

The SECRETARY, with the permission of the PRESIDENT, read the following paper :—

“Description of the Pont du Gard.” By GEORGE RENNIE,  
M. Inst. C. E.

The Pont du Gard, or Aqueduct of Nîmes, as it is sometimes called, has been described by Daviler and De Lannoy, in 1700 ; by Jean Jacques Rousseau, in 1741 ; by Pitot, in 1743 ; Nizard and Delon, in 1787 ; Grange and Durand ; J. Rondelet, in 1821, and by so many English and other travellers, that further description would appear almost superfluous. Nevertheless, having visited the structure, shortly after that of Roquefavour, the Author thought it desirable to place the ancient and modern buildings in contrast.

The Pont du Gard is, in all probability, one of the most ancient aqueducts constructed by the Romans out of Rome, as it is attributed to Agrippa, son-in-law of the Emperor Augustus, who, on his return from Egypt, in the annals of Rome 735, seventeen years B. C., commissioned him to quell the disturbances in Gaul, when, flattered with his reception from the inhabitants of Nîmes, he fixed his residence in that city. The insufficient supply furnished by the fountains of Nîmes doubtless suggested the idea of conducting thither the waters of the Eure and the Airan, rivulets situated near the city of Uzès, about seven leagues distant, from whence the water was led eastward, through several hills, and over many arches, in a devious course, to the village of Castillon du Gard, and thence southward, across the valley and river of the Gardon, over which was built this celebrated bridge-aqueduct. After crossing by this structure, the channel passes through the hills, by tunnelling, and where it crosses the valleys it is supported by small arches, in a southerly direction, towards Sarnhoe, whence it diverges suddenly in a south-western direction, and after having traversed, for a distance of a quarter of a league, the chain of mountains to the north, the aqueduct shows itself near Sarnhoe, after which it can only be traced by imaginary levels near the villages of Bezousse, St. Gervais, Marguerite, and Courbessac, to Nîmes, the total length being estimated at 41,000 mètres, or 25 $\frac{1}{4}$  miles.

M. J. Rondelet, from whom this description of the locality is derived states, that although he had measured the Pont du Gard himself, he considered the measurements of MM. Grange and Durand, and published by those engineers in the “Description of the Ancient Monuments of France,” so much more accurate, that he preferred to give them in place of his own. The following are the details :—

The Pont du Gard consists of three rows of superposed arches.

The first, or lower series, under which the River Gardon passes, consists of seven arches.

The second, or middle tier, of eleven arches.

The third, or upper tier, of thirty-five arches.

All these arches are semicircular, and rest on imposts of greater, or less elevation.

It is the third, or upper range of arches, which carries the water channel, and that at an elevation of about 160 feet.

The middle arch of the lower series is  $24^m 52^c$  or  $80 \cdot 142$  feet span.

The three arches on each side of the centre are  $19^m 20^c$  each, or  $63 \cdot$  feet span.

The smallest,  $15^m 55^c$ , or  $51 \cdot$  feet.

The arches in the second series are the same as those below. The upper series has its arches alike, viz.,  $4^m 80^c$ , or  $15 \cdot 74$  feet span.

The piers of the first and second series are all  $4^m 55^c$ , or  $14 \cdot 92$  feet thick.

The piers of the upper series vary according to the diameters of the arches below, four arches of this upper series corresponding with one arch of the lower.

As the two sides of the mountains which form the valley of the Gardon are not of equal height, that of the left bank being lower than the level of the aqueduct, while the right bank is higher, the aqueduct was sustained by a long series of arches similar to those of the upper series, and on the opposite side these arches were continued on the mountain itself.

The length of the aqueduct across the valley is  $269^m 10^c$ , or 882 feet.

The Pont du Gard is entirely constructed of cut masonry from top to bottom, and all the beds so closely jointed, and without mortar, or cement, that it was generally difficult to insert the blade of a pen-knife between them—in many cases it was not possible.

The channel which carries the water is the only part which is not of cut stone. It is constructed with rubble on the two sides, and with ordinary masonry in the interior, and covered with a cement  $0^m 05^c$ , or 2 inches thick, of broken brick, or tiles, mixed with lime and gravel. The width of the channel was originally  $1^m 22^c$ , or 4 feet, and its depth  $1^m 62^c$ , or  $5 \frac{1}{2}$  feet English. This width has, however, been diminished, by a deposit from the water, of  $0^m 29^c$ , or nearly 1 foot in thickness. This deposit proves that the usual depth of the water in the channel was about 1 mètre, or 3·2809 English feet, and that the quantity of water which passed latterly was only one-half of what it was originally.

The channel over the aqueduct was originally covered with flagstones, few of which now remain.

The Pont du Gard appears to have been broken at both ends, at some distant but uncertain period, but which is dated about 406, or near the commencement of the fifth century, so that it is probable that the water flowed through the channel for four centuries, after which it ceased to flow for fourteen centuries. Numerous stalactites, or calcareous deposits, now observable in great quantities underneath the arches, show that the water percolated through them, notwithstanding the boasted tightness of the cemented bottom.

The foundations of the Pont du Gard presented no difficulty; they were cut into the rock, about 2 mètres, or  $6\frac{1}{2}$  feet. The bed-stones are about  $0^m 10^c$ , or 4 inches in thickness. The voussoirs of the large arches are about  $1^m 60^c$ , or  $5\frac{1}{4}$  feet in length; in the second series of arches the voussoirs are about  $1^m 55^c$ , or 5 feet, and in those of the upper series they are about  $0^m 80^c$ , or  $2\frac{1}{2}$  feet.

It is to be remarked also, that the third, fourth, and seventh first courses of the voussoirs of the first and second series are connected in three pieces throughout the whole thickness of the bridge; it is only above these arches that the counter arches begin.

The three first voussoirs of the arches of the top series are connected in two lengths.

The stone of which this bridge is built came from a quarry in the neighbourhood, on the right bank of the river.

At the beginning of the eighteenth century the Duc de Rohan, to facilitate the passage of his artillery, caused one side of the foot of the piers to be cut away, one-third of the thickness of the arches of the second rank, and otherwise mutilated the bridge, so as to weaken the whole superstructure. This was, however, subsequently repaired, and in addition, a road-bridge was constructed, on the eastern face of the aqueduct, in 1743, by M. Pitot, who also repaired the aqueduct in many parts. This fine structure has been frequently repaired from time to time; and it now stands, considering its great antiquity, a splendid monument of architectural skill.

The projecting stones under the soffit of the arches, and on their faces, left, doubtless, for fixing the scaffolding, have a picturesque effect.

---