THE SUPERGA WIRE ROPE RAILWAY NEAR TURIN.

At a few kilometers from Turin, built upon the summit of a hill which overlooks the valley of the Po, rises the Superga. The events connected with the construction of this basilica have made it, especially since the opening of the wire rope railway that connects it with the foot of the mountain, a frequented place of pilgrimage. The Superga, which was built by Victor Amadeus II., in fulfillment of a vow made to the Madonna during the siege of Turin in 1706, contains the tombs of such princes of the house of Savoy as were not buried at the famous Abbey of Haute Combes. These historic souvenirs, which are still green in the mind of the populace, and, more yet, the splendid view that is to be enjoyed from the summit of the Superga, decided the Italian government and the municipality of Turin to construct the new railway, which has already been baptized by the name of "Italian Righi." The work, which was begun in March, 1883, was rapidly carried on in view of the approaching opening of the general exposition at Turin, and, on the 27th of April, 1884, the new wire cable railway was officially inaugurated.

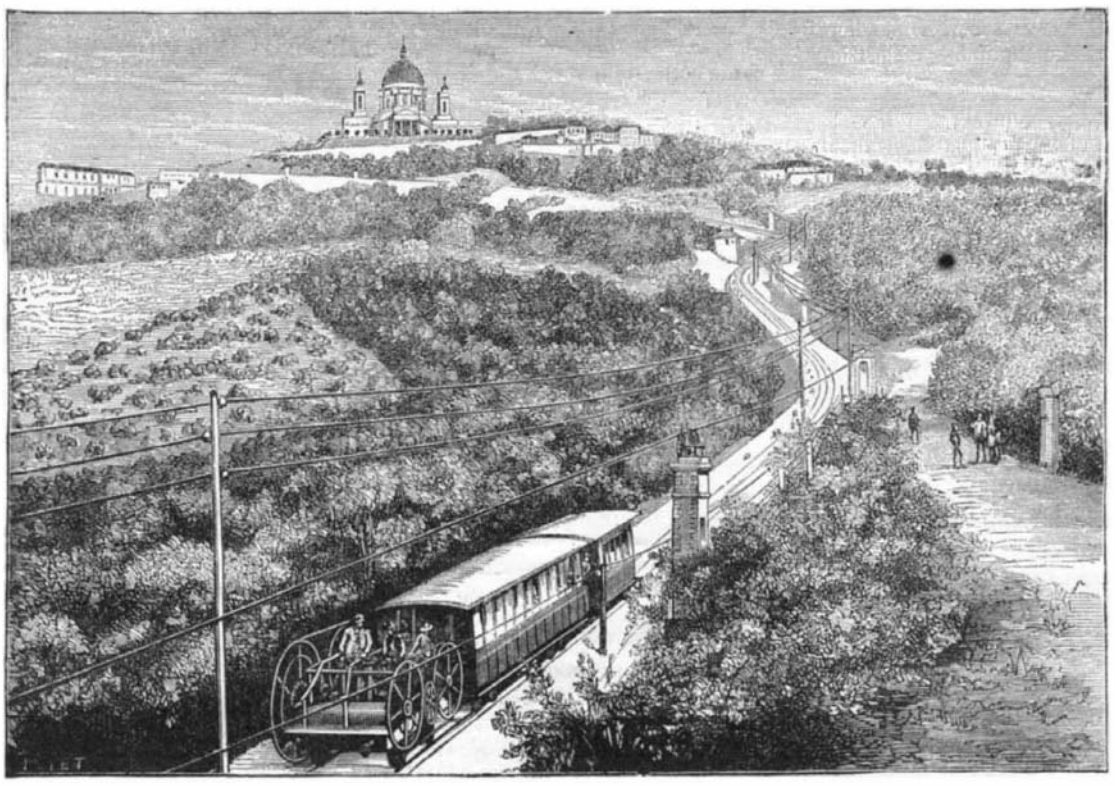

Fig. 1.—GENERAL VIEW OF THE SUPERGA WIRE CABLE RAILWAY.

The system selected for crossing the altitude that separates the basilica (situated at 733 meters above the level of the sea) from the foot of the hill, is that of Engineer Thomas Agudio, already tried with success at Lanslebourg. In this system traction is effected, as well known, by means of a special locomotive, such as is shown in Figs. 1 and 2, and the driving wheels of which are set in motion by an endless cable that traverses, in the double descending and ascending direction, the entire length of the road. The cable, which is set in motion by two stationary steam engines, is guided by intermediate pulleys, either vertical or horizontal, or of varied inclinations, according to the rectilinear direction or curve of the track, which latter consists of two ordinary rails and a toothed central one. The locomotive shoves the car up hill, and holds it back in descending. Such are the well known principles of the Agudio system, to which, after examining in detail the road itself, we shall advert further along, in order to describe the powerful brakes which secure safety to the exploitation.

