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EDITORIAL NOTICE

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

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

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The Position of the Track Engineers

Two letters from subscribers in this issue call attention to a subject to which we have referred in our editorial columns, and which is of considerable importance to those companies who wish to maintain a high standard of track construction. We refer to the somewhat anomalous position of track engineers who have no association of their own, and hence, theoretically at least, no opportunity for debating the subject of track construction. This is undoubtedly a misfortune, because, in the opinion of many, there is no department of street railway work to which greater attention could often be profitably paid than to that relating to the permanent way. It is true that at nearly every meeting of the American Street Railway Association at least one paper has been presented on some subject connected with this department, but the discussion has not been particularly full, and no great effort has been made to secure the attendance at the meeting and participation in the discussion of the track engineers of the different roads. Would it not be possible for either the American or the Mechanical Association to devote one day, which would be announced beforehand, to topics connected with track construction and maintenance? If necessary, the sessions could be made one day longer, so as not to interfere with the rest of the programme, or else one afternoon could be devoted to this subject. The different companies should then arrange, so far as possible, to secure the attendance at this meeting of their track engineers, even if the latter did not remain for all the days during which the convention was in session. This may not solve the problem, but is offered as a suggestion to accompany, possibly, that proposed by Mr. Lewis, of assigning a large part of this work to a committee, where a few interested and active workers could accomplish a great deal of preliminary work and report their conclusions to the main body for adoption.

Manhattan "L" Passes Million Mark

During the discussion of the transportation problems of New York a year ago it became evident that the public generally possessed very little accurate information regarding the facilities for handling the enormous traffic of the Borough of Manhattan, and that those who criticised the management of the elevated and surface lines were either incapable of appreciating the herculean task involved and the conditions under which the work was done or lacked knowledge of the growth of these systems and the demands that were constantly being made upon them. The same criticism is heard to-day, and officers of the Merchants' Association only recently charged the Manhattan management with failing to comply with the orders of the State Railroad Commissioners. No doubt these superficial critics will be surprised to learn that the Manhattan elevated lines are now carrying more than a million passengers every day, and that on Monday, Jan. 18, the number reached 1,025,000, the highest figure thus far attained. It should be mentioned in this connection that this was an ordinary day's business, there being no special attraction or public function to call out an unusually large throng. This performance is noteworthy of itself, and it is especially interesting as illustrating the possibilities of electric operation as compared with steam. Before the transformation of the elevated lines was effected, the Manhattan was seriously handicapped by the limitations imposed by steam operation. The old management found it impossible, on the West Side, to stop more than forty trains per hour at any one station while locomotives were in use, and then the trains were limited to five cars. Now it is found practicable to increase this number to sixty trains per hour and to add at least one car to each train. The company is now operating daily 1380 cars, which comprises every bit of rolling stock fit for service, including all of the new cars thus far received for the subway. This is just 300 cars more than the old Manhattan management estimated as the ultimate capacity of the system when it was decided to make the change from steam to electricity. Last winter, it will be remembered, sleet storms interfered with the schedule, owing largely to the fact that both steam and electricity were employed on the same lines. Now, however, that the transformation is complete and all the motor cars are provided with sleet cutters, the movement of trains has not been interrupted at any time, and not a single trip has been missed on account of snow or sleet.

Still the demand for more accommodations continues, the station platforms are thronged throughout the rush hours, the cars are necessarily crowded to their limit, and, consequently, representatives of the Merchants' Association contend that the

company is not attempting to afford relief. Bosh and buncombe! The Manhattan system has increased its capacity from an average of 749,172 passengers per day, the number carried in the holiday season a year ago, to more than a million a day at the present time. Of course, it is just as hard for the passenger to stand up when a million patrons are carried as it was when there were only 750,000 fellow sufferers, and the average man hanging on a strap can hardly be expected to view the situation with the same composure as the philosopher ensconced in a comfortable cross-seat, but with a better understanding of the situation and the earnest efforts of the men operating the road to meet the requirements there would, doubtless, be less resentment manifested, and the traveling public should await the opening of the subway with more patience.

Stopping at the Near Corner

The ordinance which requires the street cars in New York City to stop at the near instead of the far corner has now been in force for two weeks in the Borough of Manhattan and four weeks in the Borough of Brooklyn, and opinions differ as to whether it can be considered a success. There are, as our readers know, several good reasons for stopping at the near corner, the principal one being that the motorman has an opportunity, while the car has stopped, to look up and down the cross street and see whether any vehicle is coming. He can then chose his own time to cross the street. On the other hand, when the stop is made at the far corner, the car passes the cross street at considerable speed, and there is greater possibility of collision. Where a line crosses a street near a fire engine house, the Interurban Street Railway Company always has stopped its cars on the near corner for this very reason, and where a line crosses a double-track street railway, the cars are still stopped at the far corner as well as at the near corner.

Unfortunately for those who have been hoping that the solution of this long-debated question in street railway practice would be definitely settled upon its merits by the present experiment, the exceptionally inclement weather which New York City has experienced during January has been unfavorable to a fair trial of the plan. Owing to heavy snow-storms the streets have been blocked to some extent by piles of snow, and the city authorities first attempted to compel the railway companies to clear a path opposite the rear platform, or about 30 ft. from the crossing, to the sidewalk. It was found, however, that the city had no power to compel the companies to do this, and the Street Commissioner protested that his force was before they cross the street at which they wish to alight, they must be carried to the next near corner.

The experiment is one for which the city authorities only are responsible, and the Police Commissioner, who has charge of the traffic on the streets, still advocates it, although the Aldermen are showing a disposition to repeal the ordinance. The railway companies in the case are occupying the position of interested spectators, as their policy when the plan was first proposed was that while they did not advocate the change they would not oppose it. The result of the test, as so far conducted, is that the ordinance, as a whole, is a desirable one, although a very unfavorable time was selected for putting it in force. If it had been instituted in the late spring or summer it is our opinion that the public would have become so used to it that they would have been willing to have put up with the undeniable discomfort which accompanies its enforcement in very cold and snowy weather.

Pilots on Interurban Cars

As fenders are coming to be the usual adjunct of city cars, so cow-catchers, or pilots, are becoming popular with the managements of many interurban roads, especially in Indiana. Several experiences on high-speed interurban roads have tended to confirm the conclusions reached by steam railroads many years ago, that pilots were a good thing to have at the head of a fast train. In one accident, especially, which occurred on a road running out of Indianapolis recently, the value of the pilot was very conclusively demonstrated. A horse attached to a buggy wandered away from a blacksmith shop, got over the cattle-guard onto the private right of way of the railway company, and finally got caught in a bridge on the interurban road. This happened at night, and a car coming down-grade onto the bridge at high speed could not be stopped for many feet after it had passed the horse and buggy. Fortunately, the car had a pilot and the only result was the killing of the horse and wrecking of the buggy. Had the pilot been absent the chances for a derailment on the bridge, at high speed, and a very disastrous wreck would have been very great. In some cities the municipal ordinances require that some kind of a fender be used on all cars operating within the city limits. If such an ordinance is made applicable to interurban cars fitted with pilots it will cause great embarrassment unless some ingenious scheme can be evolved for changing from pilot to fender at the city limits.

matter, and their failure to enforce the laws was held to be largely responsible for the great loss of life. They have been formally held for the grand jury, and no matter what the outcome may be the investigation has put them in a sorry plight. And yet, considered in its entirety, Chicago will probably rank high in point of efficiency of municipal government when compared with other large cities of the country. How, then, can intelligent people advocate turning over such important departments of public service as the transportation system of a city to the mercy of corrupt and incompetent politicians? What assurance have we in the experience of Chicago that its transportation service would not meet the same fate as everything else entrusted to municipal management and control? None whatever. On the contrary, there is every indication that such a step would result in a carnival of corruption. In this connection, our municipal ownership friends will be interested in the announcement that the municipal street railway in Grand Junction, Col., consisting of 1¾ milles of track, two horses and two cars, the only municipally operated street railway in this country, has suspended operations, and an investigation of the financial possibilities of the system, on the part of capitalists, is solicited by the city authorities.

The Sleeping Car Proposition

We are heartily glad that on at least one long interurban system the sleeping car is to be given a fair trial. When the extent of an electric road reaches dimensions that give a chance for an all-night journey the sleeper is certainly worth a trial, and within limits the chance for success seems fairly good. Certainly the absence of smoke and dust is an important advantage during a considerable part of the year, and to the occupant the car would doubtless prove attractive as a relief from the usual kind, dusty and stuffy, with blankets surfaced like emery cloth with the ineradicable grime of years. But from the standpoint of the manager the final test of the fitness of things is the result. Is there good reason to believe that the sleeping car business will, in itself, pay, or that it will attract enough extra travel to the regular cars to cover any possible deficit? Now, in all such matters as this the proof of the pudding is in the eating, and a few months of experience will be of more value than months of theorizing about it. But, offhand, from the broader aspects of the case we are inclined to think that the experiment will be a success. As to the mere question of fare we are dubious. It may reasonably be assumed that the charge for berths will be, as it is on ordinary railroads, at least enough to cover reasonable expenses, but putting a sleeper on a long regular train is one thing and running it as an independent car is quite another. Yet, although the actual cost of long hauls with relatively few passengers is a subject on which little experience has been had on electric roads, it looks as if electric roads could stand it quite as well as steam roads. Interurban electric roads charge relatively low fares, but with a well-filled car an all-night run at even 1½ cents per passenger mile ought to cover expenses.

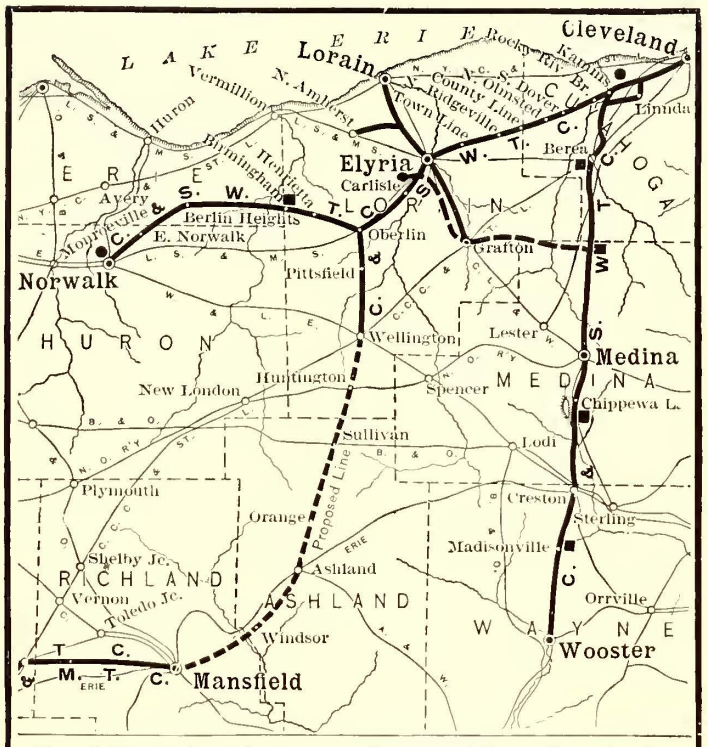
Nor is quick running time always an advantage in this class of service. As we pointed out editorially in our issue of Aug. 1, an electric sleeping car service, between cities 100 miles to 150 miles apart, with a schedule arranged to suit the convenience of the public, would often be more attractive to passengers than a competitive faster steam service with more inconvenient times for arrival and departure. And this is the condition which exists to-day in the Central States where the proposed electric sleeping car service will be instituted, and where the present steam road schedule is based largely upon the convenience of through passengers between the large terminal cities rather than between the cities of moderate size en route.

We can assume, therefore, that the sleeper service, if well patronized, ought at least to clear expenses, and its indirect effect on the traffic of a road ought to be well worth while. Somehow it is difficult to get the general, as aside from the local, public to take the long interurban lines seriously enough. We have many times called attention to the lack of adequate provisions for building up traffic, and the publicity given by a sleeper service is a thing which may possibly prove to be important. Once get the public used to the idea that long trips may be cheaply and conveniently made on electric roads and you will have a valuable increase of traffic. On exactly the same line, parlor cars can be, and to a very small extent are, advantageously used on long runs. We could name a number of long lines on which, during the summer at least, parlor cars, routed through from terminus to terminus of the system, would attract much travel which now goes to the steam roads on account of the inconvenience of transfers and waiting upon the electric roads as now run. All this is right along the line of steam railway evolution that ought to be taken as a text book by every manager of an interurban line. On steam roads parlor cars and sleeping cars came as part of a general demand for more comfortable service on long routes, and as a result of the competition that once existed between railroads running through the same territory. Like causes should naturally produce like results in interurban practice. The parlor car and sleeping car are not yet fiercely demanded by the patrons of electric lines, but they are powerful instruments of competition, and a little experience with them will awaken the public demand, that means extensive patronage.

But in order to make parlor car and sleeping car service valuable, the managers of interurban lines must take still another leaf from their rival's book. Few of the fraternity now in active service can run back in memory to the days when each little railroad ran independently, quite irrespective of the convenience of its passengers; when connecting roads made it a point to annoy one another, and the passenger had to change cars half a dozen times in a day's run. It is difficult to-day even to find out how bad the case really was, but some of our fathers and grandfathers still remember it to their sorrow. And the electric roads are passing through just this stage of their economic evolution at the present time. Consolidations, the advantages of which we have often pointed out, may, and in time will, remedy much of the existing trouble in long runs over electric lines, but the work of consolidation is slow, and as at present carried on seems to be influenced by about every consideration save that of long-distance travel. And for some reason not easily discovered the simple fundamental idea of through routing of cars does not seem to have worked its way into the generally acute consciousness of the electric railway manager. To such a suggestion we doubt not that a dozen exceptions can be taken, but the steam railway men of the generation before our own raised and overcame every objection that can be conjured up to-day. It is high time that we of the twentieth century should take their experience to heart. The advent of electric sleepers and parlor cars is a step in the right direction, but its full advantage cannot be realized until those sleepers and parlor cars can, by a general modus vivendi between connecting lines, be routed to the very end of the track that can be made physically continuous. Let us, in this instance at all events, stop adhering to the steam railroading of 1850 as our accepted pattern, and try the virtues of the practice of a later era in the art.

IMPROVEMENTS IN THE POWER EQUIPMENT OF THE CLEVELAND & SOUTHWESTERN SYSTEM

In providing for large extensions to its system, the Cleveland & Southwestern Traction Company is just completing important additions to its main power station, making it one of the largest interurban stations in the country. This plant is particularly interesting because of the fact that the new units, one of which is now in successful operation, represent one of the first steam turbine installations for electric railway work in this country, if, indeed, it is not entitled to the distinction of being the pioneer. The high-tension alternating-current



Map of Cleveland and Southwestern System and Connections, showing location of Power Stations and transmission lines.
Generating Plants indicated by heavy black dots ●
Sub-stations indicated by square blocks ■
Transmission line across country shown by broken line ▬ ▬ ▬

DISTRIBUTION SYSTEM

transmission system is used to provide for a considerable portion of the system at the present time, and eventually the old equipment will be entirely superseded.

The system was described in the Street Railway Journal of June 27, 1903, and a map was presented showing

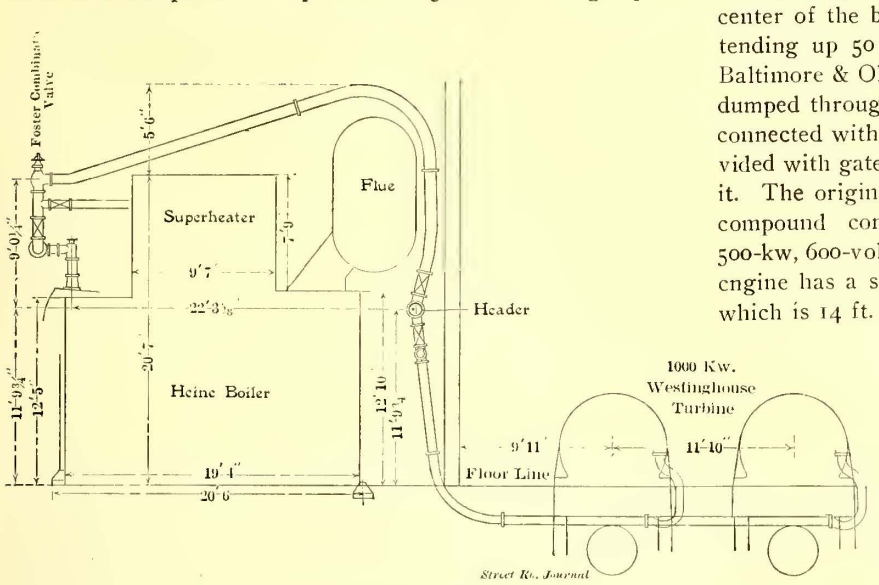
zontal Allis engines, belted to 250-kw Westinghouse generators, and one 325-hp simple non-condensing Slater engine, belted to a 250-kw Walker generator. Current is generated at 600 volts. Eventually this station will be abandoned and a rotary installed. At Norwalk the company owns the local lighting plant, which also assists the railway load at that end of the line. This equipment includes two 225-hp tandem compound condensing engines, belted to Westinghouse generators, and a 250-kw rotary converter. Steam is supplied by two 150-hp tubular boilers and one 275-hp water-tube boilers.

TEMPORARY INSTALLATION

For nearly two years, while the turbines were being built and installed, the consulting engineer, W. H. Abbott, was obliged to resort to unusual means to keep the distant portions of the new extensions in operation. A heterogeneous lot of equipment for supplying alternating current to the sub-stations already completed was installed, and the changes made from time to time to take care of unusual conditions and breakdowns, caused by overloaded engines and generators, demonstrated to a remarkable degree the extreme flexibility of the modern alternating-current transmission in connection with rotary converters and transformers.

Two 300-kw rotary converters were installed in the main station, and were operated inverted with direct current supplied from the bus-bar of the old Westinghouse equipment, and the low-voltage alternating current produced was stepped up to 20,000 volts for the transmission lines, by means of oil-cooled transformers. As new extensions were completed a belted Walker generator was temporarily installed in a lean-to at one end of the station, and this supplied direct current in parallel with the other generators. Later a Westinghouse vertical engine, belted to a 300-kw rotary, was placed in another lean-to, and this supplied alternating current for the transmission lines. The equipment at the Norwalk generating station gave and received considerable assistance. At times the rotary converter in this station was belted to the line shaft, and supplied alternating current for the sub-station at Birmingham. At other times it took alternating current through the Birmingham substation and supplied direct current for that end of the road. On other occasions it took direct current from the trolley line and operated as a direct-current motor, driving the lighting generators. Again it performed the same service, taking alternating current from the transmission lines and operating as an alternating-current motor and turning the line shafting. Much of the time it was used as a belted direct-current generator,

supplying that end of the road direct. At one time before the turbines were placed in operation 115 miles of high-speed

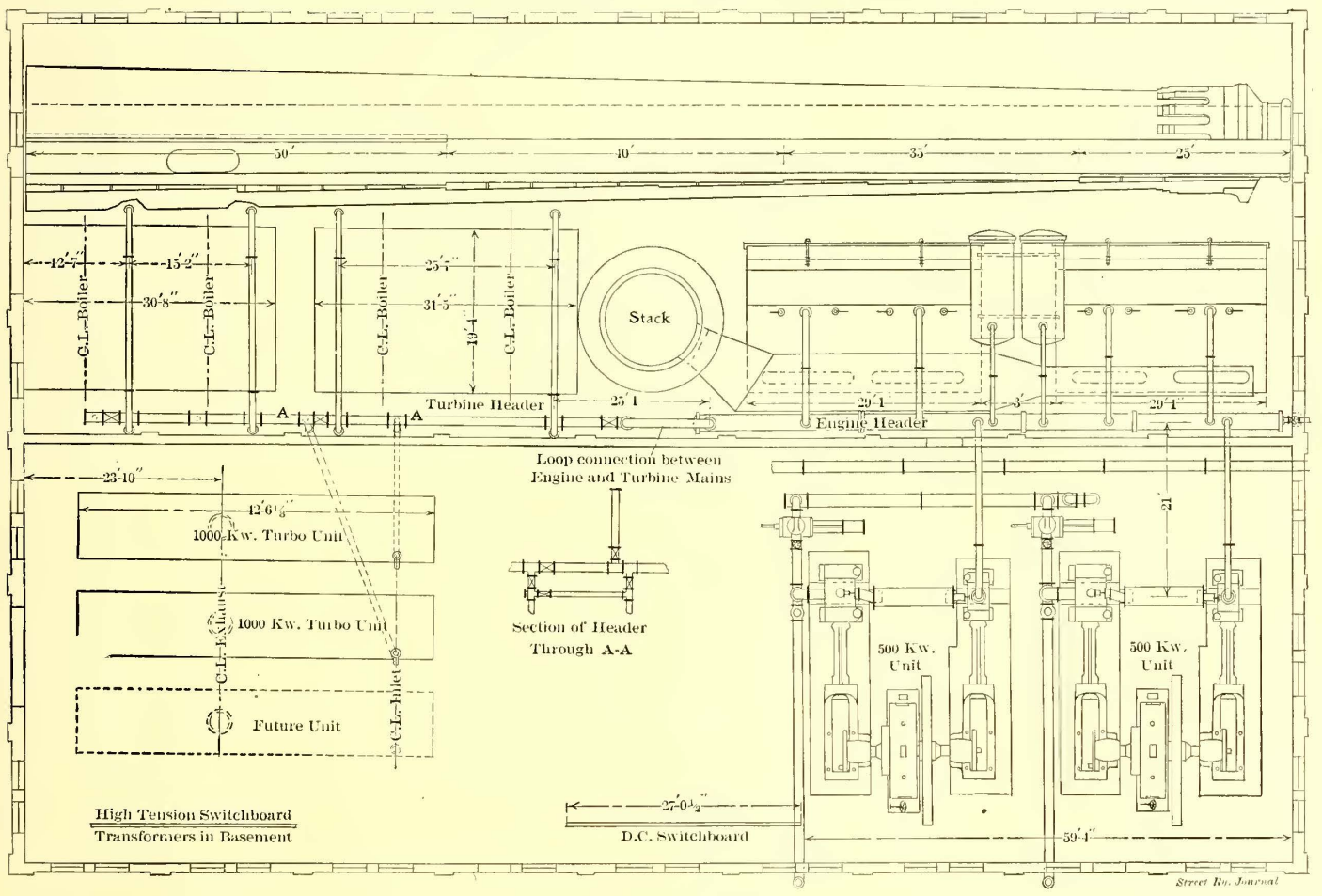


SECTIONAL VIEW SHOWING STEAM PIPING

suburban lines, with half-hourly service, were supplied by about 1100 kw of generating equipment.

