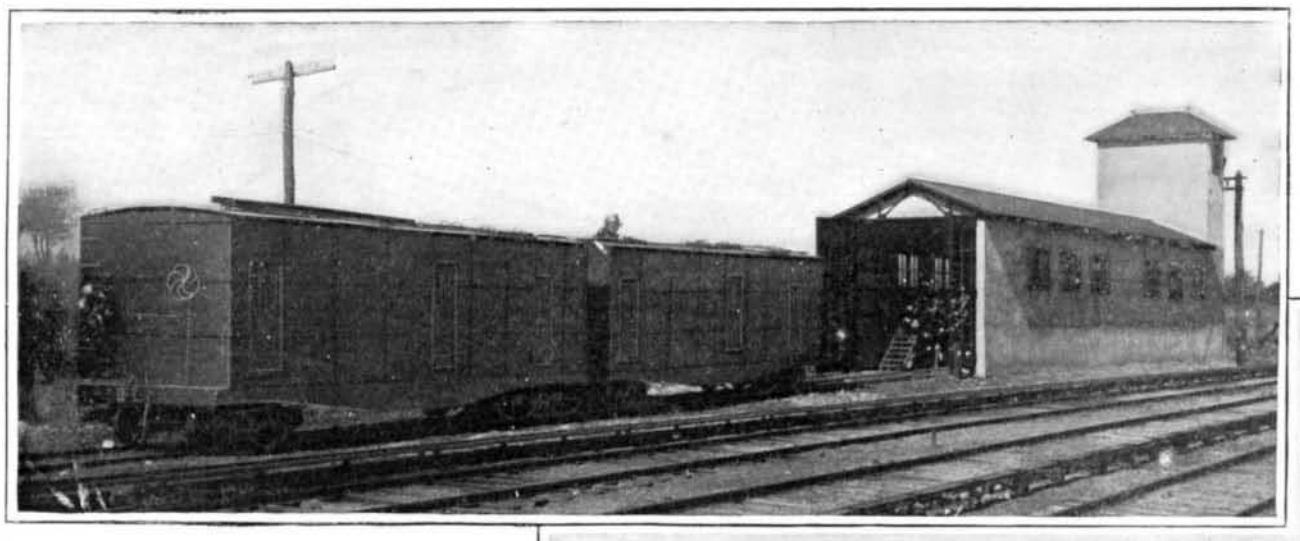
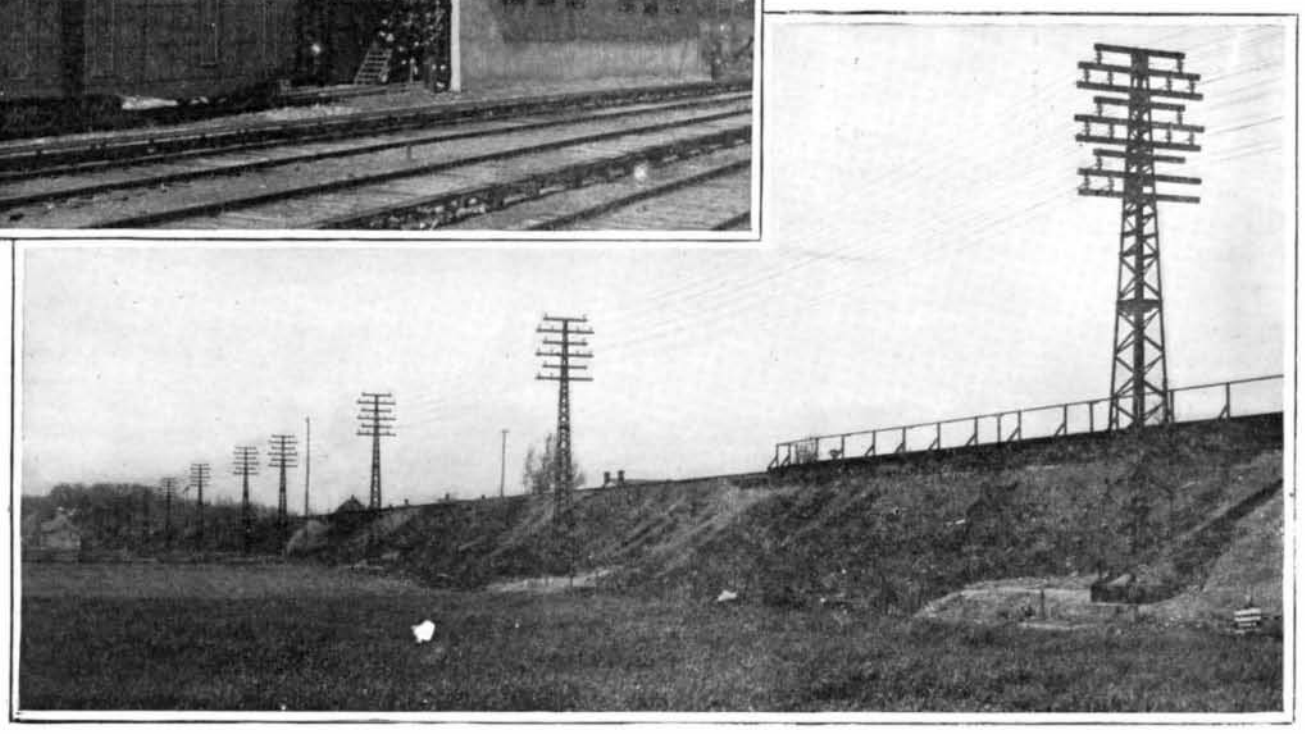
THE LONG ISLAND RAILROAD ELECTRIFIED.

