WILLIAMSON HYDROGRAPHIC CAMERA

HENRY HUGHES & SON, LTD., LONDON.

This camera has been produced primarily for the survey of coastlines from ships where as wide a strip as is possible is covered with each photograph taken. Owing to the danger of ships approaching too near land the object to be photographed is usually at a considerable distance from the camera, and therefore a long-focus telephoto lens is essential. Further, the camera must have a readily adjustable mounting so that in spite of any movement of the ship the object to be photographed can easily be kept in the centre of the view finder. From the description of the camera which follows it will be seen how the above points have been met.

DESCRIPTION.

The apparatus consists of two main parts (*a*) the camera itself and (*b*) the stand. The camera consists of (1) the body (2) the shutter unit (3) the lens.

1. *Camera Body.* — At the back of the body is fitted the film holder. This has been designed to use roll film of standard size viz. 6 or 12 exposures 2 ½" × 4 1/4" (N° 16). The picture size is, however, 2 ½" × 8" and thus on a standard 12 exposure film 6 pictures can be taken. The normal winding handles are provided with a window showing the number of exposures made. After the film has been threaded up the winding knob should be turned until the number 2 appears on the window. The film is then ready for the first exposure and subsequent exposures should be made when the figures 4, 6, 8, etc. are seen in the window.

As it will probably be found desirable to use panchromatic film, suitable filters should be used to allow full advantage to be taken of the special properties of this type of emulsion.

2. *Shutter Unit.* — The shutter is an independent detachable unit which can be removed intact by undoing 6 screws. This is made possible by the use of the WILLIAMSON all metal Louvre type of shutter. The speed of the shutter is variable between 1/60 and 1/120 of a second, and to its great efficiency and durability together with its compact design may be attributed the successful design of the whole camera. A simple shutter release is provided and the shutter is wound by one revolution of the setting handle.

The shutter can be held open by turning the setting handle through ½ a revolution at the same time keeping the shutter release depressed. In order to close the shutter the remaining ½ of the revolution is completed and the shutter is then ready for setting.

A view finder fitted with a rubber eyepiece is fixed in a convenient position on top of the camera body.

3. *Lens.* — The lens is a fixed focus telephoto iris diaphragm giving a maximum aperture of F/8. The angular field covered by each picture is 18 ½°.

Camera Stand. — This is made of welded steel tube with a service grey cellulose finish. A robust pillar projects from the top giving vertical and horizontal adjustments to the camera.

To this pillar a universal mounting is fixed on to which the camera is secured. The universal mounting can be locked in any given position but it will usually be found more convenient to adjust it so that the camera is in a mobile state and thus allowing the object to be kept in view even when the ship is in motion.

THE EKMAN CURRENT METER 1932 PATTERN.

In the *Hydrographic Review*, Vol. IV, N° 2, November 1927, page 207 and Vol. VI, N° 1, May 1929, page 157, brief information is given on the current meter. This information is supplemented here by a few indications concerning the new pattern of this apparatus, as supplied the Bureau by Messrs. Henry HUGHES & Son, Ltd., 59, Fenchurch Street, London, E.C. 3.

The general principle of the apparatus is the same as that of the earlier meters designed by Professor V. W. EKMAN. The speed of the current is measured by the number of revolutions of a propeller in a given time, and the direction to which the current is flowing is recorded by means of bronze balls dropped into compartments at the bottom of a box containing a magnetic compass. The instrument is started and stopped by means of messengers.

The propeller is protected from floating material by doors until the moment at which the measurement begins.

Fig. 1 shows the general arrangement of the instrument, 1932 pattern, but without the propeller in position and without the sinker.

Fig. 2 shows the head of the instrument when ready for lowering.

Fig. 3 shows the meter after the messenger has arrived and the measurements have commenced, but the messenger, etc. are not shown.

INSTRUCTIONS.

Suspend the meter by passing the eye at the end of the wire over the pin which is under the sleeve of the power end of the head "*H*" (Fig. 2), and slide the sleeve back to keep it in position. The length of the eye should not be more than 1.8 in. (4.5 cm.)

Attach a sinker to the link at the bottom.

Screw the two supporting bars into the frame (the screws are left handed) and fasten them to the meter by means of the unions, which are tightened with the key provided.