MAIN POWER HOUSE

The main power station, erected three years ago to take care of the Oberlin-Wellington and the Lorain extensions, is located at Carlisle, a short distance from Elyria, on the Black River, which affords ample water supply. The building is a modern steel structure with heavy brick walls, and is divided into two sections. The boiler room is 154 ft. 4 ins. x 49 ft. 6 ins., and the engine room 103 ft. 6 ins. x 49 ft. 10 ins.; both rooms are on the same level. A brick stack, 150 ft. 6 ins. tall and 17 ft. 4 ins. wide at the base, projects upward from the center of the boiler room. The stack has a dividing wall extending up 50 ft. Coal is run onto a high trestle from the Baltimore & Ohio Railway tracks, which pass the house, and is dumped through chutes into the boiler room. A large cistern, connected with the river by tunnel, properly screened and provided with gates, adjoins the house, and all water is taken from it. The original power equipment included two 750-hp cross-compound condensing Slater engines, direct-connected to 500-kw, 600-volt Westinghouse direct-current generators. Each engine has a separate jet condenser, located in the basement, which is 14 ft. 7 ins. deep, and extends under the whole of the engine room. Two 325-hp and two 345-hp Sterling water-tube boilers supply steam at 150 lbs. Hoppes water purifiers are located overhead in the boiler room. The direct-current switchboard occupies a position near the engines, and at present the direct-current machines supply the portion of the system in the vicinity of Elyria, the longest line being 17 miles. The building was designed for double its original equipment, and only half the space, in both boiler and engine room, was occupied. The new equipment, now in operation and being installed, consists of sufficient turbine equipment to permit shutting down for the present, at least, all the direct-current machinery in Elyria and Rockport. As a matter of fact, the turbine equipment, when ordered, was designed to take care of the proposed extension from Wellington to Mansfield, a distance of 40 miles, in addition to the present system, but as the matter of building this extension has been held up owing to existing conditions, the new equipment will be more than ample to take care of the present system.



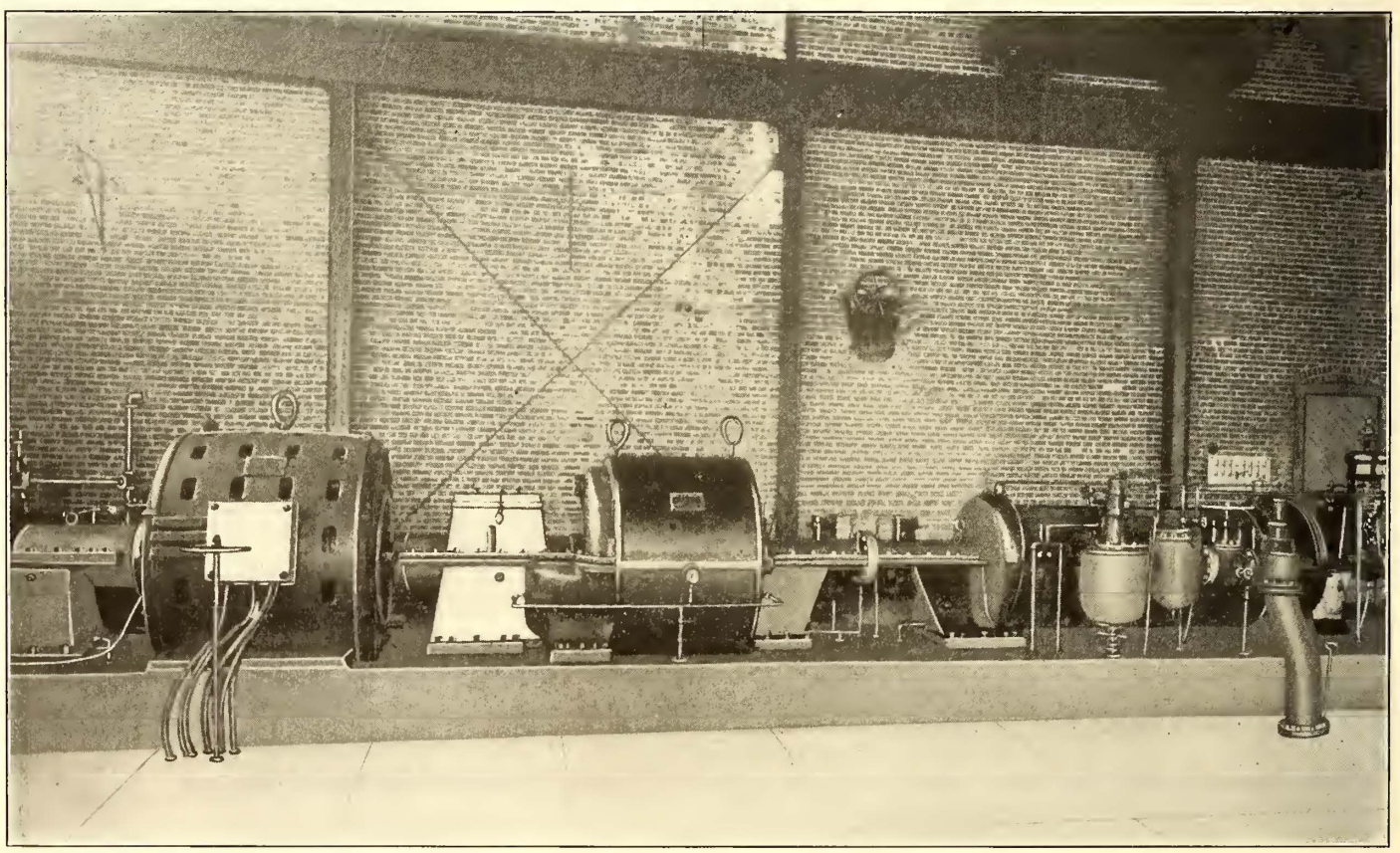
PLAN OF POWER HOUSE

In looking at the plant the first thing that appeals to the observer is the small space occupied by the alternating-current equipment as compared with the direct-current equipment, kilowatt for kilowatt. With the turbine machinery the capacity of the station has already been tripled, and there is still room for a third 1500-kw unit in addition to the high-tension switchboards and transformer banks, which are located in concrete-lined compartments in the basement. It is further estimated that a saving of one-third in boiler-plant capacity will be effected through improved economy of the turbines, in addition to a saving of $2,900 upon each 1500-kw foundation.

The main direct-current units, aggregating 1000 kw, occupy 3200 sq. ft. of floor space, or 2.13 sq. ft. per electrical horse-power. The present turbine equipment of 2000-kw capacity occupies 1780 sq. ft., allowing for liberal passage ways, or .445 sq. ft. per electrical horse-power, a little less than one-fourth

expands through successive alternate-moving and stationary blades, forming the expansion stages of the high-pressure as well as the low-pressure cylinders. Emerging from the high-pressure cylinder at considerably reduced pressure, steam passes through a separator, which removes all condensed steam, thence passing into the low pressure and through a steam cycle corresponding to that of the high-pressure cylinder. The exhaust steam passes vertically downward to the condenser.

The general construction of the turbine conforms closely to that of the single-cylinder type of Westinghouse-Parsons turbine. Both cylinders are neatly lagged with sheet steel, held in with polished steel retaining bands, the interior being filled with non-conducting material to reduce radiation. The turbine unit is mounted upon a cast-iron bed-plate of the box pattern, strongly ribbed inside to furnish sufficient rigidity to preserve alignment. Holding-down



1000-KW STEAM TURBINE IN MAIN POWER PLANT AT ELYRIA

overload of 50 per cent to be carried while the turbine unit is operating with the usual vacuum.

The generator is of the revolving field type, and delivers three-phase, 25-cycle current at 400 volts. The speed of

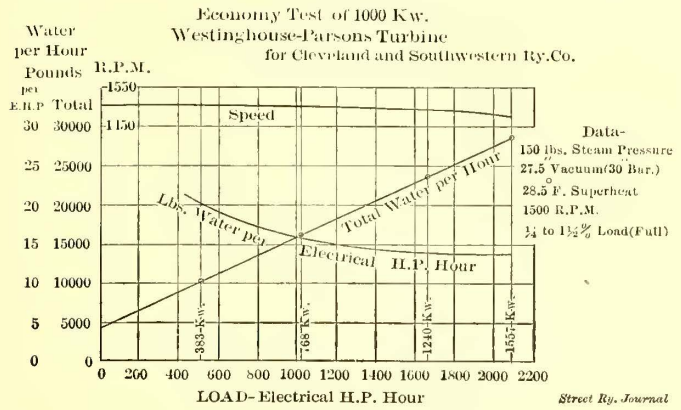


DIAGRAM OF TURBINE TESTS

the unit is 1500 r. p. m., necessitating a two-pole field, which is constructed of annealed steel of the highest tensile strength, and has strap copper winding embedded in deep slots and retained by wedges. There are numerous air ducts, providing adequate ventilation. The armature stationary element is of the usual Westinghouse construction, but its diameter is much less than that of the ordinary slow-shaft, which necessitates its running at the same speed. It is connected with the general oiling system. To overcome the variation in voltage of the main generator, due to cumulative effect of speed variation of the exciter, Tirrell regulators will be used in the exciter field. By means of series turns on the regulator these compensate for the drop in the generator and line voltage, so as to give a rising voltage characteristic. The use of a direct-connected exciter is somewhat of a departure from the ordinary practice.

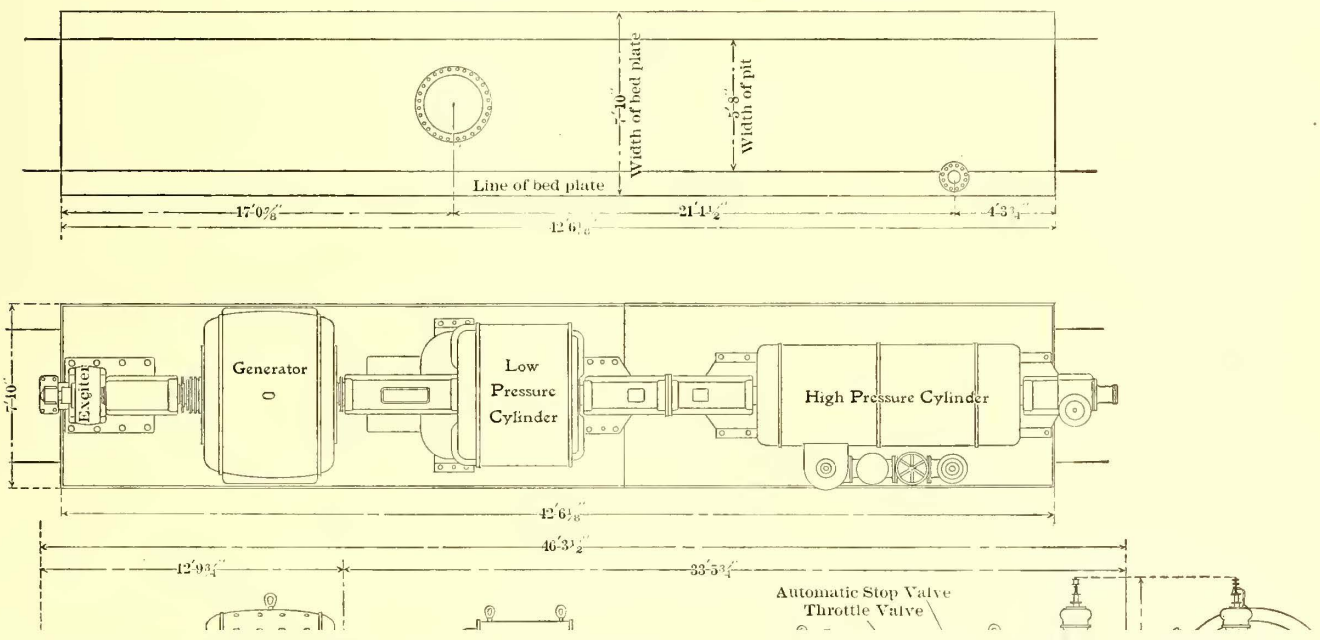
TURBINE TESTS.

The results of official economy tests conducted in the Westinghouse Machine Company's shops, at East Pittsburg, are given in the table herewith, and are shown graphically in the curve sheet, reprinted from the STREET RAILWAY JOURNAL of Dec. 19, 1903.

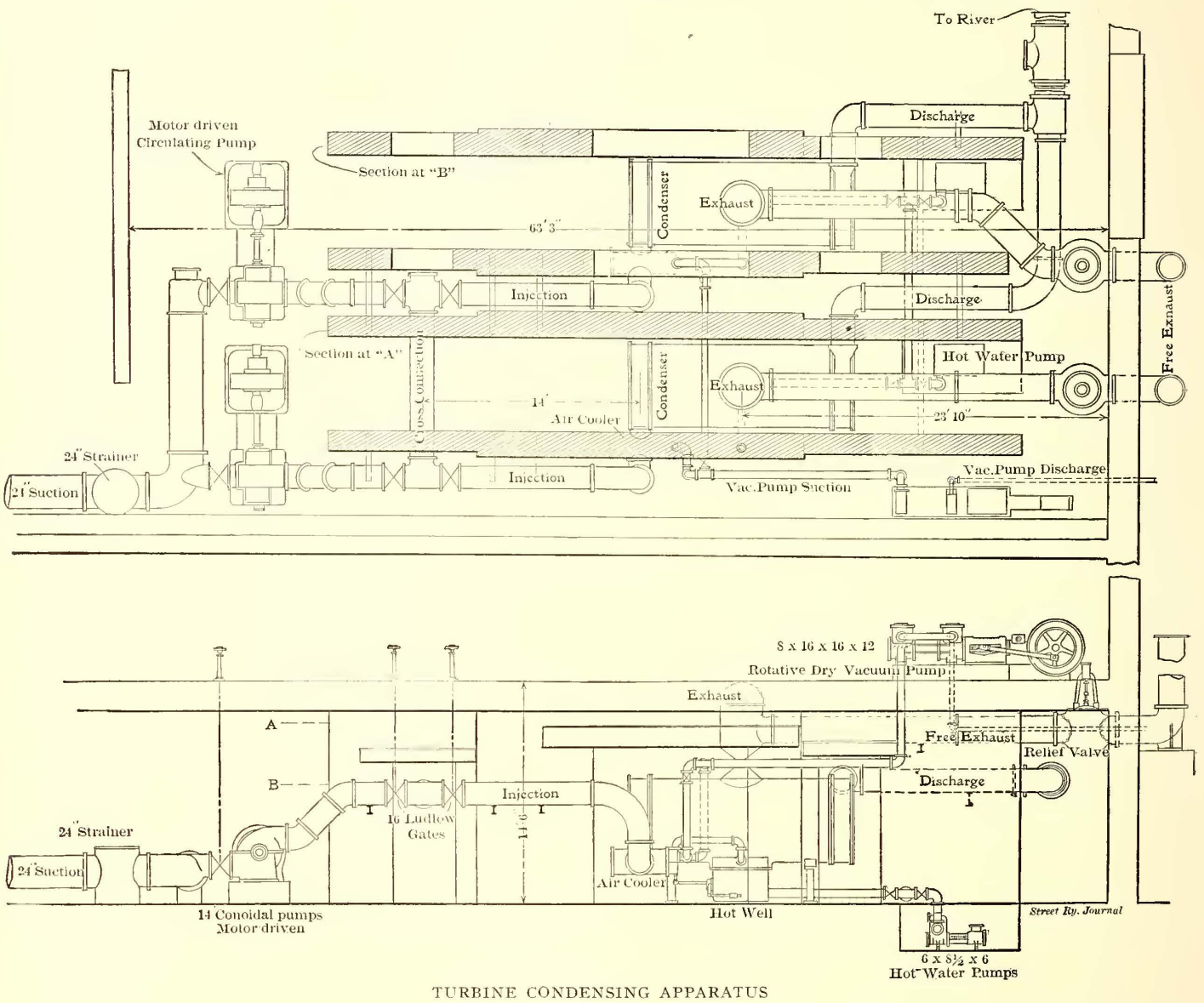
The conditions of the test were maintained approximately uniform throughout each run. The best economy was realized at a load of 1557 kw, namely, 13.668 lbs. of water per electrical horse-power-hour, this being equivalent to about 11.6 lbs. per indicated horse-power in a reciprocating engine:

TEST OF 1000-KW TURBINE FOR CLEVELAND & SOUTHWESTERN RAILWAY COMPANY

	NO. 31			
Number of tests.....	8	9	10	11
Load kilowatt.....	1557.64	1239.83	767.94	383.36
Electrical horse-power....	2087.8	1661.96	1028.07	513.88
Throttle pressure per gage	145.95	144.25	147.55	155.05
Vacuum, actual, inches...	27.6	26.64	26.58	26.67



is clearly shown in the plan reproduced herewith. As in the case of the engine plant each unit is equipped with an independent condenser, but the circulating water and other pumps are used in common by both units. A striking feature of the installation is the foundations. In the plan the two turbine foundations have been sectioned at different levels to show the area required for supporting the dead weight of the turbines. The foundations consist of concrete walls, slightly battered and varying in thickness from 17 ins. to 21 ins., and approximately 12 ft. 9 ins. in height. A heavy concrete plate, resting upon a bed of hard-pan, constitutes the foundation footing. The openings in the foundation walls accommodating



TURBINE CONDENSING APPARATUS

piping, and the air cooler are spanned by steel beams. Each foundation wall is one solid piece of monolithic construction.

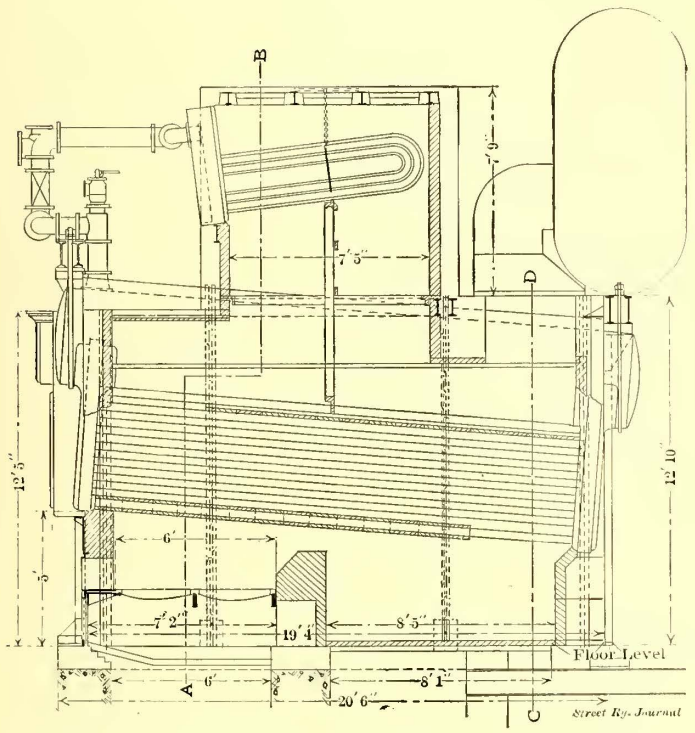
CONDENSERS AND PUMPS

The condensers, which are of the Worthington surface type, cylindrical in form, and measuring 8 ft. x 15 ft. over all, are located directly under the turbines, between the foundation walls, resting on the same floor bed, and with their intakes directly under the turbine discharges. This makes an extremely short passage for the exhaust steam, and reduces friction losses to practically zero, which in condenser connections of the usual length is quite considerable. It also utilizes space which would otherwise be wasted. Each condenser contains 3400 sq. ft. of cooling surface, consisting of 1110 1-in. brass tubes, made of seamless tubing. The ends of these tubes are straight, and pass through stuffing boxes in the tube heads, each stuffing box being provided with a gland having a lip on the inside, which will keep the tube in place, and, at the same time, permit it to expand and contract freely. It also makes it possible to remove any tube readily or replace any stuffing box in case of leakage. At the point where the steam enters the condenser there is a baffle-plate to distribute it and relieve the tubes of its impact. Both condensers have suitable hot wells, with floats controlling the steam throttle to the pump, which removes the condensed steam and delivers it to the main hot well, from which it is returned directly to the boilers.

In connection with each condenser there is an air cooler to precipitate all moisture from the air before it reaches the air or vacuum pumps. This cooler is of the surface type, and is placed in the path of the circulating water just before it enters the condensers, so that the air is thoroughly cooled on its way to the pump, and all water is condensed and removed. This operation places less work on the pump, and it gives a greater efficiency, at the same time securing a temperature nearer that corresponding to the vacuum carried. These results cannot be obtained by extra surface within the condenser where the vapors are still in contact with the water, or by passing vapors through sheets of water, which only guarantees saturation.

The vacuum pump is located on the engine room floor, and is driven by steam. It is of the two-stage type, 22 ins. to 25 ins. of vacuum being taken care of in the first cylinder and the remainder in the second cylinder. It is hoped in this way to reduce the leakage past the valves to a very small amount, even after the pumps have been in operation a long time and the parts have become worn. The pump has two heavy fly-wheels.

The circulating pumps are located in the basement with the condensers, and are of the centrifugal type direct-connected to 40-hp, direct-current 500-volt motors, the latter being operated from a switchboard located above on the engine room floor. The pumps are cross-connected so that each will supply either condenser. The circulating water is pumped from the cistern adjacent to the power house, through the condensers and back again to the river, discharging water so that there is a syphon effect, the only work required being that in overcoming the friction in the pipes. These centrifugal pumps are of a special form known as the conoidal type, with double-suction and diaphragm impellors, which may be removed without dismantling the pump. The impellors differ from those in ordinary use, in that they are of comparatively greater length and small diameter. The construction is that of two inverted cones, their bases meeting in a diaphragm in the center of the pump casings.