BY A. FREDERICK COLLINS.

The gigantic undertaking of converting the Long Island Railroad from a system using steam to an electrically-operated one marks the beginning of a new era in transportation in this country, for it is the first time in the history of railways and electricity that the feat has been accomplished. Quite true it is that the New York Central will exceed it in magnitude, but it will be at least two years before the work now going on will be completed, while the steam locomotive has already given way to the electric motor car on a large section of the first-named railroad, the inauguration having just taken place.



Two Portable Sub-Stations and Shelter House for Same.

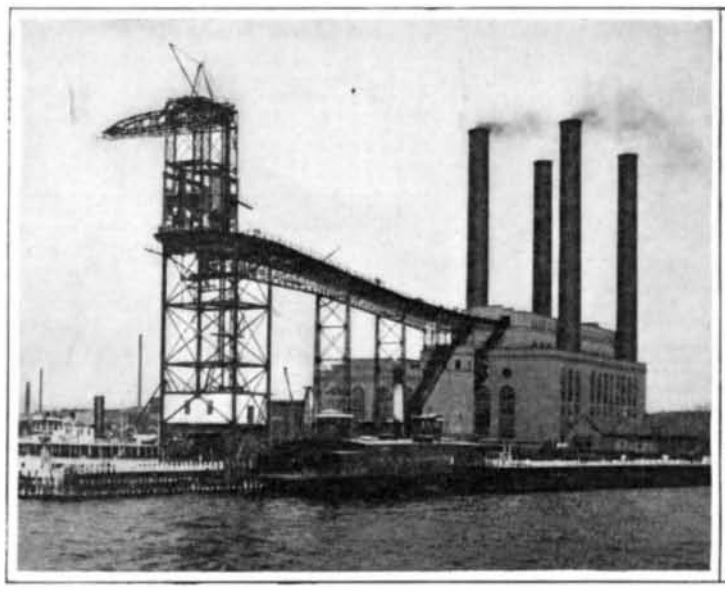


View of Trunk Transmission Line Between Long Island City and Woodhaven Junction, Showing Latticed Steel Poles.