Depress the spring "*V*" and slide out the lower part of the compass box "*R*".

Press the spring "W" upwards and slide out the upper part "*B*". Remove the cover by inserting a lever into the square aperture in its edge, put in a compass needle, replace the lid and put the whole back into the meter, pushing it well home so that the spring "W" comes into action.

Replace the lower part.

Depress the lever "*L*". This will open the doors.

Press "*P*", and pull out the upper end of the vertical bar carrying the front bearing (Fig. 3).

Pass the long end of the shaft of the propeller through the opening in the front of the gearbox and put the bearing back, taking care not to injure the pivots.

Fill the loading tube (shown in front of a propeller in Fig. 3) with balls, open the magazine "*Y*", press the split end of the loader on the end so as to pass the balls into it, and close "*X*".

Set the pointers to 0 = 4000.

Close the doors in front of the propeller and press the double spring "*T*" to the right, so that it is held by the catch "*C*". The end "*A*" of the lever "*L*" keeps the doors closed, and the propeller is locked by the locking arm "*K*".

The meter is now in Position *I*, ready for lowering (Fig. 2). Lower to the required depth, wait one minute for the compass needle to come to rest and drop a messenger down the wire, noting the time to the nearest second.

This depresses "*L*" for a moment, opening the doors, allowing "*T*" to move from the wire, and raising the locking-arm so as to release the propeller. The meter is now in Position II, free to measure the current (Fig. 3).

After a suitable interval, which depends upon the current, drop another messenger and note the time. This depresses "*L*" again so that the spring "*T*" projects so far through "*L*" that the two parts separate and hold "*L*" down. The spring in the centre of the spiral spring "*S*" descends and allows "*K*" to lock the propeller. This is Position III. Heave up.

Close the doors, remove the messengers, pull the double spring "*T*" towards the wire.

Read the dials; they give decreasing readings.

Remove the lower part of the compass box "*R*", and put it in the counting tray, shown on the right in Fig. 1. Put in another lower part, and more balls if necessary.

The meter is now ready to be lowered again. It is not necessary to re-set the pointers.

CALCULATION OF RESULTS.

The speed of the current is calculated from the number of revolutions per minute by means of the curve or formula supplied with each instrument.

