

is required, as in coast-surveying, it is necessary to sound from a boat, which can be kept in position by the oars and reference to some fixed objects on shore.

This ordinary system of sounding answers perfectly well for comparatively shallow water, but it breaks down for depths much over 1,000 fathoms. The weight is not sufficient to carry the line rapidly and vertically to the bottom; and if a heavier weight be used, ordinary sounding line is unable to draw up its own weight along with that of the lead from great depths, and gives way. No impulse is felt when the lead reaches the bottom, and the line goes on running out, and if any attempt be made to stop it it breaks. In some cases bights of the line seem to be carried along by submarine currents, and in others it is found that the line has been running out by its own weight only, and coiling itself in a tangled mass directly over the lead. All these sources of error vitiate very deep soundings. In many of the older observations made by officers of our own navy and of that of the United States, the depth returned for many points in the Atlantic we now know to have been greatly exaggerated; thus Lieutenant Walsh, of the U.S. schooner 'Taney,' reported a cast with the deep-sea lead at 34,000 feet without bottom;¹ Lieutenant Berryman, of the U.S. brig 'Dolphin,' attempted unsuccessfully to sound mid-ocean with a line 39,000 feet long;² Captain Denham, of H.M.S. 'Herald,' reported bottom in the

¹ Maury's Sailing Directions, 5th edition, p. 165, and 6th edition (1854), p. 213.

² Maury, Physical Geography of the Sea. Eleventh edition, p. 309.