The cable railway, a general view of which is given in Fig. 1, starts from the foot of the hill, near the village of Sassi, where it connects with the steam tramway running between Turin and Brusasco, travelers being thus able to go directly from Turin to the summit of the Superga without getting out of the car. The total length of the line to the basilica is 3,130 meters, and the difference in level between the starting station and that at the summit is 419. The mean gradient is 12 to 100, and the maximum 20 to 100. The curves, which compose about half the length of the entire road, have a minimum radius of 300 meters. At 783 meters from the Sassi station the road traverses a gallery of 67 meters, and further along another one of 61 meters in length. The other works of art consist of cuttings or of bridges of small importance.

The track that supports the locomotive consists of two rails of the Vignoble type (17 kilogrammes per running meter) that are spaced 1·49 m. from axis to axis, and a central rail with double toothing, which Mr. Agudio rightly styles the "vertebral column" of his system. This rail, or rather central conductor, is formed of a steel ribbon, 110 mm. in height and 12 in thickness, bent upon itself in such a way as to present at its sides a double toothing. It weighs 54 kilos per running meter. It is easy to see that the motive cable, which travels with a mean velocity of 12 meters per second, must be supported by a series of pulleys whose form and position vary with the direction of the road. The cable itself is composed of six partial cables, which are themselves formed of 8 steel wires 1·8 mm. in diameter. Its diameter is 23 mm., its weight is 1·5 kilogrammes per running meter, and it is capable of resisting a stress of 140 kilogrammes per square millimeter. During its normal operation it will be submitted to a stress of about 15 kilogrammes only. While the ascending half runs above the track itself, the descending half, which starts from the upper drum, rests upon pulleys mounted upon masonry pillars 4·25 m. beneath the road, and spaced about 100 m. apart.

The general arrangement of the location may be seen in Fig. 2. The transmission of the cable's motion is effected upon the pulleys to the left (in ascending), and these are provided at the circumference with channels in which the cable runs. The motion of these pulleys is transmitted by an intermediate system to a pair of cogwheels, which gear with the toothed central rail, and thus direct the motion of the locomotive. The engineman has within reach brakes of great power, which act by friction upon the driving pulleys or as a grip upon the central rail. In mounting, the grip brake serves to prevent a recoil motion of the locomotive in case of a breakage of the cable. In descending, the friction brakes are used, and, if need be, the others can be applied likewise.

