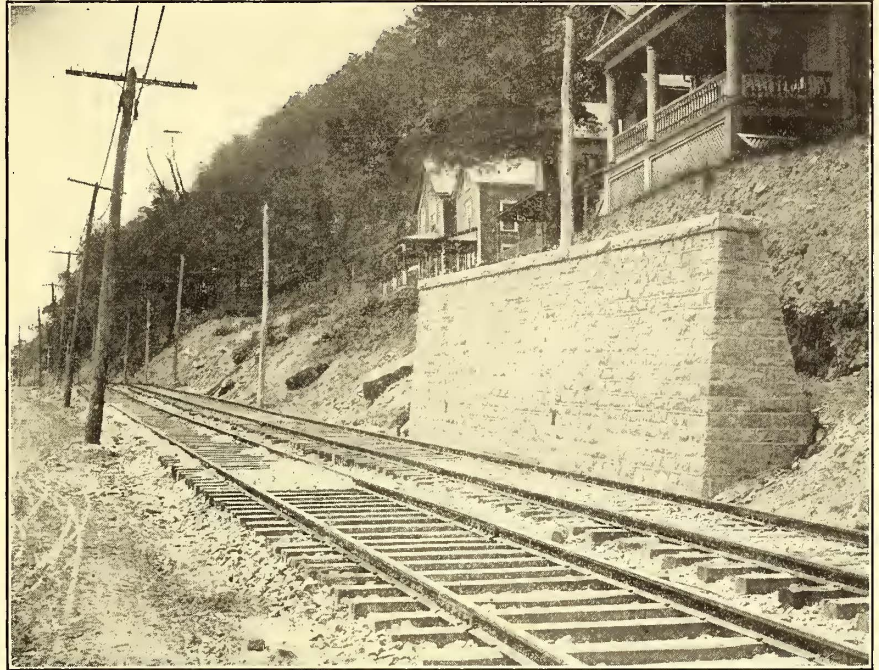
THE "HALF MOON BEND," STEUBENVILLE, SHOWING A PORTION OF THE MILL DISTRICT

Referring to the map, the intention of the interests identified with this development is to establish along the Ohio side of the river a thoroughly modern electric railway route from the Pennsylvania Railroad station in the city of Rochester, Pa., to the center of the city of Steubenville, Ohio, serving, by means of existing lines and by the building of connecting lines, the villages of Industry, Midland and Smith's Ferry, the twin cities of East Liverpool and Wellsville, the villages of Yellow Creek, Port Homer, Stratton, Empire and Freemans, the cities of Toronto and Steubenville, besides a prosperous and almost continuous suburban population between the villages and towns. Included, also, as tributary territory is a strip of river land now without proper transportation facilities extending for the entire distance along the West Virginia shore of the river. In this strip are many important towns and villages, which are connected to the Ohio side by numerous ferries and several bridges.

The road is to be constructed of 85-lb. A. S. C. E. T. rail in 60-ft lengths, laid on white oak ties, on a roadbed ballasted with gravel and crushed stone, with grades and curves which will permit of schedule speeds approximating 25 to 30 miles per hour. The road will be double track throughout its length. In all cases the location of the routes will be above the highest recorded high-water mark.

For financial and operating convenience the 50-mile route will be built in three sections. The section from Beaver to the State line (coincident with the easterly city limits of East

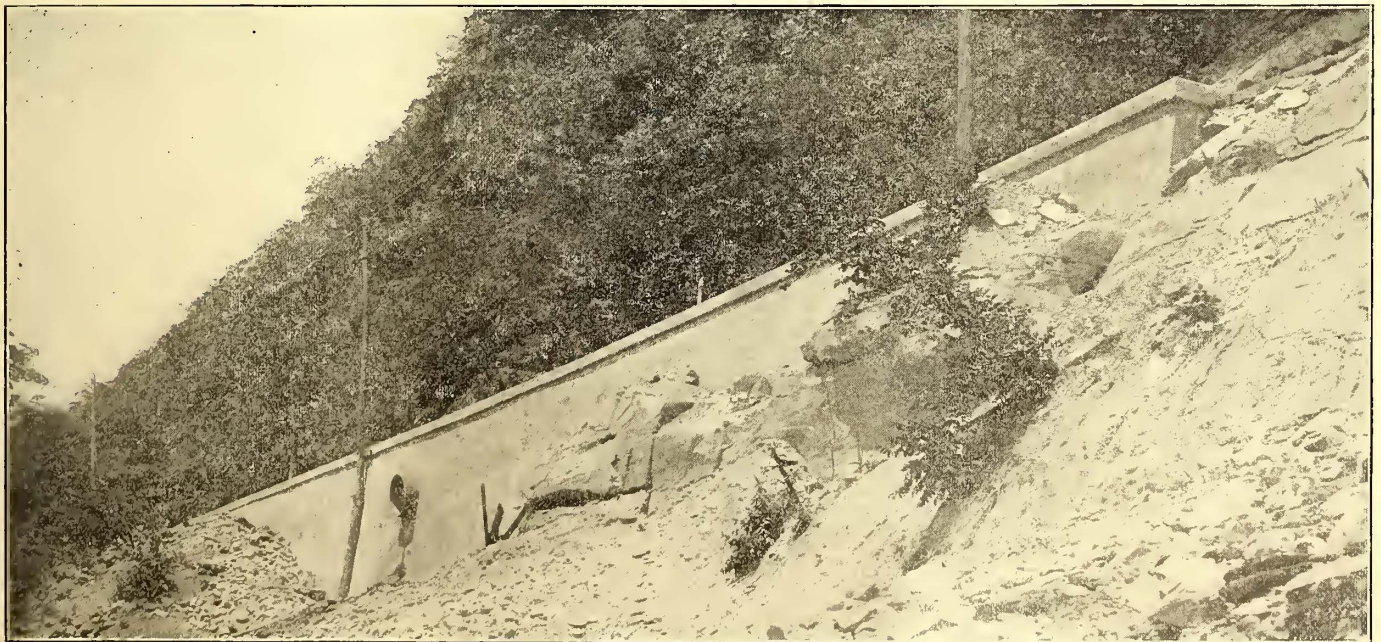
of Wellsville is now owned and operated by the East Liverpool Traction & Light Company. This company is an Ohio corporation and has acquired the properties of some eleven original railway, power, light and coal companies, thereby



NEW TRACK ON PRIVATE RIGHT OF WAY

giving it the entire electric railway and lighting business in the cities of East Liverpool and Wellsville, Ohio, and Chester, W. Va., and vicinity.

The section from Wellsville to Toronto will be built by the Steubenville & East Liverpool Railway & Light Company, also an Ohio corporation. This company is to acquire the



CONCRETE RETAINING WALL BETWEEN EAST LIVERPOOL AND WELLSVILLE

Liverpool), will be constructed by the Ohio River Passenger Railway Company, a Pennsylvania corporation, which has a traffic agreement with the Beaver Valley Traction Company under which its cars will run through Beaver to a terminal at the Pennsylvania Railroad station in Rochester, Pa.

The section from the State line to the southerly city limits

properties of the Steubenville Traction & Light Company and the Toronto Electric Light & Power Company, thereby giving it the entire electric railway, power and lighting business, between and within the cities of Toronto and Steubenville. The company connects with the Tri-State Traction Company, which owns and operates an electric railway on the

West Virginia side of the Ohio River between Steubenville and Wellsburg, from which last named point a line of the Wheeling Traction Company operates into Wheeling. It will also connect at Steubenville with a new line from Steubenville to Wheeling on the Ohio side of the river, now under construction by the Wheeling Traction Company.



TYPICAL CONCRETE CULVERT

All three of these corporations are owned and controlled by the interests identified with the Ohio Valley Finance Company, and by a tripartite agreement through cars will be operated over all the lines of all the companies, from the center of Rochester, Pa., to the center of Steubenville. Under the tripartite agreement the through line equipment will be jointly contributed by the three companies party to the contract. This agreement also provides for joint supply of power, joint car house, repair and storage facilities and joint executive and administrative organization whereby material and mutual benefits and economies will accrue to each of the companies. The officers of the three corporations are as follows: President, Van Horn Ely; secretary and treasurer, Edward McDonnell; general manager, J. C. Rothery.

THE ROUTE IN DETAIL

Beginning at the westerly city limits of Beaver, where physical connection will be made with the line of the Beaver Valley Traction Company, the route runs a short distance north of the Pennsylvania Railroad tracks along the hillside, by easy grades, and for a short distance involving some hill cutting.

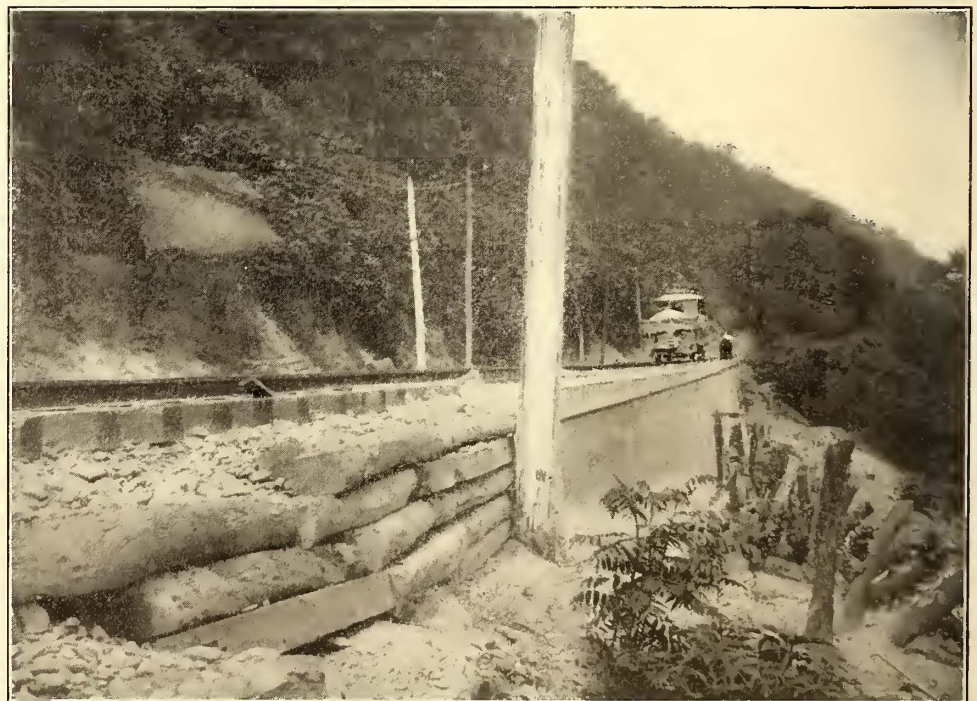
Thence the road continues on a natural ledge with easy side hill cutting and slight grades and curvatures for a distance of 2 miles; thence through a flat bottom land with easy construction for a distance of 2 miles to the village of Industry. The line passes through the main street of this village. From the village of Industry, for a distance of approximately 1 mile, the route continues by

side hill cutting just north of the present railroad tracks of the Pennsylvania Railroad by agreement with the railroad company.

For the greater portion of this section the highway, which at present is on the south side of the Pennsylvania Railroad, will be carried with the electric railway tracks on the north side of the railroad, thereby avoiding two dangerous grade crossings. It may be said in this connection that grade crossings have been eliminated throughout the entire route, either by moving the line of the highway or by steel trestle work or overhead structures.

The road then continues by easy work for a distance of 2 miles, passing through the main street of Midland, where extensive steel, iron, coke and other works are being established. The road then follows the north side of the highway with comparatively easy hillside work to Smith's Ferry, a distance of 1½ miles. At Smith's Ferry the road will turn south and cross the Pennsylvania Railroad tracks by means of a steel trestle about 400 ft. long to the south side of the railroad. The highway will also be carried with the electric railway tracks over the trestle at this point, thereby avoiding another grade crossing. Thence the route follows the south side of the railroad by easy work, with practically no grades through the main street of the village of Smith's Ferry, and over Beaver Creek by means of a bridge 300 ft. long. Thence it runs on a tangent to the State line, a distance of 1½ miles. Just beyond the State line the route turns to the north, and after crossing the steam railroad tracks on a 100-ft. bridge connects with the present tracks of the East Liverpool Traction & Light Company near the easterly city limits of East Liverpool.

The route from this point to the southerly city limits of Wellsville is over the routes already built and in operation.



TYPICAL SECTION OF TRACK ON HILLSIDE

All of the lines have been reconstructed with double track and with the intention of avoiding excessive curves and grades and grade crossings in order to provide a high-speed route. At two points in East Liverpool grade crossings have been avoided by changing the location of the old tracks from the highway to private right of way; at another point a deep ravine, as well as a grade crossing with

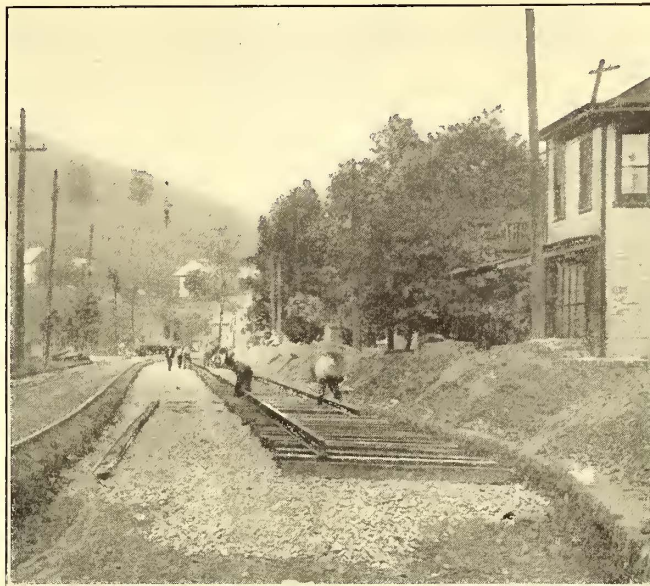
the switch line of the Pennsylvania, have been avoided by the construction of a trestle 660 ft. long, which also serves the purpose of reducing the curvature at this point from 90 degs. to 20 degs. These improvements have also materially shortened the route and will cut down the running time from 30 minutes to 11 minutes between East Liverpool and the suburbs to the east.

From this trestle the route is in paved streets for one-half mile to a steel viaduct 465 ft. long. Then for 1 mile the tracks are in the highway. The route then follows along the north side of the Pennsylvania on private right of way to the easterly city line of Wellsville; thence through the city streets of Wellsville to the southerly city line of that city.

From this point a new double-track line will be built to the village of Toronto, a distance of about 8 miles, as follows: Leaving Wellsville, where connection will be made with the present tracks, the route runs in a southerly direction along the foot of a rocky bluff for a distance of 2800 ft., at which point a cut will be made for a distance of 450 ft. additional in the face of the rock. This cut will rise with a grade of 2.5 per cent to a height of 21 ft. above the main line of the Pennsylvania tracks, which leave the Ohio Valley at this point (known as Yellow Creek) for Cleveland. From this location a steel bridge will be constructed, approximately 800 ft. in length, across Yellow Creek. From the south line of Wellsville to the southerly end of this trestle the highway, which is at present between the railroad tracks and the river, will be carried with the electric railway tracks north of the Pennsylvania, thereby avoiding several dangerous grade crossings of the steam railroad tracks.

From the southerly end of the Yellow Creek bridge, the

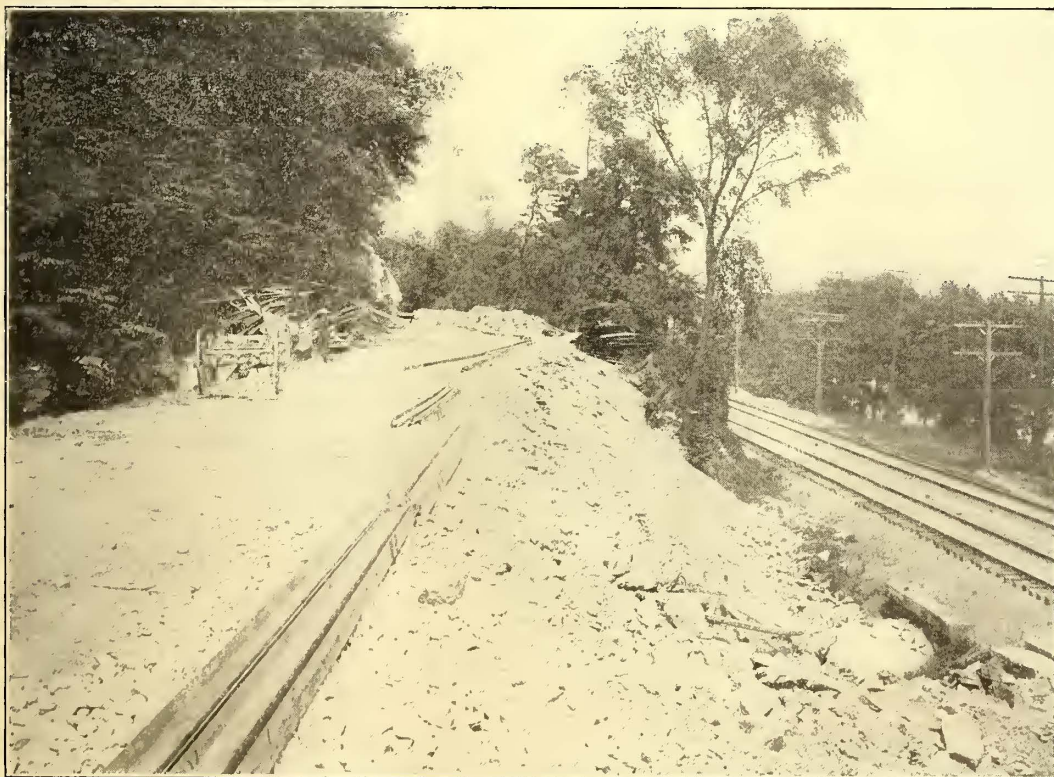
will range from 1½ per cent to 3 per cent, with very slight curvature. This is the most difficult piece of construction on the entire route, but presents no serious engineering problems. This part of the route will furnish an exceptionally



NEW DOUBLE TRACK IN WELLSVILLE

picturesque feature, and an excellent view of the Ohio Valley to the north and south will be obtained. After leaving this heavy construction, for a distance of about a mile to Port Homer station, the tracks will be constructed partially in the

highway with no extraordinary cuts or fills. This piece of track is practically on a tangent, with no grade over 1 per cent. At Port Homer the tracks will be carried by an overhead crossing over the Pennsylvania Railroad at an elevation of 21 ft. upon a steel trestle and a fill upon the eastern approach. This trestle will be about 200 ft. long and the fill about 300 ft. The track is brought to the general level of the valley after leaving the trestle and from here to Toronto will be easy construction, with light grades and curves. This last mentioned section is about 4 miles long and passes through the villages of Empire and Ekeyville (to be known in future as Stratton). For about one-third of this distance the tracks are located in the



FILL BETWEEN EAST LIVERPOOL AND WELLSVILLE

tracks follow the highway for a distance of about 1200 ft., from which point the road will be constructed just east of the highway and between it and the tracks of the Pennsylvania for a distance of about 4000 ft. Along here some heavy side hill construction is necessary, requiring in some places retaining walls on the lower side of the roadbed. The grades

highways and the balance is on private right of way.

From the northerly city line of Toronto there is in operation a single-track line into the heart of Steubenville. This route will be double-tracked, and in many cases both the original track and the additional track will be moved to new locations in order to eliminate undesirable curves and grades.

The local system in the city of Steubenville has been well laid out to serve the city's transportation needs and certain of these local routes will also be double tracked. Plans are perfected for an extension which will be made to two of these lines in order to reach desirable residential sections on the



PLATE GIRDER BRIDGE WITH CONCRETE ABUTMENTS

bluffs adjoining the city, not now reached by street railway lines.

In Steubenville, track connections will be made with the lines of the Steubenville and Wellsburg line, which has in operation a line over a suspension bridge at the foot of Market Street to the West Virginia side, and from there to Follansbee and Wellsburg, where connection is made with the lines of the Pan Handle Traction Company, operating between Wellsburg and Wheeling. In Steubenville connection will also be made with the Steubenville, Mingo & Ohio Valley route, which operates a line from Steubenville through Mingo to Brilliant, on the Ohio side of the river, and is now perfecting a connection with the lines of the Wheeling Traction Company at Martin's Ferry.

Thus will be completed a double-track electric railway route from Rochester, Pa., to Wheeling, of which route the section from Beaver to Steubenville, a distance of 50 miles, will be operated by companies affiliated with the Ohio Valley Finance Company.

POPULATION AND GENERAL INFORMATION

The Ohio Valley between Pittsburg and Wheeling is thickly populated. The two cities are about 91 miles apart, and throughout the entire distance cities, towns and villages are situated close to each other. The population of Greater Pittsburg is estimated at about 700,000; that of Wheeling and closely contiguous territory at upwards of 100,000, and the resident population along the river between the two cities at upwards of 200,000. Between Pittsburg and Wheeling there are three distinctive centers or districts of population of considerable size. About 17 miles below the Pittsburg district is the Beaver district, containing Rochester, Beaver, Beaver Falls and several other closely related communities, with a combined population of about 46,000 people. It is situated at the junction of the Beaver and Ohio Rivers on the Pennsylvania and the Pittsburg & Lake Erie Railroads. The ter-

ritory between Pittsburg and the Beaver district is very thickly populated, and for a considerable part of the distance constitutes one of the most beautiful suburbs of Pittsburg.

Separated from the Beaver district by only 11 miles of intermediate territory is the East Liverpool district, embracing East Liverpool and Wellsville, Ohio; Chester W. Va., and contiguous towns and villages, having a combined population of about 45,000. The intermediate territory separating the Beaver district from the East Liverpool district contains the new town of Midland, where the Midland Steel Company is now erecting a very large iron and steel plant, and where the location of several allied industries is now assured.

Closely succeeding the East Liverpool district and separated therefrom by an intermediate territory only about 8 miles in length is the Steubenville district, embracing the city of Steubenville and other closely related towns and villages in Ohio and West Virginia, having a population of about 41,500. The territory between the East Liverpool and Steubenville districts contains the prosperous and rapidly growing city of Toronto, and towns and villages, aggregating about 18,900 population.

The map of the valley on page 334 exhibits graphically the names and relative distances apart of the cities, villages and towns together with their populations, either separately or in groups, and the location of the principal industries. It will be seen from an examination of the contour lines thereon that the hills vary in height from 700 ft. to 1200 ft. above the sea level, which is equivalent to from 200 to 700 ft. above the river.

The Ohio River in this section of the valley is being improved by the United States Government. A series of dams is being constructed, which, when completed, will make the river navigable throughout the year. The river steamers are



ENTRANCE TO STANTON PARK, STEUBENVILLE

of a peculiar type of construction and will be able to land at any point along this portion of the stream, thereby rendering the table-lands very desirable for manufacturing sites.

The cities of Pittsburg and Allegheny are served by the lines of the Pittsburg Railways Company, whose lines extend down the river toward Rochester on the east side of the river as far as Dixmont, and on the west side of the river as far as Coraopolis. The Beaver district is served by

the lines of the Beaver Valley Traction Company, extending toward Pittsburg as far as Conway on the east side of the river and Monaca on the west side, and toward East Liverpool as far as the westerly limits of Beaver. This property is owned by the Pittsburg Railways Company, which has in contemplation the connection of the two systems. The building, therefore, by the Pittsburg company of the few miles of railway yet remaining to be constructed between Allegheny and Beaver, and the construction of the lines between Beaver and East Liverpool and Steubenville will connect by lines of electric railway Pittsburg and Wheeling and all the intervening cities in the Ohio Valley.

