

and currents, and filling up hollows by drifting about and distributing their materials.

The first careful surveys of the Atlantic, in which great depths were determined with considerable accuracy, are the cruises of Lieut.-Commanding Lee, in the U.S. brig 'Dolphin' (1851-52), and of Lieut.-Commanding O. H. Berryman, in the same vessel in 1852-53; but the sounding voyage in which modern appliances were first employed with perfect accuracy with a practical object was that of Lieutenant Berryman in 1856, in the U.S. steamer 'Arctic,' in which twenty-four deep-sea soundings were taken with the Brooke's and Massey's sounding machines on a great circle between St. John's, Newfoundland, and Valentia in Ireland, with a view to the laying of the first cable. The same ground was gone over by Lieutenant Dayman, in H.M.S. 'Cyclops,' in June and July 1857, and thirty-four soundings were taken, the depth being estimated by Massey's sounding-machine and a modification of Brooke's machine already described. The next important sounding expedition was that of Commander Dayman, in H.M.S. 'Gorgon,' from Newfoundland to the Açores, and thence to England. The depths were taken in this case with a lead usually 188 lbs. in weight which was lost at each cast, and albacore line with a breaking strain of 420 lbs. Only on one occasion, about a third of the way from the Açores to England, a cup-lead was let go, attached to a stronger line, in 1,900 fathoms, and came up half filled with grey ooze.

Another route for a telegraph cable having been proposed, H.M.S. 'Bull-dog' started in July 1860, under