APPARATUS FOR TAKING SAMPLES OF SEA WATER

by

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(Translated from the French).

The following is a description of the construction and method of use of an apparatus for taking samples of sea water at a previously determined depth. This instrument, designed by the writer, has proved entirely satisfactory. It has functioned well in a very strong current and close to the sea bed; it is not a costly instrument, its construction is simple and its manipulation easy; it has been thought, therefore, that the descriptive article which follows might interest readers of the Hydrographic Review.

The apparatus comprises two tubes *C* — *D* soldered together in the form of a cross and permitting free flow between them at the joint. In one of the tubes *C* a piston moves with a slight amount of friction. The piston has a transverse perforation about half way along it so that free passage to the tube *D* may be established or cut off. The tube *D* is open to the sea at one end and at the other connects to a rubber pocket *N*. This pocket is removable but otherwise has no special features. It may be readily purchased commercially (water bottle). The one which we employed had a capacity of about 2 litres.

The apparatus is suspended by a cable of about 3 mm. diam. The cable passes through the piston *B* following its axis of rotation. The cable *A* terminates at one end in a lead weight of about 30 kg. while the other part passes over a small roller *Q*. One complete turn of the drum of the roller reels up or pays out one metre of cable.

When it is to be used in the vicinity of a soft bottom it is advisable to first measure the depth of the soft deposit, using for this purpose the lead weight by itself. The number of turns and partial turns of the drum of the roller will permit a sufficiently accurate estimate to be made of the depth of the layer of soft mud. The information thus obtained suffices for adjusting the apparatus for the sample of water at the desired depth, by making use of the wedging chock *O*.

Before placing the apparatus in the water, the piston *B* is moved up to the extreme top position; thereupon the pin *H* engages in the groove *a* and the entire lower part of the piston obturates the water sampling tube *D*. As soon as it is submerged the entire apparatus orients itself in the current and during the time the apparatus is being lowered to the desired depth no water whatever enters the pocket *N*. The taking of the sample is determined by the drop of the messenger *E*. The shock occasioned by the fall of *E* on *B* causes the pin *H* to disengage from the groove *a*, the weight of *E* causes the piston *B* to fall until the pin *H* engages in the groove *b*. The passage through the tube *D* is then opened and the pocket *N* becomes filled with water under the pressure of the current. After a certain interval (which is a function of the strength of the current and the volumetric contents of the receptable *N*) the tube *D* is again closed off by the arrival of the messenger *G*, which, by means of the pusher *F* causes the piston *B* to fall as far as the stop *M*. In this position the obturation of the tube *D* is accomplished by the upper part of the piston *B*. When the entire apparatus has been drawn to the surface the sample contained in the pocket *N* is drawn off into an appropriate container.

N.B. It is essential that care be taken that the grooves *a* and b are not too deep. A spherical-shaped indentation with the edges rounded off somewhat has given satisfactory results.

AN HARMONIC TIDE COMPUTER

(Reproduced from an article in *The Nautical Magazine*, Glasgow, Nov., 1936, p. 428).

(*Note by the Directing Committee :* This instrument is designed to carry out mechanically certain of the computations required for the Harmonic Method of Tide Prediction as described in British Admiralty Tide Tables Part II.