SECTION OF BOILER SETTING, SHOWING SUPERHEATER

On these cones are cast radial vanes of such shape as to maintain direct water ways and secure the highest efficiency.

The hot-well pumps are steam driven; the water of condensation runs to them by gravity and is pumped into a closed hot well, particular attention being paid to excluding the air from this water so that the pipes may not be attacked by chemically pure water impregnated with air. The relief valve is operated by a water piston, which is automatic, or may be operated by hand. Each condensing equipment will condense 22,500 lbs. of steam per hour, and maintain a vacuum of 27½ ins. with circulating water at 70 degs. F. At lower temperature, 28 ins. vacuum or more will be carried. All water piping is of cast-iron of large size. Particular care has been taken to leave all passages free. The floor underneath the condensers is made with 4-in. conduit tile, covered with 2 ins. of cement, frequent drain holes being opened down to the tile. The floor above the basement is composed of iron plates of special design, to admit a large amount of air and ensure good ventilation.

BOILERS

Steam for the additional equipment is furnished by three 500-hp Heine water-tube boilers, the rating being based on 10 sq. ft. per horse-power. In order to reduce the height of the boilers and also the size of the plates in the legs, the requisite surface was obtained by using two 250-hp boilers set up close together as one boiler. C-shaped tile, which completely encircle the tubes, are used on the lower row, while ordinary tile baffling plate is used below the upper row. At present the boilers are hand fired, but arrangements have been made for putting in stokers. Grates are of the herring-bone type. The boilers are suspended from iron work, no weight resting on the walls. There is space in the room for another 500-hp boiler, and ample space for getting at tubes conveniently in the rear and also between each battery.

Above the boilers and supported by them are superheaters, which are composed of a number of bent tubes fitted into a boiler-plate head. They are known as the Schmidt type, and were built by the Heine Company. The gases, after going through the boilers, pass through the superheaters and then to the smoke flue. There are dampers by which the amount of gases may be regulated, also vertical openings in the side walls of the boilers leading from near the bridge wall directly to the superheater, so that the hot gases may be taken directly. Openings are left in the side walls of the superheaters so that soot and ashes may be blown out. The superheaters are easily accessible for the removal of tubes and other repairs, and each is built to give 75 degs. superheat when the boiler is running full load.

The plans for the piping were laid out so that the boilers may be run with or without superheaters. The boilers have safety valves so piped as to discharge steam into the open air outside the house. Automatic Foster valves are located at the points where steam starts for the header, and these are so arranged that they will automatically shut off the boiler if the pressure in the boiler goes down, if a tube breaks, or in case of breakage in the header or steam piping at any place in the house which would produce a sudden rush of steam. At several points in the engine and boiler rooms are valves operated by hand, which will shut off all boilers. All fittings on the piping and the header are extra long Crane type. No sharp bends that were avoidable were used, and care was taken to get long radius curves. The header and pipes to the turbines were made quite small, since it is expected always to run with superheated steam and with a continuous high velocity of flow. This latter is rendered possible by the nature of the turbine, which takes steam practically continuously, and not only a quarter of the time, as with reciprocating engines. The different character of the two systems is vividly shown by comparing the new header, 12 ins. in diameter, and the old one, which is 24 ins. in diameter. The two headers are connected by a U-bend, with valves for cutting apart. Another valve is located in the header so as to cut it at a point between the first two 500-hp boilers and the third boiler. There is a cross-connection provided with valves, however, between the pipes feeding the two turbines, so that they may feed from either end of the header.

The boiler feed pumps are located in a large open pit on the basement floor. There are two low-pressure suction Laidlaw-Dunn-Gordon pumps, which take hot-water from the hot well to the heater. From the heater the water flows by gravity to two outside-packed plunger-type outside-valve Worthington pressure pumps. All pumps are cross-connected so that any of the four can be used on the boilers or for suction purposes. The water for the old boilers goes to a Hoppes purifier, from which it runs by gravity to the boilers. On the new portion, and on all the plant when only the turbines are running, it is arranged to use condensed water practically as fast as it can be supplied, a small hot well under the foundations taking the water when there is a surplus. The heater is of Hoppes open type, of sufficient size practically to condense all the steam from the auxiliaries.

TRANSFORMER ROOM

Six 350-kw oil-cooled Westinghouse static transformers are located in a separate room along the basement wall, nearly under the high-tension board and near the turbines. The floor above the transformers is made of iron floor plates which are

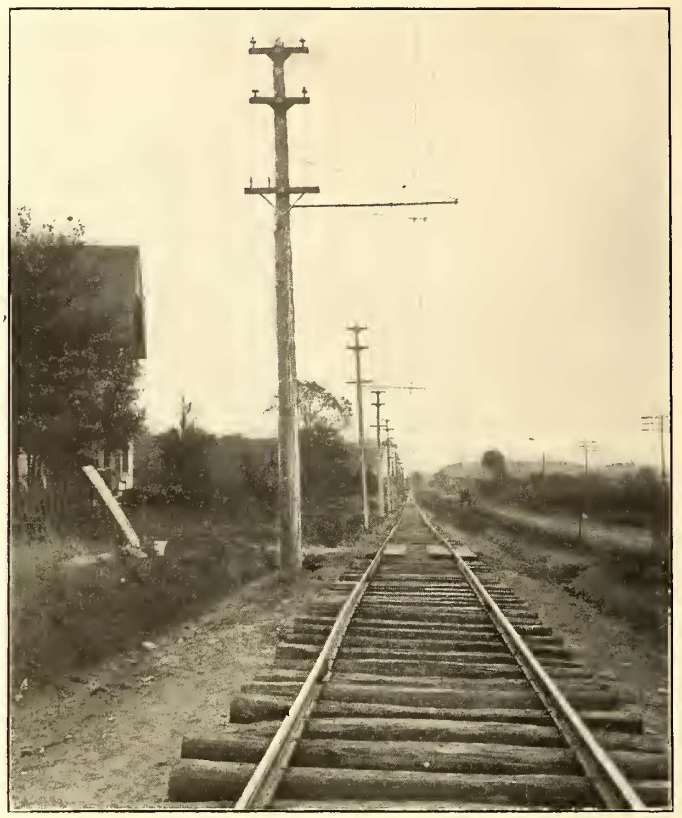
designed so that excellent light and ventilation are always to be had. These plates can be taken up readily and the transformers handled by crane. The transformers are provided with a number of taps by which the voltage may be varied in steps up to 10 per cent. They are designed for 25-cycle current, and increase the voltage from 390 to 20,000.

WIRING PLANS

All the low-tension wiring is copper cable, rubber insulated and encased in lead. It is suspended from the ceiling in iron racks, the lead itself resting on light wood strips to prevent abrasion. The current goes from the generators to the low-tension board, where it may be thrown to either one of two sets of three-phase bus-bars. From either of these sets of bus-bars it can be lead to any of the transformers.

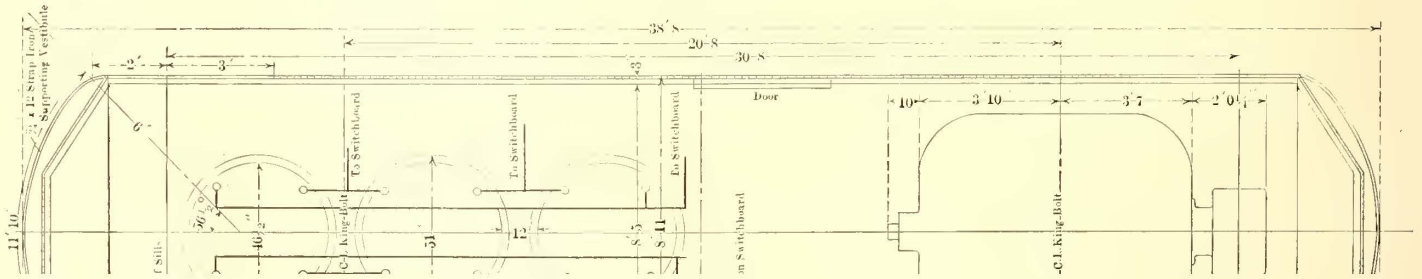
SWITCHBOARDS

The low-tension board consists of one double-exciter panel, two 1500-kw generator panels, one load panel, two 1500-kw transformer panels, two delta panels, to be located in the basement near the transformers. By pulling any one of the double pole switches on the delta panel one of the transformers can be cut out and the other two left connected. The two exciter panels control the direct-current exciters on the generators. These are arranged so that either exciter may feed either or both generators. Wattmeters on the front of the board measure the energy produced by each exciter. The two large generator panels are arranged to indicate the number of amperes produced, take care of circuit breakers which are non-automatic, and support the wiring for synchronizing. They also have power factor meters and double-throw switches for throwing to either set of bus-bars. The load panel has totalizing ammeter, integrating wattmeter, voltmeter, Bristol recording ammeter and fuses for station lighting. The transformer panels are arranged to show the amperes going to the transformers, and are equipped with automatic circuit breakers and time-limit relays. There are double-throw switches to take current from either set of bus-bars. Only the upper set is connected with the load panel, the lower set being intended only for use when the generators are run separate, as in lighting work, or when an accident has happened to the upper set. Synporcelain insulators, the pins being set in blocks of wood, which are attached to the iron framework. The advantage of this construction, it is said, is that any of the woodwork might burn without destroying the efficiency of the balance of the board or

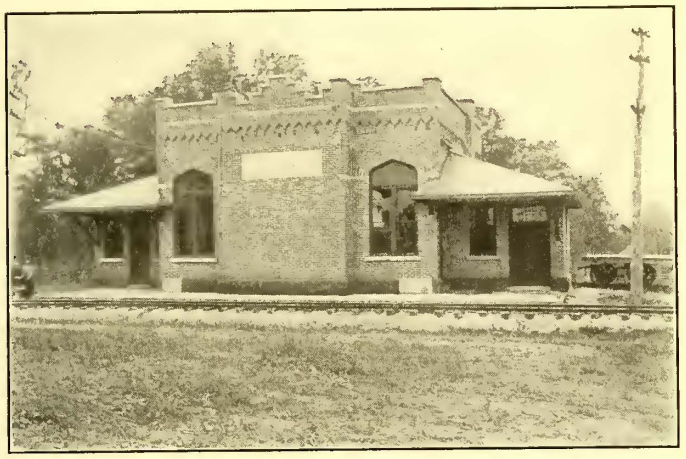


LINE CONSTRUCTION

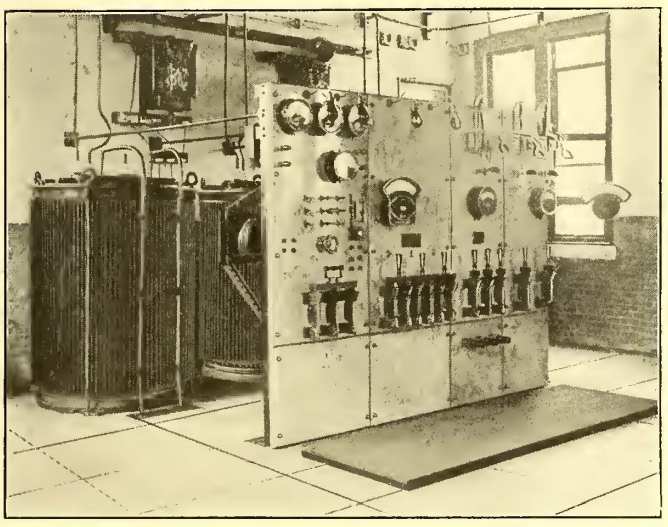
doing more damage than the dropping of the one pin attached to the block that burned. The wiring is copper cable covered with 11-32 of rubber, and the cable covered with four layers of special non-combustible fibre. In all the wiring plans provision was made for carrying conductors on insulators as though it



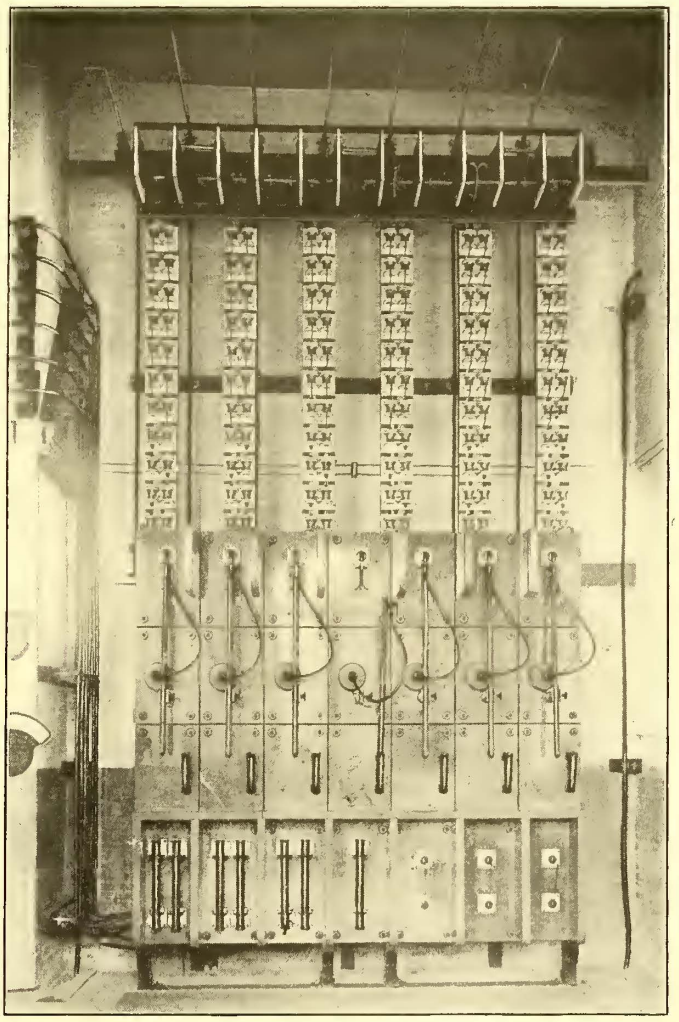
barriers around them. The lightning arresters are of the Westinghouse low-equivalent type with large condensers. They are placed above and back of the high-tension switches, just low enough to give ample space between them and the overhead crane. The condensers are set on the engine room floor back of the high-tension board. To permit the engine-driven generators, which are over-compounded, to work in parallel with the rotaries when it is desired to deliver direct current from the latter, kicking coils are put in series with the alternating-current leads of the rotaries. By this provision current is lagged sufficiently so that with an over-excited field on the rotaries the alternating-current voltage will be boosted by the series turns on the rotary fields so that the resulting direct-current voltage on them will be the same as that of the direct-current engine-driven generators. The kicking coils stand on the engine room floor back of the high-tension board.



EXTERIOR



SWITCHBOARD AND TRANSFORMERS



HIGH-TENSION CIRCUIT BREAKERS AND LIGHTNING ARRESTERS

CHIPPEWA SUB-STATION

A 20-ton hand-power crane, built by the Brown Hoisting Machine Company, of Cleveland, and provided with two cars, covers the entire engine room. Care has been taken in designing the machinery to arrange the basement so that all heavy pieces can be handled by taking up the floor.

TRANSMISSION

The high-tension lines are built uniformly with 35-ft. poles set 6 ft. in the ground. The three-phase lines are No. 3 and No. 4 wire, according to requirements, a portion of it copper and a portion aluminum. Four wires are used on each circuit, all boards being arranged so that the fourth wire can be used when there is trouble on any of the other three. Locke No. 3 brown porcelain insulators, mounted on iron pins with wood tips boiled in paraffine, are used. Cross-arms are standard, 3¼ ins. x 4 ins. x 42 ins. Frequent troubles with iron cross-arm braces has lead to the use of a triangular-shaped wood brace soaked in carbolineum to prevent cracking. Poles are spaced 100 ft. apart, and in ordinary cases the lines are used on the poles carrying the trolley brackets, telephone wires, feeders, etc. The high-tension line supplying the southern division of the system runs across country from Elyria to Brunswick, a distance of about 18 miles.

PORTABLE SUB-STATION

During the recent unsettled condition of the power equipment the company maintained, to great advantage, a floating sub-station. This consisted of a sub-station equipment installed in a plain and heavy car body, which was built in the company's repair shops. It was fitted with M. C. B. freight trucks without motors, and it was pushed to any portion where extra power was needed. For some weeks prior to the writing of this article it was located at the car house in Berea, where it was helping out the Rockport power station in supplying the northern portion of the southern division of the system. Unfortunately, a few nights ago, the car house, with all its contents, including the floater, was destroyed by fire. As the car was found to be of immense value in maintaining the voltage at points where there were excessive loads, it is probable that it will be replaced as soon as possible. The arrangement of the equipment and the wiring of the car are shown in the accompanying plan. The high-tension lines enter through holes on the outside near the top and pass to long knife switches, and from there to three 110-kw round-type oil-cooled Stanley transformers. Westinghouse low-equivalent lightning arresters were mounted back of the transformers. The low-tension wires

were rubber insulated lead-covered cables, and were carried along the side of the car to a 300-kw Westinghouse rotary converter at the other end. Numerous marble barriers and a liberal amount of asbestos board were used to prevent fire.

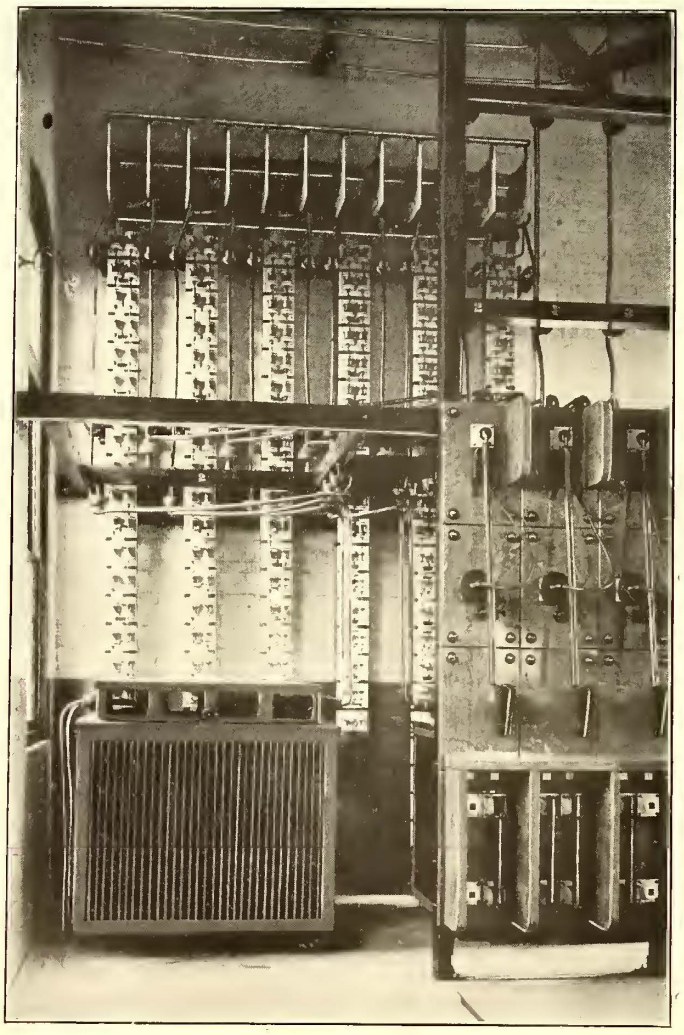
OPERATION

The ultimate plan of operation provides for the abandonment of the direct-current power stations at Norwalk and Rockport, and the installation of sub-station equipments in these houses. The alterations at Norwalk will probably be made in the near future, and 450 kw of converters and transformers will be installed at this point to take care of the local lighting load as well as the western end of the Norwalk division of the road. The Birmingham sub-station has a 300-kw rotary, while the 600-kw rotaries in the main power station will take care of the balance of the Norwalk division and the spur lines radiating from Elyria. On the southern division there are 300-kw outfits at Berea (the floater), 600 kw at Brunswick, 300 kw at Chippewa and Madisonburg, a total of 1500 kw on this division, making a total of 3150 kw of sub-station apparatus. It is hoped that one of the 1500-kw turbines will be able to supply the average load for these sub-stations, leaving the direct-current apparatus in the main station in reserve for accidents to other turbines.

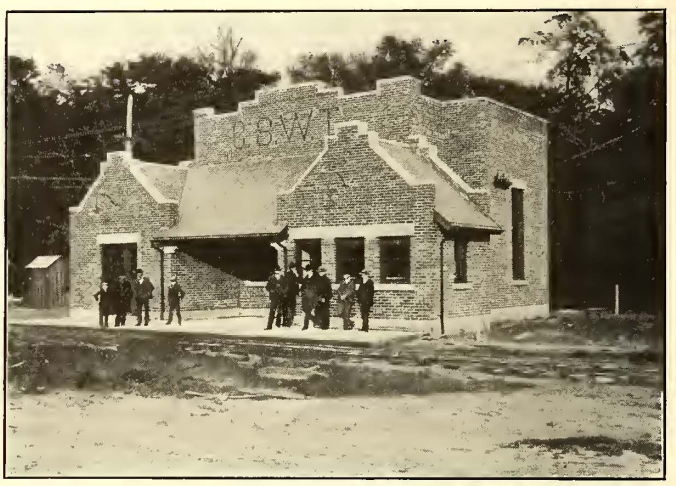
SUB-STATIONS

The Birmingham and Brunswick sub-stations are equipped with standard Westinghouse apparatus. They were described and illustrated in the Street Railway Journal of June 27, 1903. In providing for the extension of the southern division to Wooster, recently placed in operation, two very fine sub-stations were erected, one at Chippewa Lake and the other at Madisonburg. The buildings are designed for passenger and freight stations, and architecturally as well as structurally they are above the average of stations of this kind. Practically no wood enters into their construction. The walls are of brick with Bedford sandstone trimmings. The roof is supported on I-beams, and is constructed of expanded metal laid with cement. The foundations are brick and concrete, and the floors are concrete and tile on shale surface. The foundations for the rotaries are built into the floor. There is a covered gutter extending around the edge of the floor for placing large lead-covered leads which cannot be bent at sharp angles.

