MARTI MERCURY TIDE-GAUGE

Designed more especially for tide recording requirements of hydrographic expeditions, this instrument can run for thirty consecutive days without supervision.

The recording is effected by a pen registering with ink on an endless strip of paper of 30 centimeters width which is unwound by a weight-driven clock at a speed of 20 millimeters per hour. The strip is graded beforehand for height of water and time, so that at any given moment a tide reading can be taken.

The instrument (Fig. 1) consists of the following parts :

A metal bell placed on the sea bed slighty below lowest tide level ;

A mercury recording pressure-gauge set up on the ground near the shore;

A water-tight pipe filled with air and connecting the two devices mentioned above and accordingly transmitting the pressure of air in the bell to the pressure-gauge, from which the height of water can be deduced.

DESCRIPTION OF VARIOUS PARTS

1 — *Bell*

Because of the compressibility of the air inside the bell, the variations in the height of the tides are accompanied by small variations in the level of the water inside the bell. To avoid errors in the recording of the tide, the shape and dimensions of the bell are so arranged that the water reveals variations of level as close as to the 100th part of the variations of the height of the tide, and the graduation of the recording band is fixed in such a way as to correct automatically, to 1/100th part of its extent, the pressure shown by the pressure-gauge; the result is therefore the same as if the instrument recorded the exact variations of the height of the tide.

In cold regions, a layer of oil is kept on the water inside the bell to avoid evaporation of the water and condensation in the pipe.

2 — *Pipe*

If necessary, the pipe can be several hundred yards in length. It consists of a comparatively narrow piece of canvass-covered rubber tubing with a flexible, protective cover in the form of a long, close-spiral spring which is simply formed by a thick copper or galvanized-iron spiral wire coiled around the rubber tube.

3 — *Recording pressure-gauge*

The air pressure inside the pipe is measured by a mercury pressure-gauge (Fig. 4) of which the ascending arm (A) is open to the air and the descending arm (B) is subject to the pressure to be gauged.

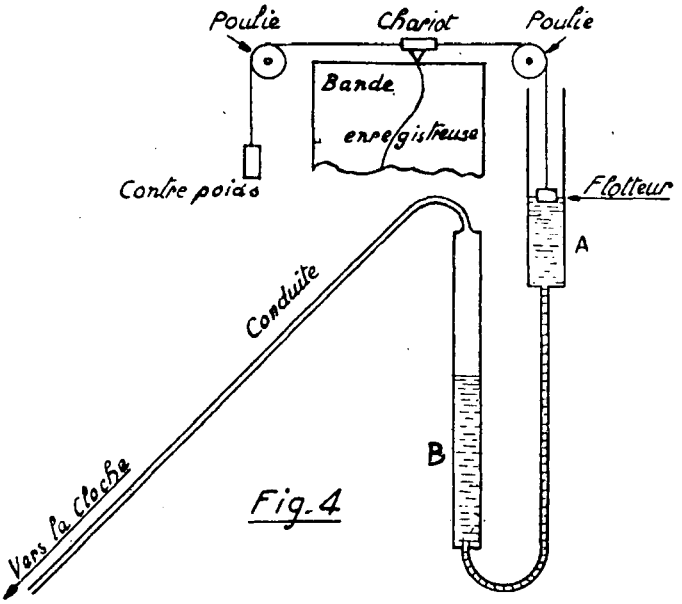


Fig. 4

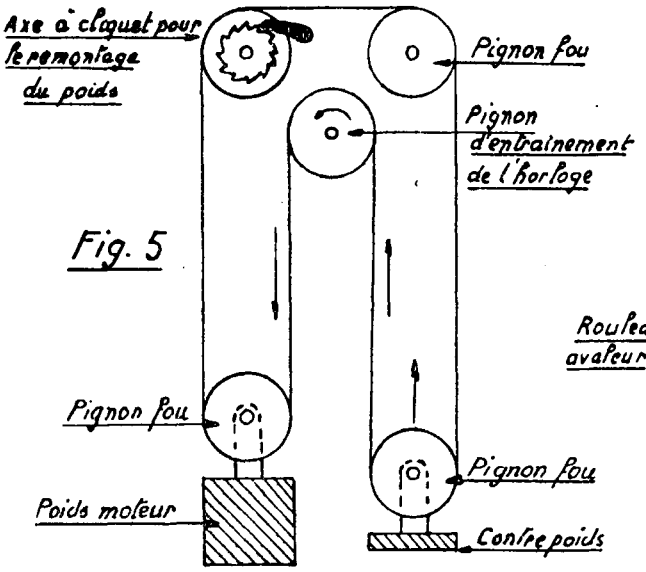


Fig. 5

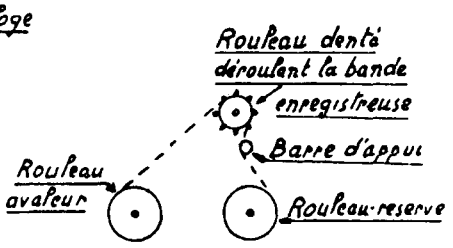


Fig. 6.