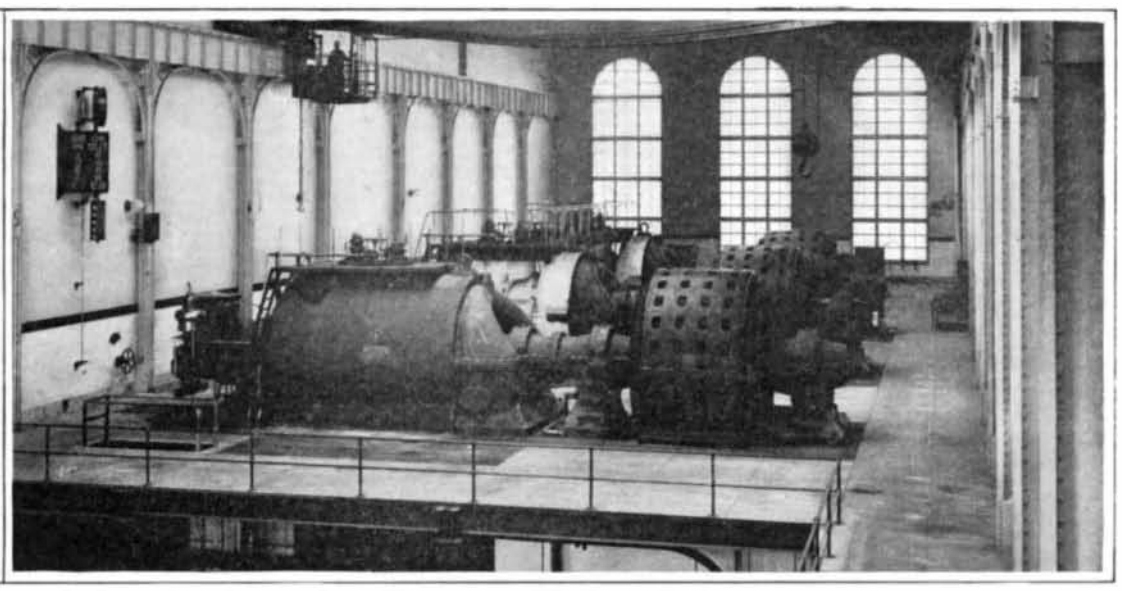
At the present time there is in operation a total mileage, when reduced to a single-track basis, of 97.5, and this is divided among the routes between Flatbush Avenue, Brooklyn, and the Belmont race track; between Ozone Park and Rockaway Park, and between Jamaica and Springfield Junction. During the next few months other portions of the road, or specifically, from Hammel to Springfield Junction, will be similarly electrified, while the line from Long Island City to Port Washington, and a short feeder from Whitestone Landing to Whitestone Junction, will be ready within a year and a half.

The progress and extensions of the electrification of the Long Island Railroad may be seen by referring to the map shown on page 398, and its inspection will serve to indicate in a measure the complicated nature of the traffic involved; thus there are two important terminals in the Borough of Brooklyn, and the roads leading from these form a network of lines over which there is conducted a heavy through as well as a suburban service. The Flatbush terminal connects directly with the Brooklyn Rapid Transit elevated lines, and these in turn lead to the Brooklyn Bridge and the Broadway Ferry. When the subway and tunnels are completed by the Interborough Rapid Transit Company, under the East River from the Battery in the Borough of Manhattan to Flatbush and Atlantic Avenues, Brooklyn, the new electric road will also connect with them, so that passengers arriving at the Flatbush Avenue terminal from points on Long Island will be favored with a short and quick route to the heart of Manhattan's financial district.

The extent of the service may be in a measure judged, when it is stated that on the Atlantic

