

ordinary way in a bucket. Water from the *bottom* was collected in an instrument specially constructed for the purpose.

The *Slip Water-Bottle* consists essentially of a brass cylinder A (fig. 39), which slides up and down a metal shank B, of at least twice its length. When the water-bottle is sent down, the cylinder is fixed in the upper part of the shank; and when it arrives at the bottom it is released and falls down to the lower part, where it rests on the lower of two accurately ground valves C and D, which fit into two conical surfaces on the inside of its upper and under edges. Thus the water which surrounds the shank at the moment of slipping is securely enclosed. The proper working of the instrument is dependent on the shank remaining straight; any bend in it would cause the valves to leak. In the instrument used in the German North Sea Expedition¹ this was provided for by the two valves being connected by a short iron rod, and the upper valve with the slipping arrangement by means of four slighter ones. But for deep soundings, where it is attached to a line along with a weight of three and often four hundredweight, greater strength is necessary to enable it to withstand the knocks to which, even with the utmost care, it is exposed, in being hoisted over the ship's side in a sea-way. Mr. Milne of Edinburgh, into whose hands the construction of the instrument was put, secured this end in a way which adds equally to the elegance and to the strength of the instrument. The shank and valves are one solid brass casting of the shape shown in the figure, the cylinder is another, and the slipping arrangement E, fixed to the end of a rod F of suitable length and great stoutness, is screwed into the top of the shank, the screw being secured by a rivet. The water enclosed is removed by means of a tap G, passing through the lower

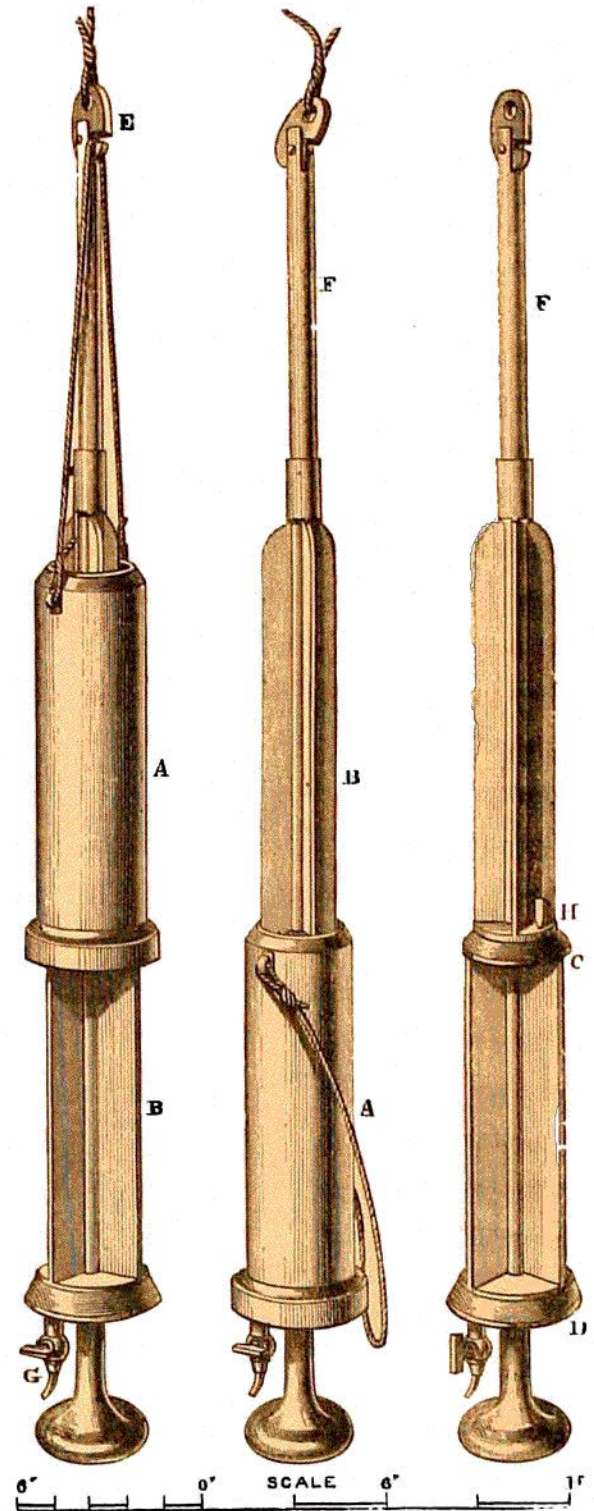


FIG. 39.—The Slip Water-Bottle.

of the shank, the screw being secured by a rivet. The water enclosed is removed by means of a tap G, passing through the lower

¹ Die Expedition zur physicalisch-chemischen und biologischen Untersuchung der Nordsee im Sommer 1872, Berlin, 1875.