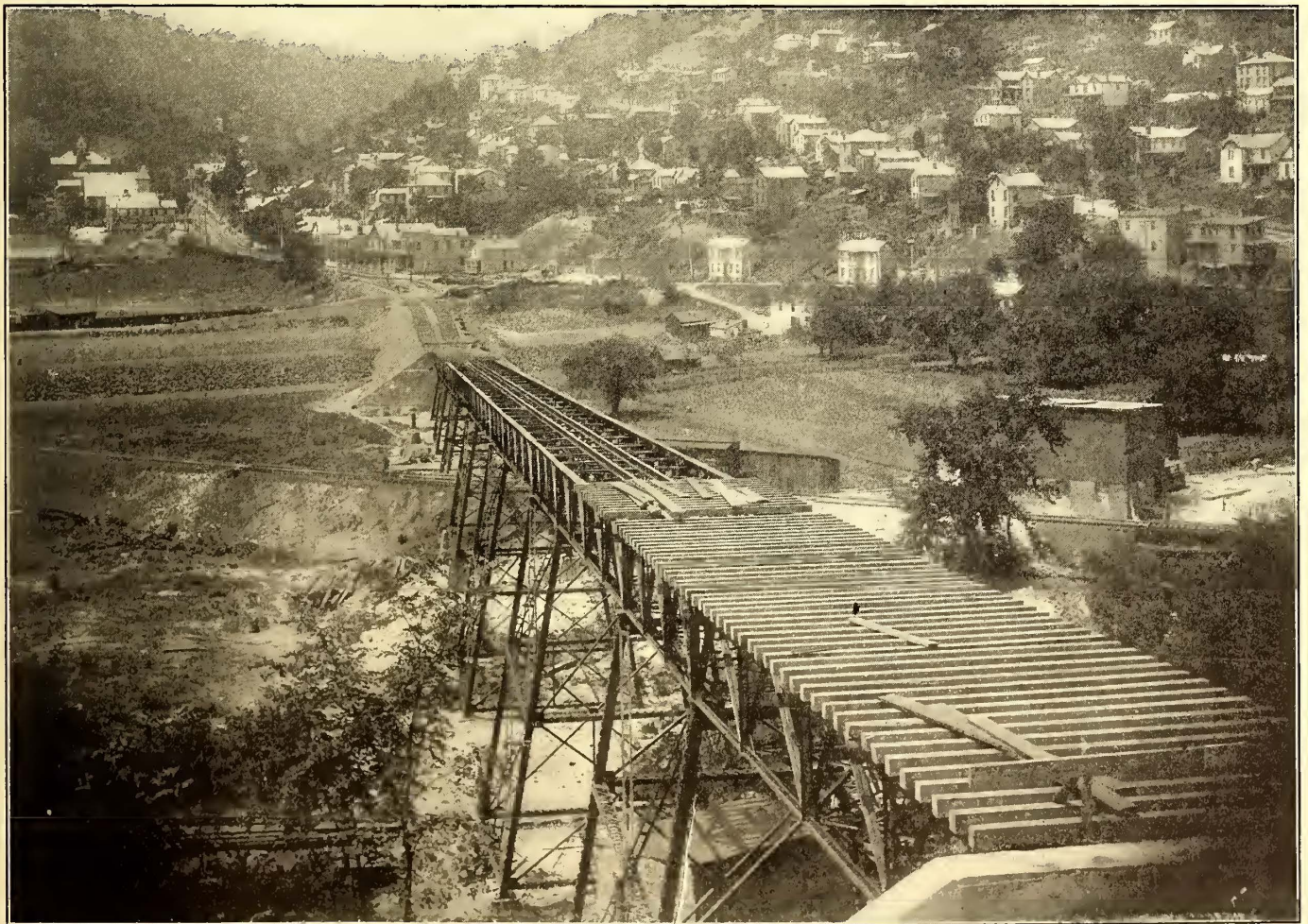
The lines of the Ohio River Passenger Railway Company and the Steubenville & East Liverpool Railway & Light Company will form a very important part of these through-line routes and will themselves serve directly a population of upward of 150,000.

In estimating this tributary population, one-half of the population of the townships bordering on the

of earnings were based for the southerly section of the route on \$12,000 per double-track mile or \$1 per capita



A VIEW OF THE RIVER FROM STANTON PARK, STEUBENVILLE



TRESTLE 600 FT. LONG CROSSING FREIGHT LINE OF PENNSYLVANIA RAILROAD IN EAST LIVERPOOL

river was taken and to this was added the population of all cities and villages on both sides of the river. The estimates

for the population served, including the terminal cities. The estimated earnings for the section from East Liverpool north

were based on gross receipts of \$12,000 per mile of double track or \$1.40 per capita, including terminal cities and towns. The single-track line between East Liverpool and Wellsville earned between \$12,000 and \$14,000 per single-track mile in 1905.

In connection with the through route up and down the valley, an extension will be built eventually to Lisbon, as indicated on the large map, thereby making tributary to the companies' lines a large amount of travel from the north.

The proposed double-track electric railway from Rochester through East Liverpool to Steubenville will supply a need not now adequately filled by the steam railroads, as the

Cleveland & Pittsburg division of the Pennsylvania lines, the position of the companies would appear to be absolutely impregnable as far as future electric competition is concerned. The franchises in the cities of Ohio are for 25 years, the former grants having just been renewed for that period. This is the limit of the term of franchises in city streets fixed by the Ohio law, but they may be, as has just been the case, renewed and extended at any time for like periods of 25 years each. The franchises in counties of Ohio outside of cities are for 50 years, and the portions of streets and highways upon which consents have been secured are intermingled with the stretches of private right of way both in and outside of



ARTIFICIAL LAKE IN STANTON PARK, STEUBENVILLE

main lines of the Pennsylvania Railroad Company do not touch the greater portion of this valley, while the Cleveland & Pittsburg division, which does operate through this portion of the valley, is largely given over to freight business, and there are only six trains carrying passengers between the towns every 24 hours. The electric road will therefore be an important feeder to the main steam railroad trunk lines both at Rochester and at Steubenville.

FRANCHISES

In locating the route, endeavor has been made to secure private rights of way wherever possible, and in view of the fact that the valley is so narrow and the available strip of bottom land is already occupied by the single highway which traverses the length of the valley and by the tracks of the

cities, thus giving in ultimate results the effect of long-term grants for the route in its entirety. For the portion of the route located in the State of Pennsylvania the consents and franchises are in perpetuity.

PHYSICAL FEATURES

On the route from Beaver to Steubenville there are four power stations, three combined railway and lighting plants and one lighting station. All railway power is generated at 550-600-volt direct current. The railway power houses are located respectively at East Liverpool, Wellsville and Steubenville.

The railway units at the East Liverpool station include one 500-kw direct-connected unit and one 250-kw and one 200-kw belted units. The plant at Wellsville, in addition to the

lighting units, contains two 200-kw direct-connected generators for railway purposes. The Steubenville plant contains two 400-kw and one 300-kw direct-connected railway units, and one 200-kw railway unit driven by vertical compound engine. In addition to these generating stations a 400 amp-hour storage battery is maintained at Stanton Park, just outside of the city limits of Steubenville, and this is used as a floating battery on the line to take care of excessive peaks.

The power scheme for the combined properties has not yet been perfected, but it will probably be based upon the generation of direct current at the present power houses with provision for such additional power as may be required.

The East Liverpool Traction & Light Company owns fifty-five cars of different types, of which twenty-five cars are required to fill the regular schedules. The Steubenville Traction and Light Company owns thirty cars, of which sixteen are in regular service. The East Liverpool Traction & Light Company also owns a steel suspension bridge over the Ohio River at East Liverpool, and over this bridge operates a double-track line to Chester, W. Va., and Rock Springs Park. The bridge, with approaches, is 1710 ft. long, and has a center span of 705 ft. The East Liverpool Traction & Light Company has its own coal mine and mines all its own coal. The mine is located near East Liverpool, and the company is taking out from 60 to 100 tons of coal per day. The same company also owns Rock Springs Park, in Chester, W. Va., directly opposite East Liverpool, across the Ohio River. This park constitutes the main pleasure resort of this section of the valley and is an excursion point for a wide territory. The steam roads alone carry to the park upwards of 125,000 excursionists a year. The resort is more than usually well located and is fortunate in its natural beauties. These have been enhanced as drawing attractions by the addition of many amusement features, including dancing pavilion, theatre, swimming tank, "aquarama," figure 8 coaster, shoot the chutes, restaurant, merry-go-round and other novelties. An agreement has been made whereby Rock Springs Park has been leased for a period of ten years to an amusement company, which has spent upwards of \$75,000 on park attractions. This arrangement secures to the railway company all the benefits of the park as a stimulant of traffic and a revenue of the rental with none of the expenses usually occasioned by street railway companies by such attractions. The novel features of the park will be described in a later article.

The thanks of Gov. Curtis Guild, Jr., extended to General Superintendent E. P. Shaw, Jr., and to the Boston & Worcester Street Railway for the voluntary service it performed at South Framingham recently, when by the collapse of a business block twelve lives were lost, are conveyed in the following letter addressed to Mr. Shaw:

Sir—By the direction of his Excellency, the Governor, I have the honor herewith to transmit to you an official copy of the report made to this office by Brigadier-General Whitney, commanding Camp Bancroft, on the late Amsden block disaster at South Framingham. This copy is furnished you for the reason that it acknowledges and commends the very material assistance rendered both by you in person and by the men of your corporation, whose services you as promptly tendered.

I am further directed by his Excellency to convey to you his personal acknowledgements for your services, and to express to you his appreciation of the public spirit shown by you and those under your direction at this time of grave emergency. Very respectfully,

JAMES A. FRYE,

Adjutant-General, Chief of Staff.

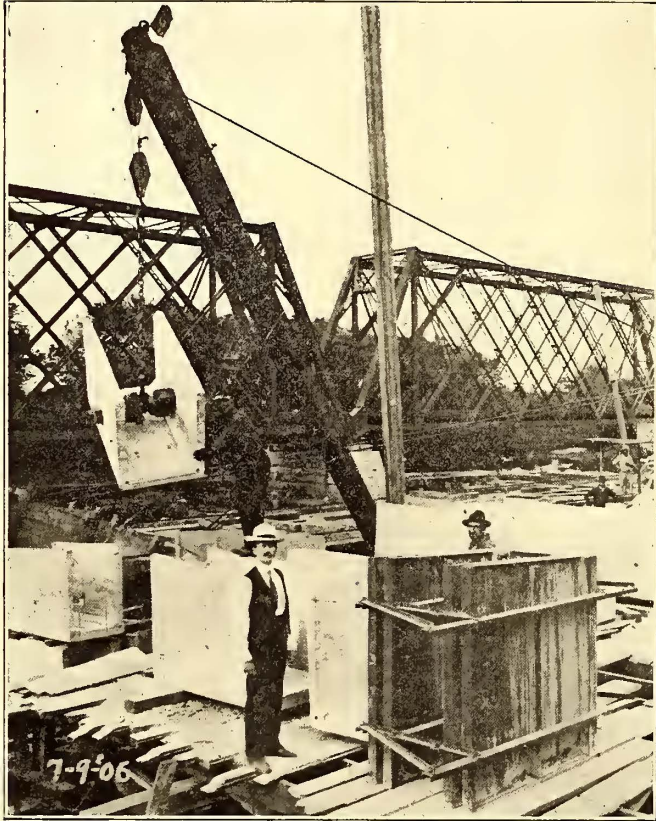
A SINGLE-TRACK, REINFORCED-CONCRETE ELECTRIC RAILWAY BRIDGE NEAR BELVIDERE, ILL.

A novel single-track, reinforced-concrete bridge, 350 ft. long, comprising four arches of 81 ft. clear span each, has recently been completed on the line of the Elgin-Belvidere Electric Railroad over the Kishwaukee River about 2½ miles east of Belvidere, Ill. Each arch of the bridge has a circular intrados with a radius of 83.36 ft. and a rise of 10.5 ft., the piers being spaced 87.5 ft. apart on centers. The arches each have two longitudinal arch ribs, 8 ft. 10 ins. apart on centers. These ribs are 2.5 ft. wide in their entire length, but vary in depth from 3 ft. at the crown to 4 ft. 6½ ins. at the haunches of the arch. Each rib carries a 12-in. spandrel wall centrally deposited above the rib and built up to the horizontal plane through the extrados of the arch at the crown. For lateral stiffness, the two ribs of each arch are connected by eight transverse beams in each span, which beams are spaced at equal distances longitudinally along the arch. On these beams are 12-in. cross walls built flush at the top with the spandrel walls, and on the latter and the cross walls the floor slab of the bridge is carried. This slab is 6 in. thick and 14 ft. wide. At the side of the floor slab is a curb, 8 in. high, built to confine the ballast of the roadbed. Drain holes are provided in the floor slab at intervals. At each of the piers a pilaster is brought up on each side of the bridge to within 3 in. of the ledge of the floor slab to support holes carrying the trolley wire of the electric line. Seats are provided at the abutments for the connection of trestle approaches to the bridge.

The water level in the stream across which the bridge has been built is about 3 ft. below the springing line of the arches at low stages, while in extreme floods it rises to within 5 ft. of the intrados of the arch at the crown. The bridge was so designed that in its erection all centering and falsework could be eliminated, thus avoiding many of the difficulties entailed by the use of timber falsework and centering. The ribs of the arch ring were built in trough-shaped reinforced-concrete forms. These trough-shaped forms were divided into seventeen sections for each rib, making each section 2½ ft. wide over all and 4 ft. 11 11-16 ins. long at the bottom. These sectional forms were 3 ft. deep at the crown and 4 ft. 6½ ins. deep at the haunches of the arch, the intermediate sections being graduated in depth between these two dimensions. The sides of the sectional forms were 3 ins., and the bottom 4 ins. thick, the ends of the trough section in each case being omitted. In these hollow sectional forms was placed, after they had been erected, the core or arch rib proper, which was 2 ft. x 2 ft. 8 ins. in cross section at the crown and 2 ft. x 4 ft. 2½ ins. in cross section at the haunches of the arch. The corners between the sides and bottom of each form were filled out with concrete. Each of these sectional forms was reinforced with ¾-in. plain round steel rods placed 8 ins. apart on centers longitudinally and 12 ins. apart on centers transversely. The weight of sections varied from 1500 to 2200 lbs.

The sectional forms of the arch ribs and those for the transverse beams connecting the pairs of the latter in each arch were cast in a series of steel molds. These molds were built of No. 16 sheet steel stiffened by 3-in. steel channels and held in alignment by angle irons so arranged and connected that each mold could be knocked down and reassembled readily. In all, 136 sectional rib forms and 32 transverse beam forms had to be cast. Since each rib was symmetrical about the transverse center line of the arch, only nine different kinds of sectional forms were required for the ribs. One steel mold was sufficient for the transverse

beams. By inserting loose wooden strips in the proper position between the inner and outer side pieces of the mold the variation in the depth of the rib forms was readily effected. The sectional rib forms were cast with the molds standing



STEEL MOLDS AND DERRICK HANDLING SECTIONAL FORMS

vertically so that one voussoir face was against the working platform on which the mold stood while the other was flush with the top of the mold. The concrete in these rib forms was made very wet in the proportion of one of cement and three of sand and filled the steel molds thoroughly.

A hole was cast in the side of each sectional form at about the center of gravity of the latter, and through these holes attachments were made for handling the forms after they had set. Those pairs of sectional forms in each of the arch ribs which are connected by the transverse beams had two rectangular openings cast in one side to facilitate this connection, the openings being made by fastening wooden blocks to the mold before the concrete was placed in the latter. The sectional forms hardened rapidly enough so that it was possible to remove the steel molds twenty-four hours after the concrete had been placed in them. When the sectional rib forms had all been completed they were numbered and stored at the site until required in the structure.

In the meantime two longitudinal rows of piles were driven on both sides of the bridge. These rows of piles were capped with 2-in. x 10-in. transverse plank braced in both directions by 1-in. boards. On top of the caps 6-in. x 10-in. stringers

were laid, and on these stringers were placed two rails for a light tramway. A traveler spanning the site of the arches was mounted on these two parallel tramways. This traveler was fitted with two triplex blocks, each carrying a balanced beam made up of two 8-in. channels. At the proper time the sectional forms for the arch ribs were lifted to a platform on the temporary bridge by a guyed derrick. The corresponding sectional forms for the two ribs of each arch were then assembled in pairs and spaced the same distance apart transversely they were to be placed in the bridge. Two 4-in. x 6-in. timbers were then placed transversely under each pair of sectional forms and bolted to two other 4-in. x 6-in. timbers placed transversely over the top of the pair of forms by bolts extending up through holes in the bottom of the forms. The pair of forms was thus firmly held in a lifting frame to which were attached hooks on the balanced beams carried by the triplex block on the traveler. A pair of forms would then be lifted into place in the two arch ribs and suspended there as well, as explained later. In this way the two ribs of each arch were erected simultaneously, and where a pair of rib forms were connected by the forms for transverse beam the three were placed as a unit.

The erection of the arch ribs was started simultaneously from each haunch, the first pair of sectional forms being supported at one end on the skew-back and at the other end attached to a set of steel rods suspended from an A-frame at the end of the arch. One of these A-frames was set at the abutment and anchored back to the piers of the trestle approach to the bridge; the other A-frame for the first arch was set on the pier at the other end of that arch and anchored back to the second pier. The anchors for each A-frame, consisting of 1 $\frac{3}{8}$ -in. round steel rods, which were in 16-ft. lengths, connected by sleeve nuts. Turnbuckles were also provided on these rods so that the length of the anchors could be adjusted. A series of eight 1 $\frac{1}{2}$ -in. round steel rods, each provided with a turnbuckle, radiated from the top of each A-frame. These rods each supported two shorter 1-in rods diverging to the sectional rib forms. These shorter rods were connected to U-bolts on the lifting frame carrying the assembled pairs of sectional rib forms, and supported the latter until the rib forms for one arch had been placed.



PLACING KEYSTONE IN ARCH

In addition to the 4-in. x 6-in. timbers of the carrying frame in which the pairs of rib forms were assembled, two light wooden frames on each pair of forms were used to brace the latter. The second sectional pairs of forms were brought into position after the first had been placed, and the two sections of that pair supported at one end on the two sections

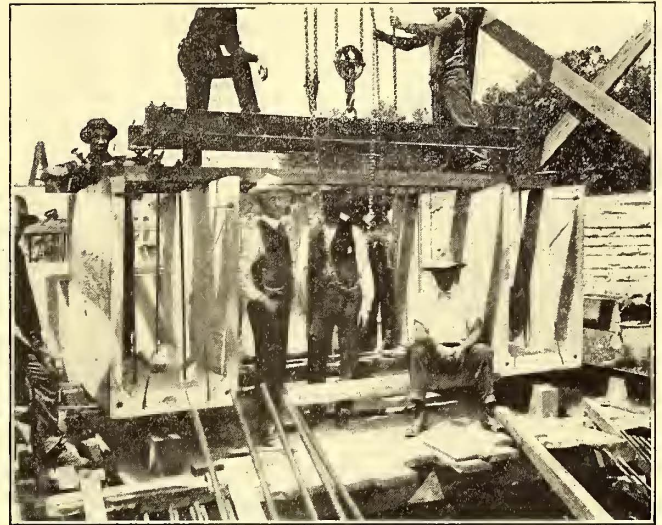
of the first pair and at the outer end by the second set of rods attached to the A-frame. The connection between the sectional form was made by steel dowels placed in gas pipes built into the inside lower corners of the sections as the latter were cast, and in some cases by wooden blocks fitted to the inside of the section. In this manner the remainder of the sectional forms were placed in position and supported.

The keystone of each set of arch rib forms required no support other than that supplied by the two sectional forms adjacent to it. When the keystones had been placed, the rods attached to the A-frames supporting the sections of the forms were slackened and the two halves of each arch rib form allowed to close against the keystone of the latter. The entire set of sectional forms comprising those for each arch rib then became self-supported and the A-frames with their anchors and rods were removed and used in a similar manner for the erection of the forms for the pair of ribs of the next arch. The lifting frames on each pair of sectional forms were removed as soon as the span was completed, but the bracing frames between the pairs of forms were left in position until the concrete had been placed in the sectional rib form.

In calculating the A-frame supporting rods the assumption was made that the sectional forms were supported at two points while being placed, which condition was actually established in the erection. The suspension rods were also adjusted that the joints between the various sectional forms were left open slightly at the top.

To insure the proper fitting of the keystone, the faces of the skew-backs on the piers were dressed before erection was started so as to make the angle between the face of the skew-back and the horizontal plane through the springing line slightly less than that calculated. In addition, the lower edge of the first sectional form was rounded in order to keep the pressure from being applied too close to the edge, and in the joint a strip of sheet lead, $\frac{1}{8}$ in. thick, was placed. The turnbuckles on the anchor rods made it possible to raise or lower half of the arch rib forms as a unit, the rotation taking place about a horizontal axis near the lower edge of the first sectional form, with an effect practically the same as if a hinge had been inserted in the joint at the skew-back. In this way the opening in the center for the keystone was adjustable, so no trouble whatever was experienced in fitting the keystone in place. After the removal of the A-frames and supporting rods, all the joints were found tightly closed and the alignment was perfect.

ing span was erected. When the sectional forms for the ribs of the four arches were in place, the reinforcement was put in position in them. These ribs, together with the transverse beams, were then filled by first putting in a 12-in. layer



PAIR OF RIB SECTIONS CONNECTED BY LIFTING FRAME

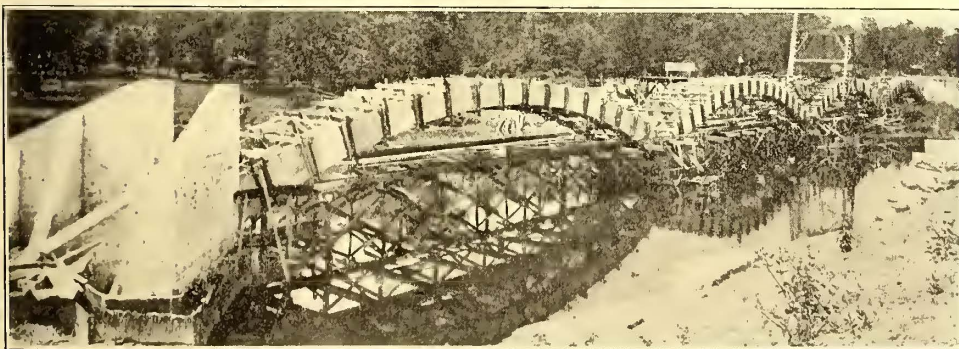
uniformly over them and then following up with the remainder of the concrete. The concrete in the arch ring and the transverse beams were made continuous by the openings through the inner walls of the sectional forms, and the entire construction thus rendered monolithic. After the arch ring had been completed in this manner, the spandrel walls and floor slab were built in ordinary wooden forms.

