

On Firing Blasts under Water by Galvanism. By John Bethell, Assoc. Inst. C. E.

Mr. Bethell's attention was directed to this subject in 1834, when engaged in experiments with his new diving-dresses. It is frequently necessary to blow off the upper decks of a wreck, so as to get at the cargo ; but great difficulty has arisen in igniting the powder. A fuze of cotton steeped in spirits of wine and gunpowder and enclosed in a caoutchouc tube was at first used ; this, however, being uncertain and expensive, the idea occurred of trying galvanism. Firing
Blasts by
Galvanism

It is well known that when two ends of copper wires leading from the poles of the battery are connected by a piece of platinum, or iron wire, the latter becomes red-hot. To apply this method, the top of the tin canister which contains the charge is fitted with two copper wires, about 6 inches long, passing through a piece of cork, and connected at their lower ends by a piece of platinum or iron wire. The canister being charged, the platinum or iron wire is pushed down into the middle of the charge, and the top of the canister cemented on with putty. The wires are well coated with a non-conducting medium, as a mixture of resin, wax, and tallow, or caoutchouc, excepting at their lower end where they are connected by the platinum, and at the upper where they are to be connected with the two long copper wires which proceed to the battery. These connecting wires, covered with cotton thread, are coated with the caoutchouc varnish, and then tied together so as to form one rope ; the diver having connected the wires of this rope with the wires of the canister, and uncoiled a sufficient length of rope, descends and deposits the canister in the wreck or hole prepared for the blast, and returns to the surface. The other ends of the wire are then dipped in the mercury cups of the galvanic battery, and the platinum wire becoming instantly red-hot, the charge is exploded. There is not more than about six inches of the wire rope lost at each discharge.

The security, certainty, and convenience, of this plan are evident. In quarries, any number of charges could be fired at the same instant, or in rapid succession ; and this method possesses incalculable advantages over every other for the military engineer, since any number of mines could be exploded at the precise moment that is desired.

On the Limestone, the Lime Cement, and method of Blasting, in the neighbourhood of Plymouth. By W. Stuart, M. Inst. C. E.

Plymouth abounds in limestone, which may be raised in solid Plymouth
Limestone.

masses of from three to ten tons ; it is used most extensively for building and for lime manure. About 13 cubic feet weigh a ton ; the limestone is of a light blue or grey colour, in general free from metallic veins, but with some indications of manganese and ironstone, round pieces of the latter being found in clay beds, intermixed with the rock, and a vein of ironstone four inches thick at the surface of the rock, and dipping towards the south, has been opened.

Cement. The author then proceeds to describe the general method of making cement in that neighbourhood, and the method which he has employed with considerable advantage.

Blasting. The bit or iron rod, called a jumper, is generally used. In pitching a deep hole, a 2-inch bit is used for about four feet, and a $1\frac{7}{8}$ -inch for the next four feet, by one man ; then two men are employed with $1\frac{3}{4}$ -inch to the depth of 14 feet, and $1\frac{5}{8}$ -inch to the depth of 21 feet. A constant supply of water is required during boring the hole. The hole being well dried, about one-third is filled with powder, say 15lbs. ; a needle is introduced as far as possible without driving it ; the hole is tamped with dry clay to the top, and then covered with a little wet clay, to prevent any of the loose particles falling in when the needle is withdrawn. A reed, filled with powder and split at the top, to prevent its falling to the bottom of the hole, is inserted, and a stone laid upon it ; the powder being ignited by a piece of touch-paper and a train, the reed flies to the bottom of the hole, and ignites the main load. The rock is generally cracked and loosened to a considerable extent, if not thrown ; in that case, the needle is driven through the tamping, and such a fresh charge is run through the needle-hole as may be requisite. From six to eight tons of rock are generally blasted with one cwt. of gunpowder. The paper is accompanied with drawings of the jumpers, the tamping bar, the needle, and the discharging reed.

Account of the Pont-Y-Tu-Prydd, over the Taâf, Glamorgan-shire. By Thomas M. Smith.

Edwards's Bridge. In 1746, William Edwards undertook to build a bridge over the Taâf ; the first, which consisted of three arches, was carried away by a flood ; the second, of the same dimensions as the present, fell from the too great load on the haunches. Before commencing the work again, Edwards is said to have consulted Smeaton, and either from the advice of that distinguished man, or from his own expe-