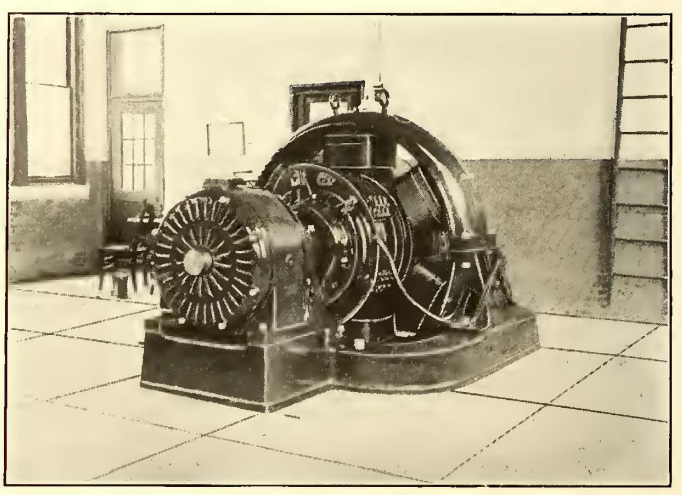
The entire electrical equipment for these sub-stations was installed by the Stanley Electric Manufacturing Company, and it shows a number of features out of the ordinary. Each station has installed one 300-kw, 25-cycle, six-pole compound-wound rotary converter, which takes current from the transformers at 397 volts alternating current, and delivers it at 650 volts direct current. The machine is over-compounded 10 per cent and is designed to withstand a 50 per cent overload for 4 hours, and a 100 per cent overload for 3 minutes. The machine is set very low, and the floor below is cut out, affording good ventilation. The armature and commutator are unusually large for a machine of this rating, the former being 40 ins. and the latter 35 ins. in diameter. The bearings are very long, and have ring oiling devices. The brush holders are of the radial type. The pole tips have not the massive copper bands common with other makes. The iron of the pole faces embrace nearly the whole of the armature surface. The makers claim this prevents the enormous rush of current when the machines are thrown in somewhat out of step, and also prevents the flashing of the machine. These converters may be readily synchronized, and it was not necessary to install synchroscopes. The



TRANSFORMER AND HIGH-TENSION ROOM



EXTERIOR VIEW



ROTARY CONVERTER

MADISONBURG SUB-STATION

armature and field insulation is designed to withstand a pressure of 3500 volts for 5 minutes. On the extended shaft of the direct-current end there is a 30-hp induction starting motor, also space for a pulley, as the machines were previously used as belted generators. The static transformers are in the rear of the high-tension switchboard. In the Chippewa station, they are of the Stanley make, but in the Madisonburg station two Westinghouse transformers have been installed, and the Stanley transformers designed for this station were placed in the floater, as their shape was more suitable for this service. The Stanley transformers are of 110-kw capacity, and the cases are round. Vertical flanges are added for radiation. Thermometers indicate the temperature of the oil used in cooling. Taps are brought out to vary the voltage from 5 per cent to 10 per cent. Six heavy leads run from the low-tension sides to three pairs of alternating-current switches on the low-tension switchboard, to give delta connection on the low-tension side. The low-tension cables are lead-covered, rubber insulated, and each passes through a separate conduit. The high-tension cables are heavy rubber-insulated, and are mounted on Locke No. 3 chocolate insulators. In all wiring behind the switches the lead is cut off 6 ins. above the floor line, and the cables are grounded at the end of the lead, in all cases, with the tin tissue method.

The low-tension board has four panels of blue Vermont marble, 2 ins. thick. The description of the board in the Madisonburg sub-station may be accepted as fairly representing the practice on all parts of the system. The alternating-current machine panel has one main three-pole machine switch of the quick-break pattern, rheostat, synchronizing plugs, three sets of voltmeter plugs, by which it is possible to get the machine voltage with the machine switches open and also any two bus-bar voltages; motor-starting switch for the alternating-current motor, throwing to the right on low voltage and to the left on high voltage, or directly across the bus-bar; voltmeter of the Stanley hot-wire type, phase indicator, synchronizing lamps, and three ammeters, the two outside being of 800-amp. capacity and the center the field ammeter. The next panel has three 1000-amp. quick-break switches, designed to cut in or out the secondaries of either of three transformers, the wiring being so designed that it is possible to run the station temporarily on any two transformers, or use the bank of three; a standard Weston station ammeter of 1200-amp. capacity, a Thompson recording wattmeter of 1200-amp. capacity, and a 24-hour chart Bristol recording ammeter. The third panel is the direct-current machine panel, and contains three cable plugs for temporary connection to the floating sub-station, which may be used in case of accident to the converter; three single-pole 800-amp. quick-break switches, the negative on the left, equalizer in the center and the positive on the right; voltmeter plug, Weston round-pattern station ammeter, I. T. E. overload and reverse current breaker of the single-pole pattern and 900-amp. capacity. In case of interruption of the high-tension current the breaker will throw, and will also throw on reversal of polarity to the converter. The feeder panel has two feeders installed. It contains one 1000-amp. quick-break switch, a 1000-amp. Weston round-pattern ammeter and a 1200-amp. I. T. E. breaker for each feeder. At the extreme right and top of the board is a swinging voltmeter on a bracket, registering a pressure of 750 volts. On the back of the board is mounted a Ward Leonard rheostat, a small transformer for board lights, resistances for voltmeters, ammeter shunts and lightning arresters. The bus-bar work is of the laminated type, and is extra heavy for mechanical strength as well as conductivity. The Weston ammeter leads are cylindrical pieces of fibre. All small wiring is fastened with small porcelain cleats, the board being drilled and plugged with lead or expansion bolts with lead sleeves. The potential voltmeter and pilot lamp leads are mounted on the extreme top of the board to eliminate all danger of fire or short circuit. Instruments are all copper finish.

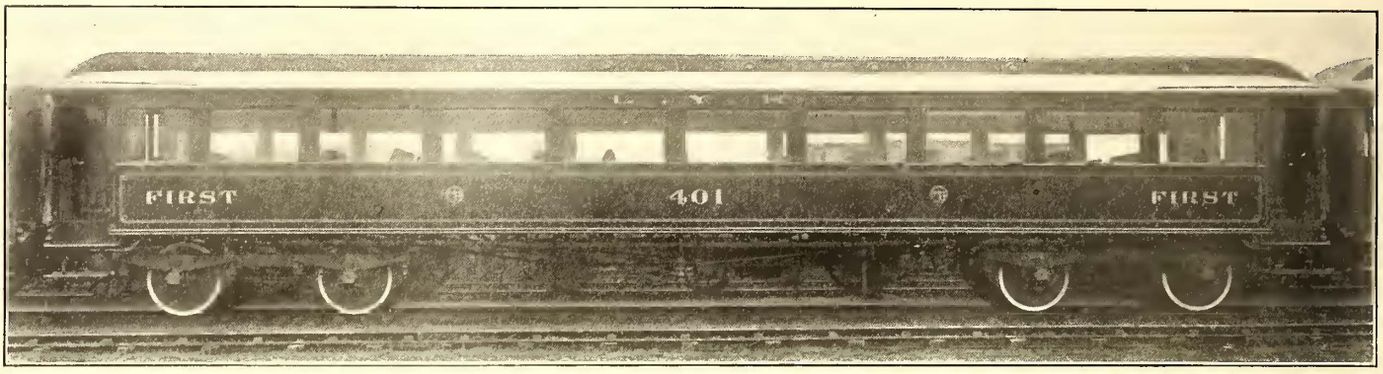
The high-tension switchboard has seven panels. It is mounted on a paraffine-impregnated white ash frame. All marble on the board was boiled in paraffine. The board is made up of panels 16 ins. wide x 2 ft. high. It is insulated from the wood frame by hard rubber pads. The four left-hand panels have the incoming high-tension leads, and the four right-hand panels have the outgoing lines. The current on entering the station passes through pole-type switches at the top of the board, then through fuses, of which there are three for each leg of each of the three phases, in order to allow for delta connection. Four wires are used on all high-tension lines, and the fourth wire also has a fuse for possible short circuits. The six wires leaving the board go then to the lightning arresters, each branch passing through two kicking coils with path to earth in front of each coil. Wires go then to the static transformers, thus completing the high-tension circuit. The Stanley pole-type switches occupy each three panels in height, the upper having a plug finger mounted on a porcelain base with a hard rubber guide below it. The center panel has a flexible cable connection secured to the end of a pole with a clamp to hold it in place. The lower panel has a pocket for the pole when not carrying current. The principle of the switch is simply a flexible lead and flexible cable. The cable end is pushed up into a socket fitted to receive it. Each switch is separated by marble barriers. The fuses, which are mounted on the lower section of the board, consist of hard rubber tubes, in which the fuse wire is held. On each end of the tube is an enlarged chamber containing a carbon ball which is held at one side by means of the fuse. When the fuse volatilizes the ball drops down, covering the hole where the fuse previously passed, and thus ruptures the arc. The rapid expansion of gases, due to the volatilization of the fuse, throws up a tell-tale aluminum lid at the upper outlet of the tube, showing which fuse has blown. The fuses are in pairs, each pair having two legs of the delta connection. Each pair is separated from the others by barriers and from the pole switches by a shelf. The upper right-hand half of the board is devoted to four-pole switches controlling the outgoing lines, thus enabling this set to cut out lines beyond. The lower part of the right-hand side of the board has a switching device for using the fourth wire. These consist of three hook-type selective switches, arranged to be operated by means of a hook on the end of a pole. Each of the three switches is connected to one of the main incoming lines, and when thrown that line is connected to the fourth wire. Each of the switches is separated by marble barriers with a marble shelf above. The lightning arresters consist of six rows of standard cellular-type Stanley arresters, surmounted by twelve impedance coils, with a path to earth at the head of each coil, making four impedance coils on each line, and four paths to earth from the point of highest potential. About halfway down the arrester the circuits join, making two paths for each circuit; two-thirds of the way down they join again, making one path to each circuit, or three for the three-phase line. This plan provides thirty-two single arresters in series from each point of connection with the full voltage to ground. The ground is formed by one heavy wire running to the track and another to a large copper plate buried in wet ground and surrounded with charcoal.

To obviate the expense of installing a crane in each sub-station the engineer of the road designed a special portable crane, which can be taken to any point on a car and set up in a comparatively short time. Roughly speaking, it consists of a large saw-horse, standing, when set up, about 16 ft. tall, so as to clear any equipment in a sub-station. The top member forms a track upon which runs a carriage for a chain hoist. The legs and cross-pieces of the saw-horse are made of angle-iron, while the top rails are channels. The several pieces are fastened together with large bolts. The crane will lift about 4 tons, and

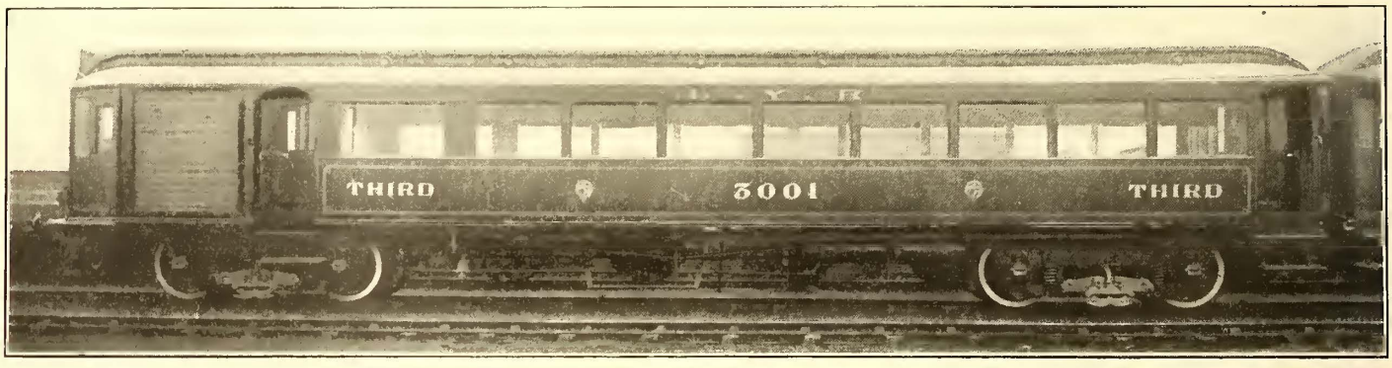
it has been found of great value in handling heavy equipment. All sub-stations have a track entering the building, so that large pieces of equipment may be handled directly from the car.

ENGINEERING

The entire design, purchase and application of all steam and electric equipment used on this system was carried out by W. H. Abbott, who for the last three years has been consulting engineer for the Cleveland & Southwestern Traction Company, as well as the other properties controlled by the Pomeroy-Mandelbaum group of interests. The present plans were made and the contracts placed when the steam turbine in America was at its very beginning, only one large machine being in operation, and that was installed in a lighting station. To commit a large railway proposition to turbines at that time might be considered rash, but is now looked upon as evidence of a far-sighted judgment, which the present generally admitted success of turbines proves. The long delay in completing the Cleveland & Southwestern turbines has robbed this plant of its true position, namely, that of being the first large plant in which turbines were definitely in operation in America, but there is little doubt that this was the first electric railway in this country to place contracts for large turbines.



EXTERIOR OF FIRST-CLASS CAR



THIRD-CLASS CAR

TOURISTS AND CALIFORNIA ELECTRIC ROADS

The management of electric railway properties in California are alive to the possibilities of the trolley in connection with visitors on sightseeing excursions. In Los Angeles, for instance, one of the many tourists' bureaus has established a branch office at the Pacific Electric Company's ticket office, where tickets will be placed on sale which will allow stop-over privileges at the ostrich farm, and tally-ho rides at Pasadena. Another form of tickets will be good for the round trip to Pasadena, including tally-ho rides, and still another ticket will entitle the purchaser to a round trip to Pasadena, including admission to the ostrich farm. An observation car will be put in service running from Los Angeles to the ostrich farm and allowing 30 minutes at the latter place.

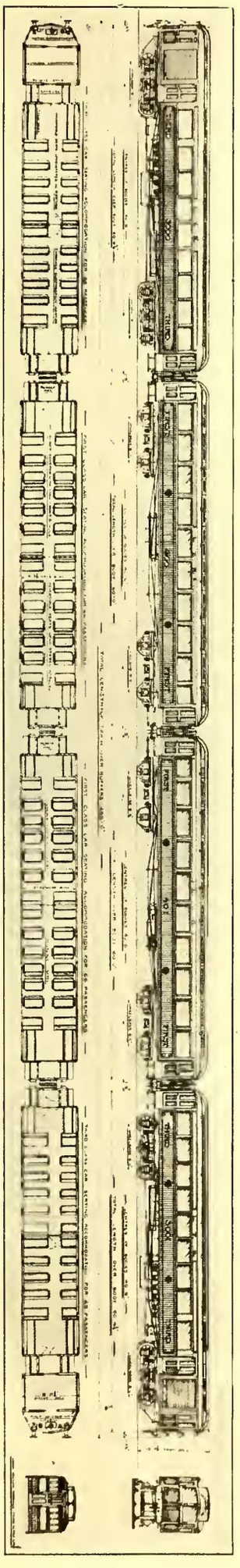
ELECTRICAL EQUIPMENT OF THE LIVERPOOL, SOUTHPORT & CROSSENS SECTION OF THE LANCASHIRE & YORKSHIRE RAILWAY

It will be remembered that little more than twelve months ago it was stated in this paper that the Lancashire & Yorkshire Railway Company, one of the important steam railroads of England, intended to electrify the portion of its line between Liverpool and Southport, and although at that time much of the detail of the work had to be decided, a start was made early last year upon the work, which has steadily and quietly progressed. The original scheme has since been extended, and a service at certain times of day will be given to the stations as far as Crossens on the north side of Southport on the old West Lancashire Line, so that the residents in these districts will eventually be able to go to and return from Liverpool and district without change of cars.

The track to be electrified amounts in all to about 23 miles of double line, nearly all of which has been completed, and all high-tension alternating cables have been laid. The sub-station buildings are all completed, and progress is being made with the erection of machinery which will be contained in them. The rolling stock is also in an advanced state, and is being fitted up with electrical equipment. The power house building is complete, and every effort is being made to get the machinery ready for operation early this year.

Although some particulars have already been given of the scheme of electrification, a general description is appropriate at this time. Briefly, the usual train will be composed of two first and two third-class cars, the third-class cars of which are equipped with four motors of 150 hp each, making a total of 1200 hp per train. To operate these motors current is obtained from a third rail, which is fed with direct current at about 600 volts from four sub-stations, three of which are situated at Birkdale, Seaforth and Sandhills, respectively, and another in the main power house building at Formby.

The power station adjoins the railway, on the banks of the River Alt, at Formby, is a building 290 ft. long by 130 ft. wide, and consists of an independent steel structure, the steel



FOUR-CAR TRAIN ON LANCASHIRE & YORKSHIRE ELECTRIC DIVISION

stanchions of which, in addition to carrying the roof, support traveling cranes over the engine room, the spaces between the stanchions being filled with brickwork. It has two spans, one containing sixteen Lancashire boilers, 8 ft. 6 ins. in diameter by 32 ft. long, for a working pressure of 160 lbs. per square inch, together with superheaters, feed pumps, induced draught plant, etc.; the other and larger span contains four horizontal cross-compound condensing engines of 1500-kw capacity, also one subsidiary vertical compound condensing engine of 750-kw capacity, capable of taking large overload for short periods.

The generators in connection with these engines are of the three-phase type, with a periodicity of 25 and a voltage of 7500. The engine room also contains steam-driven exciters, sub-station plant and a main switchboard.

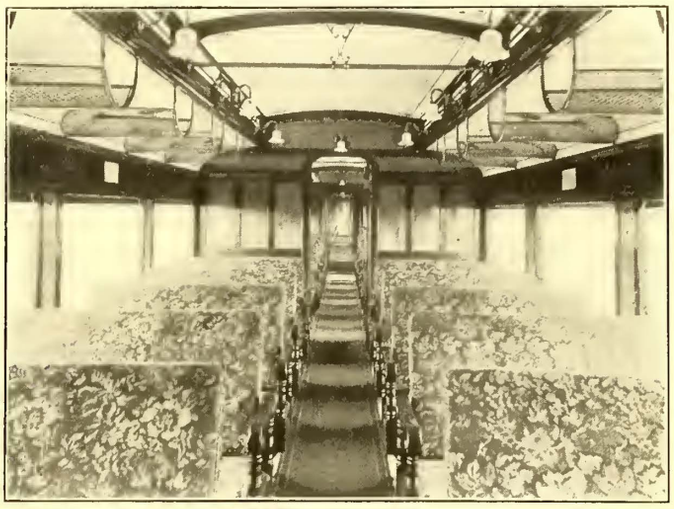
Three-core paper-insulated metallic-sheathed cables convey the high-tension current to the sub-stations, and are laid on the "solid system," at a suitable depth along the company's right of way.

Four rotary converters of 600-kw nominal capacity and 600 d. c. voltage, are provided in each sub-station, with three air blast transformers in connection with each rotary. The connections from these sub-stations to the third rail are made by insulated copper cables, run under ground in troughing.

The third rail is carried outside the track rails, and is supported at intervals of 10 ft. on insulators. The center of the rail is 3 ft. 11½ ins. from the center line of the track, and the top of the rail 3 ins. above the surface of the track rails, these being dimensions agreed upon between all the British railway companies.

The third rail is of special composition to secure conductivity, weighs 70 lbs. per yard, and is protected by a timber guard rail at points where there might be danger of accidental contact. To ensure a good return circuit a fourth rail, supported on wooden blocks, has been placed in the 4-ft. way, and bonded to each running rail; this method of return, it was thought, would interfere least with the running tracks, and would permit the easy removal of any running rail at any time.

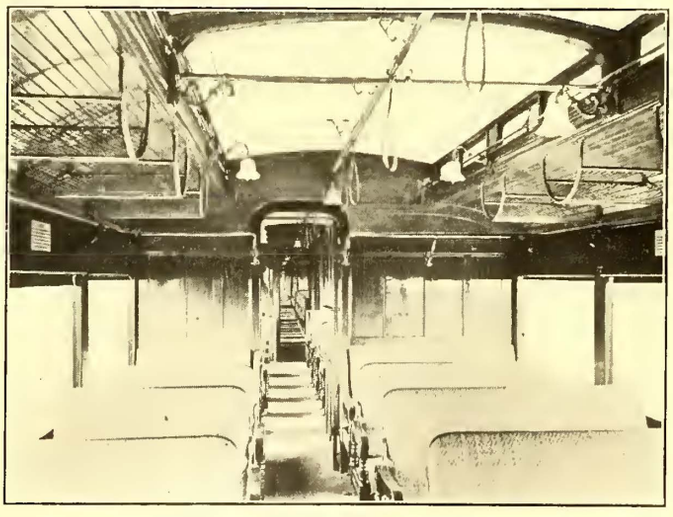
The cars differ from those used on the steam lines of the company, and were built especially for the service. They are 60 ft. long and 10 ft. wide, being the widest cars in Great Britain.



INTERIOR OF FIRST-CLASS CAR

This width was adopted because it was found before any operations were begun that it was possible on the Southport line, as distinguished from other parts of the main line, to have wider stock, some slight alterations to the track and some trifling ones to the platforms along this length alone being necessary. The cars have center aisles throughout, with vestibules to allow passage from one car to the next, according to the American practice.