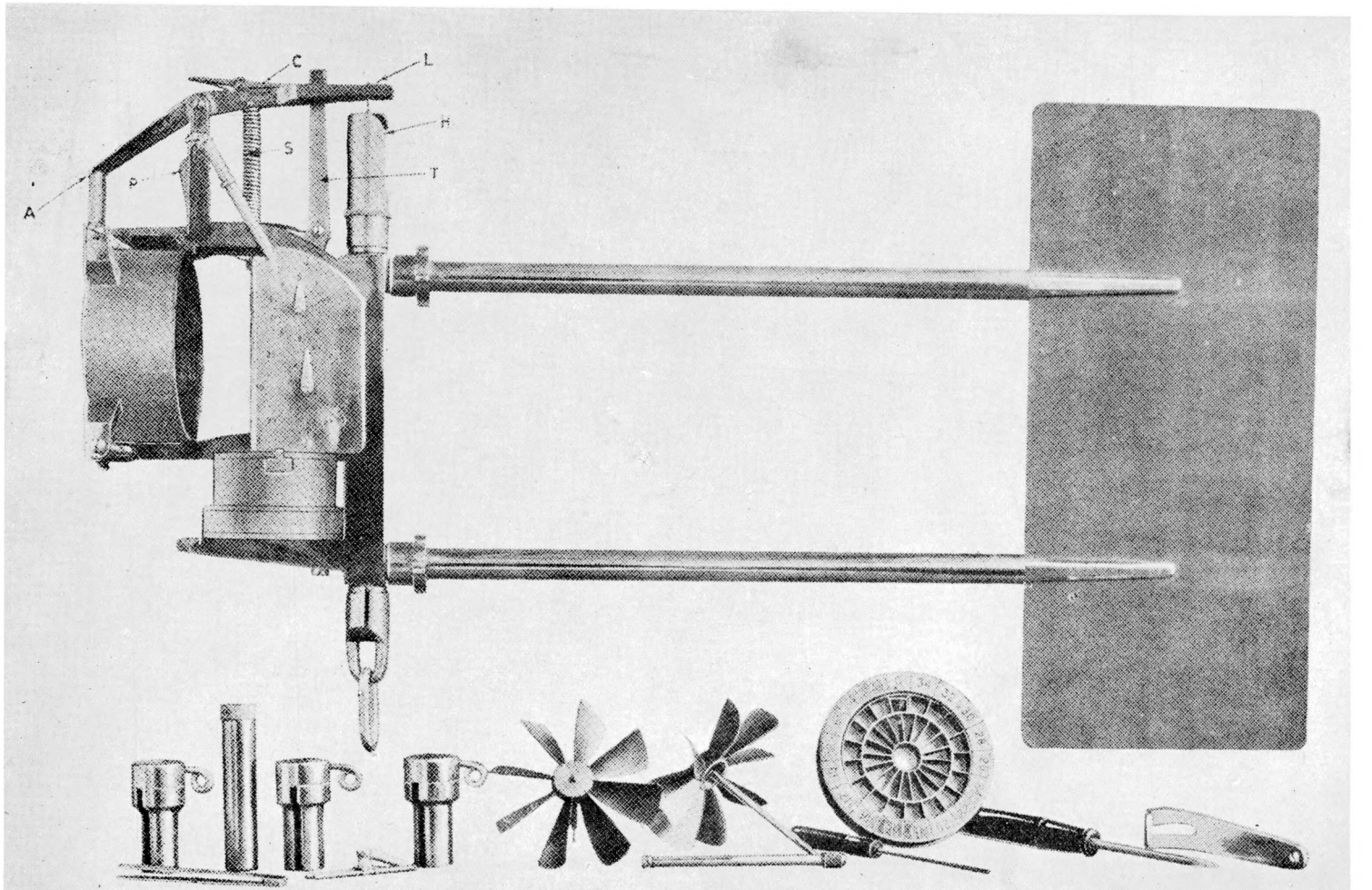

FIG. 1.