The erection of the arch rings was successfully completed in a comparatively short time, notwithstanding the fact that only unskilled labor was employed. An average of three days was required to erect the sectional forms for the arch ribs of one span, and to take down and reset the A-frames with their anchorages. The sectional forms for the ribs of the last arch ring were erected in a day and a half. The largest number of sectional forms placed per day was 12 pairs. The entire superstructure of the bridge, including the arch rings, was completed in thirty days, which included three or four days' delay caused by labor troubles.

The sub-structure presents no features of special interest. The three intermediate piers were built of solid concrete, while the abutments were provided with buttressed wing walls, which, together with the walls and base slab, were all of reinforced concrete. With the exception of one pier and one abutment, the sub-structure was founded on gravel. At that pier quicksand was encountered, which caused a great deal of trouble and involved a delay of at least thirty days in the completion of the sub-structure. Some trouble was likewise encountered on this account at one abutment. A double-walled cofferdam was finally

built around this pier and abutment and piling driven. The cofferdam was then sealed by depositing the concrete under water, after which the construction proceeded in the usual way.

The mixture of concrete for the piers and abutments was 1:3:5, and for the superstructure 1:2:4. The bridge was



NORTH ELEVATION OF BRIDGE. ALL SPANS ERECTED

The sectional forms for the ribs of all four arches were set in this manner before concrete was placed in any of them. This sequence of operation was necessitated by the fact that the piers would not have been stable under the unbalanced horizontal thrust caused by placing the concrete in the arch rib forms for one span before the skeleton arch of the adjoin-

built for a live load, consisting of a train of 40-ton interurban electric cars. Without considering temperature variations a unit compressive stress of 500 lbs. per sq. in. and a unit tensile stress of 500 lbs. per sq. in. is taken as the allowable stress in the concrete and 10,000 lbs. per sq. in. in the steel. Considering temperature variations of 40 degs. Fahrenheit above and below, the allowable unit compressive stress in the concrete is taken to be 650 lbs. and the unit tensile stress 75 lbs. per sq. in., with 13,000 lbs. per sq. in. as the allowable unit stress in the steel.

The stresses were figured for the arch fully loaded and half loaded, and were combined with the temperature stresses to produce the maximum. Only the concrete and steel in the core of the arch ribs was considered effective, but since the sectional forms actually carry a considerable part of the dead load, the factor of safety of the bridge is higher than ordinarily obtained in reinforced-concrete construction.

The reinforcement in the arch rings consists of ten $\frac{7}{8}$ -in. plain round rods in both the extrados and intrados of each arch rib, with shear rods as shown in one of the accompanying illustrations. The $\frac{7}{8}$ -in. rods are about 30 ft. long and were spliced by overlapping 3 ft. These rods were also continued into the foundation. The reinforcement in the spandrel walls consists of $\frac{3}{8}$ -in. round rods spaced 12 in. centers, horizontally and vertically. The reinforcement in the floor consists of $\frac{1}{2}$ -in. rods, $5\frac{1}{2}$ ins. apart on centers, placed transversely near the bottom of the slab between the spandrel walls, every other rod being bent so as to be near the top in the outer part of the slab and to continue up into the curbs at the sides. There were also twelve $\frac{3}{8}$ -in. round rods spaced longitudinally throughout the floor and wired to the transverse rods.

The deflection of the arch ribs was observed, first, immediately after the erection of the four arch rings and before any concrete had been placed in them; again, after the concrete had been filled in the sectional forms to form the solid ribs; and then, after all the concrete had been placed in the spandrel walls and floor of the superstructure. The results are indicated in the following table:

BELVIDERE BRIDGE

Table of elevations and deflections observed at intrados of arch ribs at crown.

All elevations are 157' +, but only decimals of feet are given. Elevation at crown as per design, 157.46. Average actual elevation 157.47.

SPAN NO.	ELEVATIONS IN FEET.			DEFLECTIONS IN FEET.			
	Before any Concrete was Placed.	After Concrete was Placed in Ribs and Diaphragms.	After Concrete was Placed in Walls and Floor.	Caused by Load of Concrete in Ribs and Diaphragms.	Caused by Load of Concrete in Walls and Floor.	Total Deflection Caused by Dead Load of Structure.	
1	North Rib...	.43	.39	.37	.04	.02	.06
	South Rib...	.38	.37	.34	.01	.03	.04
2	North Rib...	.65	.56	.54	.09	.02	.11
	South Rib...	.49	.41	.39	.08	.02	.10
3	North Rib...	.63	.58	.55	.05	.03	.08
	South Rib...	.60	.56	.53	.04	.03	.07
4	North Rib...	.54	.53	.49	.01	.04	.05
	South Rib...	.57	.56	.52	.01	.04	.05
Average.....	.54	.50	.47	.04	.03	.07	

The deflection caused by the filling of the concrete in the ribs is somewhat variable, which is probably due to the fact that the joints between the sectional forms may not have all been closed up completely. After the ribs have been completed, the deflection caused by the additional weight of concrete in the spandrel walls and floor is very regular. The total deflection in no case exceeds the normal, and the average elevation of the eight ribs at the intrados of the crown, after the completion of the structure, deviated only 1-100 of a foot from the calculated elevations.

The advantage of this type of construction is claimed to be

the elimination of centering, which is always a large portion of the total cost of a concrete bridge, and in deep and swift rivers makes construction not only extremely expensive, but dangerous and hazardous. While for the sake of expediency in this bridge a traveler and a temporary track were used for erecting the reinforced-concrete forms, according to the designers, a cableway will be used in future work. With the latter arrangement, it is believed by them, concrete bridges can be built across streams of practically any character.

The outfit required to construct a bridge of this type involves a larger first cost, but after this outfit has once been acquired, it is said to enable the construction and erection of the sectional forms at very little cost and remarkable speed. The steel molds used on this bridge could be used, it is understood, in constructing a series of arches ranging in length from 25 ft. to 100 ft., and can be used repeatedly. Where a series of bridges is to be built at one time, this feature attains greater importance in reducing cost.

The Elgin-Belvidere Railroad is under construction by the Arnold Company, Bion J. Arnold, president, of Chicago. The bridge was designed and built by the Strauss Bascule & Concrete Bridge Company, of Chicago. The work was executed under the immediate supervision of K. Hojgaard, engineer for that company.

QUARTERLY MEETING OF THE NEW YORK STATE ASSOCIATION

President Shannahan announces that the next quarterly meeting of the Street Railway Association of the State of New York will be held at Albany, N. Y., on Sept. 19, 1906. The meeting, as usual, will take the form of a one-day conference, and will be devoted to subjects pertaining to the mechanical department at the suggestion of the New York Railroad Commission. Matters of considerable importance will come before the meeting, and a large attendance of both general managers and master mechanics is urged. The hour and place of meeting and also the detail topics to be discussed will be announced in a later notice.

HIGH-VOLTAGE DIRECT-CURRENT WORK ABROAD

In connection with the article published in the May 5 issue of the STREET RAILWAY JOURNAL on the high-tension direct-current railway between Cologne and Bonn, Germany, and also the article on high-voltage direct-current lines on the continent, published on page 959 of the June 16 issue, it may be interesting to mention the practice followed by the Siemens-Shuckert Works in placing the line of demarkation between low and high voltages for railway motors. The company has built for the Berlin Elevated Railway 700-volt to 800-volt motors of the standard type. These are insulated in the ordinary manner and have given no trouble whatever. Sparkless commutation has been secured by calculating the proper number of commutator laminations.

For tensions of 900 volts or over, the company has adopted the use of auxiliary poles to secure sparkless commutation. This method has given perfect satisfaction, in particular on the Cologne-Bonn line, which is operated at 990 volts. Aside from the use of inter-poles the only changes from the standard construction are superior insulation for the armature and motor casing. It was also mentioned in the article of June 16 that the company had built a 2000-volt direct-current line for operating a freight railway in the Mosel mines. From later advices it appears that the motive power of each locomotive is divided in two groups of two motors each. At starting both groups are in series, but for running are placed in parallel, so that two motors are always in series.

A SIGNAL SYSTEM FOR RAILROAD CROSSINGS

A patent for an ingenious system designed to prevent collision between electric and steam railroad trains at crossings was granted this week to Charles R. Barnes, expert of the New York Railroad Commission, and Alfred Green, formerly master mechanic of the Rochester Railway Company. The system provides in the electric track a derailing device which is normally kept open. It can, however, be closed by the conductor or motorman, who must first cross the steam railroad track and throw a switch. The open or closed condition of the derailing device is indicated by a semaphore by day and lamps at night. The principal feature of the invention is the arrangement by which the electric railway employee is prevented from closing the derailing switch if a steam railroad train, in approaching the crossing, has come within 1000 ft., or such other distance as may be decided upon as the danger zone. The system is illustrated in the accompanying plan.

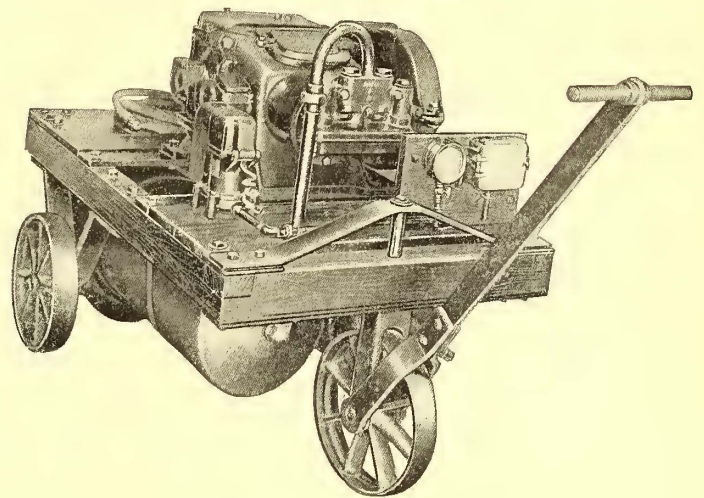
In this engraving the steam railroad track is indicated by the horizontal lines and the electric railroad track by the vertical lines. If an electric car approaches the crossing in the direction shown by the arrow, it meets at 1 the derailing switch, which can be closed only by the electric employee drawing down the electric switch 2 on the other side of the steam railroad track. This switch is normally in the position shown by the solid lines, but when drawn down occupies the position shown by the dotted lines. This switch closes a circuit from the trolley wire *C* through contact *b* and the electro-magnet controlling the derailing switch, and thus closes the switch. At the same time the movement of the handle mechanically clears the danger signal. After the car has passed the crossing the electric railway employee releases the switch handle, which is drawn back by a spring and the danger signal is reset. The engraving shows a derailing device of a similar pattern for electric cars operating in the other direction.

The locking device which is actuated by the railroad train

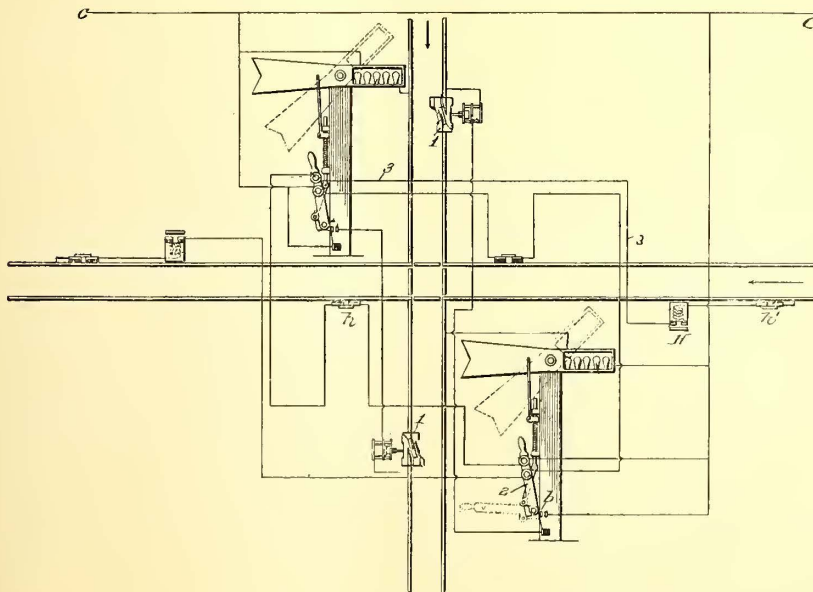
The circuit remains closed after the passage of the train until broken by one of the two circuit breakers at *h* and *h'*. The former is located just beyond the crossing and consists of a movable contact plate which is operated by the car wheel, after which all parts return to their normal position. The auxiliary circuit breaker *h'* is placed at a greater distance from the crossing than the contact maker *H*, and is installed to break the circuit caused by a train passing *H* and then returning to the right-hand side of the drawing, as would occur where an engine or train moved into proximity to the crossing and then backed away. The engraving shows a duplicate system to protect the crossing from trains approaching from left to right. The system is, of course, applicable to double-track operation as well as single.

PORTABLE AIR COMPRESSOR OUTFIT

An especially neat and compact portable air compressor outfit has recently been placed on the market by the General



PORTABLE COMPRESSOR COMPLETE



DETAILS OF SIGNAL SYSTEM FOR RAILROAD CROSSINGS

operates through the circuit closer *H*. This contact is closed by the car wheel and completes a circuit between the trolley wire *C* and the ground through the wires 3 and a magnet on each switch handle support. This magnet consists of a solenoid which, when the current passes, thrusts a pin through a hole in the switch lever and locks it in position.

Electric Company. A convenient means of obtaining a supply of compressed air for various purposes about power houses and car houses is in demand, and the new outfit admirably meets the requirements of such service. Compressed air is used in the power house for cleaning generators, converters, rotary and switchboards, and it has a wide application in car houses for cleaning dust from cars and trucks and removing copper and carbon particles from armature windings and controllers. In addition to the more apparent use of this compressed air outfit, small tools such as drills and chisels can be operated by such a compressed air supply. Being portable the entire set can be drawn to different parts of the power house or shop or put on cars and transported to sub-stations, the electrical connection with the trolley circuit is quickly made through a contactor box on the truck and a convenient length of hose used to convey the compressed air to the work. This eliminates waste of air due to

necessarily long hose or leaky pipe connection. This portable air compressor set consists of a standard CP 22 (24-ft.) air compressor similar to that used in the company's air brake systems, a governor, insulating connector, safety valve, gage, combined switch and fuse, two reservoirs 16 ins. x 48 ins., hose, contactor box, and stop-cock, all

mounted compactly on a three-wheel truck, as shown in the illustration. In the center of the truck is placed the air compressor and motor, with the governor at one side and the gage and circuit breaker mounted on a small board in front. The two steel reservoirs are carried beneath the truck floor, keeping the center of gravity of the outfit very low. The framework and tongue are of wrought iron, and the front wheel is hung in a pivoted fork of the same material.

The parts of this outfit are of the same standard and durability as the company's air-brake equipment for cars. The compressor consists of a 500-volt motor of the railway type connected by a herring-bone gear drive to a double-cylinder air compressor. The complete unit is entirely enclosed, with provision for thorough lubrication. The gearing runs in oil, making it as noiseless as possible. The governor is entirely automatic and thoroughly protected, and adjustments are provided so that the pressure at which it will act can be varied to open at any point between 60 and 100 lbs. per sq. in. of pressure in the steel reservoir. In addition to the governor an adjustable pop safety valve is provided which prevents the possibility of an excessive pressure on the reservoirs. In the combined switch and fuse, mounted vertically with the gage, all current-carrying parts are enclosed in moulded insulation, and a powerful magnetic blowout is provided for extinguishing the arc. With each machine 25 ft. of special armored air hose is furnished complete with stop-cock, coupling and nozzle for connection to machines or for cleaning purposes. The general dimensions of this portable air compressor are as follows: Height, 3 ft. 7 in.; width, 3 ft. 11 in., and length, 5 ft. 8 in.

ROLLING STOCK FOR THE WEST JERSEY & SEASHORE DIVISION OF THE PENNSYLVANIA RAILROAD

Information has been given in these columns from time to time regarding the electrification of the West Jersey & Seashore division of the Pennsylvania Railroad. This road will be open for travel on Sept. 10. The type of rolling stock to be used is shown in the accompanying illustration, which is one of eighteen cars built by the J. G. Brill Company from designs furnished by the Pennsylvania Railroad. All of the cars to be used on this division will be motor cars operated at either end and equipped with train control. The cars are of the standard form of Pennsylvania Railroad day coaches, and are equipped for both overhead and third-rail conductors. The seating capacity of each car is 58 passengers. The interiors are finished in mahogany and have the usual features of the Pennsylvania coaches (excepting that the body end windows are omitted), including toilet room, continuous basket racks, balanced sashes and push-over-back seats upholstered in plush. Both ends of the cars are enclosed with vestibules having rounded ends. At the center of the vestibule is a sliding door so arranged that when the door is open it encloses the electric control apparatus, brake and brake valve. The windows on the right side of the center door in front of the control apparatus have double sash, the upper sash being of large dimensions and extending up to the eaves. This sash is arranged to drop low enough to enable the motorman to see the side of his train and get a signal from

the conductor, as the door at his right side cannot be opened on account of the closed trap door on which he stands. The sliding door in the vestibule, which alternately covers the center vestibule opening and the control apparatus, is secured in a manner which prevents it from being tampered with by passengers, and the locking apparatus is so placed that the door can be operated in either position. Each platform is provided with hand brakes. On one platform of each car



INTERIOR OF WEST JERSEY & SEASHORE CAR FOR ELECTRIC SERVICE

against the body end, back of the motorman's position and opening upon the platform, is a switchboard compartment. The front of this compartment is enclosed with a 3-16-in. steel door set in flush with the car body, and the back has a removable panel. The compartment is lined with fireproof material $\frac{1}{4}$ in. thick.

The bottom framing is the Pennsylvania standard type, consisting of 5-in. x $7\frac{3}{4}$ -in. yellow pine side sills and 7-in. I-beams for center and intermediate sills. The four I-beams extend from end to end of the car. The floor bridging consists of $1\frac{3}{4}$ -in. x $7\frac{7}{8}$ -in. yellow pine coped into intermediate sills and tennoned into the side sills with blocking between



ONE OF THE NEW CARS FOR THE WEST JERSEY & SEASHORE DIVISION OF THE PENNSYLVANIA RAILROAD

intermediate and center sills and between the center sills. The stringer pieces are $\frac{7}{8}$ in. x 7 in., and are laid into the bridging and blocking over the intermediate and center sills and extend the full length of the car body; the bridging is secured transversely by tie rods with ends flush with the side sills. The flooring is double and laid diagonally with an upper layer of maple; both layers are tongued and grooved and have $\frac{1}{8}$ -in. asbestos fire felt between. The flooring is protected underneath with $\frac{1}{4}$ -in. transite, and in all spaces above the motor truck are placed plates of steel backed with fire belt. The needle beams are composed of 6-in. I-beams

supported at the ends in pockets which are provided with cast-steel truss-rod struts. The body truss rods are of 1¼-in. round iron, upset at the lower end to 1½ ins. The body bolsters are of open steel type and are double at the motor truck end. The body bracing is of W form with short diagonal braces and cripple posts. The letter boards are 9 ins. wide to accommodate the standard Pennsylvania Railroad 7-in. letters.

The general dimensions are as follows: Length over the body end sills, 46 ft. 6 ins.; length over the bumpers, 55 ft. 5½ ins.; from center to center of the needle beams, 10 ft. 6 ins.; width over the side sills, 9 ft. 8¾ ins.; width over the sheathing, 9 ft. 10 ins.; width over the window sills, 10 ft.; height from the under side of center sill to the top of the roof, 9 ft. 8½ ins.; height from the rail to the under side of the side sill with car light, 3 ft. 7 5-16 ins.; height from the rail top to the top of the roof, 13 ft. 3 3-16 ins.; center to center of the windows, 34½ ins.; truck centers, 33 ins.; truck wheel base, 7 ft.

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SUMMER CARS FOR VINCENNES, IND.

The street railway system in Vincennes serves a population of about 20,000 people, and the two companies there which operate in conjunction, namely, the Vincennes Citizens' Street Railway Company and the Vincennes Traction & Light Company, having a trackage of about 10 miles. In summer about twenty cars are in daily service. A half-mile extension of the tracks on Taylor Avenue to Columbia Park was completed early this summer and the contract let for the construction of a bridge over Kelso Creek and for the grading of a mile of track to a new natural park site, named Lakewood, purchased by the street railway company. This property, with its 23 acres and beautiful lake, the railway company expects to be a very profitable investment. It is also pro-

has several parks, one of the most attractive being League Park, and an idea of the amount of traffic handled on the lines of this amusement place can be had by a glance at the illustration, which shows the crowds boarding the several cars in waiting after a baseball game.

Within the recent past the Vincennes Citizens' Street Railway Company has added considerably to its rolling stock, having received several lots of closed as well as a number of open cars from the American Car Company, of St. Louis. In addition, another consignment of open cars has now gone forward, the cars measuring 28 ft. 3 ins. over the posts and 35 ft. 11⅜ ins. over the vestibules; the width over the sills is 7 ft. 8 ins., and over the posts at the seat end 8 ft. 2¼ ins.; sweep of the posts, 3⅜ ins.; centers of the posts, 2 ft. 8 ins.; height from the floor to the ceiling, 8 ft. 1 in.; height from the track to the under side of the sills, 2 ft. 5½ ins.; size of the side sills, 4¾ ins. x 7 ins.; size of the center crossings, 3½ ins. x 5⅞ ins.; size of the end sills, 4¾ ins. x 7 ins.; thickness of the corner posts, 3⅝ ins.; thickness of the side posts, 3¾ ins. Each car will seat 65 passengers. Folding steps with entrance guards are provided. The cars have an ash finish; ceilings of decorated three-ply birch. Included among the specialties employed on the cars are angle-iron bumpers, alarm gongs and signal bells, sand boxes, etc. The No. 27-G1 truck, having a wheel base of 4 ft. 6 ins., is

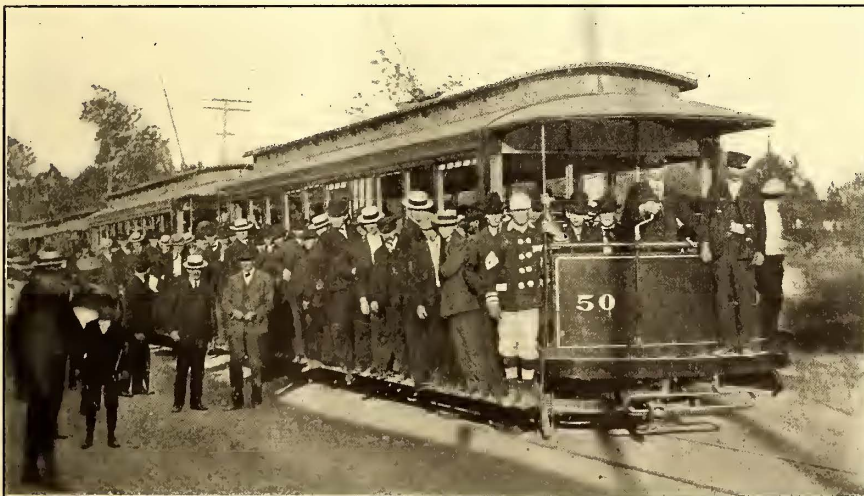


OPEN CAR FOR VINCENNES

used. The diameter of the wheels is 33 ins. and the axle diameter is 4 ins. The weight of the car and the trucks without the motors is 21,000 lbs.