The motor cars are run at the ends of the train, and are the third-class cars, and, as previously described, are equipped with

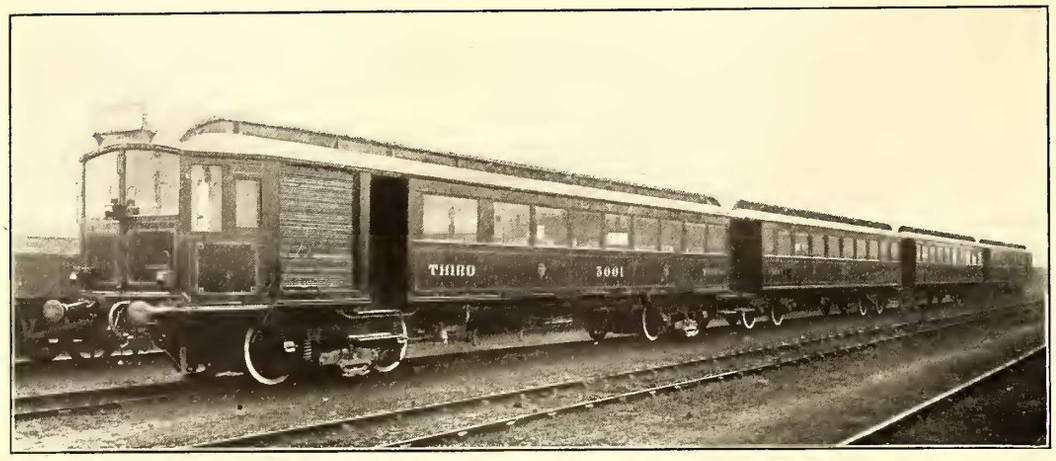


INTERIOR OF THIRD-CLASS CAR

two 150-hp motors on each truck, and with multiple-unit control. The front end has a small compartment for the motorman, containing all the apparatus for controlling the train; and near this is a baggage compartment, the remainder of the car being devoted to passengers. Most of the seats are cross-seats, and seat three on one side of the passage and two on the other, but at the ends longitudinal, to allow more room for passengers entering or leaving the cars. The seats are all covered with rattan, and are of the Hale & Kilburn walk-over type, supplied by G. D. Peters & Company. The interior of the cars is fitted with oak, giving a very light appearance.

The trailers or first-class cars have seats arranged after the same design, but only two on each side of the passage; they are upholstered in "epingle," the interior decoration being mahogany, with light wood panelling, and the roof covered with millboard. A four-car train will carry 270 passengers, the third class seating sixty-nine and the first class sixty-six people.

Perhaps it is well to mention that in order to run a satisfactory suburban service it is necessary that the delay at stations should be redueed to the smallest possible amount, and this will entail alterations in the method of dealing with baggage, as it is not to be expected that the electric trains ean carry heavy luggage. Notice boards will be hung on the platforms showing passengers where to stand to await their class, and in order to ensure quiek loading and unloading of passengers, striet regulations will be made that every passenger is to enter the carriages at the end door and leave by the front door, thus ensuring a continuous circulation.



TRAIN OF ELECTRIC CARS ON LANCASHIRE & YORKSHIRE RAILWAY

In view of the alarm caused within recent months by fires on electric trains, it will be interesting to note that the company have taken all possible precaution against any such occurrence. The motor compartments have, with the exception of the roof, which is covered with sheet-steel plates, been lined with uralite, a well-known fireproof material, the floor also being fireproof. In addition, the eable eonduits are lined with uralite, and the whole of the floor over the motors is covered with the same material and thin steel plates. All the trains also carry fire appliances.

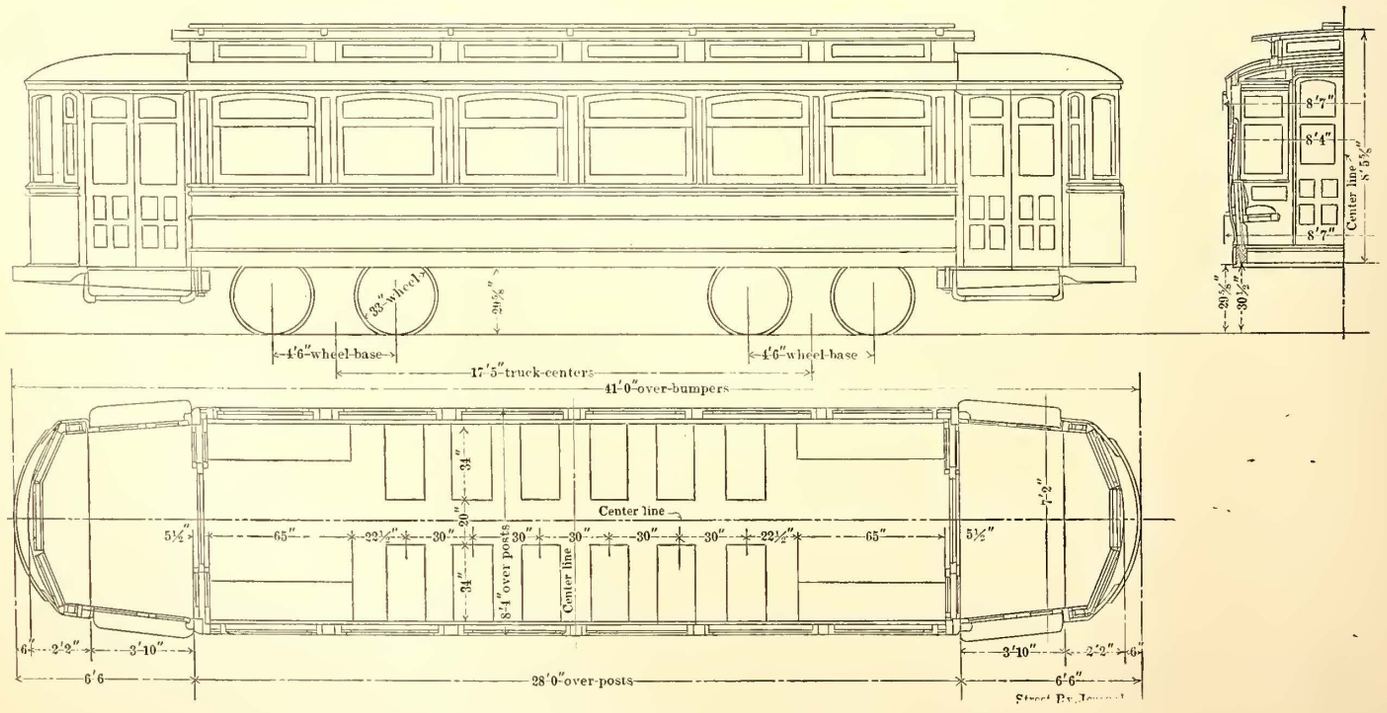
The vacuum brake used on the trains is, with some slight differences, the same as that used all over the Laneashire & Yorkshire Railway. It is fitted with quick-acting valves, but is provided with an eleetrical exhauster in place of the steam ejector on the locomotive. This is probably the first instance in Great Britain of the use of the vacuum brake upon electrically-operated trains.

The service will start with a 10 minutes headway in both directions between Liverpool and Hall Road, and every second train will run through to Southport. In addition an hourly express will run in each direetion between Liverpool and Southport and at eertain times the trains arriving at Southport from Liverpool will go on to Crossens. The accommodation trains between Liverpool and Hall Road and those between Liverpool and Southport will be run in less time than at present, but it is not intended that the expresses to Southport shall do the journey in less time than the fastest steam trains now running.

The whole of the work with the exception of the rolling stock, which is being made at the Horwich and Newton Heath Works of the railway company, is being carried out by Dick, Kerr & Company, Ltd., of London and Preston, who are now completing at their Preston works the main and auxiliary generators, the sub-station equipment, the control equipments of the trains and the rest of the electrical plant.

NEW CHICAGO UNION TRACTION CARS

The 100 new ears ordered by the Chicago Union Traetion Company from the St. Louis Car Company last fall, are now being received in Chicago. These ears are the semi-convertible type, and are the first of that type to be ordered by the Chicago



PLAN AND SECTIONS OF NEW CAR FOR UNION TRACTION COMPANY, CHICAGO

Union Traction Company, which has heretofore adhered to open and box cars. The seating arrangement is a compromise between cross and longitudinal seats, similar to that found in the standard cars of several other cities. There are cross seats for twenty-four persons in the middle of the car, and longitudinal seats at the ends for sixteen more, making a seating capacity of forty. The car has a 28-ft. body with a platform 6 ft. long on each end. The car is designed to carry a large standing load, both on the platforms and inside.

All the principal dimensions are shown on the accompanying plans. The side sills, which form the main support of the body, are 8-in. x 5-in. timbers, bolted to a 7½-in. x ½-in. steel plate. These side sills are strengthened with a truss rod of bar-iron, placed just below the window sills. The windows are very wide, and the posts are 54 ins. center to center. The cars are finished in cherry, with great simplicity and freedom from dust catching carvings or elaborate mouldings. The trucks are the St. Louis No. 47 short-wheel base city truck.

The cars are being equipped with four G. E. 70 motors, of 40-hp each. This is a new design of motor, designed first for Milwaukee city service and specially adapted to inspection and repair from above without the use of pits. It is built on the same tlines as the G. E.

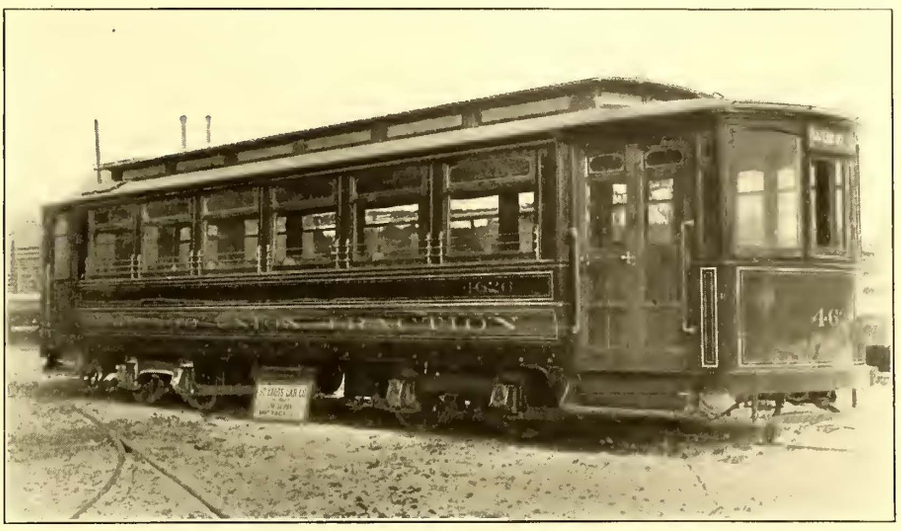
INTERIOR OF CAR

74 motor, which was described in connection with the new Milwaukee interurban cars in the issue of Sept. 5, 1903. The National Electric Company's Christensen air brakes are used on all these cars.

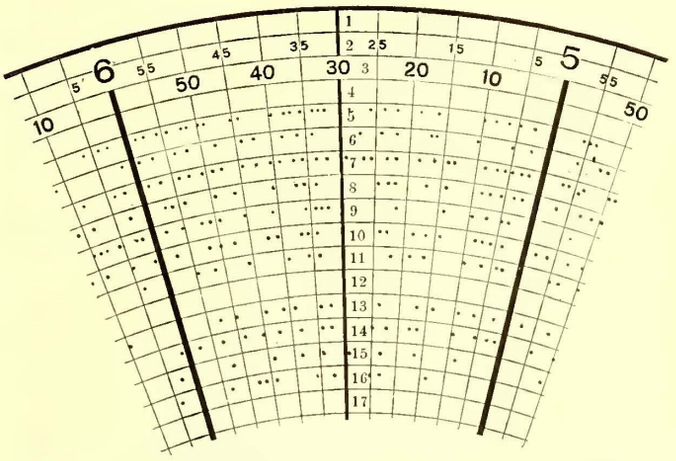
Stockholm's electric tramways, now in construction, are to be ready for use early this year.

NEW CAR-CHECKING SYSTEM OF THE BROOKLYN RAPID TRANSIT COMPANY

The Brooklyn Rapid Transit Company has adopted an ingenious method for recording the time when the company's surface cars pass a given point. It is an adaptation of a scheme originally devised by some of its officers for automatically checking elevated trains, and described in the STREET RAILWAY JOURNAL for Nov. 2, 1901. Its use on the elevated system has been discontinued, and the same machines are now employed for surface car registration. For this service the device consists of an electric clock with a revolving dial, over which is placed a circular sheet of paper, having especially arranged lines and figures on it. Each sheet may be used for 12 hours, after which it is replaced by another. As the motion of the dial is clockwise, the markings must, of course, be read from right to left. One of the complete 12-hour charts is shown in the cut on the next page, while a sector, just one-half size, is reproduced above to show the method of marking.



SIDE VIEW OF NEW UNION TRACTION CAR



PORTION OF BROOKLYN RECORD, SHOWING HEADWAY OF SURFACE CARS PAST A GIVEN POINT

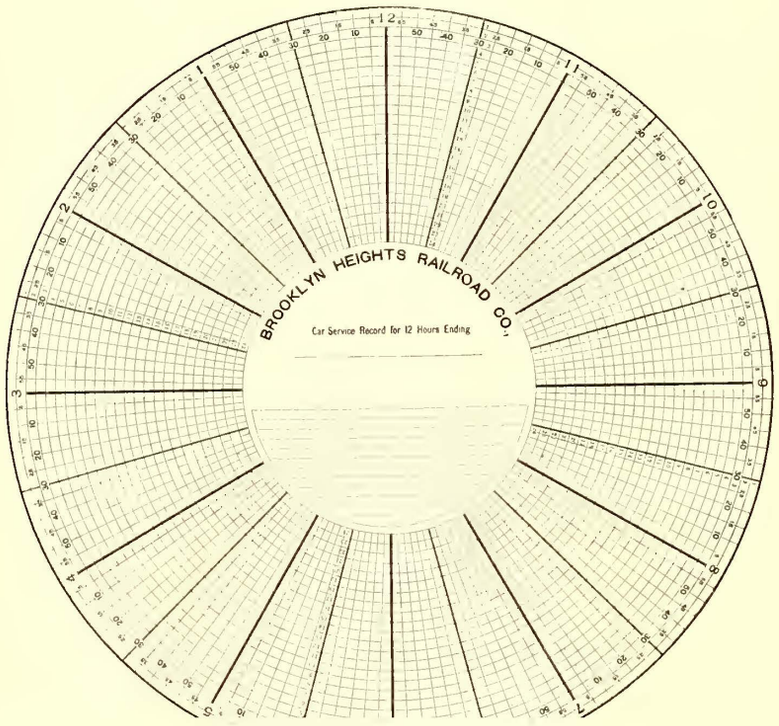
The distance between each radius represents 5 minutes. The heavy black figures indicate the hours and the lighter figures around the edge of the sheet the minutes, the 5-minute intervals being represented by somewhat smaller figures than the 10-minute intervals. The figures from one to twenty-four, placed within the concentric circles, indicate the different divisions, the operations of which are to be recorded.

On the sector reproduced the car service on ten divisions are recorded. The inspector has before him ten push buttons, numbered to correspond to the route numbers used. These

buttons, which are operated like typewriter keys, actuate a needle which perforates the sheet, and so records not only the route but the time when a car passes the checking point. The rings nearest the center, which have small recording areas, are used for the lines traveling on long headways, leaving the large areas for those on short headways.

Two of these clocks are now in service—one in the starter's box at the foot of Broadway, Brooklyn, and the other in a special booth suspended from the elevated structure at Fulton and Court Streets. The men in charge of these clocks are in no danger of being kept idle, as many cars pass the points mentioned. Ten lines intersect at Court and Fulton Streets, over 400 cars an hour passing that point during the time of heaviest traffic. The check at both points will be made on cars going in one direction in the morning and in the opposite direction at night.

The check system enables the company to determine how closely the time-tables are kept, for by simply referring to the relative distance between the holes in each ring, the chart reader finds a graphic history of the traffic conditions on each line. Another benefit is that this system will furnish the company with a record of all delays. The same result could be



THE POSITION OF THE TRACK ENGINEERS

SCHENECTADY RAILWAY COMPANY
Schenectady, N. Y., Jan. 19, 1904.

Editors Street Railway Journal:

The perusal of the editorial in the Jan. 16 issue of your journal, in which you touch upon the stand taken by the American Railway Mechanical and Electrical Association in reference to a possible extension of the scope of that Association to include all subjects relating to the construction and maintenance of the permanent way, has moved me to address you on the subject, in the hope that some way may be devised of arriving at the opinions of electrical railway men upon the subject.

I am a member of the Association in question, and at the Saratoga Convention raised the question which you discuss in your editorial. It was not difficult to see that the suggestion that the scope of the Association be enlarged met with very little response.

I took pains, however, to broach the subject to several railway managers who were at Saratoga, and each one gave it as his opinion that an extension of the work of the Association to include all subjects pertaining to track would be a distinct gain for the railways. At the New York State Convention, held at Syracuse a month later, I made some remarks to this effect when discussing a paper on "Track Construction," read by Mr. Wilson, of Buffalo.

I think it is not difficult to understand and appreciate the position taken by the mechanical and electrical engineers. The men who originated the Association, and who are now directing its affairs, are the heads of the mechanical and electrical departments of our larger street railway systems. It is very natural that this should be so. But it so happens that practically all these men are concerned with mechanical and electrical details only, and it is, therefore, fair to presume that the very interest which they manifest in their particular work prevents, to a considerable extent, their giving proper weight to the subject of "permanent way." I believe that I can speak with some understanding on this point, since I remember very distinctly the comparative indifference with which I viewed the mechanical and electrical side of street railway work when I was in charge of the roadbed only, and the quite different light in which the two subjects presented themselves to me when I assumed charge of the mechanical equipment as well as of the roadbed.

If our electric railway systems were as large as are

of roads are paying from $20,000 to $25,000 per mile of single track for track in city streets. There cannot be any question that the expenditure of such sums for permanent way demands the employment of the best possible methods if the railway company hopes to provide for renewals out of its income. Then again, high-speed interurban roads are giving rise to a number of questions that must be solved intelligently if the companies are to be spared the expense of making large future expenditures to correct what are soon proven to be false economies and poor engineering.

It would be altogether for the best interest of the companies if all their engineers were associated together to discuss all problems of construction and maintenance of plant. The great body of electric railway engineers in this country is vitally concerned in all the questions so embraced. They are entitled to a chance to discuss among themselves those questions which they cannot hope to discuss in the meetings of the American Street Railway Association. It was remarked at Saratoga that the members of the American Railway Mechanical and Electrical Association were much more concerned as to how a motorman uses his controller handle than they were in any question affecting the permanent way. This should be so only in the narrowest sense. The use and abuse of the controller is not without importance, but not many managers, I imagine, would place that question in the same category with the one of roadbed construction.

It doubtless seems to the mechanical and electrical engineers, as they are starting their organization, that they have more work before their Association than it can do justice to. I do not think this is necessarily so. At the start there will be much to do, but many of the questions now pressing will not be long in solving, and I believe that time can be found for the subjects that the track engineers will want to discuss. Moreover, it has been found in other similar organizations that work of the sort our Association has to do can best be handled by committees, and it may be found desirable to expedite the work we have to do in that manner.

The name of the Association is one of the things which, I presume, many of the present members would be loath to change, and it would not be essential provided that its scope could be. That is all I would care to contend for. As a suggestion, however, I think the name, "American Society of Electric Railway Engineers," would apply to an association embracing all the engineering features of electric railways, and would be uniform with the names "American Society of Mechanical Engineers," "American Society of Civil Engineers," etc.

As the engineers connected with electric railways have I

NORTHERN ILLINOIS ELECTRIC RAILWAY COMPANY

Dixon, Ill., Jan. 20, 1904.

EDITORS STREET RAILWAY JOURNAL:

I notice your editorial on "Track Work and the Master Mechanics," on page 87 of your issue of Jan. 16, and would like to suggest that if the men having charge of roadway design, construction and maintenance, do not find a ready welcome in the organization of the master mechanics (and it would be hard to discover a reason why they should) they might find an organization among steam road men that would fill their wants. I have in mind, particularly, the American Railway Engineering and Maintenance of Way Association.

This organization is only four or five years old, and was formed largely of steam road men, but a careful perusal of its bulletins, since my work has changed from steam to electric road work, convinces me that I cannot do better than retain my membership and carefully follow the discussions of the various subjects brought up in the association. I do not recall the exact requirement for membership, but am sure that any experienced engineer in charge of roadway work is eligible. Full particulars may be obtained by addressing L. C. Fritch, secretary, 1562 Monadnock Block, Chicago.

I mention this particular association because I am personally acquainted with its work, and know that it would be of incalculable advantage to electric railway men, though there are, doubtless, other organizations that would do as well for those who wish to follow out some specific part of roadway construction or maintenance, such as is covered by the Association of Bridge Superintendents, Road Masters' Associations, etc. When the electric roadway construction has become so specialized as to demand it, and men engaged in this work become strong enough numerically to warrant it, a separate organization might be formed. But until that time comes it would seem that a more suitable connection could be formed with men occupied in similar lines outside of the electric field than with those engaged in dissimilar work with electric railway companies.

A. M. SHAW, Chief Engineer.

DOUBLE REGISTER RODS AND UNIVERSAL NAME STAMPS

Jersey City, Jan. 21, 1903.

EDITORS STREET RAILWAY JOURNAL:

The use of a register rod on both sides of a car would be of great convenience to the conductor, and would often save considerable time in a crowded car. It should be remembered that half of the fares are collected from each side of the car, and if there is only one register rod the conductor has to force his way back and forth to register his fares as he collects them.

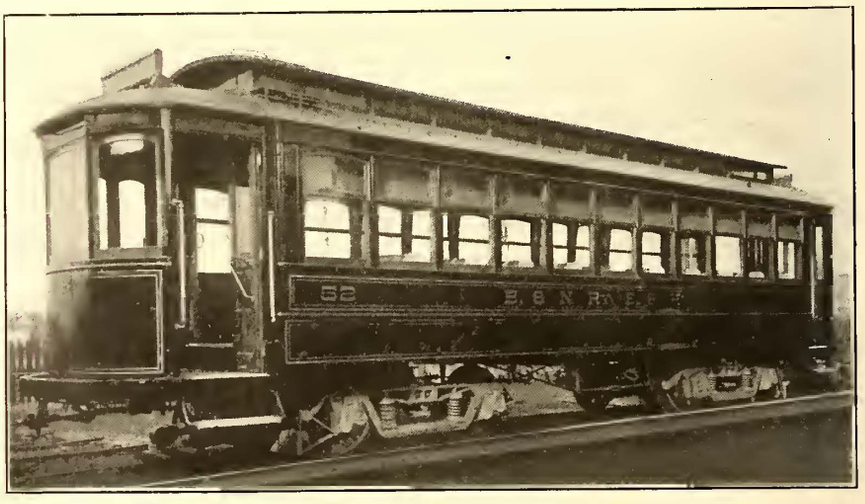
SEMI-CONVERTIBLE CAR FOR BLOOMINGTON & NORMAL RAILWAY

The accompanying illustration shows a new semi-convertible car of Brill type, built by the American Car Company, of St. Louis, for the Bloomington & Normal Railway, Electric & Heating Company, Bloomington, Ill. Normal and Bloomington are connected indirectly by two steam lines, while the electric railway shortens the distance considerably. The cities are about 5 miles apart, and there is much travel between them.

