their roadway, the difference of the strength of materials required, is yet greater.

It is for the practical engineer to determine whether the weight of 300 cubic feet of the masonry, of which this structure is composed, built on a base of 1 superficial foot in area of the same material, is too great a load to be safe; or whether even 935 cubic feet, per superficial foot, is a load to which it could safely be subjected.

No. 269.—Account of the Pont-y-tu-Prydd, over the river Tâfe, near Newbridge, in the County of Glamorgan. By Thomas Macdougall Smith, M. Inst. C.E. Read April 4, 1838.*

Among the many Bridges constructed in England during the last century, few are more interesting than the Pont-y-tu-Prydd, over the river Tâfe, on account of the boldness of the design, and the circumstances under which it was constructed. This celebrated bridge lies on the road from Lantrissant to Cardiff and Merthyr, which crosses the Tâfe at the village of Newbridge,

The name, "Pont-y-tu-prydd," which means literally, "Bridge by the Earthen House," is derived from a mud hut that stood near the site.

It was in 1746, that it was first determined to erect a bridge at a spot rather lower down the river; and William Edwards, who had gained some reputation as a country mason, was recommended as competent to undertake the work, which was commenced in the above year. This bridge consisted of three arches, and is said to have displayed considerable elegance of design; but about two years and a-half after it had been finished, it was completely swept away, during one of the great floods to which the Tâfe, like all rivers in mountainous districts, is subject; the waterway being blocked up by trees and other impediments brought down from the uplands: the water rose to so great a height as to flow over the parapet, and the bridge gave way. As Edwards was compelled by his contract not only to build, but to maintain the bridge for a period of seven years, he had to resume his labour; and, in order to guard against the danger which led to the destruction of the first bridge (that of obstructing the channel), he conceived the bold design of spanning the river with one arch only. Its situation and dimensions were the same as those of the present bridge, and he had proceeded so far with the undertaking, that the parapets only

* This paper was read at the meeting of April 4, 1838, and an abstract of it was published in the Minutes of Proceedings of that year (page 36); but it is now printed at length, because it is alluded to in Mr. Snell's paper (page 468).

were required to complete it, when another, but very different accident occurred, which again proved fatal to the structure. From the great rise in the arch, it was necessary to raise the roadway at each end, in order to facilitate the access. The quantity of material in the centre of the arch was so small, in proportion to that laid over the spandrils, that the pressure upon the haunches forced up the crown, and the whole was again reduced to ruins. This second failure would have made most men relinquish any further attempt, but it was not so with Edwards: possessing a persevering and ardent disposition, he determined on another effort to overcome the difficulty, and at length he succeeded in building the present bridge. It is, however, stated, that he consulted Smeaton on the subject. What amount of assistance was given by that eminent engineer is not known; but Edwards, either following his advice, or profiting by the last misfortune, took the precaution of relieving the arch of the great pressure at the haunches, by placing in each spandril three cylindrical openings, from face to face of the bridge, and it is said the spaces between them were filled up with charcoal, by which means the object was completely accomplished. (Plates 40 and 41.)

The arch measures 140 feet between the abutments, and has a rise, or versed sine, of 35 feet. These dimensions give a diameter of 175 feet; and in the accompanying drawing the arch is shown a segment of that circle. At the time the author made his survey, he was unable to determine the form of the arch more precisely.

The width of the soffit is 15 feet 10 inches at the springing, and diminishing to 14 feet 5 inches at the crown, by six offsets on each face, varying from 2 inches to 3 inches in depth. The roadway is only 11 feet wide over the centre of the arch. (Plate 42.) The contrivance for diminishing the weight on the haunches appears to have succeeded perfectly. The bridge was finished in the year 1750, and has now stood for a period of 96 years, a monument of the perseverance and talents of the builder.