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A NEW HEADLIGHT DIMMER

The Electric Light Shade Company, of Lima, Ohio, is introducing an attachment which can be placed on any type of headlight for the purpose of dimming the light while on city streets. Laws requiring are lights to be dimmed are becoming quite prevalent in many cities and towns, and the ordinary method of requiring the motorman to stop his car and place a dimmer or a newspaper over the headlight while passing through the streets of a town is of great annoyance to operators of interurban roads. The device brought out by the company mentioned and designed to obviate this diffi-



A LINE OF LOADED OPEN CARS LEAVING THE BASEBALL GROUNDS AT VINCENNES

posed to build an interurban line to Bruceville and Bicknell, 15 miles distant, and the ground being already surveyed, it is expected to have the road in operation at a very early date. Vincennes promises to be quite an important interurban center, as in addition to the interurban line mentioned three lines connecting Evansville and Princeton, Terre Haute and Sullivan and West Baden are soon to be built. Vincennes

culty consists of a simple roll curtain shade, which is attached above the lamp and is operated by a string from the motorman's cab. To dim the lamp the motorman simply pulls the string and attaches it to a hook. Releasing the cord causes the dimmer to roll up out of place. The roller may be placed either inside or outside of the lamp, but in the former position is protected against rain and snow.

LEGAL DEPARTMENT*

CHARTERS, ORDINANCES, FRANCHISES, ETC.

ALABAMA.—Pleading—Conclusions—Eminent Domain—Remedies of Property Owners—Appeal—Failure to Urge Objections—Waiver—Remedies of Property Owners—Street Railroads—Rights in Streets—Damages—Tenancy in Common—Action by Tenants—Action—Evidence—Trial—Failure to Request Instructions—Computation of Damages—Parties—Striking Out—Effect.

1. Const., Sec. 227, makes a corporation constructing any public utility along a street under a franchise permitting such construction liable to abutting property owners for actual damages. Held that a complaint in an action against a corporation which had constructed a railroad embankment along a street under a franchise from the city, and which merely alleged that plaintiff's lot was "damaged on account of such construction," was demurrable as containing a mere conclusion.

2. Const., Sec. 227, makes a corporation constructing any public utility along a street under franchise permitting such construction liable to abutting property owners for actual damages to their property. In an action against a corporation which had constructed a railroad embankment in a street under a franchise, the complaint alleged the plaintiffs claimed damages for that, while they were the owners of certain lots abutting on the street, defendant under a franchise from the city constructed an embankment along the street and was operating thereon a line of railroad, and that by reason of the embankment the water backed upon and stood upon plaintiffs' lots. Defendant demurred on the ground that the averments of the complaint were vague, indefinite and uncertain; that it did not appear therefrom how or in what manner plaintiffs' property was damaged; that the statements of the complaint were mere conclusions; that no facts were alleged which showed or tended to show that the property was damaged; and that the complaint did not state a cause of action, in that it did not allege any duty owing by defendant to plaintiffs, nor allege a violation of any duty so owing. Held that the demurrers were properly overruled.

3. Grounds of error not insisted upon in the brief of counsel on appeal are waived.

4. Const., Sec. 227, makes a corporation constructing any public utility along a street under a franchise permitting such construction liable to abutting property owners for actual damages. Held that the measure of damages is the difference between the market value of an abutting lot before and after the construction of the utility.

5. In an action by five or seven tenants in common for damages to the land from the construction of a railroad embankment in a street on which the land abutted, the measure of recovery by the five was five-sevenths of the total damage.

6. Const., Sec. 227, makes a corporation constructing any public utility along a street under a franchise permitting such construction liable to abutting property owners for actual damages. Held that in an action by the owner of a lot abutting on a street in which a railroad embankment had been constructed under a franchise, it was error to admit evidence as to what amount of material would be required to fill in plaintiff's lot to bring it to a level with the car rail on the embankment.

7. In an action by the minor owners of a lot abutting on a street to recover damages for the construction of a railroad embankment in the street, it was not error for the court to instruct that limitations had no application to the plaintiffs during their minority, and that it was immaterial so far as they were concerned when the embankment was constructed, without stating to the jury that the right of recovery was confined to damage accruing during and after the time of construction alleged in the complaint, where defendant requested no explanatory charge.

8. Under Const., Sec. 227, making a corporation constructing any public utility along a street under a franchise permitting such construction liable to abutting property owners for actual damages, in an action by the owner of property abutting on a street to recover damages for the construction of a railroad embankment in a street under a franchise, it was necessary for plaintiff to show that the embankment was constructed under a franchise.

9. Code 1896, Sec. 1718, in relation to eminent domain, provides that the amount of compensation to which an owner is entitled must not be reduced because of accidental benefits. Const., Sec. 227, makes a corporation constructing any public utility along a

street under a franchise permitting such construction liable to abutting property owners for actual damages, the jury may not consider whether the construction of the utility has enhanced or decreased the value of plaintiff's property.

10. Code 1896, Sec. 3331, authorizing the amendment of a complaint by striking out parties plaintiff, where all the plaintiffs who originally sued for damages to their lot owing to the construction of a railroad embankment in a street on which the lot abutted owned a joint interest in the property, and some of the plaintiffs were stricken from the complaint, it did not entitle defendant to a verdict as against the remaining plaintiffs.—(Birmingham Ry., Light & Power Co. vs. Oden et al., 41 S. Rep., 129.)

ILLINOIS.—Jury—Peremptory Challenges—Number—Appeal—Harmless Error—Challenges to Jurors—Eminent Domain—Condemnation for Right of Way—Damages—Evidence—Damages to Land Not Taken—Value of Land—Use for Illegal Purpose—Instructions—Rule of Damages.

1. In condemnation proceeding against the owner of the fee and his tenant, defendants constituted only one party, and were entitled to three peremptory challenges; the petitioner being entitled to the same number.

2. In a condemnation proceeding against the owner of the fee and his tenant, error in allowing both parties six peremptory challenges, instead of three, to which they were entitled, was harmless to defendants.

3. In a proceeding to condemn land for the purpose of widening a right of way for a third track, in which petitioner introduced evidence that it contemplated moving a station from its location, adjoining property of defendant not sought to be condemned, but situated adjacent to that to which the proceedings related, and that it intended to operate an express train on the third track at a speed of 40 m. p. h., evidence to show what damages to the property not taken would result from the removal of the station and the operation of trains at the speed named was immaterial, since the petitioner had a right, irrespective of the condemnation proceedings, to remove the station and to operate trains at the rate of 40 m. p. h. upon its existing tracks.

4. In a proceeding to condemn a tract of land which would necessitate the removal of an annex to a building on land not sought to be condemned, questions as to what effect, in the opinion of the witness, the taking away of the annex would have upon the building remaining, were improper, and should have been framed so as to call for an answer as to what would be the effect upon the fair cash market value of the land not taken.

5. In a proceeding to condemn land on which was situated a leased building used by the tenant as a saloon and dance hall, evidence that the business was so conducted as to violate the ordinances of the city and the laws of the State was immaterial.

6. In a proceeding to condemn a portion of a tract of land, an instruction that if the jury believed that the land sought to be taken was worth more as part of the whole tract than it would be worth if separately and distinctly owned, and not connected with the remainder of the tract, and further believed that the value of the part sought to be taken, as used in connection with the whole tract, was all there was of value or damage to the whole tract, they should allow for the part sought to be taken its fair cash market value as part of the whole tract, and no damages to the remainder by reason of the taking of the part sought to be condemned was misleading.

7. In a proceeding to condemn a portion of a tract of land, the owners are entitled to the fair cash value of the property taken, estimating its value with the adjoining realty owned by them, or estimating its value separately if its value is greater separately, and, if the realty not taken is not depreciated in value by reason of the taking of the remainder, then no damages to be allowed for the part not taken, but if the taking of the part condemned causes a depreciation in the value of the part not taken, or if the purpose for which the part taken is to be used causes such depreciation, the owner is entitled to compensation therefor.

8. In a proceeding to condemn a portion of a tract of land on which was located a leased building claimed to be used by the lessee in violation of the laws of the State and ordinances of the city, an instruction that no public official of the city had a right to authorize the violation of any of its ordinances or the laws of the State, and that neither the owner nor lessee could be excused for such violation because it was countenanced by a public official, was improper.—(Freiberg et al. vs. South Side Elevated R. Co., 77 N. E. Rep., 920.)

ILLINOIS.—Eminent Domain—Condemnation Proceedings—Attorney's Fees—Amount—Value of Services—Attorney and Client—Authority to Employ Assistant Counsel.

1. Under Laws 1897, p. 218, providing that in the exercise of the

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right of eminent domain, the court shall upon application of defendants make such order for the payment by the petitioner of all costs, expenses and reasonable attorney's fees of the defendant as shall be just, the court can allow only the fees for which defendant is liable, and hence is restricted to the fee provided by the contract between defendant and his attorney, or, in case there is no express agreement, the reasonable value of the attorney's services.

2. In a condemnation proceeding, an allowance of \$800 for defendants attorney's fees held against the weight of the evidence.

3. Unless a client authorizes his attorney to employ assistant counsel, he is not liable for the fees of such assistant counsel.—(Chicago & S. Traction Co. vs. Flaherty et al., 78 N. E. Rep., 29.)

MAINE.—Street Railroads—Change of Location—Determination of Railroad Commissioners—Operation—Certificate of Safety—Eminent Domain—Street Railways—Additional Servitude—Compensation.

1. The determination of the Railroad Commissioners in regard to the change of location of a street railroad is final. The omission of the clerk of the Railroad Commissioners, within five days after the filing of the certificate of their decision, to give notice of such determination to all parties of record, does not deprive the railroad corporation of its right to construct and operate its road, or make that a public nuisance which would otherwise be a lawful use of the street.

2. The operation of a street railroad for other purposes than street traffic, before the Railroad Commissioners have granted a certificate of its safety for public travel, is not forbidden by Rev. St., c. 53, Sec. 20.

3. The use of a street by a street railroad is a public servitude imposing no additional burden upon the abutter. The damages paid, when the street was built, were for all time and for all public uses fairly contemplated at the time the land was taken.

Such inconveniences as are inseparable from the use by the public of a public way cannot be made the foundation of an action for damages.—(Parsons vs. Waterville & O. St. Ry., 63 Atl. Rep., 728.)

MASSACHUSETTS.—Street Railroads—Rights in Streets—Repair—Liability—Estoppel—Order—Construction—Statutes—Construction—Obligation to Pave and Maintain—Power of Aldermen—Repeal—Effect.

1. That a street railway company complied with an order requiring it to lay and maintain paving within certain streets according to certain specifications did not estop it to thereafter contest the legality of the order.

2. An order required a street railway company to lay and maintain paving in certain streets and to assume the expense of paving where the streets were unpaved, either for the full width of two streets and between the track, or between the tracks and for a limited distance outside the rails as to the remaining streets, and also to repave with the same material the streets already paved, the surface of which would have to be removed in the construction of the road. Held that the general provision requiring the company to lay and maintain paving was not limited to paving only, and did not exclude the cost of subsequent maintenance.

3. Pub. St., c. 113, Sec. 7, relating to street railway locations authorized the Board of Aldermen and Selectmen of towns to grant original locations to street railway companies subject to such "restrictions" as they deemed the public interest required. Held that the word "restrictions," as so used, was a legal equivalent of "conditions," and therefore authorized the board to impose limitations on the full and unqualified enjoyment of the right to use the street's so granted.

4. Pub. St., c. 113, Sec. 7, provides that the Board of Aldermen of a city or the Selectmen of a town may grant an order for the location of a street railway "under such restrictions as they deem the interests of the public may require," and section 32 provides that every street railway shall keep in repair the paving, upper planking, or other surface material of the portions of the streets occupied by its tracks, and in addition a space 18 ins. on each side of the portion so occupied, etc. Held that section 7 should be treated as supplementary to section 32, and as conferring jurisdiction on the Board of Aldermen to impose a condition on the grant of a street railway location that the railway company shall pave and maintain the street to an extent greater than that prescribed in section 32.

5. Pub. St. 1898, p. 748, c. 578, Sec. 26, repealing chapter 113, section 7, with reference to the granting of street railway locations by cities, declared, (section 11, p. 742) that street railway companies shall remain subject to all legal obligations imposed in their original grants, and reference was again made in section 13 (page 743), which ratified and confirmed all previous locations which

were given validity as if granted under the repealing act. Held that the repeal of section 7 did not terminate the obligation of a company to pave and maintain streets imposed by a location grant previously made under the repealed sections.—(Blodgett et al. vs. Worcester Consol. St. Ry. Co., 78 N. E. Rep., 222.)

NEW JERSEY.—Eminent Domain—Condemnation of Land—Trolley Company.

A trolley company, holding under lease a strip of land 13 ft. in width, upon which it had built and operated a street railway, sought to condemn an additional strip of land of less width than 47 ft. lying alongside of the 13-ft. strip, the new strip to be used in connection with the already existing road. Held that there existed no power to condemn the additional ribbon of land under the provisions of section 13 of the act of 1893, as this land was not to be used either as an extension of the line of an existing railroad or a new line not exceeding 60 ft. in width.—(Metlar vs. Middlesex & S. Traction Co., 63 Atl. Rep., 497.)

NEW JERSEY.—Taxation—Franchises—Constitutionality of Statute—Nature of Tax—Property Subject—Liability to Other Tax.

1. The act of 1900 for the taxation of franchises of persons and corporations using or occupying public streets (P. L. 1900, p. 502) is constitutional.

2. The franchise tax imposed by the act of 1900 (P. L. 1900, p. 502) is in the nature of a license tax, and not a tax upon property.

3. The franchises to use or occupy public streets which are subject to a franchise tax under the act of 1900 (P. L., 1900, p. 502) are not subject to a property tax under the general tax act of 1903 (P. L. 1903, p. 394).—(North Jersey St. Ry. Co. vs. Mayor, etc., of Jersey City et al., 63 Atl. Rep., 833.)

NEW YORK.—Carriers—Passengers—Transfers—Penalty—Motive.

A street car passenger, desiring to make a trip to a point within the city, located on a car line controlled by the same company, demanded and was refused a transfer to the intersecting line, to which she was entitled under Railroad Law, Laws 1890, p. 1114, c. 565, Sec. 104, as amended by Laws 1892, p. 1406, c. 676, providing also, to the end that the public convenience might be promoted, a forfeiture of \$50 to one aggrieved by a refusal of such transfer. The passenger continued her journey on the intersecting line, paying the additional fare and making purchases at her destination. Held that the statute being punitive, rather than compensatory, it was immaterial to the company's liability for the penalty that the passenger knew she would not receive the transfer, or that one of the objects of the trip was to recover such penalty, or that she had many other similar suits pending.—(Fitzmartin vs. New York City Ry. Co., 99 N. Y. Sup., 765.)

NEW YORK.—Carriers—Regulation—Street Railroads—Refusal of Transfers—Penalty.

A street railway company is not liable for refusal of a transfer where a passenger, though desiring to go south on Avenue A, merely asks for an Avenue A transfer, and is given one good only on a northbound car.—(Gasper vs. New York City Ry. Co., 99 N. Y. Sup., 904.)

NEW YORK.—Eminent Domain—Measure of Compensation.

Where a street was taken for an elevated railroad, it was proper to award to abutting owners, not owners of the street, an amount equal to the difference between the value of the property before and after the taking, less the consequential damages due to the annoyance caused by noise, vibration, unsightliness of structure, and all elements other than the value of easements of light, air and access.—(In re Brooklyn Union Elevated Ry. Co., 99 N. Y. Sup., 222.)

NEW YORK.—Street Railroads—Delay in Construction—Forfeiture of Charter—Certificates of Extension—Statutes—Validity—Law Authorizing Construction of Street Railroad—Local Acts.

1. Railroad Law, Laws 1890, p. 1084, c. 565, Sec. 5, provides that if any domestic railroad corporation shall not, within five years after its certificate of incorporation is filed, begin the construction of its road its corporate existence and powers shall cease. Section 99 (page 1112), which applies only to street railroads, declares that in case any such corporation shall not commence the construction of its road, or of any extension or branch thereof, within one year after the consent of the local authorities and property owners, or the required determination of the General Term shall have been given or renewed, its rights and franchises in respect to such railroad, extension, or branch may be forfeited. Held that section 99 does not provide the only method

by which the charter of a street railroad company may be forfeited for delay in constructing its road, and hence does not prevent section 5, which is self-executing, from applying to street railroads, so as to work a forfeiture without any proceedings for that purpose, if such a corporation neglects for a period of five years after its incorporation to commence the construction of its road.

2. Railroad Law, Laws 1890, p. 1084, v. 565, Sec. 5, providing that if any corporation shall not, within five years after its certificate of incorporation is filed, begin the construction of its road and expend thereon 10 per cent of the amount of its capital, or shall not finish its road and put it in operation in ten years from the filing of such certificate, its corporate existence and powers shall cease, applies also to extensions constructed pursuant to certificates of extension, and the rights under such a certificate of extension are lost if work is not begun within five years from the date of the certificate.

3. Railroad Law, Laws 1890, p. 1084, c. 565, Sec. 5, provides that if any railroad corporation shall not, within five years after its certificate of incorporation is filed, begin the construction of its road, its corporate existence and powers shall cease. Laws 1901, p. 1229, c. 494, provides that the consent by the local authorities of any city previously acquired by any street railroad corporation should be deemed to be in full force and effect and continue until December 31, 1903. Laws of 1901, p. 1261, c. 508, declares that section 5 of the railroad law shall not apply to any street railroad company incorporated prior to July 1, 1895, which had obtained or become the owner of the consents of the local authorities of any city of the first or second class. Held that the statutes of 1901, so far as they relate to railroad companies whose charter rights had been forfeited by inaction prior to the enactment by the statutes, are in conflict with Const. art. 3, Sec. 18, providing that the Legislature shall not pass any private or local bill granting the right to lay railroad tracks, nor authorize the construction or operation of street railroads, except upon the condition that the consent of the owners of one-half of the value of the property abutting on the roads and the consent of the local authorities be first obtained.—(In re Brooklyn, Q. C. & S. R. Co., 77 N. E. Rep., 994.)

NEW YORK.—Carriers—Regulation—Street Railroads—Refusal of Transfer—Penalty.

Defendant street railway company operated a line of cars which ran only on 125th street, an east and west street. It also operated a line the cars of which went north on Third avenue to 125th street, thence west to A avenue, thence north on A avenue. It also had a line running south on A avenue from 125th street. To prevent unlimited riding for one fare the company had a rule that from the north-bound cars of the Third avenue line only green transfers for a ride north on A avenue should be issued, while from the cars of the 125th street line a white transfer, good in either direction on A avenue should be issued. Plaintiff boarded a Third avenue car while it was on 125th street going west, and, asking for a transfer to go south on A avenue, received a green transfer, which the conductor on the south-bound A avenue car refused to accept. Held that, in the absence of proof that the public had been given notice of the rule as to transfers, defendant was liable for the penalty for refusing a transfer.—(Gasper v. New York City Ry. Co., 99 N. Y. Sup., 902.)

NEW YORK.—Carriers—Refusal of Transfer—Rules of Company.

Under Laws 1890, p. 1096, c. 565, Sec. 39, providing that any railroad corporation which shall ask or receive more than the lawful rate of fare, unless through inadvertence or mistake not amounting to gross negligence, shall forfeit \$50, and section 104, as amended by Laws 1892, p. 1406, c. 676, providing that a street surface railroad corporation using several lines in a city shall on demand and without extra charge give to each passenger paying a single fare a transfer, entitling him to one continuous trip to any point on any such line, and for refusal to do so shall forfeit \$50, a street railroad company is liable for the penalty, though it has made a rule that the transfer be demanded when the fare is paid, and the conductor refused one because it was not demanded till some time thereafter.—(Levine v. Nassau Electric R. Co., 99 N. Y. Sup., 422.)

PENNSYLVANIA.—Street Railroads—Use of Street—Eminent Domain—Right to Compensation.

1. A street railway company obtained from a borough the right to use a certain street, the borough reserving the right to grant the "common use" of such street to another company in common with the first company. The street was broad enough

to accommodate two parallel tracks. Held that the borough could not require a later company, having permission to use the same street, to so lay its tracks as to straddle the tracks of the other company.

2. Where a street railway company is granted permission to lay its tracks in a street, allowing a later corporation to lay a part of its tracks on the tracks of a first company is an unconstitutional taking of the property of the first company.—(Commonwealth ex rel. Philadelphia, Bristol & Trenton St. Ry. Co. v. Bond et al., 63 Atl. Rep., 741.)

PENNSYLVANIA.—Street Railroads—Relaying Tracks—Acquiescence in Line—Trial—Findings—Conformity to Pleadings—Double Track—Turnouts.

1. Where a street railway company, in laying its track, failed to follow the exact line established by the borough, but the borough acquiesced in it for 10 years, it constitutes a ratification, and the borough cannot object where the railroad company follows the same line in relaying its tracks.

2. A borough, in a bill against a street railway company, charged that it was building a double-track railway to the irreparable damage of the borough, and the answer admitted the construction of the double track, but denied irreparable damage. Held that under the pleadings the court cannot find as a fact that the alleged double track was in fact a turnout.

3. A turnout in connection with a street car line is a short line of track having connection by means of switches with the main track, and an additional track in a borough cannot be considered a turnout, where, taken in connection with the original track and with a double-track railway with which the two tracks connected at the limits of the borough, it constitutes an unbroken double-track line.—(Borough of Bridgewater v. Beaver Valley Traction Co., 63 Atl. Rep., 796.)

VIRGINIA.—Writ of Error—Instructions—Review—Record—Evidence—Eminent Domain—Assessment of Compensation—Instructions to Commissioners—Compensation for Property Taken—Value—Writ of Error—Record—Review of Instructions.

1. Where the refusal of instructions is sought to be reviewed on a writ of error, the evidence should be made a part of the record by bill of exceptions.

2. Where, prior to proceedings by a street railway company to condemn a right of way over certain land, defendants had recovered the land from the railroad company in ejectment, an instruction that, in considering what was a just compensation, the commissioners must consider to what uses it might be put by the owners, and that if they had dedicated the strip to the public while they owned the fee, such ownership was subject to the rights of the public to freely travel on and over the strip, was properly refused as erroneously authorizing the commissioners to consider defendants' rights in the land, which had been disposed of by the court both in the order appointing them and directing them to consider what would be a just compensation for the fee simple title to the land and in the ejectment proceeding.

3. The instruction was also properly refused as uncertain and misleading, in that it declared that if the owners had dedicated the land to the public in "whole or in part" the public was entitled to travel over all of it.

4. A strip of land sought to be condemned had been occupied by a railway continuously for many years, during which time the strip had been repurchased by defendants for default in the payment of a debt secured by a deed of trust resting on the land. Held that by defendants' purchase under the deed of trust, they acquired the property in its then condition, and hence an instruction limiting their recovery to a sum based on the value of the land when the railway was constructed was properly refused.

5. Where instructions copied into the record were nowhere made a part of it by any bill of exceptions, they could not be reviewed on writ of error.—(Newport News & O. P. Ry. & Electric Co. v. Lake et al., 54 S. E. Rep., 328.)

LIABILITY FOR NEGLIGENCE

ARKANSAS.—Street Railways—Operation—Collision with Animals—Contributory Negligence of Owner—Evidence—Res Gestæ—Killing Animals—Liability—Damages to Property—Statutes—Application to Street Railways—Instructions—Trial—Applicability to Evidence—Comment on Amount Involved.

