warks, deckhouse sides, and awnings were covered with this grease. When it becomes necessary to refill the reel it is believed that powder can be used instead of grease and this feature will be eliminated.

It will be noted in the manufacturer's notes quoted previously that in running the wire a strain of about 38 pounds, as shown on the dynamometer scale, should be used. All our experience has been in depths of from 10 to 25 fathoms and in those depths we have found that a strain of about 36 pounds is the best. To obtain a greater strain than that requires the brake bands to be set up against the brake wheel so tightly that the wheels soon run too hot.

We found it necessary to install new springs on the brake bands, to allow the bands to be set up sufficiently.

CAUTION. — The wire splices on our original are very poorly made and are liable to jam in the lead rollers when using the gear. If this occurs the wire will part, as happened once on the *Oceanographer*, and the flyer might be bent. Refills should be made with wire spliced according to standard Coast Survey methods or preferably with one continuous length.

CIRCUMFERENCE OF MEASURING WHEEL.

The final and careful measurement gave a circumference of 1.86035 meters, which distance is used on all our work with the gear.

ADDITIONAL USES OF GEAR.

The gear was also used in connection with tests for the velocity of sound through sea water. The station ships were at buoys "George" and "Hypo", about 23 miles apart. The *Oceanographer* steamed along the line between the two buoys, kept course by the direction finder, and bombed at intervals of 1000 revolutions of the measuring wheel. R. A. R. distances from each ship were recorded at each bomb. It is believed this will give excellent information regarding the velocity.

Another use was in connection with the location of buoys for the control of an isolated shoal. One buoy was located by R. A. R., the other buoys necessary for the control were located by taut wire distances and azimuths from it.

EVAPORATED METAL MIRRORS.

(Extract from *Nature* - London, 1st September 1934, page 329).

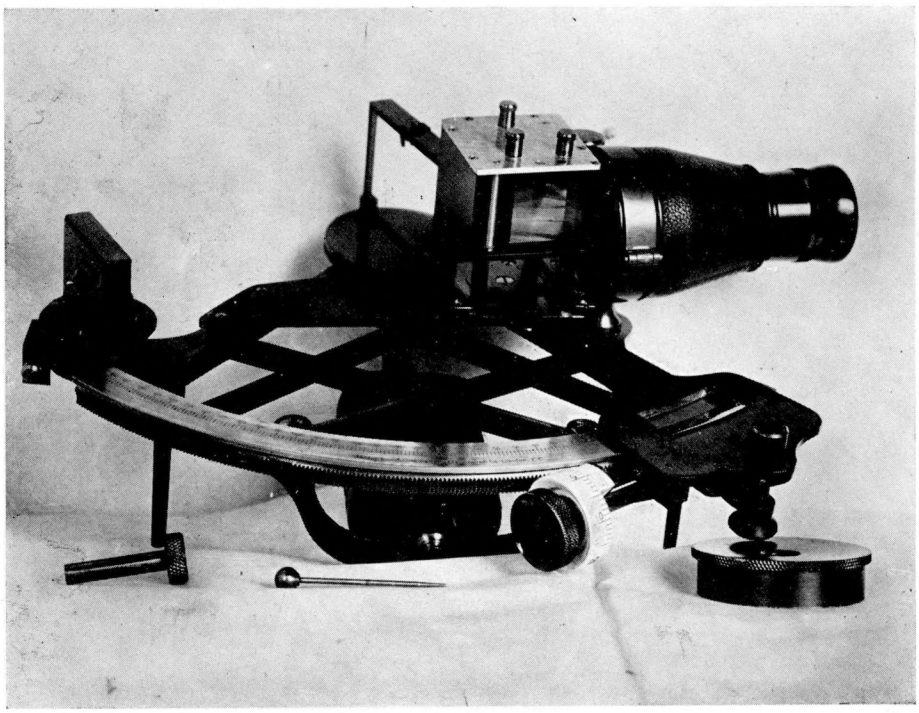
In a letter published in the *Physical Review* of 15th July 1934, R. C. WILLIAMS has described the advantages of making mirrors by evaporating on to glass first a thin film of chromiun and then a layer of aluminium. The film is at first fairly soft, but it is hardened by washing in water or alcohol and may then be rubbed hard with cotton cloth without appreciable change. Even rubbing with steel wool affects the film only slightly. The reflectivity of the films is similar to that of pure aluminium. The aluminium may be dissolved off without affecting the chromium, and the author says he has found a method of removing the chromium layer if required.