DISPOSITION DE L'UNE DES CHAINES SANS FIN

Marti Mercury Tide-gauge.

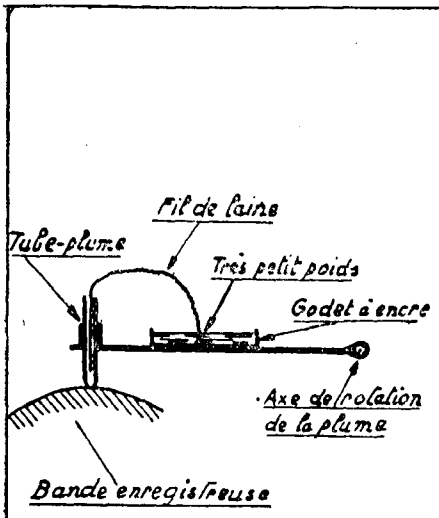


Fig. 7.

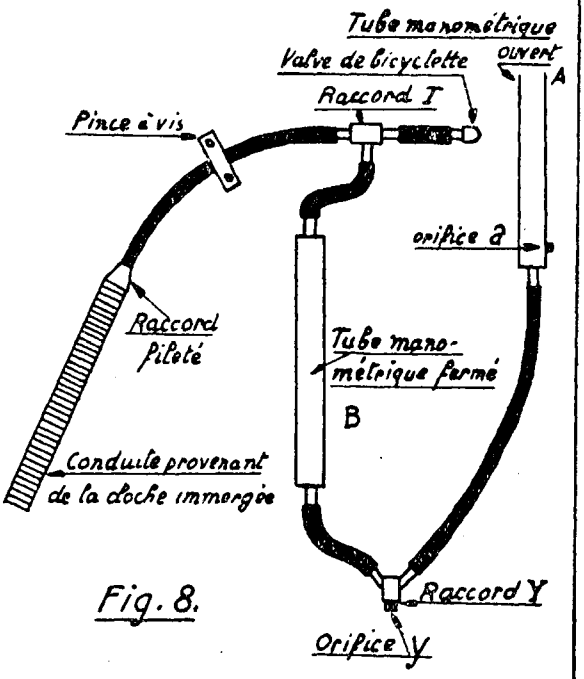


Fig. 8.