1. In an action against a street railway for the killing of a hog, the burden is on plaintiff to show that the hog was killed through the negligence of defendant.

2. Where, in an action against a street railway for the killing of a hog, it appeared that the hog was outside of the stock limit, it was not contributory negligence to allow it to run at large.

3. In an action against a street railway for the killing of a hog, it was proper to admit evidence that the motorman remarked at the time "that the hog jumped on the track right in front of the car."

4. In an action against a street railway company for the killing of a hog, plaintiff was not entitled to recover in the absence of evidence that the hog went on the track in front of the motorman in time for him to have stopped the car before striking it, had he seen it and used all the means in his power to that end.

5. Kirby's Dig. Sec. 6773, making railroads responsible for all damages to property caused by the running of trains, is not applicable to street railways.

6. In an action against a street railway for the killing of a hog, defendant requested the court to charge that, in order to find for plaintiff, the jury must find that the hog went on the track and was seen by the motorman when the car was a sufficient distance away to have permitted him, by the exercise of ordinary care and prudence, to stop the car before striking the hog, and that, if the motorman exercised ordinary and reasonable care to avoid the accident after he discovered the danger of the hog and was unable to do so, the jury should find for defendant. Held, that the instruction was properly refused.

7. An instruction that, in order to find for plaintiff, the jury must find that the hog went upon the track and was seen by the motorman of the car, or could have been seen by him in the use of ordinary care in operating the car, when the car was a sufficient distance away to have permitted him, by the exercise of ordinary care, to stop the car before striking the hog, there being no evidence tending to show that the motorman could have seen the hog when a sufficient distance away to have permitted him to stop the car, was erroneous.

8. In an action against a street railway for the killing of a hog, it was error, after submitting the case to the jury, to instruct them that the amount was small, and that it cost the county more to try the case than was involved to either of the litigants, and that it was the desire of the court that the jury decide the case if they could do so without giving up their honest convictions.—(Little Rock Ry. & Electric Co. vs. Newman, 92 S. W. Rep., 864.)

CALIFORNIA.—Appeal—Conclusiveness of Verdict—Carriers—Injury to Passengers—Evidence—Rebuttal—Presumption of Negligence—Burden of Proof—Preponderance of Evidence—New Trial—Newly Discovered Evidence.

1. Verdict of the jury, supported by conflicting evidence, will not be disturbed on appeal.

2. Where, in an action against a street railway company for injuries alleged to have resulted from the emission of flashes of flame from the electrical apparatus of the car on which plaintiff was a passenger, evidence was admitted as to the extent of the flashes and the resulting explosions, on plaintiff's theory that he was blown from the car by the explosions, or that they were of such magnitude he was justified in jumping from the car to escape, further evidence on behalf of plaintiff as to extent of the flashes and explosions was not admissible in rebuttal.

3. In an action against a carrier for injuries to a passenger, which were received under circumstances giving rise to a presumption of negligence, it is nevertheless proper to charge that the burden of proof is upon plaintiff.

4. In an action against a carrier for injuries to a passenger, received under circumstances giving rise to a presumption of negligence, defendant is entitled to a verdict if it produces sufficient evidence to balance the presumption without overcoming it by the preponderance of the evidence.

5. Newly discovered evidence which is merely cumulative is not sufficient ground for new trial.—(Patterson vs. San Francisco & S. M. Electric Ry. Co., 81 Pac. Rep., 531.)

COLORADO.—Appeal—Discretion of Court—New Trial—Harmless Error—Admission of Evidence—Record—Presumption—Negligence—Places and Things Attractive to Children—Duty of Owner—Contributory Negligence of Children—Question for Jury.

1. The determination of the court as to whether a new trial shall be granted for statements of counsel in argument will not be disturbed, except for clear abuse of discretion.

2. Permitting an expert, called by plaintiff in an action for injury to a child playing in a trolley car left by defendant in the street, to describe the different kinds of mechanical devices used on defendant's several cars, is harmless.

3. Where the abstract of record does not purport to contain the entire charge, it will be presumed that it substantially embraced instructions requested and refused.

4. On the question of liability of a street railway company for injury to children from playing about cars left in the street unguarded, the legality or illegality of the occupation of the street by the company is immaterial.

5. Where children are attracted by and go on street cars left stored on a street by a railway company, it is the duty of the company to take reasonable precaution to prevent the children going thereon, or to protect from injury such as may be attracted thereto.

6. Infants of tender years are not held to the strict rule of contributory negligence; but the care and caution required of them is according to their maturity and capacity only.

7. Whether a child being 13 years old was sui juris, and therefore to be held to the strict rule of contributory negligence, is a question for the jury.—(Denver City Tramway Co. vs. Nicholas, 84 Pac. Rep., 813.)

ILLINOIS.—Appeal—Findings—Conclusiveness—Evidence—Res Gestæ—Declarations—Admissibility—Street Railways—Collisions—Injuries—Evidence—Trial—Misconduct of Counsel—Action of Court—Instructions—Applicability to Pleadings—Construction of Charge as a Whole.

1. The judgment of the Appellate Court is conclusive on the weight of the evidence or the credibility of the witnesses.

2. Where a collision between a street car and a fire engine occurred almost immediately after a third person attempted to warn the motorman of the approach of the engine, the reply of the motorman to the warning was sufficiently connected with the thing done to make it competent evidence.

3. Where, in an action against a street railway company for the death of a fireman in a collision between a car and a fire engine on its way to a fire, it was shown that the motorman and the decedent were familiar with the rule giving the fire department the right of way, the rule was admissible as bearing on the question of contributory negligence of decedent in permitting the engine to approach the crossing at which the collision occurred at the speed he did.

4. Plaintiff's counsel in his opening statement started to state to the jury certain facts which were improper. The counsel of the adverse party interrupted him by an objection, which was sustained by the court, and the jury were immediately instructed to disregard such statement. Held, that the misconduct of counsel was not a ground for a reversal.

5. An instruction in an action for negligent death, authorizing a verdict for plaintiff on the jury finding that defendant was negligent, "and that such negligence caused the injury to the plaintiff's intestate complained of," in specified counts of the amended declaration, or any one of them, and plaintiff's intestate was at the time in the exercise of ordinary care, is not open to the objection that it does not restrict the negligence for which plaintiff can recover to that charged in the enumerated counts of the declaration, where the court charged that before there can be a recovery defendant must have been guilty of the negligence charged in some count of the declaration submitted, and that the instructions must be considered in one connected series.—(Chicago City Ry. Co vs. McDonough, 77 N. W. Rep., 577.)

LOUISIANA.—Street Railways—Injury to Person on Track—Evidence—Negligence.

1. The decedent was at a place where he had a right to be, on the track on his way to board a street car.

2. The car of the defendant company, the appliances, and the road were in good order.

3. The car was running at the usual rate of speed.

4. The decedent and his companion were not standing on or dangerously near the track on which the car which collided with decedent was coming up.

5. The decedent suddenly turned and left the place where he was standing, and ran diagonally in the direction of the coming car, and struck the dashboard and was killed. When he crossed over to the advancing car with which he collided, he was about 6 ft. from the coming car.

6. The weight of the evidence sustains the view that it was too late after the decedent came on the track to stop the car and save his life.

7. The threatened danger alleged grew out of a misapprehension. The companion remained where the two were standing before the decedent turned and walked back, and was not hurt.

8. The testimony shows that the accident was sudden. The

companion of the decedent said, with reference to the latter, "He just turned around for a minute—a second."

The court finds it impossible, in view of the facts, to hold that the motoneer is responsible for the death.—(*Greve vs. New Orleans & C. R. Light & Power Co.*, 38 S. Rep., 698.)

LOUISIANA.—Carriers—Injury to Passengers—Street Railways—Neglect of Conductors—Arrest of Passenger—Liability of Carrier.

1. The defendant railway company, by its act of incorporation, came under certain legal obligations for the safety and protection of the public, and particularly of its passengers. It had for that purpose to act through its employees, for whose acts it was responsible. The conductor of a street car represents the street railway company. The company cannot free itself from the obligations referred to by failing to give its conductors full and specific instructions or by restricting the limit and extent of their authority, so as to disable them from properly performing duties which it is inherently necessary and essential they should have to carry out to the extent of legal requirements of the functions of the positions in which they are placed. It cannot, by merely enjoining upon the conductors to perform their duties cautiously, prudently, and well, break the effect of their failure to comply with these instructions; nor can it, by throwing the instructions into the form of prohibitory orders, alter the legal scope of their powers, duties, and authority. These are matters which it cannot lessen and make to fall below the limit of authority affixed by the law to the positions themselves.

2. The conductor of a street car invited a police officer to come upon his car, saying there was a pickpocket upon it. After he entered the conductor pointed out to him one of the passengers on the car as being such. The policeman arrested the passenger, took him off the car short of his destination, marched him under arrest through a crowded street, and sent him in a patrol wagon to a police station, where he was detained several hours and then released without any charge having been preferred against him. He was shown to be a man of good character and position.

3. The conductor did not himself make the arrest, but it was through his instrumentality that the passenger was arrested and ejected from the car and taken to the station. The conduct and course pursued by the policeman was the direct and natural consequence of that of the conductor. Under the Civil Code, he who causes another person to do an unlawful act, or assists or encourages the commission of it, is answerable in *solido* with that person for the damage occasioned by that act.—(*Schmidt vs. New Orleans Rys. Co.*, 40 South Rep., 714.)

MASSACHUSETTS.—Street Railways—Collision with Team—Negligence—Evidence—Contributory Negligence—Trial—Instructions.

1. Evidence in an action for collision of a trolley car with a large covered wagon, while crossing the tracks diagonally and going in the same general direction as the car, held sufficient to authorize a finding of negligence.

2. Evidence in an action for collision of a trolley car with a large covered wagon filled with furniture, while plaintiff was driving it diagonally across the tracks going in the same general direction as the car, held sufficient to authorize a finding that plaintiff was in the exercise of due care.

3. The driver of a covered wagon, who cannot see behind it because of its size and its being loaded, has the right to assume, in attempting to diagonally cross a street railway, that the motorman of any car coming from behind will do his duty by giving him time to cross.

4. The court need not give a requested instruction on an isolated part of the evidence, as to its bearing on the question of plaintiff's contributory negligence.—(*Williamson vs. Old Colony St. Ry. Co.*, 77 N. E. Rep, 655.)

MASSACHUSETTS.—Evidence—Expression of Present Pain—Trial—Cumulative Evidence—Declaration of Deceased—Carriers—Injuries to Passenger—Contributory Negligence—Negligence—Obligation to Notify Passenger of Signal to Start.

1. In an action against a street railway for injuries to intestate, evidence that after the injury, deceased, in riding one day in her own carriage "spoke about how hard it rode," and said that "it seemed as though her carriage never rode so hard before," was admissible as an expression of then present pain or weakness.

2. Under St. 1898, p. 522, c. 535, now Rev. Laws, c. 175, sec. 66, providing that a declaration of a deceased person shall not be inadmissible in evidence as hearsay, if the court finds that it was made in good faith before the commencement of the action

and upon the personal knowledge of the declarant, the fact that in an action against a street railway for injuries to plaintiff's intestate while a passenger on defendant's car, a daughter of deceased had testified to a conversation with her mother in which the latter described the accident, did not preclude another daughter from testifying to a similar conversation with deceased.

3. In an action against a street railway for injuries to plaintiff's intestate caused by the sudden starting of defendant's car with a jerk, thereby throwing intestate down, the fact that after deceased entered the car she walked up the aisle 5 or 6 ft. before the car started, did not preclude the jury from finding that in proceeding toward the front of the car decedent was exercising ordinary care, even if she did pass an empty seat which she should have taken.

4. On the issue as to the negligence of a street railway in starting one of its cars suddenly, thereby injuring a passenger who had entered the car, the question of the negligence of defendant's conductor in giving the signal to start was to be considered with reference to his duty to such passenger, and not to another passenger still on the steps of the car.

5. Where plaintiff's intestate, a strong, healthy woman between 58 and 60 years of age, showing no sign of physical or mental infirmity, had entered defendant's street car, and was proceeding to her seat in the usual way, defendant's conductor was under no obligation to wait until she had become seated before giving the signal to start.

6. Nor was defendant's conductor bound to notify plaintiff's intestate that he was about to give the signal to start the car.—(*Weeks vs. Boston Elevated Ry. Co.*, 77 N. E. Rep. 653.)

MICHIGAN.—Street Railroads—Operation—Rights in Street—Injuries to Person on Track—Contributory Negligence—Question for Jury.

A street railroad has the right of way, and under ordinary circumstances it is the duty of other travelers using the tracks to yield them to the cars upon their approach.

One who drove upon a street railroad track ahead of a car at a time when, if he had looked, he would have seen that he could not get across in time to escape the car, and who knew that the car was behind him and traveling at a high rate of speed, was guilty of contributory negligence.

In an action for injuries to plaintiff in a collision between his vehicle and a street car. Held that the question whether the motorman could have avoided the collision by the exercise of reasonable care after dissolving plaintiff's negligence was for the jury.—(*Daniels vs. Bay City Traction & Electric Co.*, 107 N. W. Rep., 94.)

MISSISSIPPI.—Street Railways—Negligence—Injuries to Passengers Standing on Running Board—Contact with Trolley Posts—Distance from Track—Contributory Negligence—Risks Assumed—Obvious Dangers—Guard Rail—Duty to Maintain—Evidence—Presumption—Question of Law—Questions for Jury.

1. Where, in an action for injuries, plaintiff's evidence and all just inferences to be drawn therefrom, show that his own negligence contributed to produce the injury, it is the duty of the court, though defendant introduces no proof to support a plea of contributory negligence, to instruct the jury, as a matter of law, that plaintiff cannot recover.

2. When the facts are not disputed, and the inferences or conclusion resulting therefrom are indisputable, the question of contributory negligence is one of law for the court.

3. In an action against a street railway for injuries to a passenger through being struck, while standing on the running board of defendant's car, by a trolley post, evidence held to show contributory negligence on plaintiff's part.

4. A defendant need not introduce testimony to support a plea which is fully sustained by plaintiff's evidence.

5. No proof is required to establish the proposition that it is more dangerous to be on the running board of a street car than to be on the seat, or even on the platform.

6. Where a passenger on a street car, inside which there is plenty of room, voluntarily leaves his seat and stands on the car platform, and, while the car is running rapidly, attempts to return to his seat by way of the running board of the car, on a side where he knows there are trolley posts, instead of going down the aisle, he thereby assumes all the risks arising from the position taken by him.

7. In an action against a street railway for injuries to a passenger, while standing on the running board of defendant's car, through being struck by a trolley post at the side of the track, that the pole was slightly nearer the track than two other posts

just on each side of it, does not tend to prove that the post in question was dangerously near the track.

8. Nor does it show gross negligence on defendant's part, the other posts appearing to have been further from the track than was necessary.

9. In the absence of evidence, it would not be presumed that the post, which was 33 ins. from the nearest rail of a street car track, was dangerously near or at all too close to the track.

10. The mere fact that the accident occurred did not even tend to prove that the post was too near the track.

11. The fact that the guard rail or bar which plaintiff knew was ordinarily kept down along the side of the car nearest the posts, as protection against the same, was up, did not relieve him of contributory negligence in exposing himself to an obvious danger.

12. A street railway is not negligent in failing to maintain a guard rail on the side of a car nearest the trolley posts for the protection of passengers where the posts are not dangerously near the track, and the danger therefrom is obvious.

13. Carriers are not bound to so restrain the liberty of their passengers that the latter can by no act of their own put themselves in unnecessary danger.—*Bridges vs. Jackson Electric Ry., Light & Power Co.*, 38 S. Rep., 788.)

MISSOURI.—Carriers—Injury to Passenger—Pleading—Petition—Sufficiency—Amendment—Continuance—Amending Pleading—Abuse of Discretion—Damages—Personal Injuries—Amount.

1. In an action against a street railway for injuries, a petition alleging that defendant's car was stopped to receive plaintiff as a passenger, and that while she was getting on, and when by ordinary care defendant's employes could have seen the child in plaintiff's arms, and before plaintiff had reasonable time to get in a position of safety in such car, such employes "caused the said car to suddenly start forward," in consequence whereof she was injured, sufficiently charged a cause of action to be amended by the insertion of the word "negligently."

2. Under Rev. St. 1899, Sec. 688, providing that when a party shall amend any pleading, and the court shall be satisfied by affidavit or otherwise, that the opposite party could not be ready for trial in consequence thereof, a continuance may be granted, etc., amending a pleading does not entitle the opposite party to postponement of a trial as a matter of course.

3. Under Rev. St. 1899, Sec. 688, providing for a continuance on amendment of pleading, where, in an action against a street railway for injuries sustained by plaintiff while boarding a car, the complaint was amended by the insertion of the word "negligently" before the allegation of the acts causing the injury, there was no abuse of discretion in refusing a continuance.

4. Where, in an action against a street railway for injuries received by plaintiff while boarding a car, the evidence showed that plaintiff was knocked unconscious, sustaining an injury to her coccyx, which was treated as a fracture, plaintiff being kept in a plaster cast for ten days, there being a tenderness across the back, plaintiff suffering great pain, not being able to bend her leg without causing distress, and remaining in bed three or four weeks, being visited by a physician thirty-five times, and, moreover, suffering from nervous shock and an ailment resembling nervous prostration, being sometimes in a semi-comatose condition, that her back was hurt so she could not move for weeks, that she was nervous and restless and suffered great pain, and, though previous to the accident a perfect woman, her health thereafter was poor, a verdict for \$2,500 was not excessive.—(*Keeton et al. vs. St. Louis & M. R. Ry. Co.*, 92 S. W. Rep., 512.)

MISSOURI.—Carriers—Injury to Passenger—Negligence—Question for Jury—Appeal—Harmless Error—Instructions—Assuming Uncontradicted Facts—Trial—Instructions Partially Erroneous—Jumping to Avoid Collision.

1. In an action against a street railroad company for injuries to a passenger who jumped from a moving car because of fear that the motorman would not stop before reaching an obstruction on the track, evidence held to require submission to the jury of the issue of defendant's negligence, even though it should be conceded that the apparent obstruction was so located that it would not, in fact, have injured the car.

2. Where, in an action against a street railroad company for injuries to a passenger who jumped from a moving car because of fear that the motorman would not stop before striking an obstruction on the track, the petition alleged that the obstruction was in plain view of the motorman; an instruction allowing a recovery without proof of this was not reversible error in view of

uncontradicted evidence that the motorman knew of the obstruction.

3. The assumption in instructions of facts proved by uncontradicted evidence is not ground for reversal.

4. It is proper to refuse an instruction partly correct and partly erroneous.

5. Where a passenger was injured by jumping from a moving street car to avoid an apparently impending collision with an obstruction on the track, it is immaterial whether the obstruction was in "plain" view or not, or whether the action of other passengers increased her alarm.—(*McManus vs. Metropolitan St. Ry. Co.*, 92 S. W., Rep., 176.)

NEW JERSEY.—Death—Wrongful Death—Action by Surviving Husband—Distribution of Fund Recovered—Damages—Instruction.

1. The husband of deceased wife may, as her administrator, maintain an action, under the act entitled "An act to provide for the recovery of damages in cases where the death of a person is caused by wrongful act, neglect or default, approved March 3, 1848" (Gen. St., p. 1188), against a person or corporation whose wrongful act, neglect or default has caused her death, to recover for the pecuniary loss resulting to the next of kin.

2. The husband is not next of kin of his wife, within the meaning of the act of March 3, 1848 (1 Gen. St. p. 1188, Sec. 11), and is not entitled to share in the distribution of the fund recovered under that act.

3. The fund recovered under the act of March 3, 1848 (Gen. St., p. 1188), is no part of the estate of the deceased, and the administrator receiving it, whether the husband of the deceased or a stranger, is a mere trustee for its distribution to the next of kin in the method pointed out by the statute.

4. When the trial judge states to the jury what elements may enter into the ascertainment of the damages, to the exclusion of all other elements and subject matters, he is not required, even upon request, to enumerate and particularize certain of the elements and matters which are necessarily excluded from the consideration of the jury by the specific language or clear import of the charge as delivered.—(*Gottlieb vs. North Jersey St. Ry. Co.*, 63 Atl. Rep., 340.)

NEW YORK.—Damages—Issues and Proof—Personal Injuries—Appeal—Exceptions—Instructions.

1. In an action for personal injuries, the complaint alleged that plaintiff sustained a compound fracture of his skull; that his arm, elbow, ankle, legs and back were cut, bruised and contused; that the fracture was a permanent and incurable injury, and was and would be "the cause of plaintiff's being, becoming and remaining afflicted with diseases;" and that by reason of his said injuries "his physical and mental abilities have been and will remain impaired, lessened and destroyed." Held that plaintiff was entitled to prove an impairment of his eyesight, as well as any diseases directly traceable to the fracture of the skull or the injury to his arm, elbow, ankle and leg.

2. In an action for personal injuries, plaintiff's counsel, in presenting the case to the jury, stated that he proposed to offer proof that plaintiff's eyesight had been impaired. Defendant's counsel then objected that such proof would not be admissible under the complaint, and the court sustained the objection, and so instructed the jury, to which an exception was taken. The question was also presented on the examination of plaintiff's witness when the testimony was excluded by the court, and an exception taken thereto. Held that plaintiff was not required to take an exception to the charge of the jury bearing upon the question of damages.—(*Rudomin vs. Interurban St. Ry. Co.*, 98 N. Y. Sup., 506.)

NEW YORK.—Carriers—Injury to Passengers—Actions—Res Ipsa Loquitur—Evidence—Sufficiency—Trial—Instructions—Credibility of Witnesses.

1. The maxim *res ipsa loquitur* is applicable to a case where a passenger in a street car is injured by the fall of a device used for registering fares.

2. In an action against a carrier for injuries to a passenger owing to the fall of a device used for registering fares, evidence considered, and held sufficient to warrant a finding that there had not been proper inspection on the part of the carrier.

3. In an action for injuries to a passenger owing to the fall of a device used for registering fares, the court instructed that defendant's witnesses had testified that the fall was caused by the breaking of an iron prong owing to a flaw therein, which could not have been seen until after the iron had been broken, and that it was for the jury to pass upon the credibility of such witnesses, and say whether their testimony should be accepted, and that, if

the evidence appeared to be a satisfactory explanation, there should be a verdict for defendant. Held that the instruction was a proper one on the credibility of defendant's witnesses, and it was not error for the court not to have told the jury explicitly that they should find a verdict for defendant if they believed its witnesses.—(Weir vs. Union Ry. Co. of New York City, 98 N. Y. Sup., 268.)

NEW YORK.—Carriers—Passengers—Negligence—Question for Jury—Position—Care Required—Contributory Negligence.

1. Where one of the rails of defendant's horse-car track had been depressed from 4 to 6 ins. below its opposite rail for several days during improvements in the street, which depression extended about 3 ft. along the track, making a sharp pitch hole, over which defendant's car at the time of the accident was rapidly driven, and by the bounding of the car intestate was thrown from the front platform, on which he was riding as a passenger, and killed, whether the carrier was guilty of negligence was for the jury.

2. While a passenger standing on the front platform of a street car is not guilty of negligence by such fact alone, he nevertheless owes to the carrier some precaution, either by the manner of standing or by grasping some support, to guard against losing his balance by an sudden motion of the car.