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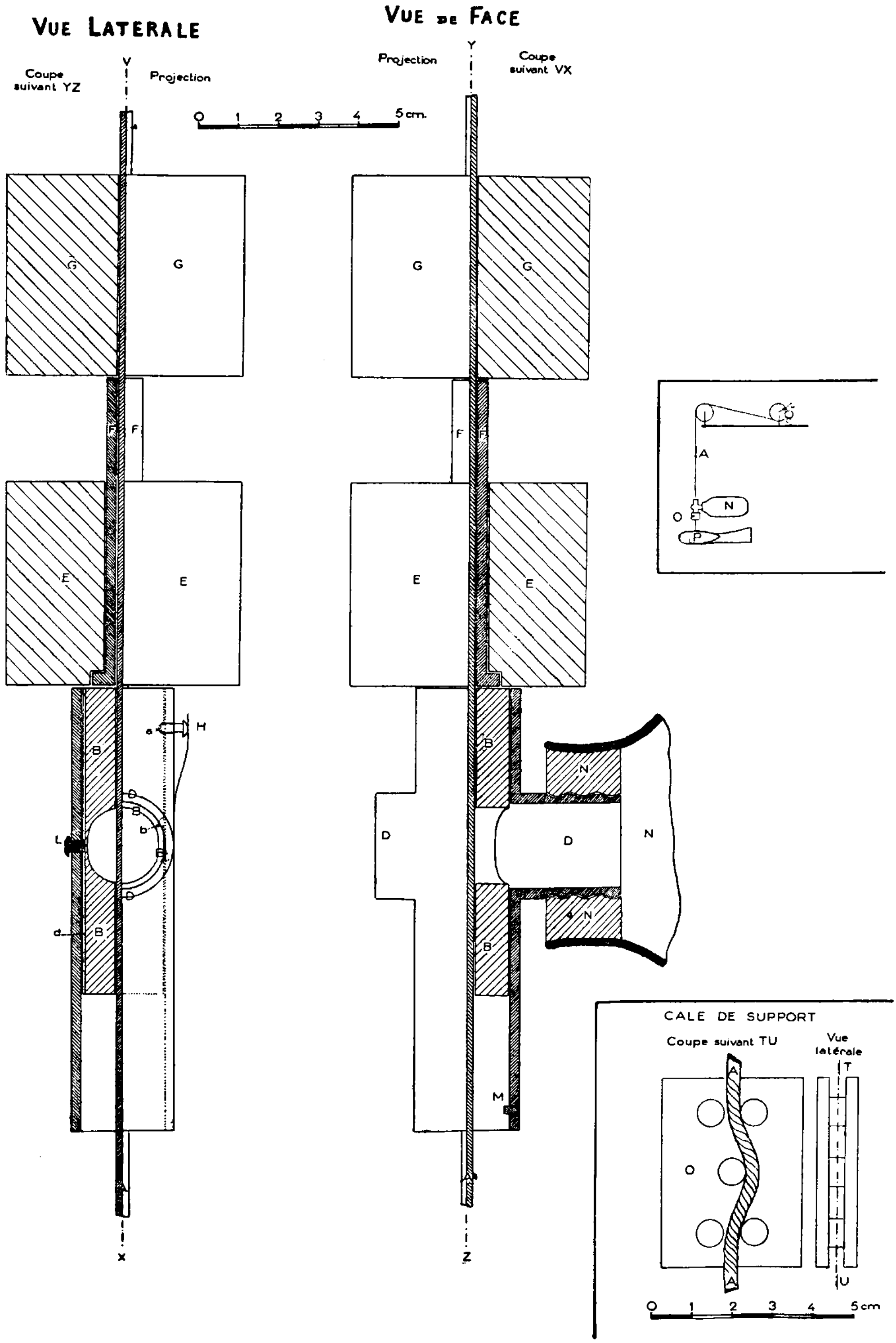
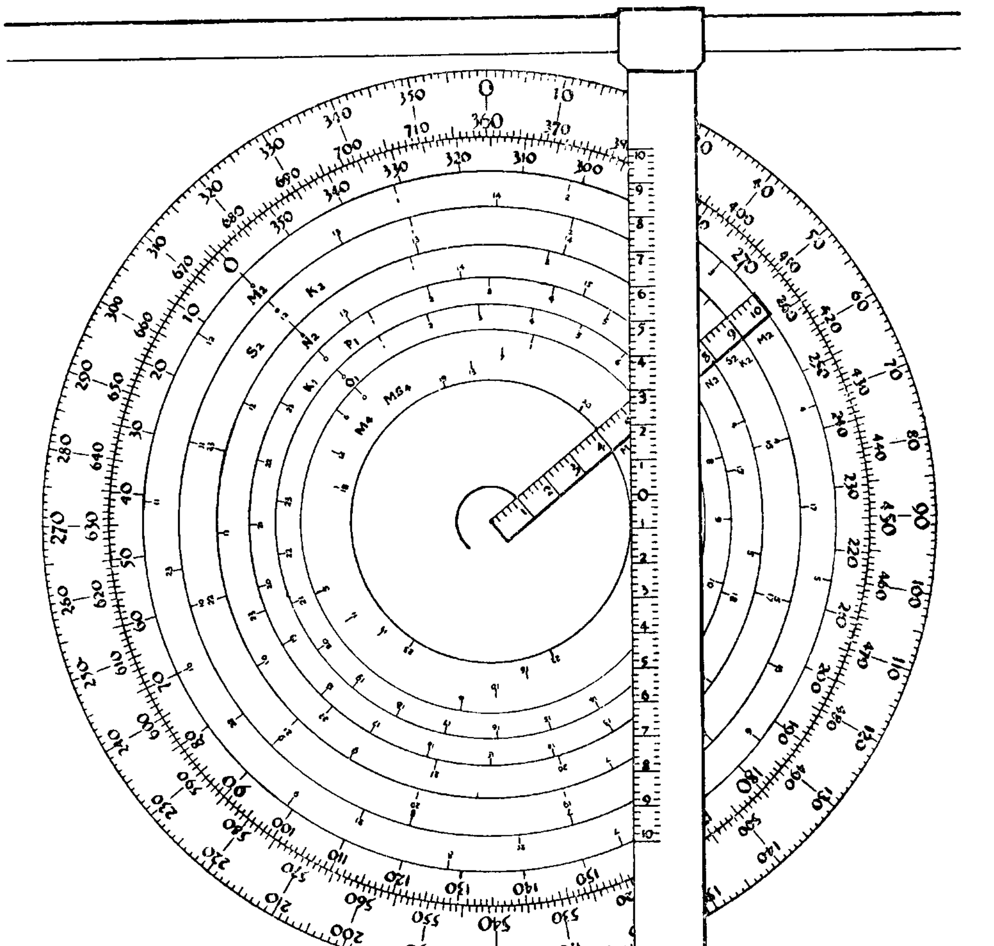