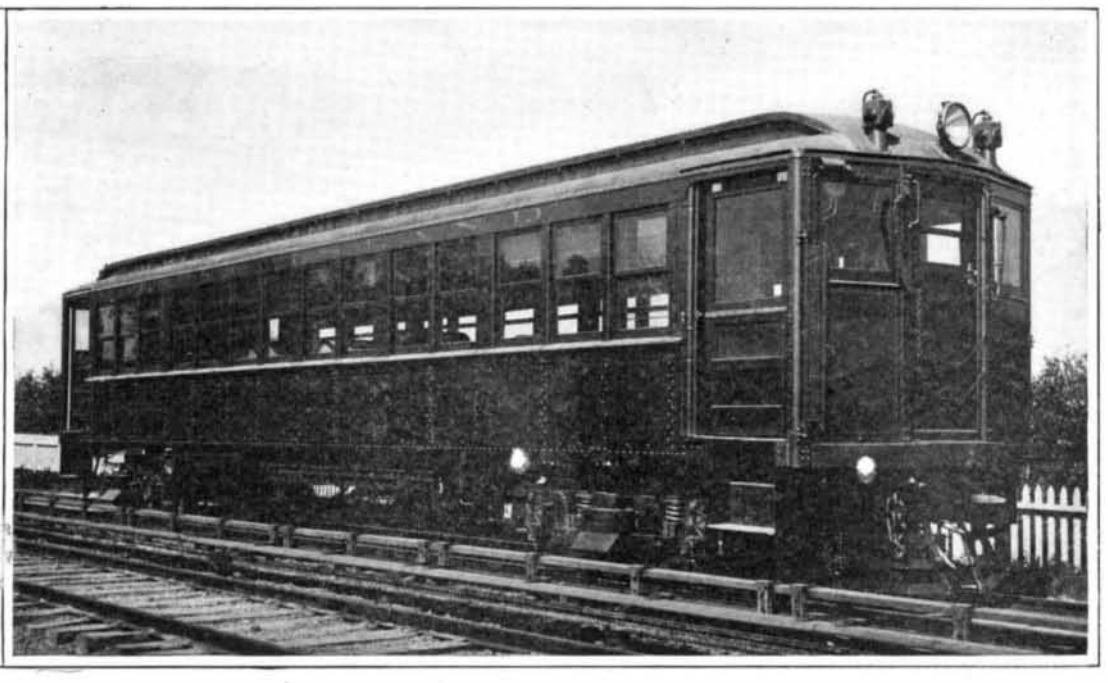


Long Island City Power Station and Huge Gantry Crane for Loading Coal from Barges.



View of Engine Room Floor, Showing 7,500-Horse-Power Steam Turbines Direct Connected to 5,500-Kilowatt Generators.

Steel and Concrete House for Housing Two Portable Sub-Stations.



One of the New All-Steel Motor Cars.

ELECTRIFYING OF THE LONG ISLAND RAILROAD.

Avenue line trains are not only run from the suburban towns on either shore of Long Island, but a large local business is also done in carrying passengers from Flatbush Avenue to Jamaica, besides a heavy excursion traffic to Rockaway Beach and to the race courses at Aqueduct, Metropolitan, and Belmont tracks. When the Pennsylvania Railroad Company completes its elaborate plans, another extension of the electric service will probably be found necessary; but with the Long Island's great project finished, it will be an easy matter, compared with the present change from steam to electricity, to equip as much of the remaining road as may seem desirable.

The current for operating the trains of the entire system is generated at the new power house on the water side at Long Island City, consequently it is located at a point on what may be termed the circumference of the network of lines which it is to feed; however, it is intended that power shall be furnished from the central station for operating the trains under the East and North Rivers when the Pennsylvania terminal and tunnels are done, and this will bring the power house a little nearer the geographical center of the entire combination of lines as contemplated in the present scheme of these two great railways, while from the standpoint of the distribution of its energy, it will approximate very closely its center.

The chief feature of the power house installation is a double tier of thirty-two boilers, each of which develops 520 horse-power, while space is reserved for sixteen more of the same size. Immediately over the boiler room are the coal bunkers, and these have a capacity of 7,000 tons; coal is brought up alongside the building on barges, when it is conveyed 110 feet to the top by a large gantry crane carrying an automatic scoop bucket holding 3,000 pounds. The coal is then automatically broken, cleansed, and weighed, when it is ready for the boilers, to which it is conveyed and fed by automatic stokers. In the engine room there are three Westinghouse-Parsons steam turbines, having a capacity of 5,500 kilowatts, while ample room is provided for increasing the number of units when the entire system is electrified. The turbines are direct connected to three-phase alternating-current generators, and these deliver the electrical energy to the transmission lines at 11,000 volts. From the high-tension lines the current is distributed to the sub-stations, of which there are five located at convenient places. The transmission cables are carried throughout the system in three different ways. They are either carried underground in conduits, or they are suspended on steel poles, while on other routes the distribution is by the third rail.

Starting at the power house, the high-voltage lines are laid in conduits, and by this means are taken underground through Long Island City until the yards of the railroad are reached, when they are permitted to emerge, and from this point on, north to south, that is to Woodhaven Junction and thence beyond to Beach Channel, they are strung overhead on latticed steel poles, as shown in the illustrations. At Woodhaven Junction there is located a sub-station, and from this point the transmission lines radiate to the east and west, running in the first instance to Flatbush Avenue terminal, and in the last to Dunton; in this case the cables are laid in conduits, as are those from Beach Channel to Hammel. The high-tension lines from Dunton to Belmont race track and from Rockaway Junction to Springfield Junction are suspended on steel poles, the latter wherever utilized being mounted on concrete foundations.

At the different sub-stations the high-voltage alternating current is converted into a direct current of 600 volts by static transformers and rotary converters. It will not be necessary to enter into the details of the sub-station equipments; suffice it to say that they represent the most advanced construction.

A novel feature of much importance is the introduction of portable sub-stations; each of these comprises a steel car of the usual design fitted with three static or alternating-current transformers and a 1,000-kilowatt rotary converter. These movable units have several uses, the principal ones being to augment the capacity of the stationary sub-stations, and to maintain the potential at any point where the traffic might become spasmodically heavy, as it often does at the different race tracks.

