

to it a float on the surface, it is evident that *exact* observation of the motions of the apparatus could not be ascertained, as these motions were liable to be retarded or accelerated by the friction of the surface water on the float, as well as by the



FIG. 25. —The Current Drag.

friction of the water on the line connecting the float and apparatus. A fair approximation, however, of the movement of the sunken apparatus may be made if that apparatus be constructed in such a manner as to expose as large an area as possible to the influence of such forces as may be at work where it happens to be, while the float be constructed to present as small an area as possible to the surface current. The lower apparatus must be of sufficient weight to sink readily, and to keep the line between it and the float as nearly perpendicular as possible, otherwise there would be no certainty as to the depth at which it was; and the float must be of sufficient size to support the weight of the sunken apparatus and the connecting line together with the strain caused by the difference between the lower and surface currents.

It will thus be seen that the current apparatus consisted of three parts, one called the "current drag," which was lowered down to such depths as were deemed requisite, another the "watch buoy," which pointed out on the surface the movements of the current drag, and a third the "current line," which connected the drag with the buoy. The current drag (see fig. 25) was made of two cross-pieces of iron at the top and bottom A A, A A, with canvas spread between them; the iron cross-pieces were each 4 feet in length, and were joined together by a bolt in the centre, so that they might be folded up when not required; they were kept at right angles when in use by a laniard fastened to their extremities. The canvas between the cross-pieces was 4 feet in depth. On the lower part of the drag was a $\frac{1}{2}$ cwt. lead B to sink it readily, and the

current line was fastened to the upper part; this was the ordinary service cod line. The current drag was lowered to the required depth, and the line was then fastened to the watch buoy C, which was like a large anchor buoy, being 5 feet in length and