The Admiralty has announced that future editions of Part II will no longer contain this method, the standard method for use by seamen now being the "Admiralty Method" which is described in Part III of Admiralty Tide Tables.

As however it is possible that many seamen may continue to use the Harmonic method, especially when a series of hourly heights are required, and as the principle of this instrument appears to be quite sound, it is considered to be well worth publishing in the Hydrographic Review).

Various articles published in *The Nautical Magazine,* particularly that appearing in the August 1936 number, have reference to mechanical means for computing tides from Harmonic Constants, and these have given rise to enquiries as to where such instruments can be obtained and what principles they embody. It is quite evident that there is undoubted interest in this question especially amongst navigators trading to ports where tides are "mixed" or "diurnal", and where non-harmonic constants are usually worse than useless.

Although various ideas for a satisfactory computer have been brought forward from time to time, some of these have been unduly complicated while others have been constructed on principles that give a result lacking the necessary precision.



The "Mercator" Harmonic Tide Computer, manufactured by J. Lilly & Sons, the New Quay, North Shields, England, which we describe below, has neither of these disadvantages. It is simple in operation, accurate in result and handy in size. The marine pattern packs into a box about 15 inches square and 1 inch deep.

The instrument consists of four principal parts. The first is a Base Plate, made of metal, on which is inscribed a circle graduated in degrees. It is numbered in two notations : the inner notation is from 360 to 719, and so conforms to the values of "*m*" given in *Admiralty Tide Tables,* Part II, while the outer notation is the usual 000 to 360. Both these notations go "clockwise" and the circle is known as the "*m*" Ring. Inside the "*m*" Ring is a Dial, free to rotate, marked in degrees, and numbered "*anti-clockwise*". Inside these graduations are the "Hourly Phase Change Intervals" of the nine constituents — which we will return to later. This Dial is called the "d and g" Dial. Concentric with these circles and riding over the *d* and *g* Dial is the *H* and *g* Pointer, which projects on to the "*m*" Ring. This Pointer has a radial edge marked off in feet from 0 to 10 and divided into .2 of a foot. Its lower edge is marked by symbols of the nine constituents. Finally, we have the T Square. This travels along either the upper or the lower edge of the Base Plate and carries a scale representing feet from 0 to 10, graduated above and below the horizontal middle line of the Dial. These feet are also divided into intervals of .2.

The use of the instrument is simplicity itself. The value of "*d*" on the Dial is put to the value of "*m*" in the Ring and the Pointer is put to the value of "*g*" on the Dial. The outer end of the Pointer will then indicate "$m + d - g$" on the Ring. But we do not necessarily require this information as we get our result direct. The T Square is moved along until it cuts the value of *fH* on the Pointer — and where the graduation on the T Square cuts this value on the Pointer is the height we want, namely $fH \cos (m + d - g)$. This, of course, is the value at 00 hours. If we require the value at any other hour, or hours, and we usually do, we simply keep the Pointer on its "*m*" Ring setting and bring 00 on the Dial to the Pointer. Then, keeping the Dial fixed, we move the Pointer until it is cutting the required hour of the constituent we are calculating. This is found in the "Hourly Phase Change" markings on the Dial which have already been mentioned. The results are read off by T-Square as before. The symbols of the constituents on the Pointer assists us in finding out the appropriate Ring of the constituent under consideration. In the line sketch, herewith, it will be noticed that "*m*" is 495°; "*d*" is 180°; "*g*" is 265°; "$m + d - g$" is 50° and if *fH* is 5,2 then $fH \cos (m + d - g)$ is + 3.3 feet.

DESCRIPTION OF TWO METHODS OF USING THE WOLLASTON CURRENT METER. *

(From information received from Messrs. Henry HUGHES & SON, Ltd., London).

The accompanying diagrams show the devices applicable in the following cases :

1). *2-Buoy Station for Measurements down to 5 fathoms*

1. Boat anchors and attaches buoy (1) to cable.

2. 20 ft. iron tube passed onto extension of cable. Cable stopped at end of tube and 10 ft. length left over outside Stopping. Small buoy (2) just big enough to float tube attached.

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* *See description of this instrument, type* 1935, *page* 122 *of* Hydrographic Review, *Vol. XIII, N° 2, Monaco, November* 1936.