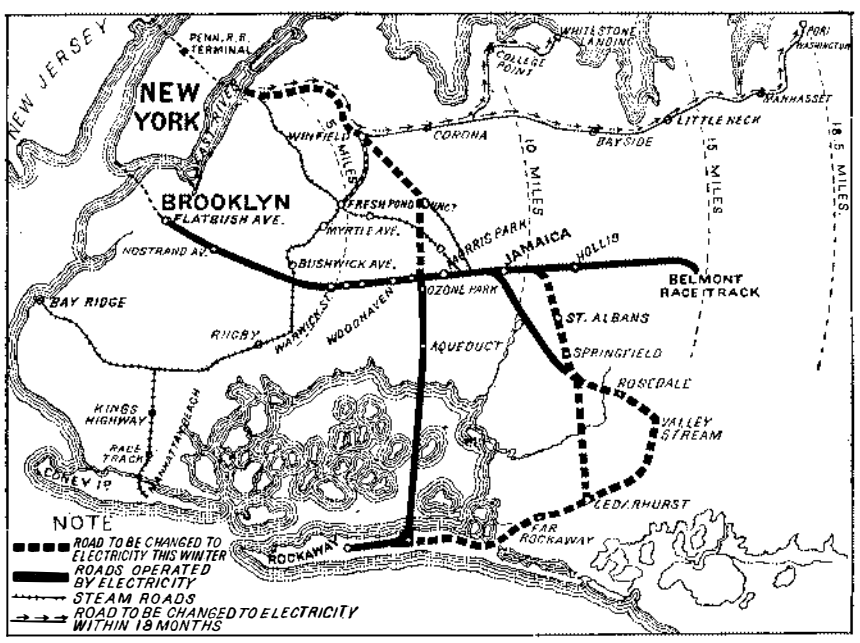
The railway equipment is of standard third-rail construction, the rolling stock being similar to and capable of being interchanged with those of existing elevated and subway lines, as well as the Pennsylvania surface and tunnel lines now under construction. Since the Long Island Railway is a third-rail system, and at the same time a surface road, it is obvious that the feeder rail must be well protected, so that pedestrians can not by any possible chance come in contact with it. The third rail is laid 27 inches from the gage line of the track to its center line, the top of the rail projecting 3.5 inches above the top of the track, this arrangement being standard with the roads previously mentioned. At given intervals sleepers extend beyond the track, and the rail is sustained in its position by vitrified clay insulators.

The rail is covered its entire length, except where it passes over grade crossings and in front of stations, by a wooden plank that is supported about 4 inches above it by wooden uprights that are placed outside the rail. At the crossings, but well within the line of protecting fences which inclose the entire right of way, the third rail terminates in a broad sloping shoe, the electrical connection being kept intact by a heavy insulated wire carried under the street or road, as the case may be, in a conduit, making connection with the third rail on either side.

At the present writing the rolling equipment consists of 150 motor cars, built entirely of steel, and these are operated in trains of five cars each. It is the intention of the officials, however, to make up the trains of motor and trail or ordinary cars, that is, a five-car train will have three motor cars and two trail cars, while an eight-car train will consist of five motor cars and three trail cars. All the cars are provided with the pneumatic multiple unit system of control, and each car is fitted with two motors of 200 horse-power each, both the latter being placed on one of the trucks, while the other and opposite truck is motorless. The steel motor cars were designed by Mr. George Gibbs, chief engineer of Electric Traction for the Pennsylvania, New York and Long Island railroads.

Since the cars were designed to be interchangeable with those of Manhattan subway and other New York and Brooklyn roads, and were yet required to run on the surface over the Long Island route, it was necessary to provide a special combination platform that would be flush with the floor of the car as in the subway, and to enter or alight at rail level, as over the route for which they are primarily intended. Each of the motor cars weighs 83,000 pounds, and can easily maintain a speed of 55 miles per hour if required, or at the rate of 25 miles per hour they can keep a schedule which includes stops of 1.6 miles apart.

Provision has been made by which the current is cut off and the air brakes applied the instant the motorman's hand is removed from the controller, and this device is an important safety factor, for should illness or death overtake him while in charge of a train, it would simply stop. To keep the heart of the railroad, that is, the power house, in constant touch with all its various ramifications, an elaborate system of telephony has been installed; the telephones are similar in design to those employed by the police of New York, and boxes are located at intervals of 2,000 feet along the line. Besides these precautions against accident, a comprehensive installation of the most efficient type of block signals has been put in. To facilitate the work of inspecting the railway and its various subsidiary appliances, two gasoline track automobiles are used; these are capable of carrying four men, together with all necessary tools and supplies. They are powerful enough to make 30 miles per hour, and light enough to be lifted from the track by two men.