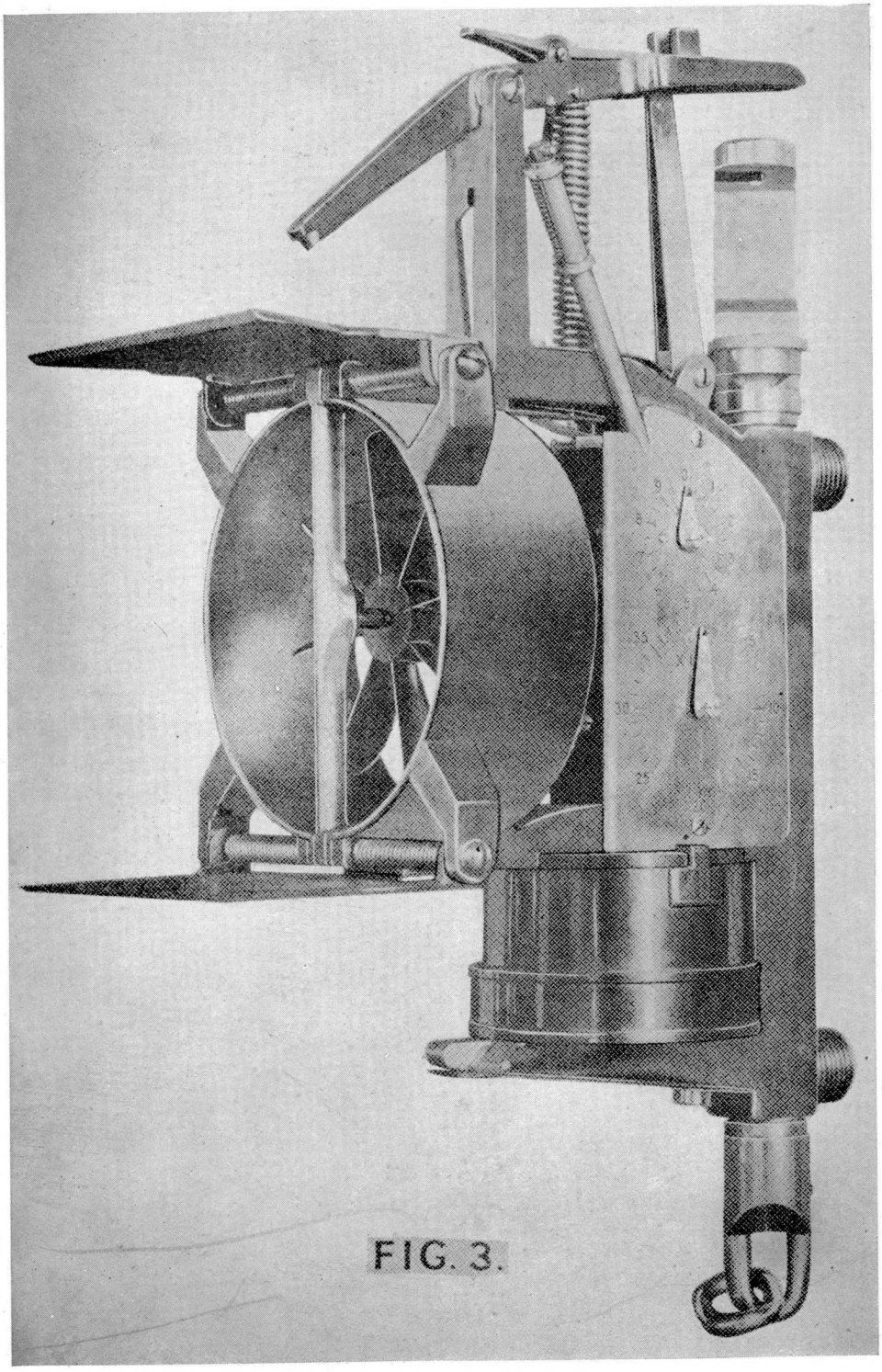

FIG. 3.

