we had become accustomed to our own plans, and could depend almost with certainty upon the amount of work we could do within a certain time, I thought it better to continue steadily throughout as we had begun, and to secure the largest possible series of similar and comparable observations, rather than run the risk of losing time through possible failures.

The Trial Cruises of the Porcupine.—The PORCUPINE was a 382-ton gunboat fitted up for the surveying service, in which she had been employed for some years among the Hebrides, and afterwards on the east coast of England. She was assigned for our special work in 1869 with all her ordinary surveying fittings, and certain important additions A double-cylinder donkey-engine, which worked to about 12 horse-power, was set up on deck amidships, and was fitted with large drums for bringing up light weights rapidly, and smaller drums for heavier work; to either of which, lines might be led either from fore or aft. We almost always used the large drum both in dredging and sounding, and except on one or two occasions, when an enormous load came up in the dredge-bag, the deck-engine delivered the rope steadily at the rate of a foot per second during the whole summer. A powerful derrick projected over the port-bow. A large block was suspended at the end of the derrick by a rope, which was not directly attached to the spar, but passed through an eye, and was attached to a "bitt" on deck. On a bight of this rope was lashed a strong combination of Hodge's "accumulators" (p. 14), an arrangement invaluable in dredging from a large vessel. From the great strength of these springs the dredge is usually drawn along without stretching them to any great degree; they become tense and taut, and yield with a slight pulsation only, to the rise and fall of the vessel. Whenever the accumulators run out it is a sure indication that the dredge has caught, or that the weight in it is too great; and that the dredge-rope ought to be relieved by a turn of the paddle-wheel or screw. A second derrick, nearly equally strong, was rigged over the stern (fig. 3), and we dredged sometimes from one and sometimes from the other.

We had an excellent plan for stowing the dredge-rope in the PORCUPINE (Fig. 3), a plan which made its manipulation easy, notwithstanding its great weight. A row of about twenty large iron pins, about 2½ feet in length, projected over one side of the quarter-deck, rising obliquely from the top of the bulwark, and ending over the deck in smooth white balls. Each of these held a coil of from 200 to 300 fathoms, and the rope was coiled continuously along the whole row. When the dredge was going down, the line was taken rapidly by the men from the pins, and in hauling up a relay of men carried the rope along the deck from the surging-drum of the donkey engine, and laid it in coils on the pins in inverse order; in letting go, the rope passed to the block of the derrick directly from the pins; in hauling up, it passed from the block to