MAP SHOWING THE ELECTRIFIED LINES OF THE LONG ISLAND RAILROAD.

To meet the effects of sea-water on cast-iron piles, and for other reasons, it is a common and good practice to make the lower lengths of greater thickness—say, ⅜ inch more—than that sufficient for the upper. Occasionally, also, the bottom lengths are filled with concrete, which no doubt adds to the length of time during which they may be relied upon.

Motor Cars in Hungary.

So far, the trade in motor cars has not acquired any great degree of development in Hungary, although within quite recent dates a marked upward movement has been noted. Hungarian industry is still too immature to enable it to supply the public with cars that would in any way be capable of competing with foreign builds. Recently a cart and wagon factory at Gyor opened an automobile section, and is reported to have made an arrangement with a large French firm for the supply of all the necessary parts. In addition to this, Mr. Rokk Gstvan, an important Hungarian industrial, has recently secured an order for the supply of light cars to the Hungarian postal authorities. Be this as it may, many years will still have to elapse ere the means (tools, plant, etc.) at the disposal of national industry will be such as to admit of the inauguration of a "motor car industry" worthy of the name.

Hitherto, French cars have been most used by the Hungarian public; this is due to the fact that the leading firms (Peugeot, Delaunay-Belleville, Dietrich, Panhard-Levassor, Darracq, Bayard-Clément, and Dion-Bouton) are all well represented at Budapest.

England, Austria, Germany, Italy, and America, are also making great endeavors to create a market in Hungary for their cars. An Italian (Turin) firm has lately succeeded in placing some of its builds, while Germany is doing fairly well with Mercedes cars, due to the push and energy of the firm's representative at Budapest, viz., Mr. Arnold Spitz, who has also a branch at Vienna. Smart advertising in trade papers has had much to do with the popularity of the German Mercedes cars.

A motor exhibition was held at Budapest last month, and exhibits were made by the following firms: French, Dion-Bouton; German, Appel-Darracq; and American, Oldsmobile. Altogether eighty-eight cars were shown, and thirty-seven of these were sold. In spite of the bad weather which prevailed the total of paying visitors amounted to 40,000 persons, and there were many others who had press, advertising, and other free tickets; from this it will be seen that the Hungarian public is taking much interest in up-to-date means of locomotion. The bad state of the roads is one great drawback to motoring in Hungary, but that can easily be overcome. All those who are wise will keep their eyes on this market; judicious advertising in papers devoted to cars that find their way to Hungary, would bring the enterprising speculator just as good results as have been secured by Mr. Spitz and other smart men who don't mind spending a few dollars.

Neuchatel Steam Turbine Plant.

Neuchatel is an example of a large town having a combined steam and hydraulic plant for delivering current. The hydraulic station at Pré aux Clées became overcharged, and as no more power could be had from the river, it was decided to erect a steam plant in the city, on the border of the lake. After considering the question of gas engines, it was finally decided to employ steam turbines. The boilers are of the water-tube pattern, coming from the Guillaume Works at Neustadt, and provided with superheaters. The boilers have 250 square yards heating surface and the superheaters 70 square yards, the latter being placed under the steam dome. A system of gates allows the flame to pass through the superheaters, or simply through the tubes. Brown-Boveri steam turbines of the well-known Swiss make are used here. The first one which has been installed has some 300 horse-power and makes about 3,000 revolutions per minute. The speed can be varied ten per cent on each side. The dynamo is mounted upon the same base and is direct-coupled to the turbine. It is of very compact shape, carrying two field coils. The condenser pump is worked by an independent electric motor. The steam turbine can be started and set running inside of ten minutes. As to the steam consumption, it is estimated at twenty-five pounds of steam, dry and saturated at eleven atmospheres per kilowatt at full load. The Neuchatel station also contains the dynamos which receive the current from the hydraulic plant at 3,800 volts and transform it to low tension current for the tramway lines.

Blowing wells, sometimes known as breathing wells, are now being investigated by the United States Geological Survey. The best-known examples of this type of well are found throughout Nebraska. The force of the air current in one of the Louisiana wells is sufficient to keep a man's hat suspended above it. The cause of such phenomena is mainly due to changes in atmospheric pressure.