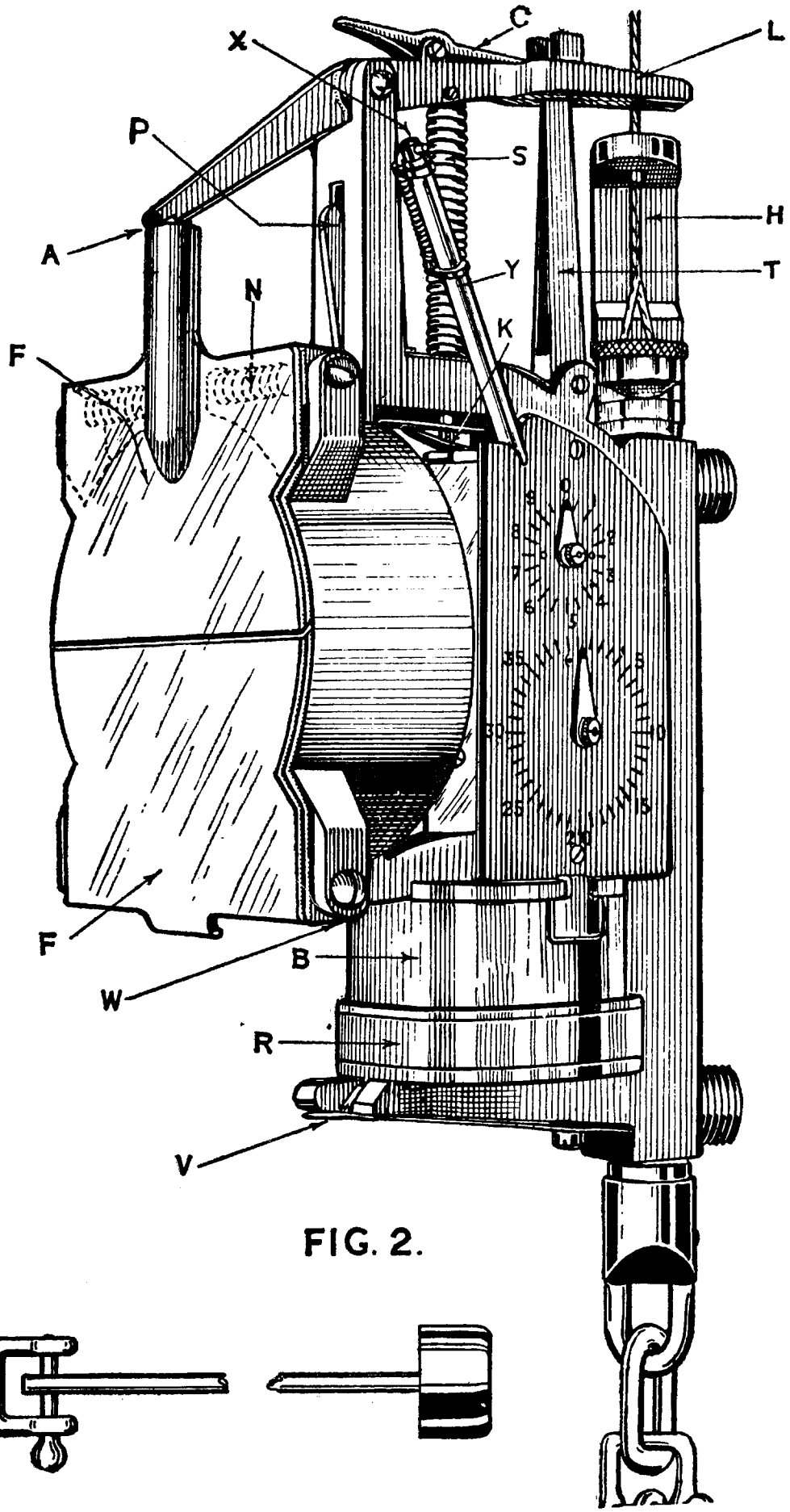

FIG. 2.

The "Direction To" is the mean of the directions indicated by the balls, weighted according to the number of balls in each compartment. For instance, if the balls fall thus :

10°	20°	40°
2	5	3

then the mean direction would be,

$$\frac{2 \times 10 + 20 \times 5 + 40 \times 3}{10} = 24^{\circ}$$

GENERAL NOTES.

Always press the double spring "*T*" towards the wire before lowering.

Before putting the meter away, take out the propeller and compass needle, wash them in fresh water and put them in their places in the bow, and wash the whole meter.

Bronze balls measuring 1/8 in. (= 0.3 cm.), preferably nickel-plated, should be used. Do not allow them to become greasy. Washing in petrol is recommended.

Steel or lead balls should not be used. The steel is magnetic, and the lead balls lose their shape and stick in the magazine.

The best supporting wire is a flexible bronze cord, since it has no magnetic effect.

In the absence of a bronze wire a flexible steel cord gives excellent results. Whatever wire is used, care should be taken that the messengers slide on it easily. The eye in the end should be made so short that no part of the splice is visible above the head ; if it projects it may prevent the messenger from working properly. A wire which has been kinked and straightened should not be used.

The messengers should fall at the same rate, but it is always advisable to keep the hand on the wire so as to feel the shock of their reaching the meter.

If the current is strong it may be found that the vibration of the wire is so great that the messenger cannot be felt to strike even at 30 fathoms. In such cases the wire may be felt with a hook of stout iron wire held in the hand. A more sensitive device is a kind of telephone which is made by fastening a stout iron wire, about a foot or eighteen inches long, into the outside of the bottom of a cigarette tin, and turning the other over into a hook.

Another method is to press one end of a wooden spar about 8 feet long and 3 to 4 in. diameter against the wire and the other end to the ear.

The direction of the current cannot be determined close to an iron ship. Errors as great as 5° have been found at depths of 10 or 12 fathoms below a steel ship 150 feet long.

The sinker should oppose as little resistance as possible to the current. A horizontal fish-shaped sinker weighing about 30 lbs. has been found suitable.

Measurements at anchor in deep water are very difficult since it is almost impossible to allow for the revolutions of the propeller caused by the ship sheering and yawing. On some occasions good results have been obtained by anchoring a small buoy on a fine wire such as that used for a sounding machine and allowing the ship to drift away from it freely while the meter is in use. The drift found on running back to the buoy is substracted from the current shown by the meter.

THE WOLLASTON CURRENT METER.

Some information concerning this apparatus is given in the *Hydrographic Review*, Vol. VI, N° 1, May 1929, page 231. Further information regarding the new model of this apparatus designed in 1935 by Messrs. Henry HUGHES & Son, Ltd., 59, Fenchurch Street, London, E.C. 3., is given here-under.

THEORY OF THE INSTRUMENT.

When a heavy stationary vertical disc is held immersed in a current of water, the water exerts an horizontal pressure on the disc, proportional to the square of the velocity of the current ; if the disc be attached to some external pivot it will be translated