The arch-stones, throughout each face, are of parallel width; they are 2 feet 6 inches deep, and vary from 6 inches to 9 inches in thickness, and from 12 inches to 18 inches in the depth of the bed. The soffit is all rubble masonry, two or three courses making up the dimensions of each arch-stone; and, from the slaty description of the material, little, or no, labour appears to have been necessary in forming the joints. The masonry of the spandrils and the parapet is of a similar description, being irregularly laid, the stones varying from 1 inch to 9 inches in thickness.

The two greatest floods which have happened, within the remem-

brance of the inhabitants, were in the year 1816, when the water rose 12 feet 6 inches above its ordinary level, and in 1829, when it attained nearly the same height.

The sketch of the centering, (Plate 43), upon which the arch was raised, was obtained, from a model in the possession of W. C. Mylne, (M. Inst. C.E.), but there are no records of how it was struck, or any other particulars relative to the construction.

The bridge is built of hard and durable grey sandstone, from the quarries in the neighbourhood: the lime used was from the well-known Aberthaw cliff, on the north side of the Bristol Channel.

The narrowness of the bridge and the steepness of the ascent were found inconvenient and dangerous, and, about twenty years ago, the roadway was, in consequence, raised at each end, and the surface paved; but even now it is so steep, (the inclination being 1 foot vertical to 4 feet horizontal) that it is found necessary to use a chain and drag, so that when a carriage reaches the centre of the bridge, one end of the chain is attached to the hinder part of it, the other end being secured to the drag, upon which a boy generally places himself, so that as the carriage descends upon one side the drag is pulled up on the other, and thus relieves the horse in descending; without this contrivance, it would almost be impossible for a loaded vehicle to pass over in safety.

William Edwards was born in 1719; he was the youngest son of a small farmer, and had been, at an early age, occasionally employed in building and repairing stone walls, which he executed with much neatness and expedition. A workshop erected by him extended his repute in his neighbourhood; and a mill, which he afterwards built, introduced him to a knowledge of the principles of the arch. The bridge over the Tâfe, which was his first effort in bridge-building, gave him an opportunity of applying this knowledge, on a scale which he little anticipated, when he undertook the work: but it raised the country mason* to a high place among the bridge-builders of his country. Three-quarters of a century elapsed before its equal, in span, existed in England.

Edwards erected several other bridges in South Wales, some of them of considerable magnitude, although not at all equal to his great work. The one of the largest span is that over the Tâfe, at Wychbree, the chord of which is 95 feet, with a versed sine of 20

* With the occupation of a mason, he combined that of a Minister, having preached for upwards of forty years at White Cross Chapel, in his native parish, where he was interred, in 1789.

PONT - Y - TU - PRYDD

PONT-Y-TU-PRYDD

SOUTH ELEVATION

10 5 0 10 20 30 40 FEET

Span of the Arch 140 0
 Rise do. 33 0
 Depth of Arch Stones on face 2 6

Width of Soffit of Arch at Springing 15 10
 Do. do. Centre 14 5
 Do. Roadway (within Parapet) 11 0

TRANSVERSE SECTION THROUGH CENTRE ARCH

Etched by J. Browne, 23, Red Lion Sq. Holborn.

PONT-Y-TU-PRYDD

PONT Y TU PRYDD

SECTION A TO B

Stone with Inscription in North Parapet

Quoins of Arch and Soffit of Bridge

SKETCH OF CENTRE

Plate presented by T.M. Smith M.Inst.C.E.

feet, and there are others of 80 feet and 83 feet span respectively ; and that at Glasebury, over the Wye, is a bridge of five arches. The experience which he had gained at Pont-y-tu-Prydd, led to many improvements in his practice, at those subsequent works, and enabled him, especially, to avoid the great rise in the arch, without impairing the stability of the structure ; but the hollow cylinders in the spandrils, were still retained in his large arches ; they seem to have formed a feature in his favourite style, although they were not much adopted by others ; but his signal success in the use of them accounts for and excuses their being carried too far for beauty.

The paper is illustrated by a drawing of the bridge, from which the copper-plates Nos. 40, 41, 42, and 43, are engraved, and, with the vignette portrait of William Edwards, are presented by Mr. T. M. Smith, for the Minutes of Proceedings.

William Edwards.