INTERIOR OF CAR FOR BLOOMINGTON & NORMAL RAILWAY

Bloomington is in the center of the State, at the junction of several main railroad lines, and its street railway system includes about 15 miles of lines owned and operated by the above company.

The car is 30 ft. 8 ins. over end panels and 39 ft. 8 ins. over crown pieces; from end panels over crown pieces, 4 ft. 6 ins.; width over side sills, including panels, 8 ft. 1 in., and over posts, at belt, 8 ft. 3½ ins.; from center to center of posts, 2 ft. 8 ins.; the sweep of posts, 1¾ ins. The side sills are 4 ins. x 7¾ ins., with 12-in. x ⅜-in. blades on the inside; size of end sills, 4¾ ins. x 6¾ ins.; thickness of corner posts, 3¾ ins., and of side posts, 3¼ ins. The interiors are finished in cherry and the ceilings are of bird's-eye maple neatly decorated. The illustration of the interior shows the extra wide aisle, which is a feature of this car, as having no wall window pockets, the ends of the seats are brought within the posts and against the side lining. The seats are 35 ins. in length, and the aisle is 25 ins. wide. This illustration also shows the excellent arrangement of lights. The platform steps are 15⅝ ins. over the rails, and the distance from step to platform is 14 ins., from platform to car floor 8 ins. The car is equipped with a number of Brill specialties, including angle-iron bumpers, radial drawbars, "Dedenda" gongs and conductors' gongs.



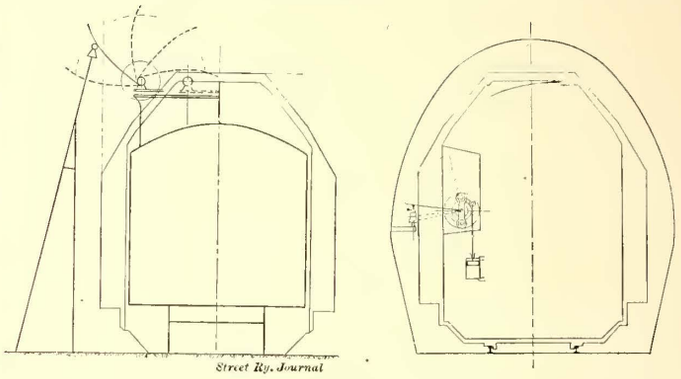
PASSENGER CAR FOR THE BLOOMINGTON & NORMAL RAILWAY

For the convenience of its passengers the St. Louis Transit Company in future will sell $1 ticket books, as it has the $5 books in the past. The books may be obtained at the company's offices or at the car houses. There will be no reduction as an inducement to buyers. As a reason for making up the tickets into $1 books, A. B. Du Pont, second vice-president of the company, said that it was in compliance with a demand in the past for tickets in book form to be sold for $1.

SINGLE-PHASE RAILWAY TRANSMISSION SYSTEM

The Oerlikon Company (Maschinenfabrik Oerlikon), of Oerlikon, near Zurich, Switzerland, has announced the details of its new high-tension transmission system for single-phase electric railways. The company states that it has made no attempt to solve the single-phase traction problem as a whole, but has endeavored to produce an efficient and reliable system covering the transmission, collection and return of current on any type of single-phase railway.

The principal feature of this system is the current collector, which is a curved rod of conducting material, having its convex face in contact with the power wire. This bow may be moved



FIGS. 1 AND 2.—OVERHEAD AND SIDE CURRENT COLLECTION BY FLEXIBLE ROD

through an arc of about 180 degs., and is easily adjustable wherever there is a change in the character of the overhead structure. This adjustment may be obtained through regulation by the motorman or automatically by projections placed at the proper points along the line.

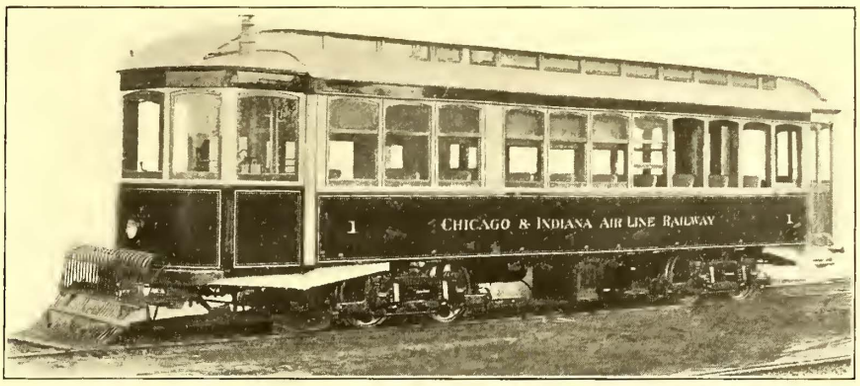
The several positions which may be assumed by this current collector are shown by the broken lines in the accompanying Fig. 1. The inner end of the collector is attached to a revolving axis, which rests on an insulated base. By means of a spring connected to this axis the collecting rod may be revolved and kept in any desirable position throughout its range. To provide for the possible shifting of the power wire, the rods are somewhat longer than usually required. This excess length is shown in Fig. 1, by the projection of the rod beyond the broken arc. The portion of the rod within the smaller arc is not used for contact, as the pressure along this part is considered too great. This system is adapted to meet all possible conditions, an example of which is shown in Fig. 2, where side contact is made in going through a tunnel lacking sufficient headroom for overhead contact.

SEMI-CONVERTIBLE CARS FOR CHICAGO & INDIANA AIR LINE RAILWAY

The Chicago & Indiana Air Line Railway has received two fine semi-convertible cars from the J. G. Brill Company for use on a new extension of the system to Indiana Harbor. Indiana Harbor is one of Chicago's rapidly developing suburban towns, and is becoming an important manufacturing and shipping point. A ship canal has been constructed extending 5 miles from the lake. Large foundries, rolling mills and other important industries are increasing. The town is about 18 miles from South Chicago, and the company's lines extend through a number of other busy and populous centers.

The cars are mounted on Brill 27-E trucks with outside-hung brakes. The wheel base is 4 ft.; diameter of wheels, 33 ins., and of axle 4½ ins. Each car is equipped with two 55-hp motors. The cars are intended to be run in one direction. The front platform has entrance on one side only, the heating apparatus being placed on the platform opposite the entrance. The rear platform has entrance at both sides. The cars are divided into two compartments, the forward compartment for smokers, seating twelve, and the regular passenger compartment seating thirty-two. The seats are of spring cane with walk-over backs, and the corner seats are placed longitudinally to the car.

The accompanying illustration shows the car partly open, with the windows at the rear end raised into the roof pockets. The interiors are handsomely finished in cherry, with ceiling of birch, painted light green. The upper part of the hardwood partition dividing the two compartments is of glass. The length of the cars over end panels is 31 ft. 8 ins., and over vestibules, 41 ft. 1 in.; from end panels over vestibules, 4 ft. 8½ ins.; width over sheathing, 8 ft. 4 ins.; interior width available for seats and aisle, 8 ft; from center to center of side posts, 2 ft. 8 ins.; the side sills are 4 ins. x 7¾ ins., with 12-in. x ⅜-in. plates on the inside. The end sills are 5¼ ins. x 6⅞ ins. The body framing is in accordance with the standard practice of the builders of this type of car, as described and illustrated in the STREET RAILWAY JOURNAL of Nov. 28, 1903. The corner posts are 3¾ ins. thick, and the side posts 3¼ ins. The cars are equipped with a number of Brill specialties, including channel-iron radial draw-bars, track scrapers, sand-boxes, angle-iron bumpers, gongs and ratchet brake handles.



CAR FOR CHICAGO & INDIANA AIR LINE RAILWAY

tween Cedar Rapids and Iowa City is already completed. The entrance to Iowa City cannot be made until a bridge is constructed over the Iowa River near the city. The material for the construction of this bridge is on hand, and the work will commence in a short time. Between Cedar Rapids and Iowa City the line will pass through Curtis, Swisher, North Liberty and Coralville. The line will be about 25 miles in length.

The Iowa City, Washington & Kalona Interurban Railway Company was incorporated recently to construct a line from Washington, via Kalona, to Iowa City, about 28 miles. The surveys have been made and the engineers are now drawing plans. The construction of the line is being pushed by several business men of Iowa City and Washington. It is not the intention of the company to operate the line. It will be leased to other parties. The line will bring Iowa City in touch with a portion of the country south of the city not heretofore connected with it by rail.

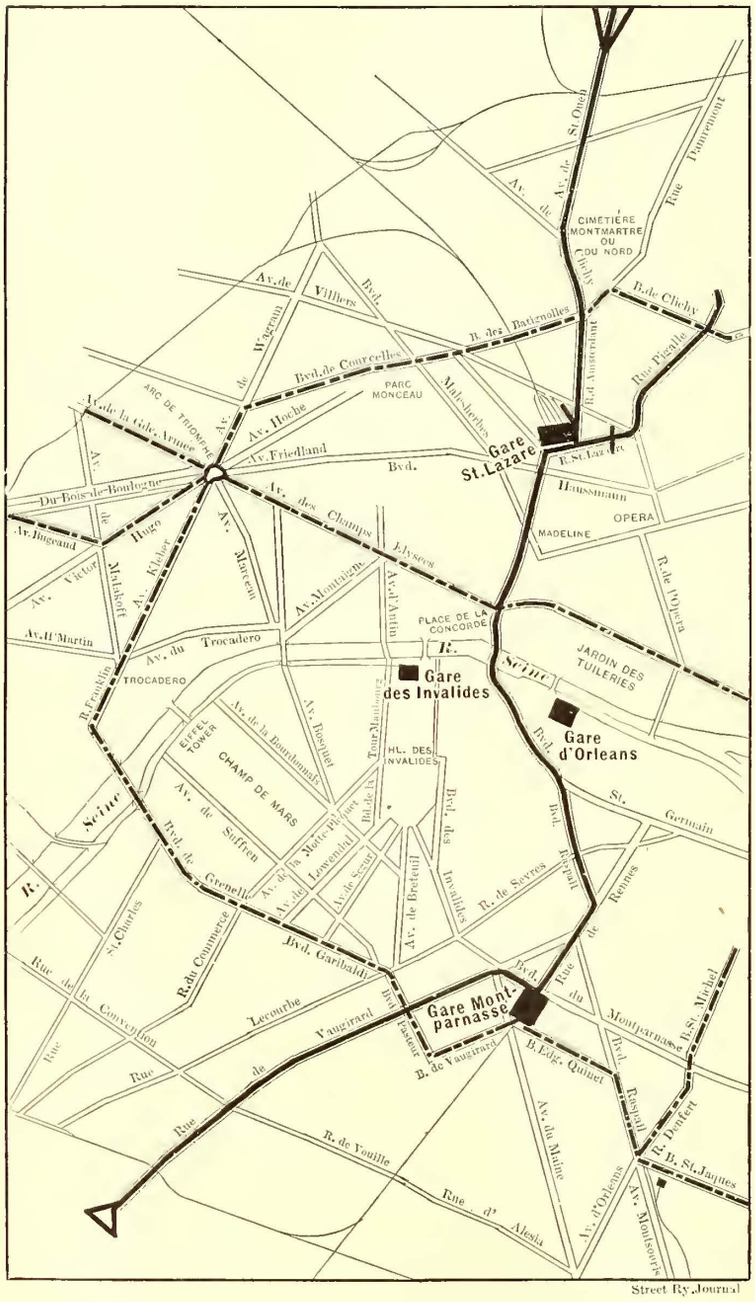
The Iowa City, Davenport & Muscatine Company was incorporated last fall, with a capital stock of $2,000,000, for the purpose of constructing a line between Davenport and Iowa City, with a spur to Muscatine. The majority of the capital stock is owned by St. Louis capitalists. The proposed line of the road between Iowa City and Davenport will be several miles shorter than the Rock Island line. The line has been surveyed between Davenport and West Liberty, and the engineers are now at work between West Liberty and Iowa City. The spur will run from a point on the main line near the town of Summit, due south to Muscatine, and will be about 7 miles in length. The plan is to begin construction work in the spring.

The business men of Iowa City are talking of constructing two other lines from Iowa City to neighboring towns; one to

UNDERGROUND ELECTRIC RAILWAY IN PARIS

Several references have been published in this paper to a proposed north and south underground electric railway in Paris. This proposal has now taken concrete form, and the route selected is shown on the accompanying map by a solid line. Connecting lines of the Metropolitan are shown by a dot and dash line, and the steam railroads in the usual way. As will be seen, the new line will directly connect four railroad stations, viz., those of Montparnasse, the Orleans Railway on the Quai d'Orsay, Les Invalides and Saint Lazare, also four large government office buildings and three large department stores.

Special difficulties will be encountered in the construction of the new line, as a number of streets through which it will run are narrow and the river will have to be tunneled. The road will be considerably deeper than the present Metropolitan line, and a number of the stations will be more than 10 m below the surface, and will be provided with elevators. It is also proposed to give up the use of the third rail and to use an overhead conductor. The principal reasons for adopting the overhead conductor are said to be to reduce the danger of short circuit and make it safer for passengers to walk along the track in case of necessity.



MAP SHOWING NEW NORTH AND SOUTH UNDERGROUND ELECTRIC RAILWAY IN PARIS

The cars will all be mounted on double trucks, and will be of the American intercommunicating pattern. It will be remembered that the Metropolitan cars are divided into compartments, and that most of them are mounted on single trucks.

GEARED RATCHET LEVER JACK

The demand for a quick, positive and durable jack for handling heavy passenger and freight cars, etc., has been met by the Duff Manufacturing Company, of Pittsburg, Pa., in its new Barrett geared ratchet lever jack of 30 tons lifting capacity.

This jack is designated as the No. 30 Barrett jack, and is said to have many features which will commend it to those having heavy loads to be raised quickly and easily. It is made of refined malleable iron and steel throughout in a substantial manner, and is operated like the well-known No. 19 Barrett jack. The jack is single-setting and automatic lowering.

GEARED RATCHET LEVER JACK

The lifting bar or rack is of high-grade open hearth steel, and is raised by a machine-cut steel pinion. This pinion is integral with a large steel gear having ratchet teeth on its circumference. The gear is rotated by means of a socket lever and pawl, and the retaining pawl, together with the automatic lowering device, is the same as is used in the No. 19 jack.

All parts are accessible by removing the shield and gear cover, the removal of which does not in any way impair the working of the jack. The direction is controlled by an eccentric at the side of the frame.

The method of rotating the gear by a socket lever and pawl requires no special care on the part of the operator, as it is not necessary to pull the socket lever out a short distance to engage the next tooth of the gear. The method of operation is simply raising and lowering the socket lever, as in the other sizes of Barrett jacks.

The device described is an improved quick-acting jack, with the simplicity of an ordinary lever jack, the leverage being especially compounded to permit ease of operation and quick action. It is stated that the jack has no complicated features and cannot get out of order. The manufacturer will make several designs of this geared ratchet lever jack in sizes to meet all heavy lifting purposes.

The street railway companies of Cleveland and Akron have been considerably annoyed of late through a form of swindle which is new in that district at least. The modus operandi of the swindlers is to purchase tickets and then carefully split them in two pieces, pasting the split sections onto thin pieces of paste board, with the lithographed side out. In a crowded car the swindle is not likely to be discovered.

FINANCIAL INTELLIGENCE

WALL STREET, Jan. 27, 1904.

The Money Market

All discussion of the money outlook naturally takes its cue from the extraordinary enlargement of bank loans, which reached its climax in the increase of over $30,000,000 reported last Saturday. Loans have now increased $85,000,000 during the last four weeks, a movement which quite parallels the extraordinary ones in the early part of 1901 and 1902. The account stands $15,000,000 above the highest previous record in the history of the Clearing-House, which was made in March, a year ago. With the causes and general nature of this credit expansion, previous articles in this column have already dealt pretty fully. The question raised above all others is whether the capital thus loaned out to financial syndicates is or is not likely to be readily returned as available bank resources. If the new securities against which these credits have been issued for the most part, can be sold to the investing public, then we may expect later on a gradual liquidation of loans. If they cannot be sold, then we shall be confronted again with the unpleasant dilemma of past seasons when forced liquidation of the more readily marketable securities has become necessary, in order to sustain surplus reserve. It is a problem, therefore, which concerns the general stock market fully as much as the money market, the outcome of both situations resting entirely upon the attitude of outside investment capital. So long as money continues to flow in from the country—$14,000,000 more was added to cash holdings last week—interest rates may be expected to continue at their present minimum level. But according to all precedent, increase of cash holdings slackens toward the end of January, ceases entirely after the middle of February, and is followed in March and the early part of April by more or less rapid decline. It is easy to see, if the movement this season follows the parallel of the past, and if loans do not contract, that surplus reserve will have fallen comparatively low by the end of another two months. In banking circles, therefore, doubt is freely expressed as to the maintenance of the present low rates of money for very much longer. The most gratifying feature of the whole money outlook is our rapidly increasing credits in the foreign trade. Europe, having greatly overestimated the size of our cotton and grain crops, has been practically caught short at the top of a wild advance, and from all appearances must continue to pay fancy prices for our cotton, wheat and corn in order to meet its necessary requirements. That this has already resulted in entirely extinguishing American indebtedness on the other side of the water is universally admitted. That Europe will owe this country very largely before it gets through, there is also little reason to doubt. Consequently, our money market will be much better able than it was in previous years, to obtain assistance from abroad in case its own resources are unduly diminished. Call money on the Stock Exchange is quoted at the nominal figure of 2 per cent; time money is obtainable for sixty days at 3½; for ninety days to four months at 4, and from five to six months at 4½ per cent.

The Stock Market

In sharp contrast to the dullness of the previous weeks, the Stock Exchange has witnessed during the last week a considerable increase of activity, and a general improvement in prices. Disappearance of the Russia-Japanese crisis, as an immediate source of alarm, belief that a decision in the Northern Securities case is still some distance off, the extremely easy money condititons, and fairly favorable reports of trade and railroad earnings—these are the visible influences on the side of rising prices. Besides this there are at least three causes favoring a better market. The first is the desire of the large financial interests who bought at the low levels last summer and autumn to secure some of their accumulated profits; the second is the efforts of the banking community to make the market more attractive for the sale of the recent issues of railroad securities, and lastly, there is the activity of a powerful contingent composed of Western speculators, and leading operators in cotton and grain, who see in the present situation an opportunity for a profitable turn on the long side. Necessarily, the buying from these various sources is chiefly in the nature of manipulation, and confidence in the stability of the advance cannot wholly be felt until there is better proof that the movement is meeting with cooperation from investment capital. The public response has so far unquestionably been disappointing. Sentiment among the great body of outsiders is still extremely cautious, not only because of the remembrance of past disasters, but also because of a well-defined doubt as to what the future has in store for business and finance. The traditional uncertainty of a presidential year is complicated in this instance by the serious problems, the solution of which largely depends upon the outcome of next November's election. Financial circles justly feel that there is more than ordinarily at stake in the choice of candidates, and in the outcome at the polls. As a restraining factor this is probably the most important that the present situation holds. But in addition the grave question of the credit position suggested by the recent loan expansion is also a matter of much misgiving.

The movement of the last week has centered almost entirely in the railroad and industrial stocks. The local traction shares, which previously were active leaders, have been relegated to the rear, and trading in this quarter has not been particularly active, nor have prices shown much change. The pools in Brooklyn Rapid Transit, Manhattan, and Metropolitan, have apparently had too much work on hand in other quarters to attend to their traction favorites. These stocks have simply been supported whenever occasion has required, but no further attempts have been made to advance prices. Speculative opinion continues bullish toward the group, on the theory that they will be taken in hand later on, when the rise elsewhere has spent some of its energy.

Philadelphia

Entirely in consequence of the general market improvement, the Philadelphia street railway securities have enjoyed a further advance on the week. The three leaders of the movement have been the Philadelphia Company stocks, Philadelphia Rapid Transit and Union Traction. Dealings in all these issues have been more active than at any time since last summer, but the buying has plainly enough come from speculative sources, and is not inspired by any new developments in the individual properties. Philadelphia Company common rose from 41 to 43, the talk being that a large block of the stock, which for a long while has hung over the market, had at length been absorbed. The preferred rose from 45 to 46½, but subsequently receded to 45½. Rapid Transit has been taken in hand on the assumption that with the $5 assessment paid in, the "bad news" is all out. Quoted at its full value of $15 paid in, the stock advanced from 13¾ to 15¼. Union Traction rose in sympathy, from 47 to 48, which is the highest figure of the season. Philadelphia Electric showed considerable activity, but without any corresponding improvement in price. It advanced from 6⅜ to 6½, and then dropped back to 6⅛. Other sales for the week comprise American Railways at a rise from 43¼ to 45, Citizens' Passenger at 345, Philadelphia Traction at 97⅝, Reading Traction (100 shares) at 30¼, Pittsburg Traction preferred (300 shares) from 48½ to 49½, and Railways General at 2.

Chicago

Rumors that a dissolution of the existing relations between the Union Traction and its subsidiary companies—the North Chicago and the West Chicago—might be sought by the stockholders of the latter, were discredited by the leading officials. The leases are such it is argued, that however disappointed the holders of the subcompany shares may be over the reduction of their dividends, they cannot be nullified without process of litigation. North Chicago stock made a new low record of 70 during the week, on sales of 100 shares; recovering later to 72. West Chicago dropped from 47 to 46. The Union Traction shares were adversely affected by this weakness, the common declining to 5¼, and the preferred to 30. Metropolitan Elevated common was strong at an advance from 16⅞ to 18, Metropolitan preferred sold up to 53, then back to 52⅛. Two thousand shares of Union Elevated changed hands between 2⅜ and 2¾. South Side sold up from 92 to 93, Lake Street receipts went at 2¼ and 2⅛, a hundred shares of Northwestern common sold at 15 and 16, and the preferred sold at 48. All matters growing out of the controversy between the Union Traction and its underlying companies have been referred to a master in chancery, and Judge Grosscup will render no decision until the master's report is in his hands.

