

gangway hurdle surrounding them. They can be towed to the desired position in the manner of a lumber raft. When secured in the desired position, they are surrounded by barges laden with stone, and at a given signal the stone is cast on to the mattress, the art being to ensure that it shall sink uniformly in its desired location. As the raft sags it should take the ground first at the centre, and when it is completely in position rip-rap stone is thrown to cover it and prevent its breaking up. These rafts sometimes measure 80 feet by 400 feet, and the art of their employment is essentially Dutch, but the practice was adopted by Captain Eads in the works at the mouth of the Mississippi River. The entrance channel of the river was projected into the Gulf of Mexico by means of jetties supported on similar fascine work. The east jetty had a length of 11,800 feet, and the west jetty a length of 7800 feet; the scour so induced, assisted by dredging, has resulted in a channel depth of 30 feet.

De Muralt has employed concrete mattresses in lieu of the old type of fascine. These consist of concrete slabs about 1 yard square and 5 inches thick. They are laid out on a low-water flat, secured together with iron links. A pontoon is floated over them at high tide, and by means of cable attachments worked from windlasses the entire mattress is lifted, the method of lifting ensuring that its formation is not distorted when over the desired location; it is then lowered on the sea bed, being held uniformly and horizontally. It is claimed that this arrangement is not only more efficient but cheaper than the old system, and that the concrete mattress can be laid on a sloping as readily as on a level sea bed.

In modern Dutch practice the de Muralt system of plating embankments is a novelty. The system is largely in use in Holland, and has been adopted on an extensive scale in Great Britain. De Muralt employs two methods. In the lighter system (fig. 32) concrete tiles about 16 inches square and  $2\frac{1}{4}$  inches thick are used. The edges of these are rebated, so that the tiles interlock. The former practice was through a hole in the centre of the tile to drive a concrete pin to fix the slab in position. It has been found, however, that the heads of