MICROMETER HYDROGRAPHIC OR SURVEY SEXTANT

The following is the description of a micrometer hydrographic or survey sextant designed and constructed by Messrs. H. HUGHES & Son, Ltd. (1), contractors to the Hydrographic Department of the British Admiralty.

This Sextant (see Fig.) has been specially designed for survey work to give the greatest possible ease and rapidity of observation. By the adoption of the micrometer

(1) *Messrs. H. Hughes & Son, Ltd., 59, Fenchurch Street, London, E. C. 3.*



Sextant Hydrographique ou Topographique à Micromètre

Micrometer Hydrographic or Survey Sextant.

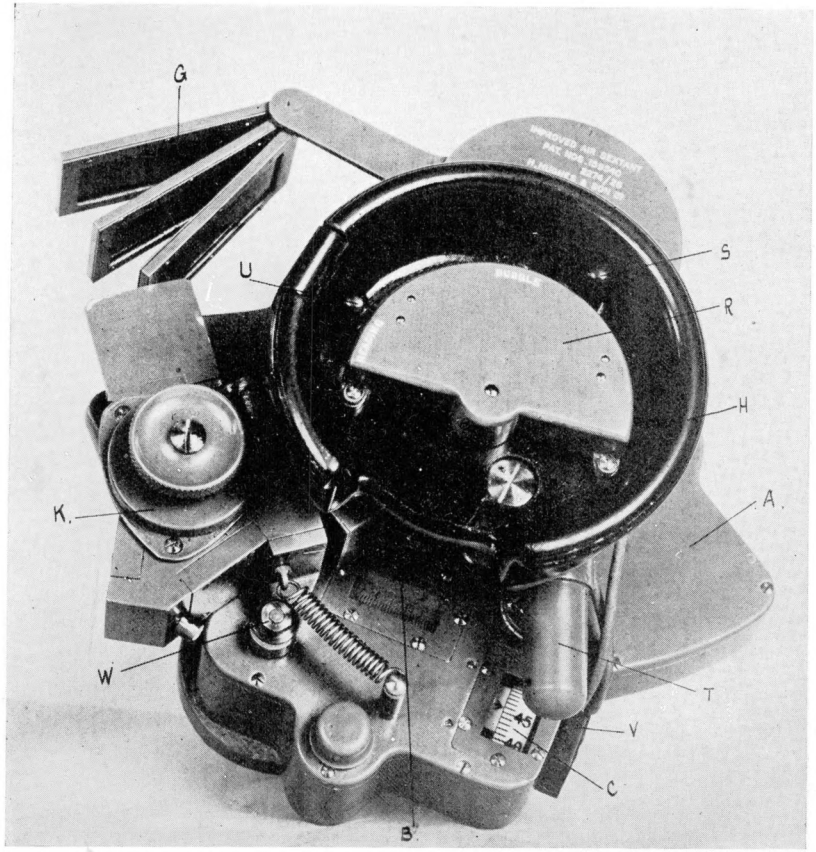


FIG. 1

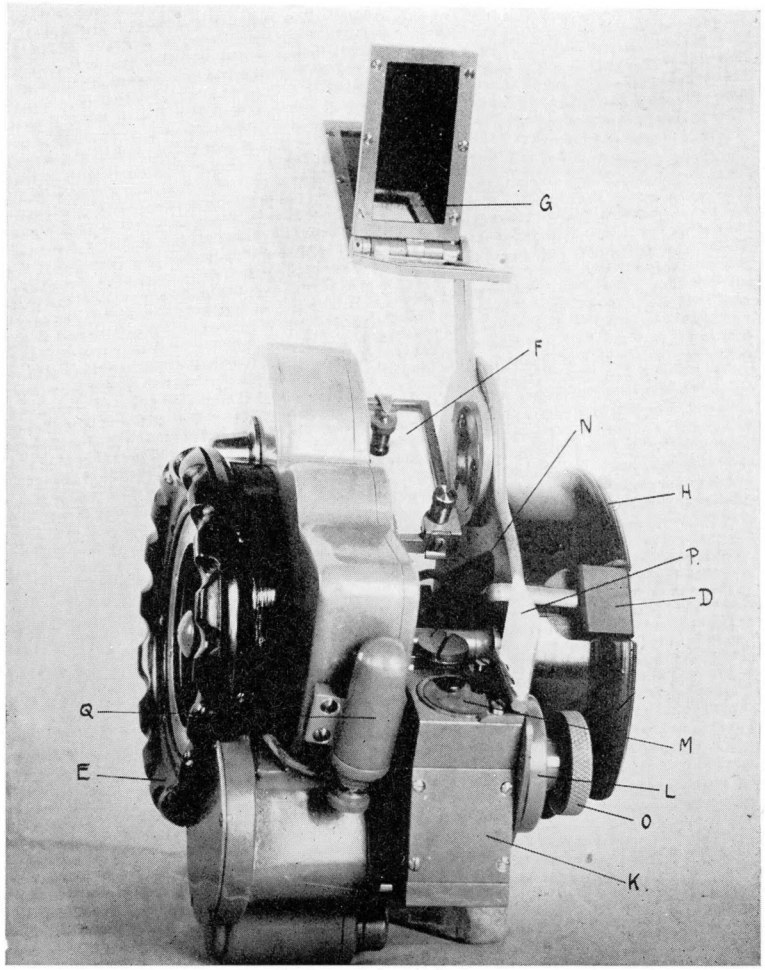


FIG. 2

The "Husun" improved Bubble Sextant. — Sextant à bulle perfectionné, Type "Husun".

the angles can be read off by the unaided eye in three or four seconds and the saving of eyestrain to the observer largely increases the amount of work capable of being carried out in a given time.

A pentagonal prism can be supplied to order which enables all observed angles to be increased by 90°. Thus, the plain sextant gives observations up to 140° which by sliding the prism attachment into place can be increased to 230°.

The prism is readily attached and detached by means of a simple slide fitting, the bridge which carries it being left permanently in place on the sextant limb. As the prism is of the double reflecting type, slight variations of position in placing it on the sextant have no effect on the angles observed.

SPECIFICATION.

Limb and Index Arm: Diamond pattern limb of 6 inch radius with inlaid brass arc divided to degrees and reading from 0° to 140°. A safety stop is fitted to prevent the index being swung so far as to strike the mounting of the horizon mirror. Special index arm with plain index arrow to read whole degrees on the arc and fitted with patent micrometer gear reading to single minutes which also serves as an endless tangent screw. The micrometer is thrown out of gear by pressure between finger and thumb on the end of the index arm where it is normally held for "sweeping". The micrometer reading is very open and plain (1 minute = 1/16 inch : 1.6 mm.) so that no magnifier is required and readings are taken with the greatest ease and rapidity.