Other Traction Securities

Massachusetts Electric issues were the feature of the week's traction dealings in Boston, the common gaining another point to 24, and the preferred a point and a half to 80½. The move appears to be wholly speculative. Boston Elevated was idle on its old

range between 140 and 140½, West End common rose a point from 90 to 91, and the preferred sold at 108. Exceptional activity distinguished the week in the outside street railway bonds dealt in on the Baltimore Exchange, with numerous advances in prices. City & Suburban of Washington 5s sold up from 93½ to 94, Atlanta Street Railway 5s from 103¼ to 103¾, Anacostia & Potomac 5s from 93 to 94⅝, Norfolk Street Railway 5s sold at 105¼, City & Suburban of Baltimore 5s at 112½, Central Street Railway 5s at 114, Baltimore Traction convertible 5s at 101¼, Toledo Traction 5s at 100⅛, Charleston Railway 5s at 102½, Knoxville Traction 5s at 101, Lexington Street Railway 5s at 97, Richmond Street Railway 5s at 104¼, and Augusta Street Railway 5s at 100¾. The United Railways securities rose fractionally, the general 4s, after selling at 90¾, rallying to 91½, the incomes advancing from 56 to 56¾, and the stock from 8⅛ to 8⅜. The upward movement in Interborough Rapid Transit on the New York curb has apparently been suspended for the moment. The stock reached its high point, 109⅞, a week ago, declined to 107¼, and later rallied to 108. Sales of 400 New Orleans Railway common were reported between 9 and 10. St. Louis Transit sold up from 11 to 11½, Washington Traction preferred sold at 47½, the bonds from 75⅝ to 76⅞; Brooklyn Rapid Transit 4s at 76½, and Nassau Electric 4s at 77½. On the New York Exchange, North American shares advanced briskly, anticipating the increase in the annual dividends from 4 to 5 per cent, announcement of which was made yesterday. Twin City Rapid Transit was also bid up apparently by the old speculative pool in the Canadian specialties.

Tractions were comparatively inactive at Cincinnati last week. Five hundred shares of Cincinnati, Newport & Covington preferred sold at 82½ to 82¾, and 210 shares of the common at 28½ to 29, all in small lots. Detroit United advanced from 65 to 69, on small sales, aggregating 112 shares. Cincinnati Street was inactive, twenty-five shares selling at the old price, 133. A small block of Cincinnati Street 5s brought 107, and a small lot of Cincinnati, Dayton & Toledo 5s 81½.

At Columbus there was considerable demand for Springfield (Ohio) Railway & Light, which is making fine gains in earnings; holders are asking 37, and several sales were made around this point. East St. Louis & Suburban sold at 62. Columbus Railway & Light was firm at 35. Columbus Railway common sold at 85¾ to 86. The preferred is now held at 109.

Northern Ohio Traction & Light again featured in Cleveland. The dealings were about 500 shares on an advance from 14½ to 17¾. A few weeks ago there was considerable of this stock for sale at lower figures, but holders now appear to feel that it is due for further increases, and are holding off for higher prices. Northern Texas Traction is again attracting attention, because of its fine showing, and about 350 shares sold at 31¾. Cleveland Electric sagged from 75½ to 72½. This stock has always been inclined to anticipate good news, but now, when it developed that the twenty-year franchise extension could not be negotiated at once, the stock sold off.

Security Quotations

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

	Closing Bid	
	Jan. 19	Jan. 26
American Railways	43	44¼
Aurora, Elgin & Chicago (preferred)	a55	a55
Boston Elevated	140	140
Brooklyn Rapid Transit	50	49⅞
Chicago City	160	160
Chicago Union Traction (common)	5½	5¼
Chicago Union Traction (preferred)	31¾	30
Cleveland Electric	74	70½
Consolidated Traction of New Jersey	63	64
Consolidated Traction of New Jersey 5s	105½	105½
Detroit United	64¾	65
Elgin, Aurora & Southern	a30	a30
Interborough Rapid Transit	—	107½
Lake Shore Electric (preferred)	a42	—
Lake Street Elevated	2⅛	2
Manhattan Railway	144⅞	145
Massachusetts Electric Cos. (common)	23	22¼
Massachusetts Electric Cos. (preferred)	79	79
Metropolitan Elevated, Chicago (common)	16	17½
Metropolitan Elevated, Chicago (preferred)	51	52
Metropolitan Street	122½	122¼
Metropolitan Securities	90	89
New Orleans Railways (common)	9⅝	9¾
New Orleans Railways (preferred)	29½	29
New Orleans Railways 4½s	78	a79½
North American	87½	88½
Northern Ohio Traction & Light	14	15¼
Philadelphia Company (common)	40¾	42¼
Philadelphia Rapid Transit	8⅜	†14⅞
Philadelphia Traction	97½	97⅝
St. Louis Transit (common)	10½	11½
South Side Elevated (Chicago)	92	92
Third Avenue	121	121½
Twin City, Minneapolis (common)	91	94
Union Traction (Philadelphia)	46¾	47¾
United Railways, St. Louis (preferred)	52½	52
West End (common)	90	90⅛
West End (preferred)	108	108⅛

a Asked. † Includes new $5 assessment.

Iron and Steel

The principal incident of the week in pig iron was the shading of prices by Southern producers, in order to meet the cut recently made by the Northern interests. In spite of what this competition seems to show, the tonnage of the pig product is reported as fair. It is generally believed that the deadlock in the steel rail trade is likely sooner or later to end in the makers giving way. Their hand is being forced already by the cutting of prices by mills which reroll old steel rails. In other branches improvement is disclosed in the bar trade, in plates and shapes, and in wire products. Weakness, on the other hand, is still disclosed in sheet steel. Quotations are as follows: Bessemer pig iron, $13.75 and $14, Bessemer steel $23, steel rails $28.

Metals

Quotations for the leading metals are as follows: Copper 12¾ cents, tin 28¼ cents, lead 4½ cents, and spelter 4⅞ cents.

HARASSING THE PUBLIC SERVICE CORPORATION

When the Public Service Corporation took over the several street railway and lighting properties in Northern New Jersey, it naturally found itself in control of a number of systems whose apparatus and methods of management differed greatly. The corporation first set about to harmonize, as far as possible, and at once, all of these systems, and then took up the further simplification of the operation of the properties by standardizing the equipment. With this end in view, a number of changes were made in the method of operating the lighting companies, and then the street railway systems were given attention. A number of changes were made in the operation of the cars and in one or two details of management, and plans were laid out for materially benefiting the service by increasing the rolling stock and readjusting the power supply. The company realized, however, that but few of these improvements could be made before the winter set in, and therefore made the best arrangements possible for getting the maximum of service with the facilities in hand.

The position of the company was thoroughly set forth to its patrons by President McCarter soon after control of the various companies was assumed. Despite this fact, the residents of some of the places through which the company operates have recently become dissatisfied with the service given, and in one or two cases most strenuous measures have been adopted by the Councils, in what they thought was the interest of the community at large. Particularly annoying to the company has been the action of the West Hoboken Town Council in revoking the ordinance passed April 5, 1893, giving the North Hudson County Railway Company, now a part of the Public Service Corporation, the right to change its motive power from horses to electricity. Similar action was contemplated by the North Bergen township committee, but the councilor for that committee advised against any hasty action.

In view of this action and the agitation against the company, President McCarter has found it necessary to make a public statement regarding the position of the company. As in the statement made by him when the companies were first taken over, he again reviews the conditions that existed then, and tells of his hopes for the future, and of the plans for improvements that now are under way. Following this announcement Mr. McCarter secured a writ of certiorari from Justice Dixon, restraining the West Hoboken officials from interfering with the company, and the action of the town authorities will be certified to the Supreme Court for review. The writ is made returnable at the next session of the Supreme Court, on the second Tuesday in February.

CLEVELAND'S THREE-CENT FARE CASE CARRIED TO THE COURTS

The Cleveland Electric Railway Company has secured a temporary injunction restraining the city of Cleveland from enforcing the McKenna 3-cent fare zone ordinance, which was passed by the City Council two weeks ago, and which was to have gone into effect Sunday, Jan. 24. The action of the company was a precautionary one, in case nothing comes of the peace negotiations now on for a settlement of the whole street railway situation, as the company proposes to fortify itself, so as to continue to fight, if necessary. The hearing on the injunction just obtained will be held Feb. 13.

The prospects for a settlement of the company's franchise problem on the zone basis, suggested for trial by Mayor Johnson, are not so bright as they were a week ago. Nothing definite has been done during the past few days, but it is evident that the majority of thinking people are not even in favor of a trial of the zone proposition. It is generally believed that it will not prove satisfactory, either to the public, or to the company. Judging from the hundreds of letters that are being published in the daily papers and from personal talks with business men, there is a growing sentiment that the best and simplest way to solve the problem, is on a basis that will give the company sufficient revenue to make a reasonable profit on its business, and at the same time give the best of service. Even should the city make a contract on an extremely low-fare basis, if the company did not receive a fair return on the investment, the result could not help but be disastrous to the city in the way of poor car service. There is a growing sentiment in favor of a settlement on the present basis—six tickets for a quarter, and universal transfers. While this plan is not altogether satisfactory to the company at present, by reason of abuse of the transfer privileges, it seems as if certain restrictions might be made that would prevent much of the dishonesty now rampant, and at the same time allow the public reasonable transfer privileges. Altogether it is extremely probable that a vote taken at this time on the proposition of testing the zone plan would meet with overwhelming defeat, and Mayor Johnson is beginning to appreciate this fact.

NEW INDIANA ROAD

The Wabash & Rochester Railway Company, which is headed largely by Cleveland people, has established offices at 926 to 928 Williamson Building, Cleveland. The company will build an electric railway between the Indiana towns mentioned in the title. The project has been under way for some time, and the promoters now announce that it has been financed and that contracts have been placed for the construction of the road during the coming summer. The United States Engineering & Construction Company, 930 Williamson Building, Cleveland, has the contract for the construction work, and N. O. Pound, of the Pound Construction Company, of New York, is also interested individually in the construction of the road. The road will be 40 miles long, and will be built on private right of way except in the

FOREIGN ORDERS FOR NATIONAL ELECTRIC COMPANY'S AIR BRAKE EQUIPMENTS

Some important foreign orders for air-brake equipments have been received recently by the National Electric Company, of Milwaukee, Wis. Among them may be mentioned the following: Two hundred automatic air-brake equipments for motor cars for the Underground Electric Railways Company, Limited, of London; ninety automatic air-brake equipments for the Metropolitan Railway Company, of Paris; thirty-four straight air-brake equipments for the Amsterdam Electric Tramways; sixty-four automatic air-brake equipments for the Mount Vesuvius Electric Railway, Naples, Italy. In addition to these European orders, the company has received an order for thirty-seven straight air-brake equipments for the Government Tramways of Sydney, Australia, and nineteen straight air-brake equipments for the Hanshin Railway, of Japan. All of these foreign orders have been received within the past month.

The London order calls for air compressors with a capacity of 50 cu. ft. of free air per minute, which is much larger than the air compressors furnished by the National Electric Company to the New York Subway, which have a capacity of 20 cu. ft. of free air per minute. The air compressors to be furnished for the Metropolitan Underground Railway, of Paris, are also larger than the New York Subway compressors, as they will have a capacity of 35 cu. ft. of free air per minute. The air compressors for the Mount Vesuvius Electric Railway are of the same size as those in the New York Subway, and the other foreign orders call for the company's regular standard No. 1 compressors, which have a capacity of 11 cu. ft. of free air per minute.

THE FLOODS IN OHIO

Events in Ohio the past week indicate that electric railways have more to fear from floods than from heavy snow fall. As stated in a recent issue of the STREET RAILWAY JOURNAL, the severe snow storms the early part of the month did not seriously interrupt traffic on any of the roads, either city or interurban, but the melting of this snow last week, accompanied by unprecedented rain storms for this time of year, had a most disastrous effect upon electric railways all over Ohio. The damage was most severe in the case of the interurban lines which have been built in valleys.

The Lake Shore Electric Railway Company was one of the heaviest sufferers. Six bridges between Norwalk and Toledo were wrecked, and this portion of the line was tied up for three days. The boiler room at the Fremont power house was flooded and the fires put out, so that traffic on the division from Norwalk to Ceylon had to be suspended for a day. The Cleveland-Sandusky division was not affected. High water put out the fire in the main power station of the Toledo Railways & Light Company, and, in addition to this, it was impossible to secure coal, so that the city, as well as the interurban service of all lines entering Toledo, was crippled for a short time. Undergrade crossings on the Detroit, Monroe & Toledo Short Line were filled, and this road was tied up. Tracks of the Toledo, Bowling Green & Southern were

feet deep. At Franklin a trestle on the Cincinnati, Dayton & Toledo line was washed out, and business between Cincinnati and Dayton was suspended.

Altogether, last week was undoubtedly the most disastrous in the history of Ohio electric roads. Steam roads also suffered to a considerable extent, but in many cases they were saved losses through the fact that heavy stone ballasted roadbeds, steel bridges with stone abutments and concrete and stone culverts are more eommon with them than with the electrics, particularly the older electric roads.

AUTOMOBILE COMPANY CELEBRATES ANNIVERSARY

In the event of the completion of its new factory building and of its sixth anniversary, the Winton Motor Carriage Company, of Cleveland, recently entertained a party of fifty daily and trade journal newspaper men from New York, Philadelphia, Boston, Chicago, Cleveland and other cities. The Eastern party came in special cars. All the guests were taken to the new Winton factory, which is said to be the largest and most complete automobile manufacturing plant in the world. After an inspeetion of the plant, the party was taken in automobiles to the Hollenden Hotel, where a magnificent banquet was spread. This was participated in also by Mayor Tom L. Johnson and other prominent automobilists. As announced in the Street Railway Journal of Jan. 2, the Winton Motor Carriage Company is manufacturing a gasolene touring car whieh is especially adapted for inspection tours by eleetric railway operators.

EXTENT OF FIRE DAMAGE AT E. W. BLISS COMPANY'S WORKS

The E. W. Bliss Company announces that the newspaper reports regarding the reeent fire at the company's works were greatly exaggerated. The company states that the fire was confined to the upper story of the main works, and the damage was eonfined practically to burning out the office. This fire will have hardly any effect on its business, even in the main works, where general machinery is manufactured. The company espeeially emphasizes the fact that the fire will not in any way affect the filling of railroad orders, as all the railroad material is made at the company's projectile works, located in South Brooklyn, about 5 miles from the main works.

ANNUAL MEETING AT TOLEDO

At the annual meeting of the stockholders of the Toledo Railways & Light Company, held at Toledo a few days ago, the old board of directors and all the officers were re-elected. The officers are: Chairman of board, Albion E. Lang, of Toledo; Henry A. Everett, of Cleveland, president; L. E. Beilstein, of Toledo, vice-president and general manager; Herman S. Swift, of Toledo, secretary; Spencer D. Carr, of Toledo, treasurer.

With the exceptions of the two last named, the foregoing, with Edward Moore, of Cleveland; Herbert Holt, of Montreal; Robert B. Van Cortland, of New York, and Barton Smith, of Toledo,

The company has in its treasury Toledo Railways & Light Company 4 per eent bonds certified, $603,000, not included in the above, which were issued for 75 per eent of actual eost of betterments and extensions.

CHICAGO UNION TRACTION MATTERS

Judge Grosscup has been asked to arbitrate the diffieulty between the Union Traction Company and its underlying companies, and he, in turn, has referred the matters in dispute to a master for investigation. The representative of the underlying eompanies, and the receivers for the Union Traction could come to no agreement as to their troubles, and it was determined to put the matter before the judge. The underlying eompanies claim that the interpretation put on the leases to the Union Traction Company, under the reeent plan of reorganization, was not what was intended or thought of by the directors of the underlying companies. Then a committee representing both companies was instructed to meet the receivers of the Union Traction Company. At this meeting the interpretation of disputed points in the ease was diseussed. In the leases made last August between the three companies it was stated that a "reasonable charge for depreeiation of the plant and equipment" be allowed. New cars are now being purchased by the Union Traction Company receivers, and other improvements in the service are being made. The dispute arises as to whether these improvements should be eharged to the depreciation aceount, or to the improvements which the Union Traction Company is expected to make. If they are charged to depreciation the improvements come out of the earnings of the underlying eompanies and diminish the dividends of the stockholders by so mueh. If they are charged to new improvements the Union Traetion Company bears the expense.

Judge Grosscup, upon reading the petitions whieh were prepared by Attorney John S. Miller, who is counsel for the receivers of both the Union Traction and the underlying companies, entered an order referring the questions in the petition to Master-in-Chancery Henry V. Bishop. The master-in-chancery is to hear the contentions and evidence bearing upon the questions at issue, and he is to report to Judge Grosscup.

This order of Judge Grosseup delays the question of paying or ascertaining the dividends to be paid to the underlying companies for the first quarter under the new amendment leases. In the meantime the receivers for the Union Traction Company remain also the reeeivers for the underlying companies, which do not agree to the eonstruction of the amended leases.

In their petitions to Judge Grosscup the reeeivers asked the eourt for instructions on the payment of the rentals per dividends due to the stockholders of the North Chicago Street Railroad Company sinee Jan. 15. These instructions will, in view of Judge Grosscup's order, be given after the inquiry is made by the master-in-ehaneery, and the judge reaches a decision, and until that time there will be no dividends paid.

WORK OF THE ELECTRIC RAILWAY TEST COMMISSION

A seeond meeting of the Electric Railway Test Commission of the Universal Exposition, St. Louis, 1904, convened in New York on Jan. 27, 1904. All of the commissioners, namely, J. G. White, chairman; H. H. Vreeland, James H. McGraw, George E. McCul-

AN IMPORTANT DECISION IN OHIO

An important decision has just been handed down by the Supreme Court of Ohio in the case of the Hamilton, Glendale & Cincinnati Traction Company vs. the Hamilton & Lindelwald Electric Transit Company. The action was originally brought by the transit company to enjoin the traction company from constructing, operating and maintaining a street railway on East Avenue, in Hamilton, in pursuance of the provisions of an ordinance passed by the board of control, granting such right to the traction company. The transit company was in possession of the street with a track with a gage of 4 ft. 8½ ins., and the traction company attempted to straddle its track with a 5-ft. 2½-in. gage. The transit company secured a temporary injunction in the Common Pleas Court, which was subsequently dissolved, and it appealed to the Circuit Court, which granted a perpetual injunction. The traction company carried the case up to the Supreme Court, which has announced the following syllabus:

When a city council has, by ordinance, legally granted to one street railway company the right to construct its railway and lay its track on and over a particular part of a designated street within said city, and such company has duly accepted said grant and entered upon and taken possession of the right of way so specifically granted, a subsequent grant by said city council, or its successor in office the board of control, of the same right of way, or substantial part thereof, to another street railway company for like purposes, will not of itself confer upon the second grantee the right to enter upon and take possession of the route or right of way so granted, where such entry and possession by it will materially and injuriously interfere with, interrupt and abridge the first grantee's use and enjoyment of the said right of way. And where said second grantee threatens, and is about to take possession of said route and right of way under and by virtue of its said grant, without the consent and against the will of said first grantee, and without having appropriated the right so to do, it will be restrained from so doing by injunction. Judgment affirmed. Davis, Shauck and Price, JJ., concur.

NEW RATTAN SEAT ENAMEL

One of the most disagreeable features street railway companies have had to contend with in the renovation of old cars is the unsightliness of the seats and backs. To recover them is quite expensive, and yet to leave them untouched greatly mars the general effectiveness of the renewal work and gives a decidedly unfinished appearance to the cars.

The Sherwin-Williams Company, of Cleveland, Ohio, claims to have solved this problem by its new product—rattan seat enamel. It very closely imitates the natural color of the rattan, dries with a hard finish, impervious to water, and by its filling and covering capacity prevents water penetrating into the seat.

The company has issued a card showing on a piece of rattan what this article will do, and if the company's claims are correct this enamel should become very popular.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED JAN. 19, 1904

749,716. Rail Contact Shoe; George W. Brady and Lawrence P.

TOURNAMENT TO AID SPANISH WAR VETERANS

The Spanish War Veterans' organization is about to conduct athletic sports in New York for the benefit of members in needy circumstances, and for the widows and children of dead comrades. General Eugene Griffin is corps commander of the State of New York Spanish War Veterans, which comprises about thirty-five commands and nearly 5000 enrolled comrades. The commands in the vicinity of New York city have arranged to hold a military athletic tournament in the armory of the Twenty-Second Regiment, N. G. S. N. Y., on March 5, 1904, the net proceeds to go to the treasuries of the corps and commands concerned.

Numerous prizes have been donated by prominent citizens, and as the services of nearly all participants will be given gratis, the affair should prove very successful. Subscriptions from those interested should be sent to General Eugene Griffin, at 44 Broad Street, New York city, for the prize fund of the tournament.

PERSONAL MENTION

MR. F. D. SAMPSON, who for the past nine years has been manager of the Charlotte Electric Railway, Light & Power Company, has resigned from that position to accept that of designing and consulting engineer of the D. A. Tompkins Company, manufacturers of Charlotte, N. C.

MR. T. E. FELT, of Cleveland, has resigned as superintendent of the Ohio Central Traction Company, of Galion, Ohio. Mr. Felt is considering a proposition from a Western road. He formerly was superintendent of the Richmond & Petersburg Railway, operating between Richmond and Petersburg, Va.

MR. S. B. McLENEGAN has been appointed superintendent in charge of operation of the Los Angeles Interurban Railway Company, the new Huntington corporation which recently took over the Los Angeles Company, California Pacific Railway Company and Los Angeles-Glendale Electric Railway Company. Mr. McLenegan was fomerly superintendent of the Los Angeles Traction Company and the California Pacific Railway Company.

