

operation, and not unfrequently remain under water more than a minute at a time. The cylinders have been sunk as deep as 40 feet; but with extreme labour.

A series of these wells being sunk at intervals of 1 foot between them, they are filled with a grouting of lime and rubble-stone, and separately arched over; arches are then thrown transversely from the centre of each parallel pair, and another set of arches turned over the adjacent wells longitudinally; the whole is then covered with masonry, and the pier or other building raised upon it: such foundations are found to answer perfectly in situations where almost any other kind would be washed away.

The communication was accompanied by a drawing of the process, and of the tools used, showing also the modification of the system proposed by Colonel Colvin, of the Bengal Engineers, for obtaining foundations for a curtain, or line of wall, by sinking square masses of brickwork, with two or more wells in each, through which the workmen could excavate the soil.

Captain  
Goodwyn.

In answer to questions from the President, Captain Goodwyn observed that the greatest peculiarity of this system was that the sinker worked under water: such had been their custom for ages. Upon this kind of foundation, many of the large fortresses in India were constructed, and they stood remarkably well; whereas if timber piles had been used, the white ant would have destroyed them in a short time.

Lieut. Sale.

Lieutenant Sale observed that another main reason for not using piles was, that timber was scarce and dear, whereas labour was plentiful and cheap. Hence the general use of the brick cylinders.

Mr. Parkes.

Mr. Parkes conceived the most ingenious parts of the proceeding to be, the sinking through the water, and thus avoiding the risk of bringing up large quantities of sand, and the combination of arches, for distributing the weight of the superstructure equally among the brick shafts. Such shafts had been used by the Chinese, and sunk in the same manner from time immemorial.

Mr. Simpson.

In answer to a question from the President, Mr. Simpson described the process now so much practised for sinking wells through bad strata by means of cast-iron cylinders; excavating the earth from within the cylinder by an instrument called a "miser," which is a conical iron shell with a valve opening inwards; it is suspended by iron rods  $1\frac{1}{2}$  inch square, and worked from the level of the ground without pumping up the water: it is not uncommon to excavate

to a depth exceeding 100 feet in that manner. The "miser" can bring up a cube yard of earth each time it is raised. Cast-iron cylinders are preferable to brick shafts, which frequently hang up, and in that case give much trouble, whereas if the iron cylinders do not descend freely, they will bear the application of considerable force to drive them down. They are frequently forced through the indurated ferruginous gravel. Light planking is also sometimes used, particularly in such cases as in the well he is now sinking at Chelsea, which is 20 feet square, lined throughout with 3-inch planking. It has reached the quick sand at a depth of 32 feet, and will be stopped there.

Mr. Davison had just completed a well at Messrs. Truman and Mr. Davison.  
Hanbury's brewery, with cast-iron cylinders, 8 feet diameter, and 193 feet deep, an account of which he promised to present to the Institution.

The President was now sinking a set of cast-iron cylinders through The President.  
sand which was liable to be washed away ; they were to be filled with concrete and used as the foundation for a lighthouse at the Point of Air. An account of the construction was, he believed, preparing for the Institution.

**"An Historical Account of Copper Sheathing for Vessels." By J. J. Wilkinson.**

The two former papers by the same author,\* treated of Wood and Lead Sheathing for Ships: the present communication gives Copper sheathing.  
in the introduction a general account of Copper as a metal; the localities supplying it; the uses to which it has been applied, from the earliest period to the present time; and the relative estimation in which copper of various countries is held on account of its degree of purity, its ductility, or its better preparation, in which latter particular British copper is stated to be pre-eminent.

An epitome is then given of a return to the House of Commons; whence it appears that in 1839, into Swansea alone, there was imported 4350 cwts. of unwrought metal, and 419,604 cwts. of ore, and that there was exported during the same year, of British metal, 153,742 cwts., and foreign metal 112,830 cwts. Copper from Sweden is considered more malleable than that from Hungary; but the former is not so good as British metal, as it contains a portion of iron.

Copious extracts are made from "Knowles's Naval Architecture,"

\* Minutes of Proceedings, 1841, pp. 98 and 132.