

ment as follows, and clamped permanently. The sextant being mounted on its stand, observe the double altitude of the sun in artificial horizon, with the telescope pointing as nearly as possible to the centre of the artificial horizon. Make the suns exactly cover each other, and bring the bubble of the level into the centre of its run, clamping it securely. So long as the clamp is not loosened, the sextant being set to the double altitude of a star, if the sextant is turned truly vertically on its axis until the bubble is in the centre of its run, and moved bodily on its stand towards or from the artificial horizon until the telescope points correctly to the centre, then both direct and reflected images of the star will be seen in the field of the telescope.

Electric
Light.

A small electric light fitted on the arm carrying the magnifying glass, with wires leading to a dry battery or a Bichromate Battery, will be found a very great convenience. The light coming from a fixed point, there is less liability to errors of parallax in reading off the sextant, than if an ordinary lantern is used.

Rack and
Pinion.

This fitting for focussing the telescope enables the focus to be obtained with greater nicety.

SOUNDING SEXTANT.

This useful form of sextant is made of various sizes. It chiefly differs from the observing sextant in being generally lighter and handier, in having the arc cut only to minutes, and having a tube of a bell shape so as to include a larger field in the telescope.

All angles in the frame of the instrument should be rounded off, especially that at the zero end of the arc. Considerable injuries may result to the face of the observer when using the sextant in a boat in a lively sea, if this is not done.

The graduation of the arc should be plain enough to read without a magnifying glass.

The measurable angle should be as large as possible, *i.e.* about 140°.

The index glass should be large, so as easily to pick up objects.

The telescope should be of a high magnifying power and clear definition. Good Tube
Invalu-
able.

These sextants are now supplied by the Hydrographic Office with two telescopes—one for ordinary use, and another, of aluminium, with a larger object glass for occasions when faint objects are required to be seen. The collimation of these large telescopes is however a delicate matter, and when accuracy is required, should be tested.

When in good adjustment, a sounding sextant so fitted is invaluable for star observations with a faint sea horizon.

RESILVERING MIRRORS.

On service, the mirrors of sextants, especially sounding sextants, frequently get dimmed by damp, and the surveyor must be able to resilver them himself.

A supply of tinfoil, of good quality, for this purpose, is one of the necessary stores. Mercury is always to be had. The operation has been frequently described, but it is perhaps better to repeat it.

Take a piece of tinfoil, a little larger than the glass to be silvered, and smooth it out on a perfectly flat surface, as a sheet of plate glass, or a thick smooth book-cover. This smoothing can be well done by a little pad of chamois leather, which can be kept for the purpose, or by the finger.

Drop a small bubble of mercury on to the foil, and by gentle rubbing with the pad, spread it over the former so that it shows a bright surface. Pour mercury on until the piece of foil is quite fluid, and brush any large spots of dross lightly off. Lay a piece of clean paper, long enough to handle easily, on the mercury, and the glass, previously well cleaned by means of spirits of wine, on the paper. Pressing on the glass with one hand, withdraw the paper with the other, slowly and steadily, and a pure surface will appear under the glass, the dross all coming away with the paper.

Incline the book, or whatever surface we have been working on, so as to let superfluous mercury run off, placing strips of tinfoil at the lower edge to assist in sopping this up.

After from twelve to twenty-four hours, the amalgam will be dry, and firmly adhering to the glass. Cut the edges care-