The communication is accompanied by fifteen drawings, showing the details of construction of the locks and gates, bridges, quays, embankments, &c.

February 8, 1842.

"Description of the Ponte della Maddelena, over the River Serchio, near Lucca." By Richard Townshend, Assoc. Inst. C. E.

The bridge described in this communication, is situated about half-way between the town and the baths of Lucca, in the Grand Duchy of Tuscany; it was built by Castracani, in the year 1317, on the site of one which had been constructed by order of the Countess Matilda, early in the twelfth century, and subsequently destroyed; it is believed that a Roman bridge formerly existed on the same spot.

The present bridge is of grey limestone of the country. The large arch of 126 feet 6 inches span, is of a semicircular form, and springs directly from the rocky bed of the river, without any prepared foundation. The smaller arches are of various spans, 46 feet 10 inches, 33 feet, 28 feet, and 7 feet 6 inches. The style of construction is somewhat similar to that of the Pont-y-prydd, over the Taff, in South Wales.

An engraving of the bridge accompanied the Paper.

"Description of the Mill, Forge, and Furnaces of a Welsh Iron Work." By Thomas Girdwood Hardie, Assoc. Inst. C. E.

The Author commences by describing the general plan of an iron work, consisting of six blast furnaces, four double-fire refineries, and a forge and mill, capable of converting into bar-iron the produce of the six blast furnaces.

He then enters very fully into certain alterations of the interior shape of the blast furnaces introduced by him at the Blaenavon works, from which have resulted an economy of fuel, regularity of work, and an improved quality of iron. The principal alterations appear to be, making the interior diameter greater above that at the boshes, and establishing a proper ratio between the diameter of the boshes and that of the charging place, and proportioning both to the height of the furnace. The opinions are supported by calculations of the quantity of blast used in smelting given quantities of ore, and the effect which the form of the furnaces must have in directing the current of the blast through the materials, by which also the point of fusion would be necessarily affected, and the chemical combinations varied. The particulars are then given of the construction of
the furnaces at Blaenavon, and the details of the blowing engines, blast mains, regulators, valves, &c., with calculations of the quantity of blast used in the various processes of the manufacture. The construction of the casting-houses, with the mode of ventilating by the iron roof, is detailed. The general arrangements of the balance pits, coke yards, mine kilns, and bridge houses, are shown, and the author proceeds to describe the forge and mill, which have 35 puddling furnaces, with hammers, shears, rolls, and heating furnaces in proportion. He then condemns the usual practice of leaving the coupling boxes loose upon the spindles, as liable to break the rolls, shafts, or machinery, and gives the theoretical and practical reasonings for preferring fixed couplings.

The communication is illustrated by three drawings, showing the general distribution and the details of an iron work.

Mr. Lowe believed that there was an incorrectness in the statement, Mr. Lowe, of the iron after being freed from its oxygen by the heat of the furnace, taking up a dose of carbon from the coke, thus becoming a carburet of iron, which is a fusible compound, and as such, fell melted into the hearth. On the contrary, he thought that the iron was combined with carbon in the ore, and that there was not any necessity for the medium of the fuel to charge it with carbon.

In reply to “Why the ore required, or why the iron carried away, Dr. Faraday said, that the ore being essentially a carbonate of iron, the first action of heat, either in the mine kilns or in the furnace, was to draw off the carbonic acid and leave an oxide of iron, and then the further action of the fuel (besides sustaining a high temperature) was to abstract the oxygen of the oxide, and so to reduce the iron to the metallic state, after which a still further portion of the carbon of the fuel combined with the iron, bringing it into the state of easily fusible or pig-iron.

As carbon may be communicated to the iron in two ways, distinct in their nature, either by contact with solid carbon, as in the process of cementation (that by which steel is commonly converted), or from the carbonated gases, either carburetted hydrogen, or carbonic acid, which occupy nearly every part of the air-way of the furnace, it would be desirable to distinguish, as far as may be in any furnace having a particular form or action, what proportion of the whole effect is due to the one mode of carbonization or the other.

Mr. Wallace stated that the ore was a carbonate of iron, or a prot-oxide of iron and carbonic acid united, and not a carburet of iron.