



FIG. 1

- 1. - Threaded outer ring. — Bague extérieure fileté.
- 2. - Shoulder and rubber ring. — Épaulement et bague de caoutchouc.
- 3. - Adjusting spring. — Ressort de réglage.

INSTRUMENTS.

SEXTANTS AND MIRRORS

by

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The production of the sextant in its present form was such an advance in design and so nearly fulfilled the requirements of seamen and others, that with the exception of one or two improvements made in recent years and numerous attempts to perfect a method of using an artificial horizon for observations at sea, little attention has been given to this instrument by either inventors or makers.

The endless tangent screw and micrometer reading are two of the main changes made in later days, but the main structure and fundamental idea remain the same.

True, attempts have been made to alter the shape of the instrument, but though this has added in some cases to its portability and occasionally led to quicker reading, in no case has it been possible to improve every part of the existing and original form.

For an indefinite number of years the shape of the two mirrors, i. e. horizon and index mirrors, have remained unchanged and, beyond certain improvements in the methods of their silvering, no attempt has been made to alter their somewhat unimaginative shape. Further, in almost all cases, inherited tradition has retained the half silvered horizon mirror, although it is now established that, prejudice apart, it is quite unnecessary, and only increases the liability of damp and moisture behind the silvering.

Many reports have reached the British Hydrographic Department concerning the unreliability of the existing type of mirror, both in sextants intended for navigational use and in those especially designed for hydrographic purposes. These emanated mostly from ships abroad in damp or tropical climates. Lately these have become so numerous that an attempt has been made to improve on the existing pattern, resulting in the production of the watertight circular mirror shown in adjoining illustrations. Invented by one of the Staff of the British Hydrographic Department, the patents have been handed over to Messrs. Henry HUGHES of 59 Fenchurch Street, London.

Turning to Figures 1 and 2, the main points are obvious: the arrangement of the mirrors consists now of a frame with a strengthening web on the back, a rubber ring, a perfectly circular and parallel silvered mirror and an outside threaded ring fitted with a shoulder retaining the mirror firmly in position. It is essential that when screwed home this threaded ring should butt on the main frame, at the same time ensuring air-tightness by the slight compression of the rubber ring.

The photographs show the mirrors, back and front horizon and index, in their mounts.

Various types of sextants have been fitted with these round mirrors for trial and the results have been entirely satisfactory: it is probable that they will eventually replace the existing type.

Mirrors of this description are less liable to get out of adjustment, and are practically impervious to all ordinary weather conditions.

The adjustments for the horizon mirror have been altered, and an examination of Figure 1 will show that the whole frame containing the mirror is capable of movement in any direction, rocking on a central spring. The adjusting screws are small and can be constructed for use with either an adjusting pin or small spanner. They are covered by dust caps.

In the case of the index mirror, no adjustment is fitted, as from the strength of its design nothing save a shattering blow will affect it once it has been properly positioned by the makers.

ON TRIAL :

(A) *Hydrographic Sextants* (Fig. 3).

These have been found to be most satisfactory and, in fact, decidedly superior to the old pattern. Although their first cost is slightly in excess of the older type, an economy is effected, firstly by their long life and secondly by the saving of spare mirrors usually carried in all British sextants.

(B) *Navigating or Observing Sextants* (Fig. 4).

Here the traditional prejudice against a wholly silvered glass has to be overcome. Many sextants so fitted are still on trial and in the writer's opinion they are just as good, if not better, for observing purposes than the older type, and the advantages of the watertight and almost imperishable mirror should go a long way towards overcoming the above-mentioned prejudice.

If, however, a half silvered glass is still a definite requirement for certain navigators, this can also be provided in an equally watertight case, though strength must necessarily be impaired.

**APPARATUS FOR MEASURING THE ABSOLUTE PERSONAL EQUATION
IN OBSERVATIONS WITH THE PRISMATIC ASTROLABE.**

by

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We have thought it necessary for clearness' sake, before discussing this subject, to try to define the notion of the personal equation in observations with the prismatic astrolabe.

We will then describe the method we have been led to adopt for examining the appliances submitted, and how their value may be judged from the results obtained.

We will next make some general remarks on the appliances, with a view to simplifying the detailed description of each. The Memorandum will conclude with the figures they furnished and the conclusions we have drawn from them.

1. *The personal equation in observations with the prismatic astrolabe.*

Determinations of time by the prismatic astrolabe show that the chronometer error deduced from a series of observations is different from the most probable chronometer error obtained by observations on the meridian or by a driven hair-line.

For an observer taking several series, the differences vary a little from day to day, but their mean value remains generally fairly stable ; it may thus be accepted that this

(1) *Members of the Committee appointed by the Bureau of Longitudes to examine apparatus manufactured in France with a view to the International Determination of Longitudes of October-November 1933, for measuring the personal equation in observations with the prismatic astrolabe.*