MR. WILLIAM WARD HINCHER, formerly of the chief engineer's office of the Chicago Union Traction Company, of Chicago, Ill., has opened an office in Chicago for the Albert and J. M. Anderson Manufacturing Company, of Boston, Mass., and will give his entire attention to the Anderson interests. His office is at 175 Dearborn Street. Mr. Ernst Waltman, of that company, was in Chicago recently arranging for the opening of the Chicago office.

AS THIS ISSUE is going to press, announcement is made of the resignation of Mr. W. W. Wheatly as general manager of the railway department of the Public Service Corporation. No successor to this position has as yet been selected. Mr. Wheatly is planning to take a short vacation before assuming active work again, but it is understood that he has already received an offer of the office of general manager of an important electric railway system elsewhere.

MR. ERNEST THOMPSON, partner in the firm of Nalder Bros. & Thompson, makers of ammeters, voltmeters and other instruments, London, England, died recently, after a long and

director of the Cleveland Electric Railway. It is probable that his position will not be filled, and that General Manager J. J. Stanley will combine the duties of both offices. A few days ago Mr. Mulhern was pleasantly surprised by about 150 of his former employees, who presented him with a gold watch and chain.

MR. W. H. ABBOTT, who for the last three years has been consulting engineer for the Pomeroy-Mandelbaum railway properties, was probably the first engineer in this country to recommend the adoption of the steam turbine in large units for heavy railway work. Mr. Abbott made a special study of turbines in Europe several years ago, and he has since been an earnest advocate of their development and adoption. He was one of the pioneers in the use of the DeLaval steam turbine for light railway service, and the direct-current machine of this type at the Galien power house of the Ohio Central Traction company, which was described in the STREET RAILWAY JOURNAL, April 25, 1903, was installed under his supervision. The equipment of the Cleveland & Southwestern Railway, which was entirely under his personal supervision, affords another instance of his progressive spirit. A complete description of the power plant is presented in this issue. Among the improvements introduced in this plant were 1000-kw Westinghouse-Parsons turbines, the first units of this size contracted for in this country for railway operation. This is not the only innovation which Mr. Abbott has introduced into this system, but it is undoubtedly the most prominent and important, as it marked an entirely new step in central-station practice for railway work.

W. H. ABBOTT.

MR. R. E. DANFORTH has been appointed general manager of the Rochester Railway Company, which controls all the city lines and has connections with the interurban properties entering the Flower City. Mr. Danforth has been assistant general manager of the company for about two years, and consequently he is familiar with the local conditions and the requirements of the service. During the last six months he has been in actual charge of the property, owing to the absence of Mr. T. J. Nichol, whom he succeeds in the position of general manager. Mr. Nichol has been traveling in Europe for several month, and it is understood that he has accepted a favorable offer in Paris. His resignation as vice-president and general manager of the Rochester Railway Company was submitted at the annual meeting on Jan. 19, and was accepted, Mr. C. M. Clark, of Philadelphia, being elected vice-president, and Mr. Danforth general manager. Mr. Danforth came to Rochester from Cleveland in April, 1902. He is generally recognized as one of the

MR. HOWARD E. HUNTINGTON has been appointed general manager of the Los Angeles Railway Company to succeed the late Mr. John A. Muir. Mr. Huntington is the son of Henry E. Huntington, president and chief owner of this railway company, and of the other principal Los Angeles traction systems. Mr. Howard E. Huntington is one of the youngest general managers of a large city traction property in the country, he being only twenty-seven years of age, but despite his lack of years he brings to the position considerable railroad and enginecring experience, as well as executive ability, industry and a capacity for hard work. He began his railroad career by driving stakes with an engineering corps of the Southern Pacific, and spent five years in California and Arizona in engineering work for that road. He then went to Harvard, where he took up special civil and electrical engineering work for over two years. Returning to Los Angeles last spring, he was appointed assistant to the general manager of the Pacific Electric Railway Company, under Mr. Epes Randolph, and also fulfilled the duties of superintendent of electric construction. He held that position until his recent advancement. Mr. Huntington is a director in the Los Angeles Interurban Railway Company, and is also connected officially with many of the large corporations in which his father is interested.

MR. JOHN ALLAN MUIR, general manager of the Los Angeles Railway Company, died at his home in Los Angeles on Friday, Jan. 8. His funeral occurred the following Sunday afternoon, from the Second Presbyterian Church in East Los Angeles, and was attended by thousands of citizens who loved and respected him. While the body lay in state in the little church from noon until 1:30 o'clock hundreds passed the white casket to pay their final tribute to the memory of a man whose name has become a synonym for energy, kindness and good fellowship. Mr. Muir accepted the position of general manager of the Los Angeles Railway Company in February, 1902, after a service with the Southern Pacific Railroad Company that began in November, 1870. When he severed connections with associations that covered a period of thirty-two years, he was the senior division superintendent of the Southern Pacific system. Naturally his resignation caused a sensation. He and Henry E. Huntington had been personal friends for a number of years, and when Mr. Huntington began the expansion of his electric railways in Los Angeles one of his first acts was to make overtures to his former Southern Pacific subordinates, who, by reason of their ability and experience, could best serve him. Mr. John Allan Muir was born at Truro, Nova Scotia, on Sept. 25, 1850. Educated in the public schools of Truro, he entered the employ of the Pictou Extension Nova Scotia Railroad as telegraph operator in March, 1866. In November, 1870,

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NAME	ON JUNE 30, 1903		YEAR ENDING JUNE 30, 1903					
	Capital Stock	Funded Debt	Total Receipts All Sources	Operating Expenses	Charges on Earnings	Dividends Paid Amount	Dividends Paid PerCent	Surplus for Year
	$	$	$	$	$	$		$
Philadelphia Rapid Transit Co	3,000,000	.....	15,436,574	7,234,893	7,795,792	.....	..	405,889
Pittsburg Railways Co	5,000,000	4,579,000	8,603,696	4,569,904	3,880,957	.....	..	152,835
Lehigh Valley Traction Co	2,681,200	2,770,000	811,668	585,197	424,818	7,905	..	df. 206,250
Scranton Ry. Co	3,000,000	3,000,000	722,228	442,659	233,986	.....	..	45,583
Wilkes Barre & Wyoming Valley Traction Co	5,000,000	2,067,000	678,767	349,578	178,060	150,0 0	3	1,128
United Traction Co. (Reading)	400,000	149,900	577,689	333,553	228,855	20,000	5	def. 4,719
Central Pennsylvania Traction Co	2,000,000	75,000	517,485	246,661	99,824	120,000	6	.....
Conestoga Traction Co	4,000,000	1,887,575	409,182	248,600	187,618	.....	..	27,036
Pittsburg, McKeesport & Connellsville Ry. Co	3,000,000	2,978,500	334,199	225,721	107,969	.....	..	def. 508
Johnstown Passenger Ry. Co	2,000,000	1,780,000	329,778	140,713	229,064	40,000	2	59,566
Chester Traction Co	500,000	250,000	326,805	194,131	107,432	20,000	4	5,242
Schuylkill Valley Traction Co	500,000	345,000	302,258	233,863	99,116	.....	..	def. 30,721
Erie Electric Motor Co	1,250,000	1,000,000	238,628	146,091	57,593	.....	..	34,943
Beaver Valley Traction Co	1,500,000	1,075,000	214,654	116,994	66,622	.....	..	31,037
Altoona & Logan Valley Electric Ry. Co	415,350	470,500	191,084	119,024	30,306	41,535	10	220
Pennsylvania & Mahoning Valley Ry. Co	8,000,000	2,500,000	173,849	96,652	151,400	.....	..	74,203
Pottsville Union Traction Co	1,250,000	735,000	169,461	117,055	60,477	.....	..	8,073
Philadelphia & Lehigh Valley Traction Co	1,500,000	1,948,000	169,114	171,149	60,824	.....	..	def. 62,859
The Holmesburg, Tacony & Frankford Electric Ry. Co.	750,000	400,000	150,147	100,457	28,280	21,000	2.8	410
City Passenger Ry. Co. (Altoona)	200,000	50,000	145,834	120,261	5,502	20,000	10	69
Philadelphia & Westchester Traction Co	597,175	390,000	136.532	84,499	36,608	.....	..	15,426
Williamsport Passenger Ry. Co	338,550	169,000	116,206	88,970	15,350	.....	..	11,886
Pittsburg, McKeesport & Greensburg Ry. Co	1,030,000	1,100,000	115,841	64,492	45,882	.....	..	5,467
Lehigh Traction Co	1,000,000	585,000	113,693	70,234	37,254	.....	..	6,155
York Street Ry. Co	300,000	150,000	107,089	58,198	17,450	42,350	14.1	def. 10,908
Schuylkill Traction Co	2,000,000	558,000	104,079	68,629	35,950	.....	..	def. 501
Allentown & Reading Traction Co	250,000	550,000	101,725	48,171	42,774	.....	..	10,779
Delaware County & Philadelphia Electric Ry. Co.	300,000	64,000	87,788	59,698	7,007	21,000	7	83
Harrisburg & Mechanicsburg Electric Ry. Co	144,500	144,500	87,421	56,555	23,564	.....	..	def. 7,301
Warren Street Ry. Co	200,000	200,000	82,707	53,229	13,960	.....	..	15,519
Lebanon Valley St. Ry. Co	500,000	500,000	76,847	40,120	26,531	10,000	2	195
Washington & Canonsburg Ry. Co	1,000,000	125,000	71,991	27,561	7,340	.....	..	37,090
Jefferson Traction Co	243,700	.....	66,046	53,759	419	2,870	*3.59	8,997
Erie Traction Co	500,000	440,000	65,669	43,091	33,897	.....	..	11,319
Media, Middletown, Aston & Chester Electric Ry. Co	116,671	.....	64,716	56,383	10,736	.....	..	def. 2,402
Olean, Rock City & Bradford R. R. Co	210,000	200,000	64,602	46,364	13,062	.....	..	def. 5,176
Sharon & Wheatland St. Ry. Co	50,000	50,000	63,995	56,710	11,359	.....	..	def. 4,074
Shamokin & Mt. Carmel Electric Ry. Co	697,950	302,000	62,726	32,768	19,017	.....	..	10,941
Columbia & Montour Electric Ry. Co	375,000	345,000	61,179	28,398	16,067	.....	..	16,714
Lewistown & Reedsville Electric Ry. Co	150,000	275,000	58,185	26,976	12,851	.....	..	18,458
Tamaqua & Lansford St. Ry. Co	200,000	200,000	57,090	31,672	11,588	10,000	5	3,830
Newtown Electric St. Ry. Co	300,000	300,000	54,559	42,355	22,762	.....	..	def. 10,556
Southwestern St. Ry. Co	400,000	400,000	52,369	33,423	20,192	.....	..	def. 1,247
Bradford Electric St. Ry. Co	130,000	125,000	52,240	34,872	8,537	9,100	7	def. 269
Tarentum Traction Passenger Ry. Co	100,000	100,000	51,411	28,083	6,000	.....	..	17,327
Butler Passenger Ry. Co	50,000	100,000	47,001	31,418	2,312	.....	..	13,270
Wilkes-Barre, Dallas & Harvey's Lake Ry. Co	200,000	150,000	45,005	34,781	9,062	.....	..	162
Pottstown Passenger Ry. Co	87,500	75,000	44,262	28,831	5,345	.....	..	10,086
Philadelphia & Easton Ry. Co	641,000	641,000	44,026	19,289	23,263	.....	..	1,474
Erie Rapid Transit Co	500,000	350,000	43,130	33,368	22,120	.....	..	def. 12,358
The Valley St. Ry. Co	150,000	150,000	42,431	32,541	14,230	.....	..	def. 4,341
Kittanning & Ford City St. Ry. Co	50,000	50,000	42,313	21,181	4,235	.....	..	16,897
Meadville Traction Co	350,000	300,000	35,797	27,636	7,500	.....	..	661
Westchester St. Ry. Co	350,000	350,000	35,502	24,220	13,770	.....	..	def. 2,488
Philadelphia, Bristol & Trenton St. Ry. Co	1,000,000	650,000	32,261	28,186	27,191	.....	..	def. 23,116
Titusville Electric Traction Co	100,000	100,000	31,862	23,197	6,361	.....	..	2,304
Mauch Chunk, Lehighton & Slatington St. Ry. Co	600,000	500,000	29,668	23,099	228	.....	..	6,341
Shamokin & Edgewood Electric Ry. Co	60,000	60,000	28,502	18,525	10,096	.....	..	def. 120
Vallamont Traction Co	101,700	100,000	28,063	14,327	7,032	.....	..	6,704
Cumberland Valley Traction Co	446,400	277,500	27,251	26,859	205	.....	..	187
Peoples St. Ry. Co. (Nanticoke)	100,000	100,000	25,620	13,680	6,233	.....	..	5,707
Susquehanna Traction Co	200,000	100,000	24,910	19,601	2,480	.....	..	2,829
Lewisburg, Milton & Watsontown Passenger Ry. Co	150,000	150,000	24,193	17,401	8,014	.....	..	def. 1,222
York & Dallastown Electric Ry. Co	106,000	.....	24,047	10,884	857	15,680	8 & 12	def. 3,374
Connellsville Suburban St. Ry. Co	25,000	175,000	22,196	12,216	9,623	.....	..	358
Latrobe St. Ry. Co	100,000	100,000	21,632	14,013	2,668	.....	..	4,951
Philadelphia & Chester Ry. Co	350,000	350,000	21,459	22,110	18,468	.....	..	def. 19,119
Red Lion & Windsor St. Ry. Co	800	.....	20,887	6,539	11,709	.....		2,540
York & Dover Electric Ry. Co	121,000	.....	20,533	7,067	840	11,050	5 & 10	1,576
Carlisle & Mt. Holly Ry. Co	100,000	100,000	19,780	10,581	5,466	.....	..	3,733

* On $80,000.

FINANCIAL REPORTS OF THE OPERATING STREET RAILWAYS OF THE STATE OF PENNSYLVANIA FOR THE YEAR ENDING JUNE 30, 1903—*Continued*

NAME	ON JUNE 30, 1903		YEAR ENDING JUNE 30, 1903					
	Capital Stock	Funded Debt	Total Receipts All Sources	Operating Expenses.	Charges on Earnings	Dividends Paid		Surplus for Year
						Amount	PerCent	
	$	$	$	$	$	$		$
Lykens & Williams Valley Ry. Co	188,500	174,300	19.767	7,938	389	.....	..	11,442
Sunbury & Northumberland Electric Ry. Co	125,000	5,000	19,257	18,352	3,875	.....	..	def. 2,971
South Side Passenger Ry. Co	25,000	25,000	18,025	14,511	1,968	.....	..	1,546
Montoursville Passenger Ry. Co	75,000	75,000	17,371	13,310	4,045	.....	..	16
Montgomery & Chester Electric Ry. Co	55,000	100,000	16,871	12,706	5,033	.....	..	868
DuBois Electric & Traction Co	50,000	49,800	15,630	10,290	4,114	.....	..	1,227
Northampton Traction Co	500,000	400,000	15,706	14,291	10,000	.....	..	def. 8,585
Highland Grove Traction Co	23,000	.....	11,327	10,248	890	.....	..	189
Stroudsburg Passenger Ry. Co	51,200	8,000	10,650	5,398	365	.....	..	4,886
Ashland & Centralia Electric Ry. Co	60,000	60,000	10,375	6,341	4,937	.....	..	96
East End Passenger Railway Co	18,000	18,000	10,054	8,051	1,211	.....	..	782
Ringing Rocks Electric Ry. Co	50,000	54,000	5,757	12,172	.....	.....	..	def. 6,414
Gettysburg Transit Co	100,000	100,000	7,730	7,403	296	.....	..	30
Bangor & East Bangor St. Ry. Co	40,000	40,000	8,178	5,784	1,194	.....	..	1,200
Hanover & McSherrytown St. Ry. Co	30,000	.....	8,144	5,347	304	.....	..	2,483

NEWS OF THE WEEK

CONSTRUCTION NOTES

HOLTON, CAL.—The Holton Power Company is developing water power on the large Imperial irrigating canal, and will build an electric railway, 12 miles long, to Imperial, where connection will be made with the Southern Pacific Railroad. Samuel Starrow, of Los Angeles, is the engineer for the Holton Power Company.

LOS ANGELES, CAL.—Articles of incorporation have been filed in San Diego by the San Diego Bay Terminal Railway Company. The incorporators are: George W. Marston, U. S. Grant, John E. Boal and others, all of whom are also incorporators of the San Diego & Eastern Railway. The capital stock is $50,000. The purpose of the new company is to build 5 miles of railway within San Diego.

LOS ANGELES, CAL.—Grading will soon begin on the new Pacific Electric Railway Company's line to Anaheim Landing. This road will be a branch from the Long Beach line, about 10 miles from Los Angeles, turning southwest. When completed it will be 26 miles long. One trestle will be needed over a bayou, but otherwise the construction will be simple. The road will be double track of standard gage.

LOS ANGELES, CAL.—Henry E. Huntington has issued orders for the extension of the Pasadena Short Line to Lamanda Park. The line will be built on Huntington Drive from the Monrovia Division, and will supply a connection with the Colorado Street line in Pasadena. Later the line will be completed to Sierra Madre. Work has also been begun on a branch line to run south on the Alhambra Division to Shorb's winery, in order to land supplies intended for Dolgeville. Orders have been issued to rush construction of the Los Angeles Railway Company's new line to Garvanza. Mr. Huntington denies the story of the absorption of the Ventura-Bakersfield electric road.

STOCKTON, COL.—J. T. Burke, acting for J. R. Paddock, has made application for franchises in this city and San Joaquin County for permission to run pole lines for supplying electric light, heat and power. It is said that the interests which Mr. Paddock represents will use the power for the electric railway that is proposed between Stockton and Bakersfield.

ORANGEVILLE, IDAHO.—The surveying crew of the Southeastern Electric Railroad Company under Chief Engineer W. Hill is running the line from Orangeville to the power station on Clearwater, and between Cottonwood and Denver. The surveys will be completed by March 1.

BELLEVILLE, ILL.—The Belleville City Council has granted a franchise to the Southern Illinois Electric Railway Company to operate an electric line on Mascoutah Avenue, Abend Street and Second Street to Illinois Street, where the line will connect with the East St. Louis & Suburban Railway. The company was represented by its president, J. R. Piercy, and Superintendent Isaac R. Smith, of Mount Vernon, Ill. These officials signed agreements before the franchise was granted that the fare from Mascoutah to Belleville would be 15 cents one way for adults and 7½ cents for children under twelve years of age, and that cars would be running from Salem to Belleville by July 1.

CHICAGO, ILL.—The sub-committee of the council committee on local transportation, which has had the Northwestern Elevated Company's ordinance for the Ravenswood extension in hand for some months, has recommended a change in route which would permit the company to run only two blocks in Irving Park boulevard. The sub-committee has also adopted an amendment proposed by Alderman Butler requiring the company to build a 4½-mile surface extension west of Western Avenue to Irving Park, Mayfair and Jefferson. Attorney Knight, for the company, has given notice that this amendment is not acceptable.

HILLSBORO, ILL.—The City Council has granted Isaac Hill a franchise to construct and operate an electric railway in Hillsboro, the work to be begun in one year and completed in two years. If the work is done the franchise will last twenty years.

VENICE, ILL.—The management of the Granite City & Venice Electric Railway Company is preparing plans for a new power house and car houses at Venice.

BEDFORD, IND.—The City Council has granted an electric street railway franchise to a company of local men, including Col. A. C. Voris, W. M. Mathews, J. W. Gouser, M. N. Messiek, E. B. Thornton, V. V. Williams, I. N. Glover and Frank Owens. The line will be extended to Ooletié, in the quarry district. The total cost of construction is estimated by the engineers at $125,000. The company will incorporate at once.

BROOKVILLE, IND.—Charles N. Wilson, of Indianapolis, representing the Columbus, Greensburg & Richmond Traction Company, addressed a mass meeting at Carthage, Rush County, recently, in the interest of a traction line from Greenfield to New Salem, to connect with the company's main line from Columbus to Richmond. All Mr. Wilson asked for was a free right of way through Carthage. The proposition was favorably received.

COLUMBUS, IND.—The Columbus, Greensburg & Richmond Traction Company has awarded the contract for the survey of its road to Jeup & Moore, engineers, of Indianapolis. The work is to begin in ten days. The progress of this company has been very rapid and the contract for actual construction will soon be let. C. N. Wilson, of Indianapolis, is secretary.

CRAWFORDSVILLE, IND.—The Consolidated Traction Company is arranging to build a large power house in Crawfordsville in the spring. Edward Hawkins, president.

KINGMAN, IND.—Col. A. G. Smith and other local capitalists are promoting an electric railway from Kingman to Covington.

RICHMOND, IND.—The City Council has made formal demand upon the Big Four Railroad, requiring it to raise its bridge on West Main Street, so that interurban cars from Indianapolis may enter the city. At present this bridge is the only thing which prevents the operation of through cars from Indianapolis to Dayton, and as soon as it is put in shape so that cars can pass under it, it is generally understood that the Holland sleeping cars, illustrated in a recent issue of the STREET RAILWAY JOURNAL, will be placed in operation from Indianapolis to Columbus.

SHELBYVILLE, IND.—A. U. Blessing, W. H. Henderson, E. M. Boyd and other local men are promoting an electric railway between Shelbyville and Columbus, via Hope. A civil engineer has been secured to survey the route of the line and report as to the feasibility of the project.

VINCENNES, IND.—The Western Indiana Traction Company has elected officers, as follows: Samuel Williams, of Vincennes, president; F. S. Robinson, of Cloverland, vice-president; John Le Croix, of Vincennes, secretary-treasurer. The company will build a line from this city to Terre Haute this spring.

WABASH, IND.—The stockholders of the Wabash & Rochester Railway Company, organized to build a traction line from this city to Rochester, 35 miles, and in aid of which $112,000 in subsidies has been voted, has elected officers as follows: Charles Crean, of Geneva, Ohio, president; C. E. Barnum, of Cleveland, Ohio, treasurer.

NORTH ADAMS, MASS.—The Selectmen of Williamstown have given a hearing on the petition of the Hoosac Valley Street Railway Company for an extension to the Vermont State line, there to connect with a line for Bennington, Vt. The line in Vermont will be controlled by the owners of the Hoosac Valley Street Railway Company.