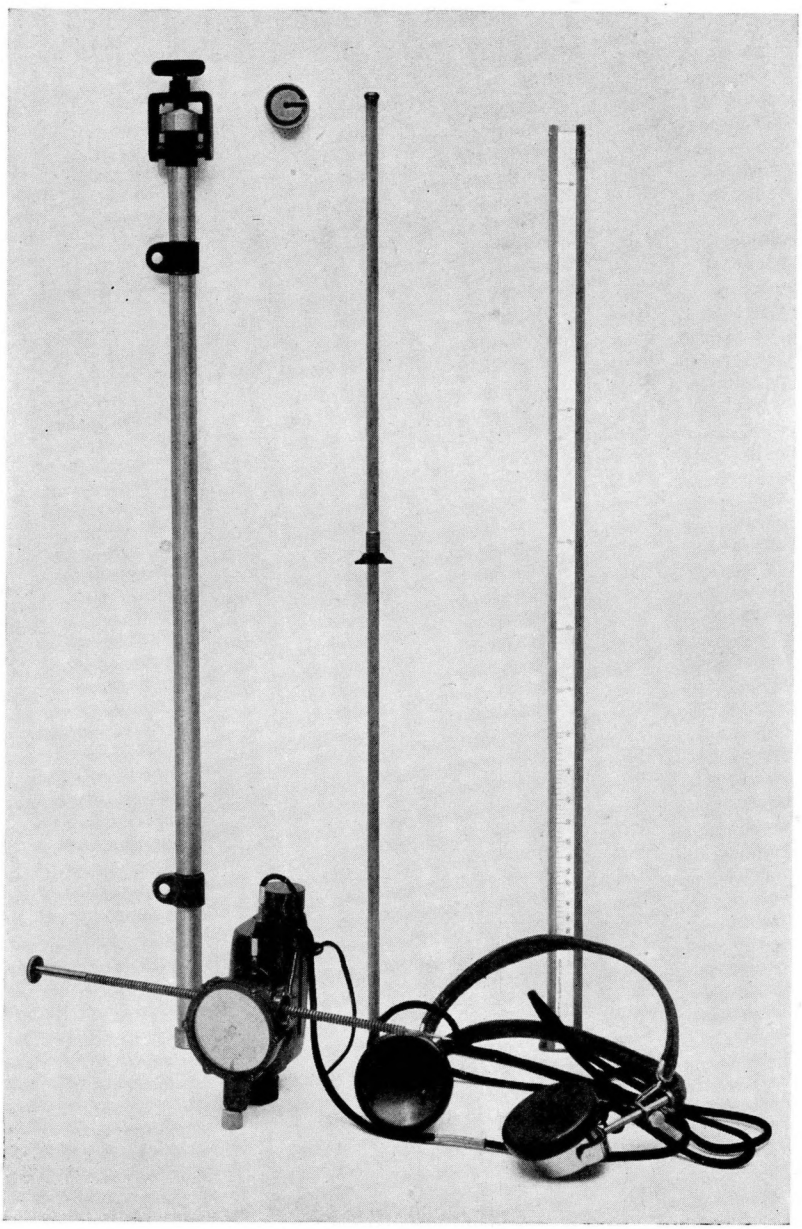

C. & G. S. Sounding Tube
Tube pour Sondages du C. & G. S.

DESCRIPTION OF U. S. C. & G. S. SOUNDING TUBE (*)

The pressure sounding tube, developed and used by the U. S. Coast and Geodetic Survey, consists of a brass tube, ½ inch inside diameter and 24 inches inside length, these dimensions being held to close limits. The lower end of the tube is sealed and the upper end is closed by a removable cap held in place when in use by a thumb screw, this upper cap being provided with a small tubular opening for connecting the interior of the tube with the sea.

The cap is constructed in two parts; the main part which fits tightly over the top of the tube has a groove 1/8 inch wide and 1/8 inch deep, which forms a nearly complete circle near the outside of the cap. This groove is extended to a hole at the centre which connects with the interior of the tube and a similar hole near the outer edge of the part connects with the sea. The top piece is soldered tightly over this groove so that it forms a narrow channel nearly 2 inches long, having a sufficiently restricted cross sectional area so that when water is being forced in as the tube descends, no air will at the same time pass out, and conversely, when the tube is being raised to the surface, air only will pass out and no further water will gain entrance.

In practice the tube is fastened to a weighted line and is lowered to the bottom, and the water passing through the channel in the cap, which is, of course, at the upper end of the tube, drops to the bottom of the 24 inch chamber. As the water enters the air is compressed and admission is sufficiently rapid so that the pressure within and without the tube is practically equal at all times. In this way it is not necessary that the tube remain at the bottom more than momentarily. As the tube is raised to the surface, the air pressure inside exceeds the hydro-static pressure and, in consequence, bubbles out through the opening in the cap. It should be noted here that the motion of descent and ascent must be continuous, otherwise extra water will be admitted and an erroneous reading obtained.

When the tube is brought to the surface it contains an amount of water which is in proportion to the depth to which the tube has descended. The water is measured by a specially built device which consists of a rod 5/16 inch in diameter, held to close limits. Upon removal of the cap from the tube, the rod is inserted and upon reaching the water displaces it and, when lowered far enough, brings the level of the water to the top of the tube. A sliding finger, held in place by friction on the rod indicates the length necessary to bring the water to the top and this length, measured by a specially

(*) See preceding Article.

prepared scale reads directly the depth in fathoms to which the tube has been lowered. This value must be corrected for temperature and barometric pressure.

This method of measuring the amount of water is volumetric and requires considerable accuracy in the dimensions of the tube and also the diameter of the measuring rod as the error introduced by an incorrect diameter would be as the square of the error in the particular part. There is also a certain personal element in the matter of deciding when the water has actually reached the top of the tube, and these considerations have led to the development of a different type of measuring device which is now being experimented with. In this device, which is electrical in nature, an insulated rod, terminating in a needle point, is lowered into the tube until the point comes in contact with the surface of the water contained therein. A small battery in the body of the instrument supplies the necessary electrical current and one side of this battery is electrically connected to the body of the tube. The other side of the battery is connected through a pair of headphones to the beforementioned rod. When the point of the rod touches the water a sharp click is heard in the observer's ear. The rod is in the form of a circular rack and, in being pushed downward, the teeth of the rack engage with a gear directly connected to a dial graduated to fathoms in such a manner that the length of the rod inserted in the tube measured directly the depth to which the tube has descended. The advantage of this instrument is that the personal element is entirely removed, as there is only one point at which the click occurs. Another advantage is that with the displacement method, if the rod is accidentally inserted too far, water is forced out of the tube and the sounding is lost. With the electrical method, there is no such loss and the readings may be repeated if necessary, to assure that the correct measurement has been made.