3. Where, in an action for death of a street car passenger by being thrown from the front platform of the car by a sudden jolt thereof, there was no evidence describing the manner in which deceased was standing with reference to bracing himself, nor whether he had hold of any part of the car just prior to the accident, nor any facts from which the jury could have inferred that deceased was taking any precaution whatever to guard against losing his balance, plaintiff failed to establish that deceased was not guilty of contributory negligence.—(Depew vs. New York City Ry. Co., 98 N. Y. Sup., 276.)

NEW YORK.—Street Railroads—Collisions With Vehicles on Track—Rate of Speed—Negligence as Matter of Law—Actions—Contributory Negligence—Sufficiency of Evidence—Evidence—Prior Accidents—Error—Reversible Error.

1. The fact that a street car is running in a sparsely settled and little frequented locality at a speed of from 15 to 20 m. p. h. is not, of itself, negligence as a matter of law with respect to a collision with a vehicle on the track.

2. In an action against a street railway for injuries resulting from a collision between defendant's car and plaintiff's wagon, evidence examined, and held to show contributory negligence on the part of the driver of the wagon.

3. In an action against a street railway for injuries resulting from a collision between defendant's car and plaintiff's wagon, the admission of evidence that defendant's motorman had previously been concerned with an accident was erroneous, although it may not have affected the result, and would not, of itself, call for a reversal.—(American Ice Co. vs. New York City Ry. Co., 98 N. Y. Sup., 219.)

NEW YORK.—Master and Servant—Injury to Servant—Obvious Danger—Negligence of Employer—Question for Jury—Contributory Negligence—Question for Jury—Assumption of Risk—Appeal—Reservation of Grounds of Review—Hypothetical Questions.

1. The danger of an employee receiving an electric shock while clearing snow from an elevated railroad with an iron shovel, in consequence of the same coming in contact with the electrically charged third rail and another iron connected with the track, thereby producing a short circuit, is not an obvious danger, and is one which a layman is not likely to know unless specially instructed, or unless he happened to observe the effect.

2. In an action for injuries to an employee, evidence considered, and held that the question whether the employer was negligent in failing to furnish the employee with a wooden shovel instead of an iron one, with which to clear snow from an elevated railroad, or in failing to instruct him as to the danger of striking the shovel against the third rail and another piece of iron on the track, was for the jury.

3. Whether the employee was guilty of contributory negligence. Held for the jury.

4. The question whether the employee assumed the risk. Held for the jury.

5. Where, in a personal injury action, the evidence showed that molten iron was precipitated into plaintiff's eye, the error in allowing a medical expert to testify in answer to a hypothetical question

based on molten lead being precipitated into the eye was not reversible error; the attention of the court not being called to the fact that the question assumed that the metal was lead.—(Smith vs. Manhattan Ry. Co., 98 N. Y. Sup., 1.)

NEW YORK.—Street Railroads—Negligence—Defective Tracks—Notice—Stipulation—Admissions—Injury to Bicycle Rider—Trial—Directing Verdict.

1. Where, by the construction of a subway beneath the roadbed of a street railway, a trolley slot thereon would spread at times about an inch for a distance of 2 ft, and a bicycle rider was injured because thereof, and the evidence showed that the slot was safe up to within a short time prior to the accident, the street railway company was not chargeable with notice of the condition, so as to make it liable on the theory of negligence.

2. Where, in an action against a street railway for injuries to a bicycle rider caused by the spreading of the slot in the track, a stipulation by defendant, admitting that it maintained the slot on which plaintiff was riding when injured, is not an admission that it was responsible for the condition of the slot at the time of the accident.

3. Where, a street railway company was sued for injuries to a bicycle rider by the spreading of the slot in the track, it could show under the general denial that it was not responsible for the spreading of the slot, which was the cause of the accident.

4. Where, at the close of the trial both parties request the direction of a verdict, any question of fact which the evidence may present is submitted to the court.—(Griffin vs. Interurban St. Ry. Co., 94 N. Y. Sup., 854.)

WASHINGTON.—Carriers—Injury to Street Railway Passenger—Negligence—Trial—Directing Judgment.

1. Testimony that just as a street car was slowly turning from an avenue onto a street the conductor, at the instance of a passenger on the back platform, signaled to stop the car, whereupon the passenger crossed the platform and took his position on the lower step of the car, with his hand on the stanchion, ready to alight when the car stopped; and that, instead of stopping, the motorman increased the speed of the car so that it was going 8 or 10 miles when or soon after it got round the curve, and that the passenger was thrown off, is sufficient to go to the jury on the question of negligence of the persons operating the car in leading the passenger into a place of danger and throwing him off his guard.

2. Where there is evidence to support plaintiff's case, the court may not direct judgment for defendant, though the preponderance of evidence is so great for it that a verdict for plaintiff could be set aside as against the evidence. Judgment can be directed only where the granting of a non-suit would be warranted.—(Weir vs. Seattle Electric Co., 84 Pac. Rep., 597.)

WISCONSIN.—Action—Conditions Precedent—Notice of Personal Injury—Disability of Infancy—Constitutional Law—Right to Remedy for Injuries.

1. Laws 1897, p. 678, Chap. 304 (Rev. St. 1898, Sec. 4222, subd. 5), providing that no action for an injury to the person shall be maintained, unless within one year after the happening of the injury notice shall be given to the person liable therefor, is not a statute of limitations within Rev. St. 1898, Sec. 4233, providing that if a person entitled to sue shall be within 21 years of age, the time of his disability shall not be a part of the time limited for the commencement of the action, but imposes on all persons, including minors, the obligation to serve such notice in order to maintain an action.

2. The notice of a personal injury is sufficient within Laws 1897, p. 678, Chap. 304 (Rev. St. 1898, Sec. 4222, subd. 5), declaring that no action for a personal injury shall be maintained, unless within one year after the injury, notice in writing, signed by the party damaged, his agent, or attorney, shall be served on the person liable therefor, when it shows that it is given on behalf of the person injured, and the father may give such notice on behalf of an injured minor.

3. Laws 1897, p. 678, Chap. 304 (Rev. St. 1898, Sec. 4222, subd. 5), providing that no action for a personal injury shall be maintained, unless within one year after the injury notice is served on the person liable therefor, gives a reasonable time within which to serve the notice in actions accruing after its passage, and it is not, when applied to such actions, in conflict with the fourteenth amendment to the Federal Constitution, or with Const. art. 1, Sec. 9, declaring that every person is entitled to a remedy in the laws for all injuries.—(Hoffmann vs. Milwaukee Electric Ry. & Light Co., 106 N. W. Rep., 808.)

LONDON LETTER

(From Our Regular Correspondent.)

The result of the working of the Metropolitan District Railway Company under the complete scheme of electrification which has been in operation now for some time, must be said to be distinctly disappointing, and a few of the details given by Sir George Gibb, at the half-yearly general meeting held recently, show traces of the difficulties under which company has been working since the scheme was completed. The total capital expenditure up to June 30, in connection with the electrification of the railway and all its concurrent improvements, amounted to £1,783,000, and during the half-year under review, the company had carried over 32,750,000 passengers, which is an increase of over 5,000,000. As far as numbers are concerned this is a record, but, unfortunately, the expenses have also increased in an almost alarming ratio, and the net result is that after paying the dividends on the guaranteed stocks, there is a deficiency of nearly £50,000. Sir George spoke most confidently of the excellence of the rolling stock and the complete apparatus in connection with the electrification, though a good deal would yet have to be done in modifying the bogie trucks on which the carriages were mounted, these having caused considerable trouble. As has been frequently mentioned in this column, the prices of transportation in London have been steadily falling for years, ever since, it may be said, the Central London Railway, commonly known as the twopenny tube, was opened. In common with all other transportation companies the District Railway has decreased many of its fares, and it would appear from Sir George's report that the directors have now come to the conclusion that these have been reduced in too great a degree, so that, commencing with September they have resolved to materially increase these fares, taking care, however, to do so in such a way that passengers will feel the increase in the least possible degree. The carriage, for instance, of workmen at a very low fare has resulted in an almost alarming increase in this portion of traffic. Workmen's fares have increased in the last ten years from 5,000,000 to upwards of 16,000,000 per annum, and as they work out at only .65d. per passenger, the company is resolved to make some substantial increase in these fares. The cheap return fares will also be done away with, and though the company does not propose to resume the old fares, which were too high, the special reductions will be largely made in the return tickets. The directors are still confident that much better results will appear in the future, and it is to be hoped from every point of view their anticipations will be at an early date realized.

There has been a modern battle of Hastings—the battle of the Sunday trams. For some time past there has been a growing demand for the running of Sunday trams in this historical city by the sea, and as has been the case in most other cities in Great Britain, the progressive element has again won the day. As in other cities it was decided a few weeks ago to submit the whole thing to public ballot, the papers containing a simple question as to whether the voter was in favor of the running of Sunday tramways or not. The result is a majority of 1420 in favor of Sunday tramways in a total vote of nearly 6800. The subject has given rise to columns of literature in the local daily press and in circulars, to huge posters on walls and in windows, to sermons in the various churches, and to much amusing poetry of the usual election character. The ballot was comprehensive in character, and allowed not only heads of families but their wives and frequently their sons to vote, and it is now alleged that many members of families are not on speaking terms.

An important announcement has just been made by the directors of the Midland Railway Company, stating that they intend to electrify the 8 miles of their line which lie between Heysham Harbor (which it will be remembered is the new Midland route to Belfast), Moncambe and Lancaster. There are not many details available at present, but it is announced that it is intended to work this line on the single-phase system, and the present power house at Heysham Harbor, recently equipped by the British Westinghouse Company, will be utilized for the furnishing of the necessary current. Catenary overhead construction will, of course, be used, the voltage being 3300 at 25 cycles. The through trains will not be operated at present, the electric service being proposed only for local trains. The neighborhood is not one from which any great results are expected from a statistical point of view, as the traffic is not dense, but the application will be looked upon as an experimental one from which greater developments will arise in the future.

An equally interesting piece of information which has recently been made public by Lord Stalbridge, who recently presided at

the half-yearly meeting of the London & North Western Railway Company, is that the company, provided that the shareholders approve of the scheme, intends to apply for powers to make an entirely new electric railway from its present terminus at Euston to Watford, a distance of over 17 miles. The necessity for such a line has been brought about by the demand for increased suburban service, which the company cannot at present expand to any great extent without seriously interfering with the work of its long-distance traffic, which perhaps at the present moment is the best conducted in the world. The proposed line is intended to run partly alongside and partly under the present main line, with a loop and local station under the present Euston terminus. By having the new station at Euston underground, the company will be able to afford connection with the City & South London Railway and the Charing Cross, Euston & Hampstead Railway. This is a most important development in the right direction, and will undoubtedly be of vast service in developing the suburban services of this most important railway, and also in vastly increasing the comfort of passengers on main line trains.

The London County Council is proposing an extensive scheme of new tramways for which approval will be sought at the next Parliamentary session. These schemes will embrace a total mileage of 33½ miles, all of which, with the exception of 6 miles, represent new lines. A total of £700,000 will be necessary for the equipment, the estimates providing for the use of the conduit system, as already installed in most of their tramways, except in certain places where the overhead trolley system is deemed advisable. One of the most important schemes is a double line of tramways from the Marble Arch by way of Edgware Road and Maida Vale to Cricklewood, a distance of 7½ miles. Another important scheme is the line of tramways which will eventually be placed on Hampstead Road, a portion of the line being laid by way of Seymour Street across Euston Road, via Woburn Place, Tavistock Square and Russell Square, joining with the existing lines at Southampton Row. The other portion of this same scheme will be by way of Hampstead Road across Euston Road and along Tottenham Court Road to Francis Street, Gower Street, Bedford Square and New Oxford Street. These lines will join at Hampstead Road with the existing tramways which run northwards to Highgate and other northern suburbs, which will also soon be electrified. Other important schemes are in the southern suburbs in the vicinity of Wandsworth and Putney, while two important schemes are intended to provide increased facilities for approach to the Crystal Palace, and it is also proposed to extend the existing tramways at Streatham to the county boundary at Norbury. In conjunction with the work which the Council already have authority for these will create an extensive system of tramways, and there are no real good reasons why the powers sought should not be granted.

The electric tramway service over the new Vauxhall Bridge has now commenced, and cars are now running from Victoria to Catford, via Camberwell and Peckham. A portion of the London County Council's new electric tramway from Tooting Broadway to the Hop Exchange, via Garret Lane, Wandsworth, Battersea and Vauxhall, has also been opened. Mr. John Burns, M. P., rode on the first car from Tooting, and expressed himself as highly gratified with the new route. The remaining portion of the route is expected to be in full working before Christmas. It is also interesting to note that the Royal assent has now been given in the House of Lords to the London County Council Tramways and Improvements bill for the construction of tramways over Westminster Bridge and along the embankment, to meet the proposed tramways over Blackfriars Bridge, which the City Corporation have agreed to widen.

The highways committee of the London County Council reports that it is taking the necessary steps in connection with the appointment of the committee suggested by the Admiralty to inquire whether the working of the Greenwich electricity generating station will have any injurious effect upon the Royal Observatory, Greenwich. Arrangements have been made with Sir Benjamin Baker to act as the Council's representative on the committee. It has also been thought well that the Council should obtain the assistance of an expert from the astronomical and scientific point of view, and in that connection arrangements have been made with Prof. C. Boys to act in an advisory capacity to the Council. The representatives appointed by the Admiralty on the committee are Prof. J. A. Ewing and Lord Rosse.

The historic town of Stirling, in Scotland, and the beautiful residential town of Bridge of Allan, in the immediate vicinity, have for years been connected by an indifferent system of horse tramways. Many attempts have been made to produce something better, and it is, therefore, a matter of congratulation that the

National Electric Construction Company, Ltd., of London, has acquired the Stirling & Bridge of Allan Tramways for the sum of £10,000 in cash and £9,470 in shares of the National Company. It is intended at once to proceed with the electrification of this line, the electrical energy being taken from the Stirling Corporation. Should the undertaking prove to be a success, the line will probably be extended to Bannockburn on the south and Dunblane on the north, with probable further extensions along the foot of the Ochil hills.

One good result of the accident to an electric car at Highgate Archway has been the renewal of the tramway cars used by the Highgate Hill Steep Grade Cable Company, whose service has been running from the Archway to the top of Highgate Hill for the past twenty years. After the accident, the Metropolitan police stopped the running of these cars until some kind of guarantee was given that they would be remodeled and better equipped with brakes. The whole service was therefore stopped for some little time until a new car with the necessary improvements was put in service, and on the company's guarantee that it would remove all the old vehicles and put on equally good new ones, the service was permitted to be resumed.

Mr. J. F. C. Snell has resigned his position as borough electrical engineer of Sunderland, having decided to come to London as a consulting electrical engineer, and the committee has determined to advertise for a successor at a commencing salary of £800 per annum. Mr. Snell was engaged at the last Parliamentary inquiry into the London County Council's bill for supplying the London area with electricity in bulk, and it is probable that he will be asked by the London County Council to accept a retainer for the next Parliamentary session. Mr. Snell is a young man of marked ability, and his conduct of the electrical affairs of the city of Sunderland has been one of continued success, so that it is confidently expected that before very long he will become one of the most respected of the consulting electrical engineers in the Metropolis.

The dispute between the Manchester Corporation and its tramway employees has recently been settled by the arbitrator, a member of the Board of Trade. His decisions are decidedly against the men, as he states that he is of opinion that if the concessions demanded by the men were granted, not only would heavy charge be entailed on the rate payers, but the employees would receive benefits from the undertaking quite out of proportion to those to which they are reasonably entitled. The result is that the men will lose the concession which the tramways committee were prepared to grant, and will, in addition, have to pay the costs of the arbitration. Curiously enough, almost concurrently with this decision, comes the statement that the Salford tramway men are applying for an increase of pay, which the Salford Corporation are by no means willing to allow. The matter is at present under discussion, but it would appear that the Salford men are being well treated, and with the Manchester decision staring them in the face it is not likely that they will proceed much further with their complaint.

Mr. John E. Pitcairn, who has been for over twenty years general manager of the tramways in Edinburgh, has tendered his resignation. In accepting it, the directors of the Edinburgh & District Tramways Company, Ltd., have minuted that they have done so with great reluctance, and have voted him a retiring allowance. Mr. Pitcairn has seen the original Edinburgh street tramways undertaking taken over by the town, the conversion of horse haulage into cable traction, and the extension of the system to the suburbs; and largely to him is due the present admirable organization of the tramway system in the city. Mr. Shepherd, the new manager, is a native of Plymouth. He acquired his experience under the Manchester Tramway & Carriage Company, of which he was for a time a branch manager. When the concern was taken over by the Corporation he was elected outside superintendent. From Manchester he went to Bradford as traffic superintendent, and inaugurated there a system of overhead trolley electric traction. In 1903 he came to Edinburgh to be traffic superintendent of the Edinburgh & District Tramway Company, of which he has now been appointed general manager and secretary.

In considering the electrification of the Edinburgh tramways the municipal authorities have been looking into the merits of the surface contact system. Requests for information as to the practical operation of lines equipped with the surface contact studs, of the town clerk in each municipality in England, and have developed the following facts: Wolverhampton has 20 miles laid with the Lorain system. The cost of construction of permanent way per mile is reported as £5,665; full electrical equipment, in-

cluding feeders, etc., £2,735, total £8,400 per mile. Working cost per car mile, as per last balance sheet, 6.5d. The Lorain system has now been in operation since January, 1902. The working during this time has been satisfactory in every degree, and the working costs compare favorably with those of the overhead system. The financial results also are favorable, after allowing fully for depreciation. In Lincoln, 3 miles have been laid with the G. B. contact system, which works out at about 10 per cent more than the inclusive cost of track and electrical equipment on the overhead system. As the cars have only been running for seven or eight months figures are not available for up-keep, etc., but it would appear that the citizens generally speak very favorably of the way in which the service has been conducted. It is said that if the system costs no more proportionately for up-keep during the next six months than it has during the last the cost of up-keep should compare very favorably with that of the overhead system, and the same remark applies to the current consumption, which at present is very little more than would be the case with the overhead system. The town of Mexborough is installing a surface contact system, but can give no information yet. Dresden, in Germany, has both the Dolter and Kingsland systems in experimental use, but Dr. Matther, the town clerk, states that the cost is considerably more than the trolley, and that it is unlikely than any surface contact system will be adopted.

The auditors of the Liverpool Corporation electric tramways undertaking have just issued their report upon the accounts for the year 1905. It is interesting to note that the car receipts for the year amounted to £550,083, an increase in the twelve months of £9,233, and the passengers carried reached the high total of 119,123,644, the figures showing an increase over the previous year of no fewer than 2,480,981. Yet notwithstanding this great additional traffic, it is recorded that the mileage run has been reduced to 12,066,963, a decrease of 99,456 miles as compared with the year 1904. The passenger receipts per mile averaged 10.940d., as against 10.669d. for 1904. The revenue account produced a surplus of £175,677, leaving, after payment of sinking fund and interest charges, a net surplus of £75,959, and of which two-thirds was placed to the reserve fund and the balance, £25,319, paid over in relief of rates. The amount set aside for renewals and depreciation, £88,814, is equal to 7.68 per cent on the capital sum of £1,156,597 in connection with the establishment of the undertaking. The reserve fund stands at £214,398.

The highways committee of the London County Council reports that during the year ended March last the Council's southern tramways earned £782,210, £626,860 being the receipts from the electric cars and £155,350 from the horse cars. The working expenses amounted to £561,755. The gross surplus of receipts over expenses was £220,454. Debt charges, etc., amounting to £174,853, and other charges left a net surplus of £2,319 to be carried to the appropriation account. This compares with a net surplus of £7,054 in 1904-5, when the same amount was set aside for renewals, and other special charges were made. The committee states that the working expenses for electric traction have been considerably heavier than they are expected to be when the permanent generating station at Greenwich is used to full advantage and the temporary stations are wholly dispensed with. On the whole, the results of the year's working (which are considerably more favorable than was anticipated in the annual estimates) are regarded as being very satisfactory.

The Llandudno & District Electric Tramway Construction Company, Ltd., has been registered, with a capital of £100,000. The objects are to adopt agreements (1) with the Carnarvonshire Electric Traction Syndicate, Ltd., relating to the acquisition of certain light railway orders authorizing the construction and working of certain lines of electric light railway between Colwyn Bay, Llandudno and Deganwy, together with the undertaking of the Llandudno & Colwyn Bay Electric Traction Company, Ltd., subject to certain liabilities; and (2) with Bruce Peebles & Company, Ltd., relating to the completion of the construction and equipment of the said light railways or part thereof, and to carry on the business of tramway, railway, omnibus and electrical, steam or other mechanical carriage and van proprietors, carriers of passengers and goods, electricians, engineers, etc.

The Sheffield City Council has received an interesting report with respect to the maintenance of the existing electric tram system. Special importance is attaching to the matter in that Sheffield has adopted a universal penny fare from the center of the city to all suburbs, a system the soundness of which has been severely criticised. By it passengers are carried in some instances as far as 3¼ miles for the penny, a cheaper rate than has been attempted either in this country or on the Continent. Notwith-

standing this the Council finds that the income of the undertaking is sufficient for its needs, and that reasonable assistance out of the surplus will probably be available year by year in aid of the rates. It has been decided to establish a renewals fund of £75,000, and to put aside each year towards renewals an amount equal to 1 penny per car mile traveled, which will realize about £26,000 or £27,000 per year. That sum, it is considered, will be sufficient to meet all calls on this account, through it is pointed out that neither Sheffield nor any other city has yet had sufficient experience to guide them to any exact figure.

The Glasgow tramway accounts were submitted for approval at the Town Council recently. Councillor Alexander, in moving their adoption, said that while the revenue had been greater, the net surplus was reduced by £37,000. This was largely due to the fact that expenses for the maintenance of track had amounted to the enormous sum of nearly £70,000, or about £40,000 more than in the previous year. He could not promise that the surplus would be any larger next year, so that there would not be any balance to enable them to increase the halfpenny-fare distances. Replying to critics, he pointed out that whilst the department had borrowed practically three millions, the debt at present amounted to only £1,700,000. In twelve years they had paid to the common good £191,000, whilst in twenty-three years the private company, which formerly leased the streets, paid only £63,000. The accounts were adopted.

The first step towards the municipalization of the tramways in the Rossendale Valley has been taken by the Rawtenstall Town Council, which has decided to purchase the tram lines in the borough, extending to Waterfoot, Crawshawbooth and Lamb Row, Haslingden.

A series of trial runs have been made on the Wemyss & District Tramways system with most satisfactory results. The line begins at Leven and joins on to the Kirkcaldy Corporation system at Gallowtown. A feature of the line is the fact that for three-fourths of the distance— $7\frac{3}{4}$ miles—it runs through fields, and thus does not disturb traffic on the public highway. Through cars are to be run in connection with the express trains at Kirkcaldy, so that the tramway is likely to be patronized by golfers from Edinburgh and Glasgow.

A. C. S.

DETAILS OF THE SALE BY THE NEW HAVEN COMPANY OF ITS TROLLEY PROPERTIES

Official announcement was made in Boston last Thursday of the details of the sale of the New York, New Haven & Hartford Railroad of the electric railway properties in Massachusetts, which it operated through the Consolidated Railway Company. Mention of the sale was first made in the STREET RAILWAY JOURNAL of Aug. 25, all the facts being given at that time that were then available for publication. This matter is now supplemented by the following official notice:

The transaction by which the street railway companies in Massachusetts formerly owned by the Consolidated Street Railway Company of Connecticut have passed from the control of that company is a sale in fact as well as in name.