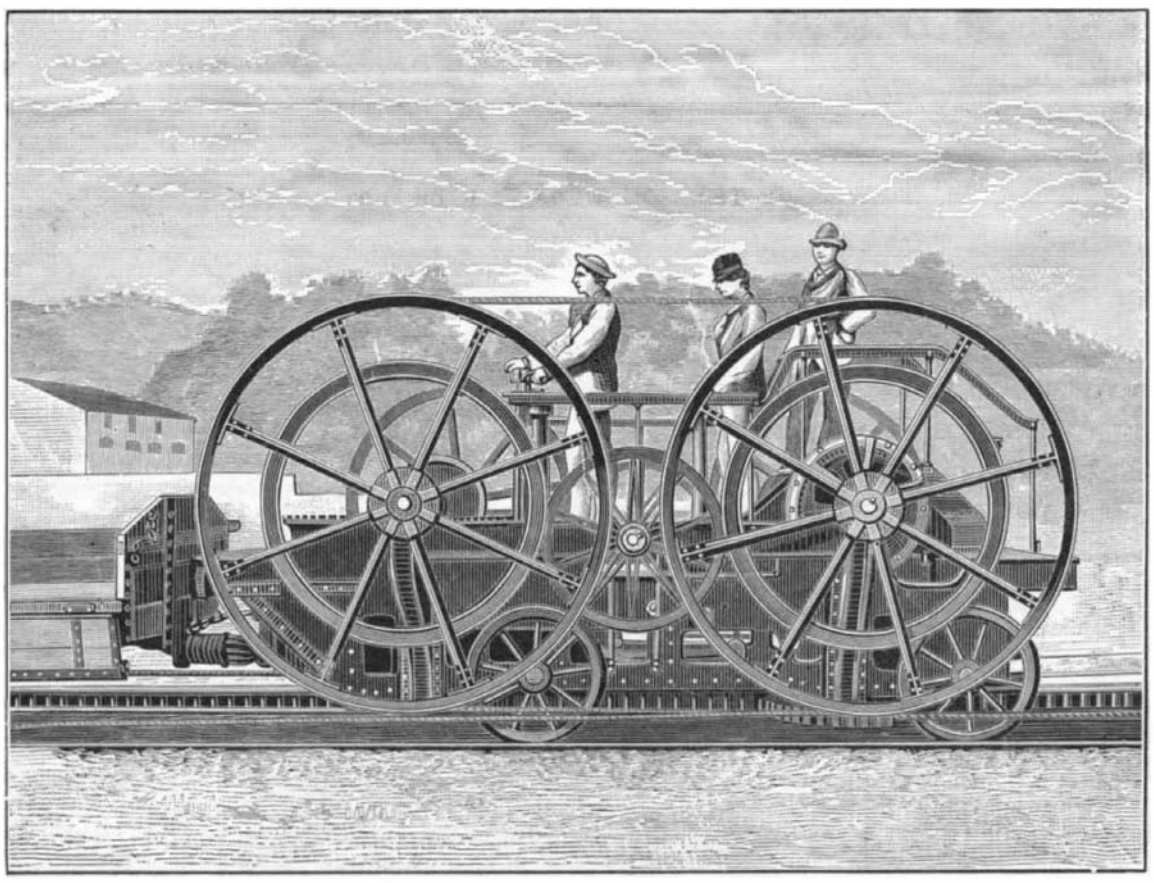

Fig. 2.—DETAILS OF THE LOCOMOTIVE.

The stationary engines which set in motion the two large drums over which the cable runs, and which consequently move the latter too, are installed at the lower station. They are of the Sulzer type, and develop 500 horse power.

In short, the Superga cable road is classed to-day as one of the most ingenious applications of traction upon steep gradients. Its promoter, and, we might say, its author, M. Agudio, is thus practically carrying out the theories that he has so many times so clearly exposed. Of the panorama which is to popularize this new road, of the superb valley of the Po, the souvenir of which carries one back to the most glorious times of ancient Italy, of the grand aspect of the Alpine chain from Mont Rose to Mont Viso, of all the new wonders that unveil themselves to dazzled eyes, we shall say nothing. Our object is only to give a hasty description of a new work which is henceforth to take its place among the genuine triumphs of engineering science.—*La Nature.*

Pneumatic Clocks in Paris.

Although the grand programme relating to works of public utility in France has been modified considerably of late, and their execution retarded by various causes which would be long to enumerate, there has been no hitch in carrying out that part of the scheme which is concerned with the supply of compressed air for practical uses in the capital. It will be remembered that the original scheme included the working by means of this agency, not only of clocks in the municipal buildings and offices and in private houses, but also of electric lighting and of various motors for commercial purposes.

Of these designs the first mentioned is the only one which has yet been realized to any large extent; but in this, at any rate, namely, the perfecting by the new power a distribution of force to the Parisian clock, rapid progress is being made. Before the end of last year it was announced that no fewer than 6,000 clocks of various kinds, chiefly exposed to public view, were regulated in this way in three of the most populous *arrondissements* of the capital. A short delay will now suffice to establish the system in all the other districts, including the whole area within the fortifications, and even to extend it to some of the principal suburbs. Already about 60,000 feet of conduits have been laid, and one at least of the branch stations for storing the air has been completed and fitted up for use. The principal works at which the compressing process is performed are situated in the Rue Menilmontant, and occupying an area of about 7,000 square yards. The air is compressed to a normal pressure of six atmospheres, but the force actually employed in the local service is not so much as half of this. When the project has been fully worked out, the whole city will be supplied with conduits and accumulators, and the motive force will be supplied to those who require it at a set price in much the same way as gas and water.

Patent Stove Door Litigations.

The simple matter of supplying the oven doors to cook stoves with openings covered with wire gauze has become the subject of extensive patent litigations. The Filley patents are claimed to be the original Jacobs in this instance, and the value of the invention is held to be among the hundreds of thousands of dollars.

AMBER is dissolved in sulphuric acid and by pure alkalies. It can be made into a varnish by heating it very hot, pouring oil upon it, and stirring in a little turpentine as it cools.