THE BRIDGE OF EL-KANTARA.

Plate LIV.

The rebuilding of the bridge of El-Kantara, at Constantine, was decided on in 1869, during the tour of inspection of his Excellency M. le Comte de Chasseloup-Laubat, then minister for Algeria and the Colonies, accompanied by M. Tostain, Inspector-General of the Ponts et Chaussées.

After careful preliminary investigations, the Administration des Ponts et Chaussées adopted, for crossing the ravine in which the Rummel flows, a system composed of two viaducts in masonry, connected by a cast-iron arch of great span. The construction of the viaducts was reserved, and M. Martin having submitted to the Administration a design for the cast-iron arch, with the requisite centering for putting it into place, was intrusted with the execution of that part of the work.

The position of this arch thrown across a ravine of considerable depth, and the application of a new system of scaffolding having only two points of support, give a certain amount of interest to its construction. It replaces an ancient stone bridge built by the Romans, and which, having been repaired several times during the rule of the Beys, fell a few years ago, and was totally destroyed.

The new bridge re-establishes the communication between the Arab quarter of Constantine and the opposite plateau of Sidi-Mahrouk, which had been severed since the destruction of the old bridge. On this side of the town the ravine is 394 ft. deep and 328 ft. wide at the top, presenting the appearance of a huge crevasse. The sides gradually approach each other, till at the bottom they are separated only by the bed of the Rummel, here a few yards in width. The Rummel has an open course for a very short distance below the centre line of the new bridge. It then disappears under three natural bridges, of which the first has a considerable length; and about 300 yards below the last of these bridges it falls into the valley of the Hamma by a cataract 230 ft. high. It was over this ravine, and close to the first natural arch, that the Administration decided on the erection of a bridge, partly in stone and partly in cast iron, the dimensions of which could not fail to be very great, but which were reduced as much as possible by taking advantage of the natural points of support offered by the rock at suitable depths. On either bank of the ravine is a viaduct in masonry, these viaducts stopping at the points where the sides become almost perpendicular, and their ends being 188 ft. distant from each other. Over this space is thrown the cast-iron arch, which connects the two viaducts, and spans a gulf 394 ft. in depth.

The principal difficulty offered by the construction of this arch lay in the erection of a centering for the cast-iron ribs, and this difficulty was especially great in a country offering so few resources, and where nearly all materials and labour had to be brought from France. To execute the centering in the most economical manner, it was requisite that the system employed should fulfil two conditions—facility and rapidity of construction, and economy of material. It was necessary, in fact, to avoid the sending abroad, and maintenance on the works of a special and very costly staff, and to reduce as much as possible the expense attendant on the transport of materials and plant.

It was decided that the conditions imposed would be best fulfilled by employing as a centering a series of wooden ribs, supporting the iron ribs, just as these last ultimately supported the permanent structure. This having been determined on, it was possible to erect the wooden ribs in a comparatively simple manner by constructing in the first place a platform, suspended from chains cables in such a manner as to be parallel to the intrados of the wooden ribs. The amount of timber used was very small, and the ribs, having been previously framed together in France, were fixed with great facility. The result fully justified the expectations that had been formed. The purchase or hire of the chains of the suspended platform would, however, have seriously increased the cost of this mode of construction, had not the Administration de la Marine consented to lend them to the contractor, thus still further increasing the economy of the system.

The method used in the construction of the bridge of El-Kantara is interesting; not only because by its means a particular difficulty was overcome, but also because it affords the solution of a problem of not unfrequent occurrence. It affords a simple, and, comparatively speaking, inexpensive means of throwing a stone or iron arch over a chasm of great depth.

The centering on which the cast-iron ribs were bolted together consisted of four timber ribs, strongly braced with horizontal and vertical cross bracing, and resting