A voluntary association, the New England Investment & Security Company, was organized and took over all the shares of the Massachusetts trolleys owned by the Consolidated Company, with the exception noted below. The Consolidated Company received in exchange therefor the promissory notes of the New England Company, all the preferred and common shares of the New England Company having been turned over to bankers for sale. The preferred shares of the New England Company represent the value of the property sold. They are guaranteed by the Consolidated as to 4 per cent dividends and \$105 per share in liquidation.

In consideration of the Consolidated affixing its guaranty to these preferred shares it received the proceeds of the common shares of the New England Company. These common shares were sold by the bankers to gentlemen, many of whom are prominently identified with interests of the New Haven Railroad. These gentlemen purchased these common shares from their personal funds and their ownership is of a purely personal nature. The common shares do not represent much property value, and, therefore, the price paid was based on prospective rather than present value.

So far, the New England Investment & Security Company has issued \$10,000,000 preferred stock and \$10,000,000 common stock. The preferred shares are in the hands of a prominent banking house for sale and will doubtless be put out to yield the New England Company something like par. Bearing the guaranty of the Consolidated company and being nontaxable Massachusetts stock, it is expected these shares will be in strong demand.

This transfer does not mean that the Consolidated management believe

that their previous position was untenable. They were of opinion that a of these trolley companies with an inflamed state of public opinion adverse to them; and having assumed that the action of the State authorities public service corporation cannot to-day successfully perform the service represented dominant public opinion in the commonwealth, they acted in deference to what that opinion seemed to be, but nevertheless with entire confidence that their previous position was legally right and proper and in the best interests of the public they endeavor to serve.

The management of the Consolidated were aware also that some of these trolley minority stockholders whose interests would doubtless be jeopardized in litigation, not because of any fault of their own, but merely because an outside company had stepped in and bought control of the companies in which these individuals had minority interest.

Furthermore, the management of the Consolidated, no matter how firmly they believed their position to be legally right, could not consistently with the dictates of prudence jeopardize in litigation stockholders' equities representing millions, when the benefits of such litigation might be had in a much simpler way.

Partly at least for this reason they have not sold all of the trolleys, but have retained one system, consisting of two small roads, the Worcester & Webster and the Webster & Dudley. The entire stock of these roads is to-day in the possession of the Consolidated. These roads were leased to the Consolidated by virtue of an act of the Legislature of 1901, but their status is just the same as the status of the other trolleys which have been sold to the New England Company, so far as stock ownership is concerned, and any action of the State authorities in bringing a test suit.

We understand that the management of the Consolidated are perfectly willing, if the State authorities are sincere in their wish that the State law be tested, that this case be sent up to the courts on an agreed statement of facts for a decision, and they will in every way co-operate with the Attorney-General to facilitate a decision by the courts at the earliest possible moment.

The situation is now this: The New Haven Railroad owns all the stock of the Consolidated Street Railway Company of Connecticut. The Consolidated of Connecticut owns to-day all the stock of the Worcester & Webster and Webster & Dudley, in Massachusetts. Therefore, if under the laws of Massachusetts there is anything illegal in the New Haven Railroad owning the stock of a trolley company of the State of Connecticut, which in turn owns street railways in Massachusetts, here is a test case, the adjudication of which the Consolidated people will facilitate with all the means at their command.

Plans for the sale of these trolley companies were begun no less than a year ago, and the transaction was practically finished before the legislative hearing on Beacon Hill in June. The only effect the action of the State authorities had on the matter is that instead of the common stock of the New England Company remaining in the treasury of the Consolidated Company, it has passed instead into the hands of private individuals.

Meanwhile, the stockholders of the New Haven Railroad may be assured that their officers and directors are free from the charge of permitting the New Haven Railroad to be concerned in the direct or indirect holding of stock in Massachusetts trolley companies; and that all the trolley companies formerly held by Consolidated interests in Massachusetts with the above noted exception have been sold not because their ownership was illegal, but in deference to Massachusetts public opinion.

ORANGE COUNTY TRACTION SOLD

The Orange County Traction Company, it is stated, has been purchased by a local New York syndicate, of which ex-Governor Odell is the head. The company owns about 20 miles of line. For three weeks there has been a strike of the regular employees, and strike breakers have been running the cars. The men demanded the closed shop, an increase of wages of 5 to 15 per cent and other concessions. The new owners have made a settlement with the men and are said to have granted every demand.

TOLEDO & WESTERN DEAL OFF—PROPERTY WILL PROBABLY BE SOLD

The deal for the purchase of the Toledo & Western Railway by a Cleveland syndicate headed by J. R. Nutt has fallen through. The stockholders' committee which undertook to secure the stock for sale to the Nutt syndicate at \$6.25 a share failed to get in much of the stock owned by Toledo people. The Toledo people tried to get more than the figure offered the other stockholders, and as a result the entire deal has been called off. The property will now probably go through sheriff's sale. A suit has been filed against the Toledo & Western Railway Company by the American Car & Foundry Company, because of the failure of the Railway Company to pay certain notes said to be due.

IOWA INTERURBAN EARNINGS IN 1905

The interurban railway companies of Iowa have filed their annual sworn statements with the Executive Council of the State, giving gross earnings, operating expenses, net earnings and other information for the use of the Executive Council in determining the values at which to assess these properties for taxation. The following is a brief summary of facts as shown by such statements for the year 1905:

The Interurban Railway Company, of Des Moines, reported 28.87 miles of track, same as in 1904; total gross earnings, \$154,733; gross earnings per mile, \$5,359; total operating expenses, \$81,309; operating expenses per mile, \$2,816; total net earnings, \$73,424; net earnings per mile, \$2,543; total value of road, including buildings, lands, power plant and equipment, \$328,164. After deducting taxes the company earned more than 21 per cent on this valuation. The gross earnings were \$15,179 greater, the operating expenses \$8,076 greater, and the net earnings \$7,103 greater than for the year 1904. The company earned 19½ per cent in 1904, and nearly 19 per cent in 1903, on the total reported valuation for those years.

The Cedar Rapids & Marion City Railway Company reported 14.21 miles of track, same as in 1904; total gross earnings, \$138,182; gross earnings per mile, \$9,724; total operating expenses, \$100,086; operating expenses per mile, \$7,043; total net earnings, \$38,096; net earnings per mile, \$2,680; total valuation, including buildings, lands, power plant and equipment, \$179,031. After deducting taxes the company earned nearly 20 per cent on this valuation. The gross earnings were \$14,208 greater, the operating expenses \$3,311 greater, and the net earnings, \$10,897 greater than for the year 1904. The company earned more than 15 per cent in 1904, and about 11½ per cent in 1903 on the reported valuations for those years.

The Waterloo & Cedar Falls & Northern Railway Company reported 54.73 miles of track, same as in 1904; gross earnings, \$152,077; gross earnings per mile, \$2,778; total operating expenses, \$83,829; operating expenses per mile, \$1,531; total net earnings, \$68,248; net earnings per mile, \$1,247; total value of the road, including buildings, lands, power plant and equipment, \$591,910. The company earned over 10¾ per cent on this valuation after deducting taxes. The gross earnings were \$16,929 greater, the operating expenses were \$3,746 greater, and the net earnings \$13,183 greater than for the year 1904. The company earned 9 per cent in 1904 and 8 per cent in the year 1903 on the reported valuations for those years.

The Mason City & Clear Lake Traction Company reported 14.62 miles of track, the same as in 1904; total gross earnings, \$37,779; gross earnings per mile, \$2,584; total operating expenses, \$24,255; operating expenses per mile, \$1,658; total net earnings, \$13,524; net earnings per mile, \$924; total valuation of road, including buildings, lands, power plant and equipment, \$46,700. After deducting taxes the company earned over 24 per cent on this valuation. The gross earnings were \$232 greater, the operating expenses were \$4,673 less, and the net earnings \$4,904 greater than for the year 1904. The company earned 13 per cent in 1904 and less than half of 1 per cent in the year 1903 on the reported valuations for those years.

The Tama & Toledo Electric Railway Company reported 2.75 miles of track, the same as in 1904; total gross earnings, \$11,557; gross earnings per mile, \$4,202; total operating expenses, \$10,152; operating expenses per mile, \$3,691; total net earnings, \$1,405; net earnings per mile, \$510. Total valuation of the road, including buildings, lands, power plant and equipment, \$28,370. After deducting taxes the company earned 3 2-3 per cent on this valuation. The gross earnings were \$786 greater, the operating expenses \$1,145 greater, and the net earnings \$360 less than for the year 1904. The company earned 5 per cent in 1904 and 12 per cent in 1903 on the reported valuations for those years.

The Cedar Rapids & Iowa City Railway & Light Company reported 27.63 miles of track, same as in 1904; total gross earnings, \$85,030; gross earnings per mile, \$3,077; total operating expenses, \$53,789; operating expenses per mile, \$1,946; total net earnings, \$31,241; net earnings per mile, \$1,130; total valuation, including buildings, lands, power plant and equipment, \$394,462. The company earned nearly 7½ per cent on this valuation after making deductions for taxes. The report for the year 1904 only covered four and one-half months, the report for 1905 covers the entire year. The gross earnings were \$60,749 greater, the operating expenses \$36,681 greater, and the net earnings \$14,068 greater than for the four and one-half months of operation during the year 1904. The company earned about 5 per cent on the reported valuation in 1904.

The Boone Suburban Railway Company reported 4.7 miles of track, same as in 1904; total gross earnings, \$6,562; gross earnings per mile, \$1,396; total operating expenses, \$3,660; operating expenses per mile, \$778; total net earnings, \$2,902; net earnings per mile, \$617. Total valuation of property, including buildings, land, power plant and equipment, \$17,600. After deducting taxes the company earned 15 1-3 per cent on this valuation. The gross earnings are \$565 less, the operating expenses \$3,330 less, and the net earnings \$1,415 greater than for the year 1904. The net earnings did not pay the taxes in 1904. The company earned about 14 per cent on the reported valuation in 1903.

The Iowa & Illinois Railway Company reported 32.968 miles of track; total gross earnings, \$78,587; gross earnings per mile, \$2,383; total operating expenses, \$62,902; operating expenses per mile, \$1,907; total net earnings, \$15,685; net earnings per mile, \$475. Total valuation of property, including buildings, lands, power plant and equipment, \$1,462,494. The company earned about 1 per cent after making deduction for taxes. As the company only operated its line for about one month during the year 1904, there is no basis for comparison between the two years.

The total gross earnings of the eight interurban companies for the year 1905 was \$664,510; the average gross earnings per mile, \$3,682; the total operating expenses, \$419,985; the average operating expenses per mile, \$2,327; the total net earnings, \$244,525; the average net earnings per mile, \$1,349. The gross earnings for 1905 were \$163,342 greater, the operating expenses \$94,939 greater, and the net earnings \$68,403 greater than for the year 1904. It must be remembered, however; that one company was only in operation one month during the year 1904, and another only four and one-half months during that year. All of the companies show a gain in percentage of earnings based on actual valuation of the properties. The Mason City & Clear Lake Traction Company, has the highest percentage of earning capacity, returning 24 per cent on its valuation in 1905. The Interurban, of Des Moines, comes next, with 21 per cent, and the Cedar Rapids & Marion City Company third, with nearly 20 per cent. The Cedar Rapids & Iowa City Railway & Light Company make a very good showing for the first full year of operation, earning 7½ per cent on its actual valuation. The Iowa & Illinois Railway Company showed a balance on the right side of the ledger, but a small one. This company reports a valuation of \$1,462,494, including expensive power plants, and net earnings of only about 1 per cent on such valuation. It is believed, however, that the company will be able to earn about 8 per cent on this valuation during the year 1906. And more than that thereafter, as the line connects two cities of fair proportions, and in all benefits a population of more than 125,000.

AGREED ON B. R. T. TEST CASE ON CONEY ISLAND FARE

Stephen C. Baldwin, representing Borough President Coler, conferred Friday afternoon at the offices of the Brooklyn Rapid Transit Company with former Justice Edward W. Hatch, and other legal representatives of the company, and an agreement was reached between the parties as to the form of test case to be brought for a definite settlement of the question of a 10-cent fare to Coney Island over the Brooklyn Rapid Transit lines.

Mr. Baldwin admitted that an agreement as to the method of procedure in the proposed test case had been agreed upon practically, and he believes that the case will be heard not later than October in the Court of Appeals. According to Mr. Baldwin, the case will assume the form of an omnibus cause, a suggestion put forward by counsel for the company, both sides believing that a satisfactory result would ensue from such a step, especially as all were agreed as to the form of procedure. Mr. Baldwin also expressed the belief that probably what was required thoroughly to smooth the situation regarding the collection of a second fare to Coney Island was the introduction in the courts of an individual case against a single line controlled by the company. That was his original contention, but rather than be held responsible for any delay in the adjustment of the papers, he yielded to the omnibus proposition put forward by the company's lawyers.

As the matter now stands the next step will be to turn the necessary papers over to Attorney-General Mayer, who will serve notice on the Brooklyn Rapid Transit that injunction proceedings have been instituted to restrain the company from charging more than one 5-cent fare to and from Coney Island on its lines. To this the company will make answer, and this move will be followed by argument before a justice at Special Term Supreme Court. Then, regardless of which side may win at Special Term, an appeal will be taken to the Appellate Division of the Supreme Court, and then a final appeal to the State Court of Appeals.

PUBLIC SERVICE INVESTMENT COMPANY

This company has recently been organized under the laws of the State of Delaware with \$1,500,000 capital stock to act as a holding company for eleven Pennsylvania corporations forming the Valley Forge system near Philadelphia. Five of these companies have been organized under the general, or steam railroad, act, and their lines will be equipped with the third-rail system; four are organized under the street railway act and will distribute passengers on either side of the main line by means of surface trolley roads; one is a construction company and one is a spring water bottling company. The line extends northwest from the city of Philadelphia along the south side of the Schuylkill River, a distance of some 20 miles, to Phoenixville. The Montgomery Securities Company is the fiscal agent for the Public Service Investment Company, and the construction company, the Denbeigh Construction Company, will do all of the construction work. The officers of the Public Service Investment Company are: L. Knowles Perrot, chairman of the executive committee; David Rombold, Jr., president; E. W. Johnson, secretary and treasurer.

QUESTION BOX FOR THE ENGINEERING ASSOCIATION

Secretary Mower, of the American Street and Interurban Engineering Association, has issued a circular letter, stating that a question box will be discussed at the Columbus meeting, and requesting questions relating to the power house, overhead, mechanical or way departments, which members would like to have answered. Descriptions and illustrations of kinks, or homemade contrivances, for use in the question box will also be welcome. As this year's convention will be devoted particularly to the interests of interurban roads, so far as possible, questions should refer to interurban matters. No names will be attached to the questions in publishing them, but the names of those replying will be given unless request is made to the contrary. In order that the questions may be classified and distributed in good season, all questions and other matters should be sent to the secretary promptly. Mr. Mower's address is South Western Traction Company, London, Ont.

PLANS OF THE FORT DODGE, DES MOINES & SOUTHERN RAILWAY

The officials of the Fort Dodge, Des Moines & Southern Railway Company, which is constructing an electric line from Fort Dodge to Lanyon, where connection is made with the Newton & Northwestern, thence over the tracks of the latter company to Kelley, and thence to Des Moines over the new line now under process of construction, have made public a few of their plans. They announce that the road will be 90 miles in length, and that arrangements have been completed for an entrance into Des Moines over the tracks of the Des Moines City Railway Company. The connection with the tracks of this latter company is made near the city limits on the Flint Valley line. The company has already acquired control of the city railway system of Fort Dodge, and the new road will be operated in connection with said city railway. The work of constructing the line is now well under way. Gangs of graders are at work on the section between Des Moines and Kelley, and other crews of graders are in the vicinity between Lanyon and Fort Dodge. The work of constructing the large steel bridge over the Des Moines River, just south of Fort Dodge, has been underway for several months, and the officials state that the bridge will be completed in ample time. The graders at work between Des Moines and Kelley have practically completed the grading on 12 out of the 28 miles. Several miles of track have been graded between Lanyon and Fort Dodge. The work of laying the steel is now started, and the officials believe that the track will all be constructed and ready for operation by Jan. 1, 1907. The power house is to be constructed at Fraser, a point on the main line of the Newton & Northwestern, located about midway between Des Moines and Fort Dodge. It will be of brick and steel, and the capacity will be about 3000 hp. The generators will be driven by Westinghouse-Parsons turbines. The electricity will be distributed at 20,000 volts to five sub-stations. The officials state that the track and overhead construction will conform to the latest practice, and the roadbed will be specially constructed for the high speed of the passenger trains and for the heavy freight traffic already guaranteed. A striking feature of

the road is that about 35 miles of the main line of the Newton & Northwestern, the section lying between Lanyon and Kelley, Ia., will be electrified. If the operation proves successful it is the intention of the officials of the Newton & Northwestern to electrify the whole length of the line from Newton to Rockwell City. Steam engines will be used for the hauling of freight over the line between Fort Dodge and Des Moines, electricity to be used for passenger service only.

STRIKE IN SAN FRANCISCO

With the exception of the California and the Geary Street lines, street railway traffic in San Francisco was suspended Aug. 26, as the result of a strike for higher wages by conductors and motormen of the United Railway system. The strike went into effect at 5 a. m. The railroads made no attempt to run cars, and there was no disorder. Further action in the strike awaits the arrival of Patrick Calhoun, president of the United Railways Investment Company. Although the California and Geary Street lines were in operation their limited equipment was inadequate. The employees of these two lines will not be called out, but they expect their employers to follow the lead of the larger company in any change that may be made in the wage scale. The demand is understood to be for a flat rate of \$3 per day, with eight hours' work.

BOSTON & EASTERN COMPANY SEEKS RIGHTS

The Boston & Eastern Electric Railroad Company has filed with the Railroad Commissioners a petition, asking the board to issue a certificate that public convenience and necessity require the construction of an "interurban" electric railroad between the cities of Boston and Beverly, with a branch leaving the main line at Peabody and running to Danvers. The length of the proposed road, on the main line, is about 16½ miles, and the length of the branch line will be about 2 miles.

This is the first company to organize under the "interurban railroad bill," so-called, enacted by the last General Court, which was passed in order to allow of high-speed electric roads between large centers in this State. It is proposed to make the running time of express trains between Boston and Beverly 23 minutes.

Under the terms of the "interurban" act, fifteen or more persons may form an association for the purpose of building and operating an interurban railroad, which may be operated by electricity or any power other than steam. The road may be built entirely upon private land, but at least half of it must be on private land, and it is the intention of the promoters of the Boston & Eastern road to construct it entirely upon private land, and it will also be an elevated structure practically the whole distance, so that there will not be a grade crossing in the entire system. It will be necessary to construct tunnels in the city of Salem and in Lynn, on account of grades which cannot be overcome in any other way. The tunnels in Salem will be a sixth and a quarter of a mile long respectively, while the tunnel in Lynn will be nearly half a mile in length.

The new law requires that the capital stock of the railroad be at least \$10,000 for each mile of track, but as the association has not as yet become incorporated it is not known what the amount of the capital stock will be.

With the petition the directors have filed a very elaborate set of plans, showing that the railroad proposes to have its Boston terminus in Sullivan Square, Charlestown, very near the present station of the Boston Elevated Railroad. From Sullivan Square the road will run in a northerly direction along the side of the Charlestown playground and across the marshes to Everett, where it curves to the east and runs into the city of Chelsea, then northerly through Revere and Saugus to Lynn, where it runs very nearly through the heart of the city, going just south of City Hall Square. From City Hall Square the road takes a sweep to the north, and runs to the Salem line, cutting through a corner of that city and running through Peabody, after which it again enters the city of Salem and proceeds to its terminus at Beverly. The Danvers branch leaves the main line at the station between Pierpont Street and Main Street in Peabody, and runs direct to Danvers Square.

Under the present plans it is proposed to have nineteen stations on the road, divided among the cities and towns as follows: Boston 1, Everett 1, Chelsea 2, Revere 2, Saugus 0, Lynn 5, Peabody 1, Salem 3, Danvers 2 and Beverly 2.

ELECTRICITY ON THE MADISON STREET AND MILWAUKEE AVENUE LINES, CHICAGO

Electricity has been substituted for cable as motive power on the Madison Street and Milwaukee Avenue lines in Chicago. The last cable trains were run Sunday morning, Aug. 19, and the cars on the Madison Street lines arrived at the houses in a rather dilapidated condition, due to the efforts of passengers to celebrate the change of power. When the houses were reached, almost everything in the way of furnishings or fittings that could be pried or broken off had been removed by souvenir collectors. The train previous to the last one was subjected to even greater abuse. Believing it to be the last one, the passengers at Sheldon Street seized the gripman and conductor, and, after stopping the train, wrecked it by throwing the cars over on their sides. According to General Manager Roach, the North Side cable lines will be ready for electric operation within thirty days. The change of power on these lines will permit work to begin on the lowering of the La Salle Street tunnel. Preliminary work on the lowering of the Washington Street tunnel will be begun by Angus Brothers & Company at once. Steel for the new roof construction for this tunnel, as well as for the Van Buren Street tunnel, will be received about Sept. 1.

FRANCHISE SOUGHT IN LOS ANGELES

For some time the Los Angeles Pacific Company has been desirous of obtaining a franchise to build and operate a double-track railroad through a tunnel to be constructed on Hill Street, between First and Temple Streets. Several times the company has tried to secure this privilege, but found it impossible to do so except with the twenty-one year limit clause attached. However, this bit of trackage has become so necessary for the carrying out of the company's extensive improvements that an ordinance has at last been presented to the City Council asking that the Los Angeles-Pacific Company be granted the right to construct tracks, and for a period of twenty-one years thereafter to maintain the same and operate a double-track railroad through the tunnel to be constructed on Hill Street, between First and Temple Streets. The ordinance also asks a similar privilege for tracks under California Street and lands belonging to the city between California Street and Sunset Boulevard, and to connect with the Los Angeles-Pacific tracks now on Sunset Boulevard. It is asked that privileges be granted subject to the conditions that there shall be deducted from the total cost of the tunnel \$8,000 and that the Los Angeles-Pacific Company pay one-half the remaining cost; and that the company shall construct all necessary flumes and culverts for the passage of water under the tracks; that the city shall have the right, at the expiration of twenty-one years, to purchase the track, provided that the option to make such purchase shall have been declared not more than three years nor less than six months before the expiration of the period by resolution of the City Council. Should the city wish to purchase the road at the time mentioned, its value is to be determined by a board of arbitrators.

NEW PUBLICATIONS

"Moody's Manual of Railroads and Corporation Securities for 1906." New York: The Moody Corporation. 2800 pages. Price, \$10.00.

This book comprises ten sections, devoted respectively to: Membership lists on various stock exchanges, Government and State securities, steam railroads, electric traction companies, gas and electric light companies, water supply companies, telephone, telegraph and cable companies, industrial corporations, mining and oil companies, financial institutions. The industrial section has been the especial field of the manual since its first issue, and comprises 400 pages. The electric lighting section has over 1000 entries.

