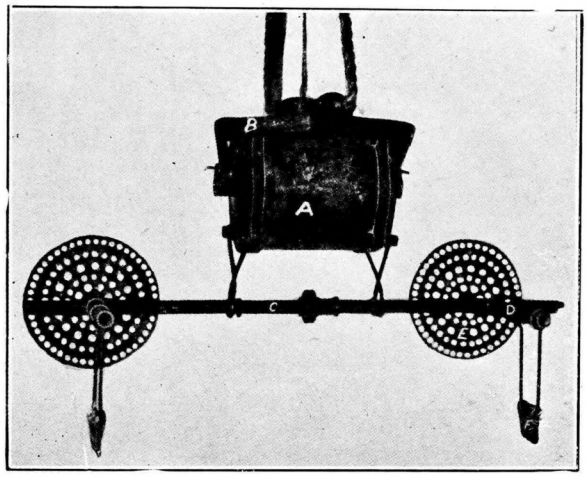

Fig. 1

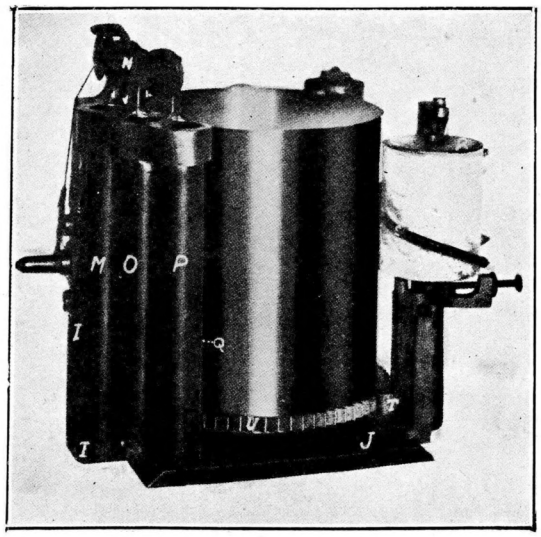

Fig. 2

BUCHANAN-WOLLASTON RECORDING CURRENT METER

See CONSEIL PERMANENT INTERNATIONAL POUR L'EXPLORATION DE LA MER

Publication de Circonstance N° 86, in 8°, 14 pages, 6 illustr. *Copenhagen, May* 1925.

The meter described is the outcome of a conviction that recording meters using rotating vanes are not the most suitable for work at sea, owing to their comparatively fragile nature and other reasons. The frictions vary so much in different instruments that each one has to be calibrated separately.

The idea of using light for recording was rejected as it necessitates a dark-room and introduces much extra trouble.

The construction of the meter is as follows:

A watertight cylindrical drum is slung on trunnions from a frame. Below the drum and attached to it by bent wire slings is a rod free to move in the eyes of the slings. To this rod are attached at right angles other short rods which carry at one end circular plates pierced with large holes and at the other weights of lead which balance the plates so that they are always normal to a horizontally flowing current. The frame carries a vane which sets the meter to the current. The force of the current, impinging on the pierced plates swings round the drum on its trunnions until its moment about the axle of the drum is balanced by the moment of the weight of the plates, rods, etc., about the same point. The various angles through which the drum moves on the trunnions, therefore, correspond to different currents, and these angles are recorded inside the instrument.

As a "starting-point" a standard barograph clock was taken and the rest of the meter fitted to it. When the watertight case swings round under the force of the current, the clock, being slung on the former's axis of revolution, remains still. Passing over a roller on the clock is a cord of which one end is attached to a projection from one of the cross-pieces, the other being attached to a small plumb-weight fitted with rollers and this carries a pen of special form which writes on the paper carried by the drum. As the case revolves, the clock remaining still, the pen is moved up the paper, tracing out a graph of the currents speed. Small movements of the pen caused by wave action are eliminated by means of a counterweight descending in an oil-tube.

The direction of the current is marked on the record every 20 minutes by means of a small cylindrical 2-point compass. The cylinder, which is made of aluminium is fitted with a paper "jacket". A pawl on the bracket carrying the compass engages in a toothed wheel on the clock-drum. While the pawl is riding up one of the teeth, the compass is free to set itself to the earth's field. Every 20 minutes, the pawl drops into a space in the toothed wheel, and the spiral of the compass is pressed against the paper on the drum leaving an ink mark, the position of which gives the compass-point to which the meter is set by the current.

As far as possible, steel parts in the clock were replaced by gun-métal or phosphor-bronze parts to avoid interference with the compass.

The Instrument was calibrated by actual tests in Poole Harbourg, the speed of the current being taken with a log of special design used at the depth at which the meter was sunk, and a stop-watch.

The range of currents for which the present plates are suitable is from about 25 to about 3.5 or 4 knots, which covers well the ordinary run. Where it is desired to record very small currents or very large ones, larger and lighter, or smaller and heavier plates could be substituted for the present ones, or perhaps a kind of sea-anchor (a conical bag with central hole) of fairly large size would be best for light currents.

It may be convenient to divide out the squares among sectors of the same angle as those in the boxes in Ekman's meter.

The manipulation of the instrument is extremely simple. Two men can easily take it in, put on new paper, reink pen and compass, and get the instrument to work again in about half an hour. The total weight of the instrument is about 1/2 cwt. It has been tested to 40 fathoms, but would probably stand hundreds of fathoms without leakage as the pressure of the water acts in such a way as to force the joints together.

The cost of the original meter was about £ 50 including cost of drawings and patterns for casting. Experiments and trials have resulted in a simplification of the design and further meters could probably be turned out for between £ 20 and £ 30.

The instrument described is the result of numerous experiments using different kinds of vanes, rudders, methods of slinging, *etc.*

Most of the constructional work was carried out by Messrs. Elliott & Garrood, engineers, of Beccles.

The recording part of the meter may also be fitted inside a water-tight buoy to record the extent and direction of the angle of the buoy from the vertical.