

reaching the bottom. Lieutenant Parker, U.S.N., of the sloop "Congress," ran out 50,000 feet of line without touching the bottom.

Walsh's experiments on board the "Janey" convinced Maury that wire was less suitable than cord. He then had recourse to a line with a 32-lb. bullet attached, which was allowed to descend, and when it touched bottom the twine was cut near the surface, the depth being calculated by measuring what was left of the twine on board. The experiments of Lieutenant Rogers Taylor on board the "Albany" showed that it was necessary to use something stronger than twine. Maury demonstrated the influence of submarine currents by sounding on the same spot with one and with two 32-lb. bullets, for he found invariably that the depth indicated was less when the two bullets were used; the double weight descends faster, and is therefore not so long exposed to the action of the currents. From this it was considered advisable to use stronger lines, reckoning the time each 100 fathoms took to run out, but still the moment of touching bottom, if bottom were reached, remained doubtful. Lieutenant S. P. Lee of the "Dolphin" obtained, however, some good results, and afterwards every American ship, the officers of which would undertake deep soundings, was supplied with a sufficient quantity of prepared line and 32-lb. bullets. Every opportunity of sounding in deep water was to be taken advantage of, still one important particular was wanting,—there was no positive proof that Lee and his predecessors had touched bottom, and up till that time it had been deemed impossible to bring up samples of the deposit.

BROOKE'S SOUND-  
ING APPARATUS.

It was then that Midshipman J. W. Brooke, a young and distinguished officer attached to the Observatory, proposed to Maury that the well-known apparatus, which now bears Brooke's name, should be adopted. This consisted of a detaching apparatus affixed to the lead of the sounding line, on a principle similar to that employed by Cusanus, Puehler, and Alberti without a line.<sup>1</sup> With this apparatus Brooke collected in the Pacific samples from depths down to 3500 fathoms; Midshipman J. G. Mitchell of the "Dolphin" and his men acquired such dexterity in the use of the apparatus that they seldom failed to bring up a sample of the bottom. The samples thus obtained were carefully labelled and sent to the head of the Hydrographic Office. Brooke made use of his apparatus on board the "Vincennes" in the North Pacific,<sup>2</sup> but he confesses that the motion of the boat interfered with the precision of the observations. After several trials in the Indian Ocean and Coral Sea, however, he came to the conclusion that it was possible to take soundings down to any depth. He mentions a sounding taken in the Indian Ocean at a depth of 7040 fathoms, but the line broke; this failure he attributed to the currents. In the Coral Sea some excellent results were obtained; from a depth of 2150 fathoms, in lat. 13° S., long. 162° E., the tube came up full of clayey calcareous matter so compact that it retained the marks made by the bullet in slipping along the tube.

<sup>1</sup> See *ante*, pp. 56 and 57.

<sup>2</sup> Maury, *op. cit.*, vol. i. p. 169.