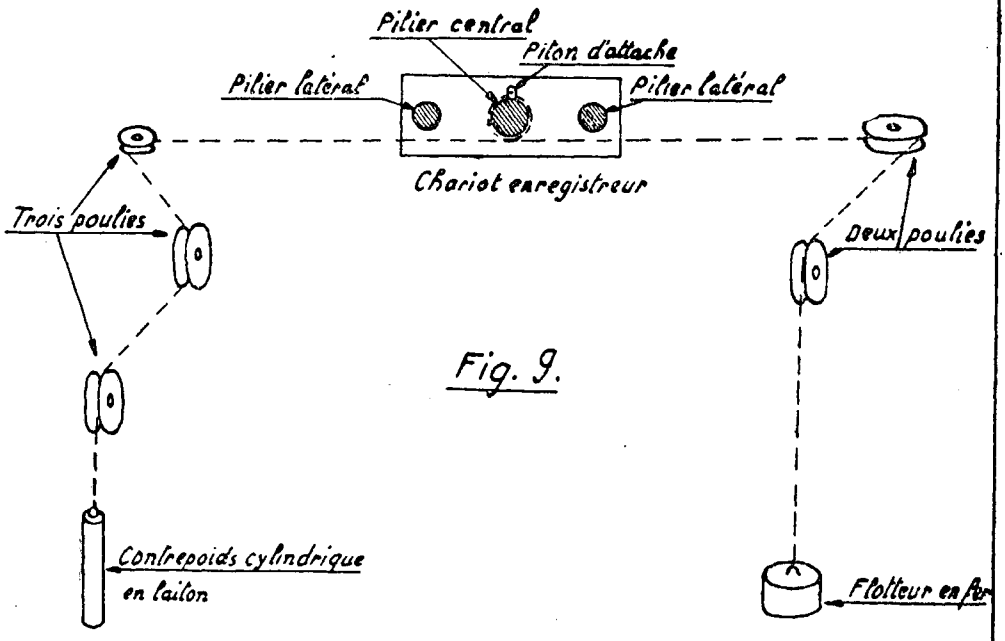
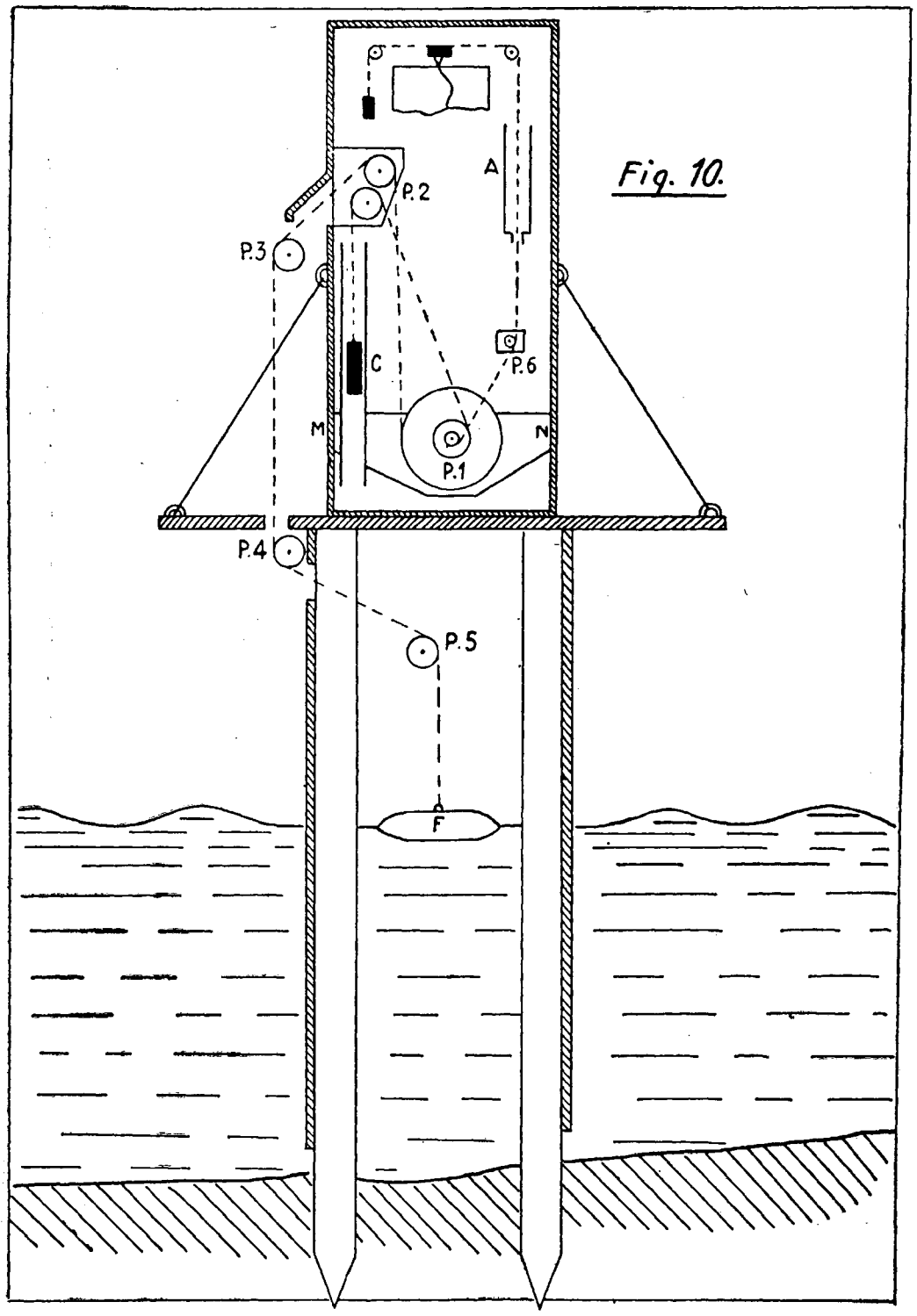


Fig. 9.

Marti Mercury Tide-gauge.



Marti Mercury Tide-gauge.

The wire joining the carriage to the float of branch (A) should not be extendible ; it should be made of a very fine metallic wire (nickel silver of 15/100th diameter), a short spare length of which is supplied with the tide-gauge fitting.

The counter-weight supporting the taut wires is led through a little vertical funnel composed of a brass tube fixed on the left side of the body of the apparatus.

The scale of the heights recorded is dependent on the ratio of the diameters of tubes « A » and « B » to the pressure-gauge. In principle, the tide-gauge is fitted with a single open tube, « A », but with three closed tubes, « B1 », « B2 » and « B3 ». The recording of the tide is arrived at :

with the first of these tubes, on the scale of 1/60th, for which the graduated divisions of the strip of paper equal heights of water of 30 centimeters, the graduation ranging from 0 to 15 meters ;

with the second of these tubes, on the scale of 1/40th, for which the graduated divisions of the strip of paper are equal to heights of water of 20 centimeters, the graduation ranging from 0 to 10 meters ;

with the third of these tubes, on the scale of 1/20th, for which the graduated division of the strip of paper are equal to heights of water of 20 centimeters, the graduation ranging from 0 to 5 meters.

The instrument can therefore always be used under advantageously sensitive conditions, whether of small or large tidal amplitude.

RECORDING DEVICE

A perforation on the edge of the recording strip ensures that the strip is drawn at a perfectly even speed by a ratched spool notched to one of the wheels of a powerful clock with circular spiral balance . The motive power for the clock is supplied by the slow descent of a heavy, oblong weight suspended by an endless chain (Fig. 5).

The lift of the weights is such that the instrument can work for thirty days without being rewound.

The recording device on this tide-gauge can also be used for recording small-amplitude tides. For this purpose, a float is used which lies on the surface of the water and is placed in a well connected with the sea. In this case, the recording on the strip can be made on either the 1/20th or the 1/10th scale.