"Stray Currents from Electric Railways." By Dr. Carl Michalke, translated and edited by O. A. Kenyon. New York: McGraw Publishing Company. 101 pages. Illustrated. Price, \$1.50.

Troubles with electrolysis, as with cross-induction from railway circuits to telephone circuits, have now practically passed

away from American practice, due partly to improved bonding and partly to a better knowledge of the causes of and means for preventing action of this kind. In spite of the tremendously greater extent of the American electric railway systems and their higher average potential drop, the subject has never attracted here the attention that it has abroad, where the governmental authorities early adopted, and have since retained, the erroneous idea that the extent of the potential difference between rails and pipes is the criterion of electrolytic damage. The drastic British and German rules based upon this assumption have had the effect of compelling foreign electrical engineers to give much more attention to devising methods for reducing potential differences than to lessening the destructive current flow in the pipes, and have resulted in the complicated negative booster and other return systems which form so prominent a part of European, particularly of British, practice. The book under review is probably the most complete treatise of its kind which has been issued abroad, and, as reflecting the European situation, is of interest to the American reader. Its most valuable portion to the latter is its discussion of preventive methods other than by "milking." In this chapter the author says that roads on their own right of way have practically nothing to fear, and for city roads, where considerable leakage is apparent, recommends a well drained and consequently insulated roadbed, such, we presume, as would be supplied by track laid on gravel, cinders or concrete, and the exercise of care that the service pipes do not come too close to the rails. For the pipes themselves the author prefers cast iron, covered, where necessary, with pitch or some insulating paint, and laid with insulating joints. In some cases bonding between the pipes and the rails is advisable. Periodical reversal of the trolley potential is also recommended, but should be frequent. One writer quoted recommends once an hour.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED AUG. 21, 1906.

828,871. Apparatus for Preventing Collisions at Railway Crossings; Charles R. Barnes and Alfred Green, Rochester, N. Y. App. filed Nov. 12, 1903. Referred to in detail elsewhere in this issue of the STREET RAILWAY JOURNAL. A derailing plate is located in advance of the crossing and may be moved into operative relation by an electro-magnet automatically energized by a circuit closed by the movements of the semaphore arm.

828,879. Automatic Electric Brake; Augustus L. Duwelius, Cincinnati, Ohio. App. filed May 7, 1904. A small series generator is directly geared to the wheel axles and supplies current for a magnetic clutch through which the brakes are operated. This clutch, therefore, releases whenever the wheels stop revolving or "skid."

828,921. Pleasure Railway; Robert Buchanan, Jr., New York, N. Y. App. filed Feb. 9, 1906. A pair of trucks support a structure in the form of an animal, and a third rail is movable to depress a lever which sets the brakes.

828,939. Air Pressure Brake; Erwin Kramer, Berlin, Germany. App. filed Aug. 3, 1904. In order to avoid wheels skidding when brakes are applied, the patentee has a pressure cylinder for controlling the brake valve. This pressure cylinder is operated by a fluid circulatory system geared to the wheel axles.

828,957. Brake-Shoe; Albert Nelson, of Chicago Heights, Ill. App. filed Sept. 5, 1905. The brake-shoe has hardened steel cutter plates inset therein, which true up the wheels of the car whenever the brakes are applied.

828,980. Electric Circuit and Apparatus for Railway Signaling; Henry W. Spang, of New York, N. Y. App. filed Aug. 21, 1902. A circuit is arranged between the forward wheels and the rearward ones of a train, so that signals may be received when the train is passing over an insulated section of the track, the track being properly included in a transmitting circuit.

829,032. Power Brake; Louis Pfingst, of Boston, Mass. App. filed Nov. 4, 1904. Has a small motor directly geared to the brake-operating spindle, and means on the ordinary handle by which the motor or the hand lever are alone separately effective to set the brake, or by which both may be used together.

829,078. Adjustable Arm for Reversible Car Seat Backs; Robt.

L. Mangan, of Springfield, Mo. App. filed Oct. 2, 1905. The back of the car seat is mortised to receive a casting having an annular flange shaped to fit in the mortise. This casting has pivot connections with the reversing arm of the seat.

829,109. Trolley Wheel Fork; Edward W. Keating, of Terre Haute, Ind. App. filed Feb. 3, 1906. The harp has upwardly projecting rollers swiveled thereto, which are capable of being spring-pressed in either direction when passing guy wires, etc.

829,132. Electric Semaphore; Jean F. Webb, of Denver, Col. App. filed June 25, 1906. Mechanical details of semaphore having a separate signal circuit operated by the movement of the arm to indicate that it has properly moved to danger position.

829,135. Motor Control System; Charles E. Bennett, of New York, N. Y. App. filed Dec. 28, 1905. In order to secure the advantages of a multiple-unit control system in a simple installation adapted to trolley cars, the patentee has a circuit-breaking magnet beneath the floor of the car which not only acts in case of overload, but also continually acts as a contactor, and removes arcing from the usual controller to a point beneath the car where it is not dangerous.

829,139. Single Pilot Wire Control System; Charles M. Clark, of Summit, N. J. App. filed May 16, 1906. A complete multiple-unit control system for trains operable over a single pilot wire. Relay magnets on the different cars are selectively operated simultaneously from the controller on any car.

829,142. Railway Traffic Controlling System; Clarence W. Coleman, of Westfield, N. J. App. filed Feb. 15, 1904. The rails are charged to alternately potential difference and alternating-current magnets, on the principle of a constant current transformer are effective to close relay circuits for setting the danger and caution signals.

829,143. Air Brake System; Fred. D. Corey, of Schenectady, N. Y. App. filed Dec. 29, 1905. Has equalizing discharge valve by which only one engineer's valve on the train is operative at any given time.

829,151. Motor Starting Rheostat; John L. Hall and William C. Yates, of Schenectady, N. Y. App. filed Aug. 23, 1904. The contactors are initially moved by powerful magnetic coils, which are, however, automatically cut out of circuit as soon as the contactors have moved. The contactors are held in their closed relation by supplemental magnetic coils of less power.

829,152. Traveling Staircase; Edoard Lewis Hocquart, of Paris, France. App. filed June 6, 1905. The improvement mainly relates to a pair of anti-friction rolls which are situated beneath the grate-like platforms for the purpose of guiding the steps.

829,192. Electrical Signaling Device; Clinton M. Allen, of Bay City, Mich. App. filed Oct. 23, 1905. A system of wireless telegraphy adapted for train service. A wire is stretched along the track which serves as an antenna, and a ball on the locomotive serves as the receiving instrument.

829,221. Railway Brake; Aldis H. Marden, of Watertown, Mass. App. filed Jan. 19, 1906. The brake-shoe has a rearwardly projecting lug to engage the usual I-beam forming the brake support.

829,241. Railway Signal System; Robert O. Turner, of Barre, Vt. App. filed Feb. 5, 1906. A plurality of trolley conductors are stretched alongside of the track, and spring blades on the locomotive are effective to complete signaling circuits therewith.

829,256. Pleasure Railway; William J. Brown, of Pittsburg, Pa. App. filed Dec. 13, 1905. A form of Ferris wheel designed to roll along a horizontal track.

829,289. Car Fender; William Pickett, of West Lynn, Mass. App. filed July 29, 1905. The car fender is hinged in front of the car and has a notched wheel and detent by which it is kept in raised relation when desired.

829,309. Automatic Railway Block Signal; Harry M. Abernathy, of Cleveland, Ohio. App. filed Jan. 25, 1906. The semaphore signal is operated from a motor through a magnetic clutch.

829,342. Railway Signal; James Knight, of Philadelphia, Pa. App. filed Feb. 9, 1906. Mechanical details of semaphore operating mechanism actuated by pneumatic cylinders partially buried in the ground at the base of the semaphore.

829,747. Car Coupling; Adolph Moritz, of Montgomery, Ala. App. filed Jan. 13, 1905. Relates to improvements in the tail piece of the knuckle of an ordinary coupler head.

PERSONAL MENTION

MR. JOHN B. ROGERS, of San Francisco, has been elected vice-president and director of the United Railways of Portland, vice Mr. W. D. Larrabee, resigned.

PROF. W. E. GOLDSBOROUGH, of J. G. White & Company, was the commencement speaker this year at the Thomas S. Clarkson School of Technology at Potsdam, N. Y. The subject of Prof. Goldsborough's address was "Ambition."

MR. J. LESTER WOODBRIDGE, formerly engineer of the sales department of the Electric Storage Battery Company, of Philadelphia, has been appointed chief engineer of that company, succeeding Mr. J. B. Entz, who has resigned to accept the position of vice-president of the Electric Vehicle Company, of Hartford, Conn.

MR. WALTER C. KERR, of Westinghouse, Church, Kerr & Company, presented an interesting and powerful address on "Knowledge and Action" at the graduating exercises of the Staten Island Academy last June. The address has recently been reprinted by the academy and, like all of Mr. Kerr's addresses, presents a great deal of food for thought.

MR. H. J. DRESSEL, superintendent, and W. H. Reynaud, claim agent of the New Orleans Railway & Light Company, have returned from a visit to leading Northern cities, where they inspected and studied the electric transportation systems. Leaving New Orleans July 15, they went to Chicago, thence to Milwaukee, Minneapolis, St. Paul, Detroit, Cleveland, Buffalo, Niagara Falls, Indianapolis and Cincinnati.

MR. C. N. DUFFY, formerly secretary and treasurer of the Chicago City Railway Company, and Mr. H. C. Mackay, formerly comptroller of the Milwaukee Electric Railway & Light Company, were each recently presented by the American Street and Interurban Railway Accountants' Association with a sterling silver bowl, as a token of the appreciation of the association for their services while president and otherwise connected with accountants' association. This presentation was made to them under instructions of the executive committee of the accountants' association, and was due to the fact that both gentlemen had severed active connection with street railway work. The pieces were selected by President Brockway and were suitably inscribed.

INSPECTOR BEYER, of the Grosse Berliner Strassenbahn of Berlin, Germany, celebrated last month the twenty-fifth anniversary of the day when he ran the first electric tramway in the world. It was in the year 1881 that Herr Werner von Siemens, the founder of the German firm of Siemens & Halske, built the first electric street tramway from the Anhalt Railway station to Lichtenfelde. Herr Beyer was the first man in charge of the new conveyance, uniting in his person the functions of motorman and conductor. He afterwards rose gradually to the post of chief inspector of the tramway system of that part of Berlin. Herr Beyer was made the recipient of some very valuable presents from his employers and from the members of the company's staff.

MR. JOHN DONNELLY has resigned his position as master mechanic of the Toronto Railway Company, of Toronto, Ont., which he has filled since April, 1905. Mr. Donnelly had an extensive experience in electric railway mechanical work prior to going to Toronto, having been master mechanic of the Indianapolis Traction & Terminal Company, of Indianapolis, Ind., and engaged in the mechanical department of the International Railway Company, of Buffalo, N. Y. While in Toronto he put the rolling stock in first-class shape and introduced a number of labor-saving devices and methods, some of which were described in the STREET RAILWAY JOURNAL for Feb. 14, 1906. Mr. Donnelly will make his headquarters in New York for the present.

MR. FRANK H. WAMPLER has been appointed master mechanic of the Cincinnati, Newport & Covington Light & Traction Company, with headquarters at Covington, Ky. Mr. Wampler has had wide experience in the mechanical department of electric railway work. For about twelve years he was master mechanic of the Philadelphia Rapid Transit Company, in charge of the Kensington Avenue shops, and prior to that time was for two years master mechanic of the Scranton Railway Company, at Scranton, Pa. He is also well known in connection with his work on the Intramural Railway at the Chicago World's Fair Exposition, having been sent to Chicago by the General Electric Company to assist in making the electric railway installation on the fair grounds.

TABLE OF OPERATING STATISTICS

Notice.—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. † Including taxes. ‡ Deficit.

COMPANY	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Avail-able for Dividends	COMPANY	Period	Total Gross Earnings	Operating Expenses	Net Earnings	Deductions From Income	Net Income, Amount Avail-able for Dividends
AKRON, O. Northern Ohio Tr. & Light Co.	1 m., July '06	104,454	50,890	53,565	22,738	30,827	GREENSBURG, PA.	1 m., July '06	26,615	10,767	15,848	-----	-----
	1 " " '05	100,049	49,025	51,025	23,267	27,758		1 " " '05	22,423	11,129	11,294	-----	-----
	7 " " '06	565,510	308,363	257,144	158,810	98,339	Pittsburg, McKeesport & Greensburg Ry. Co.	7 " " '06	123,098	-----	-----	-----	-----
	7 " " '05	525,527	285,942	239,585	160,869	78,717		7 " " '05	100,328	-----	-----	-----	-----
BINGHAMTON, N. Y. Binghamton Ry. Co.	1 m., July '06	32,468	13,664	18,804	7,725	11,079	HANCOCK, MICH.	1 m., June '06	20,152	*11,752	8,400	3,918	4,482
	1 " " '05	31,612	13,602	18,009	7,282	10,728	Houghton County St. Ry. Co.	1 " " '05	21,134	*11,461	3,173	3,614	†441
	3 m., June '06	1,025,025	632,891	392,134	241,616	150,518		12 " " '06	14,634	40,670	14,460	14,460	20,627
BUFFALO, N. Y. International Ry. Co.	3 " " '05	954,012	488,698	465,314	240,214	225,100		12 " " '05	211,196	*144,624	66,572	45,945	†37,655
	6 " " '06	1,943,548	1,231,116	712,432	480,069	232,363	HEMPSTEAD, N. Y.	3 m., June '06	58,601	30,043	28,558	14,403	14,155
	6 " " '05	1,777,689	1,003,899	773,790	473,455	300,335	N. Y. & Long Island Tr. Co.	3 " " '05	40,670	26,210	14,460	5,547	8,913
CHAMPAIGN, ILL. Illinois Traction Co.	1 m., July '06	262,545	136,125	126,420	-----	-----		6 " " '06	98,508	54,701	43,807	28,153	15,654
	1 " " '05	207,253	108,541	98,712	-----	-----		6 " " '05	55,786	38,564	17,222	6,117	11,105
	7 " " '06	1,624,373	911,118	713,255	-----	-----	HOUSTON, TEX.	1 m., June '06	51,158	*30,138	21,021	7,692	13,329
	7 " " '05	1,317,135	725,400	591,735	-----	-----	Houston Electric Co.	1 " " '05	44,854	*25,328	19,526	8,657	10,869
CHARLESTON, S. C. Charleston Cons. Ry. Gas & Elec. Co.	1 m., July '06	61,727	34,564	27,163	13,017	14,147		12 " " '06	558,301	*346,646	211,655	100,366	111,289
	1 " " '05	58,363	31,523	26,841	13,167	13,674		12 " " '05	429,571	*302,952	126,619	101,457	25,162
	5 " " '06	272,214	162,708	109,506	64,933	44,573	JAMAICA, N. Y.	3 m., June '06	54,278	38,534	15,744	9,150	6,594
	5 " " '05	254,917	148,216	106,701	65,083	41,618	Long Island Elec. Co.	3 " " '05	50,278	31,093	19,185	9,202	9,202
CHICAGO, ILL. Aurora, Elgin & Chicago Ry. Co.	1 m., June '06	113,155	60,043	53,112	24,939	28,173		6 " " '06	83,759	71,145	12,614	17,971	†5,357
	1 " " '05	97,449	51,115	46,333	23,664	22,670		6 " " '05	74,797	57,259	17,538	18,538	†609
	3 " " '06	305,668	167,521	138,146	74,817	63,329	KANSAS CITY, MO.	1 m., June '06	457,788	245,102	212,686	142,026	70,660
	3 " " '05	269,046	148,495	120,551	72,895	47,655	Kansas City Ry. & Lt. Co.	1 " " '05	418,645	219,204	199,441	135,853	63,588
Chicago & Milwaukee Elec. R. R. Co.	1 m., July '06	97,425	33,485	63,939	-----	-----		12 " " May '06	5,162,839	*2,596,539	2,566,300	1,644,524	921,776
	1 " " '05	67,263	20,871	46,392	-----	-----		12 " " '05	4,465,722	*2,235,266	2,230,462	1,501,862	728,600
	7 " " '06	423,298	177,279	252,019	-----	-----	LEECHBURG, PA.	1 m., July '06	4,368	2,923	1,445	-----	-----
	7 " " '05	279,236	124,888	154,348	-----	-----	Pittsburg & Alleghany Valley Ry. Co.	4 " " '06	19,366	8,348	7,770	-----	579
CLEVELAND, O. Cleveland, Painesville & Eastern R.R. Co.	1 m., July '06	32,631	*15,774	16,856	-----	-----	MANILA, P. I.	1 m., July '06	43,750	33,250	20,500	-----	-----
	1 " " '05	30,654	*14,585	16,068	-----	-----	Manila Elec. R. R. & Lt. Co., Railway Dept.	7 " " '06	305,830	154,485	151,316	-----	-----
	7 " " '06	146,518	*81,876	64,642	-----	-----		1 " " '06	73,750	36,950	36,000	-----	-----
	7 " " '05	130,070	*77,732	52,338	-----	-----	Total, all depts.	7 " " '06	513,785	259,378	254,409	-----	-----
Cleveland & Southwestern Traction Co.	1 m., July '06	64,136	32,790	31,346	-----	-----	MILWAUKEE, WIS.	1 m., July '06	305,681	143,817	158,864	90,191	68,673
	1 " " '05	54,823	28,304	26,519	-----	-----	Milwaukee El. Ry. & Lt. Co.	1 " " '05	277,203	126,959	150,243	78,577	71,666
	7 " " '06	353,413	205,950	147,463	-----	-----		7 " " '06	1,977,341	987,029	990,312	604,596	385,716
	7 " " '05	292,198	177,196	115,002	-----	-----		7 " " '05	1,838,895	909,395	919,500	529,326	390,174
Lake Shore Electric.	1 m., June '06	75,980	*41,724	34,256	20,404	13,852	Milwaukee Lt., Ht. & Tr. Co.	1 m., July '06	81,679	26,784	54,895	30,709	24,186
	1 " " '05	67,969	*37,443	30,526	20,404	10,122		1 " " '05	70,659	24,115	46,543	23,863	22,680
	6 " " '06	376,188	*226,238	149,950	122,424	27,526		7 " " '06	374,420	149,830	225,090	176,671	48,419
	6 " " '05	326,626	*198,131	128,495	122,424	6,071		7 " " '05	327,483	146,481	181,002	141,773	39,229
DETROIT, MICH. Detroit United Ry.	1 m., July '06	564,603	*315,134	249,469	95,321	154,148	MONTREAL, CAN.	1 m., July '06	300,885	161,161	139,724	55,802	83,922
	1 " " '05	507,089	*285,682	221,407	89,891	131,516	Montreal St. Ry. Co.	1 " " '05	257,828	136,319	121,509	32,752	88,757
	7 " " '06	3,242,940	*1,924,958	1,317,982	659,498	658,484		10 " " '06	2,494,670	1,528,354	966,316	374,810	591,505
	7 " " '05	2,853,067	*1,719,706	1,133,361	643,815	489,546		10 " " '05	2,181,820	1,394,840	786,980	231,920	555,060
DULUTH, MINN. Duluth St. Ry. Co.	1 m., June '06	66,999	29,266	37,734	17,534	20,200	NEWBURGH, N. Y.	1 m., June '06	13,030	8,043	4,987	-----	-----
	1 " " '05	55,456	28,376	27,081	16,826	10,255	Orange Co. Trac. Co.	1 " " '05	12,102	7,466	4,636	-----	-----
	6 " " '06	358,388	191,475	164,762	105,053	59,709		6 " " '06	56,928	42,836	14,092	-----	-----
	6 " " '05	304,742	167,465	137,277	100,579	36,698		6 " " '05	51,118	39,117	12,001	-----	-----
EAST LIVERPOOL, O. East Liverpool Tr. & Lt. Co.	1 m., July '06	33,132	16,784	16,348	8,274	8,074	NEW ORLEANS, LA.	1 m., July '06	443,831	264,685	179,146	161,450	17,696
	9 " " '06	235,340	130,442	104,898	74,377	30,521	New Orleans Ry. & Lt. Co.	7 " " '06	3,342,919	1,805,153	1,537,766	1,077,736	460,030
EAST ST. LOUIS, ILL. East St. Louis & Suburban Co.	1 m., June '06	94,833	47,879	46,955	-----	-----	PHILADELPHIA, PA.	1 m., July '06	275,876	-----	-----	-----	-----
	1 " " '05	85,698	33,071	52,627	-----	-----	American Rys. Co.	1 " " '05	254,636	-----	-----	-----	-----
	6 " " '06	517,298	278,246	239,052	-----	-----	ST. LOUIS, MO.	1 m., July '06	794,220	*493,762	300,458	198,026	102,432
	6 " " '05	480,135	222,258	257,876	-----	-----	United Railways Co. of St. Louis.	1 " " '05	726,861	*451,674	275,187	198,840	76,347
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1 m., June '06	98,289	61,926	36,363	-----	-----		7 " " '06	5,194,488	*3,821,845	1,976,443	387,347	589,096
	1 " " '05	85,500	53,242	32,258	-----	-----		7 " " '05	4,772,949	*3,150,853	1,622,096	1,394,177	227,919
	6 " " '06	497,248	312,452	184,795	-----	-----	SAVANNAH, GA.	1 m., June '06	58,224	*30,165	28,059	11,269	16,797
	6 " " '05	426,159	267,504	158,655	-----	-----	Savannah Electric Co.	1 " " '05	55,177	*29,939	23,239	10,554	12,684
FT. WORTH, TEX. Northern Texas Tr. Co.	1 m., June '06	73,032	*45,398	27,634	9,942	17,692		12 " " '06	614,780	*369,689	245,091	130,343	114,749
	1 " " '05	67,849	*31,292	26,557	10,326	16,230		12 " " '05	565,963	*326,391	239,572	127,070	112,502
	12 " " '06	735,736	*454,365	281,371	119,275	162,096	TERRE HAUTE, IND.	1 m., June '06	66,667	*35,847	30,819	13,776	17,043
	12 " " '05	608,356	*350,869	257,487	113,243	144,244	Terre Haute Tr. & Lt. Co.	1 " " '05	55,543	*38,636	16,907	10,613	6,294
GALVESTON, TEX. Galveston Elec. Co.	1 m., June '06	32,165	*16,411	15,754	4,167	11,587		12 " " '06	703,844	*434,450	269,395	140,850	128,545
	1 " " '05	25,195	*14,237	10,958	4,167	6,791		12 " " '05	596,447	*387,033	209,414	114,688	94,725
	6 " " '06	139,461	*90,559	48,902	25,000	23,902	TOLEDO, O.	1 m., June '06	178,110	*88,351	89,759	42,269	47,490
	6 " " '05	121,169	-----	-----	-----	-----	Toledo Rys. & Lt. Co.	1 " " '05	163,226	*80,846	82,380	41,771	40,609
GLOVERSVILLE, N. Y. Fonda, Johnstown & Gloversville R.R. Co.	1 m., June '06	84,768	34,088	50,680	-----	-----		6 " " '06	962,502	*508,846	453,656	253,730	199,936
	1 " " '05	57,731	38,729	19,002	-----	-----		6 " " '05	895,793	*463,736	432,057	253,815	178,242
	12 " " '06	776,941	403,655	373,286	-----	-----							
	12 " " '05	705,583	382,960	322,623	-----	-----							