Mirrors and Telescope :

Index mirror.....	2 1/8 in. × 1 5/8 in.	54 mm. × 41.3 mm.
Horizon mirror	1 3/8 in. × 1 1/8 in., fully silvered.	35 mm. × 28.6 mm.

The fully silvered horizon mirror is of course the best for survey work. A spare pair of mirrors is provided. Large erect telescope with 1 3/4 in. (44.5 mm.) object glass having power 4 1/4 × and field 4° to 4 1/2° with eyecup focussing mount and diopter collar. Thus, each worker's focus can be recorded and set up by the diopter scale without delay. A blank head is also provided. The telescope, or blank head, is mounted in a split collar with hinge and clamp screw and the sextant packs in its case with the telescope in position.

Case : A stout box of unpolished teak is supplied with the instrument, fitted with special packings for the adjusting keys, telescope, blank head, and spare pair of mirrors, the latter being packed first in a metal box which is then again packed in a teak box screwed into the instrument case. The case is fitted with sunk handle, recessed hooks and lock and key.

Sizes and weights :

Weight of sextant with telescope ready for use	4 lbs.	1.8 kg.
Weight of sextant complete with spares in case.....	12 lbs.	5.4 kg.
Outside dimensions of case.....	13 1/2 in. × 11 in. × 6 in. :	34.3 cm. × 28 cm. × 15.25 cm.

HUSUN IMPROVED BUBBLE SEXTANT.

BOOTH PATENT.

Within the last few years Messrs. Henry HUGHES & Son Ltd., London, have improved their model of bubble sextant described in *The Hydrographic Review*, Vol. VI, No. 2, November 1929, p. 140. In the following article details are given concerning the most recent model of this appliance.

The instrument consists of a micrometer sextant, having all the mechanical gear totally enclosed, in conjunction with a special bubble horizon of which the bubble, after