E. S. RITCHIE.

Instrument for Determining the Variation of the Compass.

No. 45,753. Patented Jan. 3. 1865.

Fig. 1,

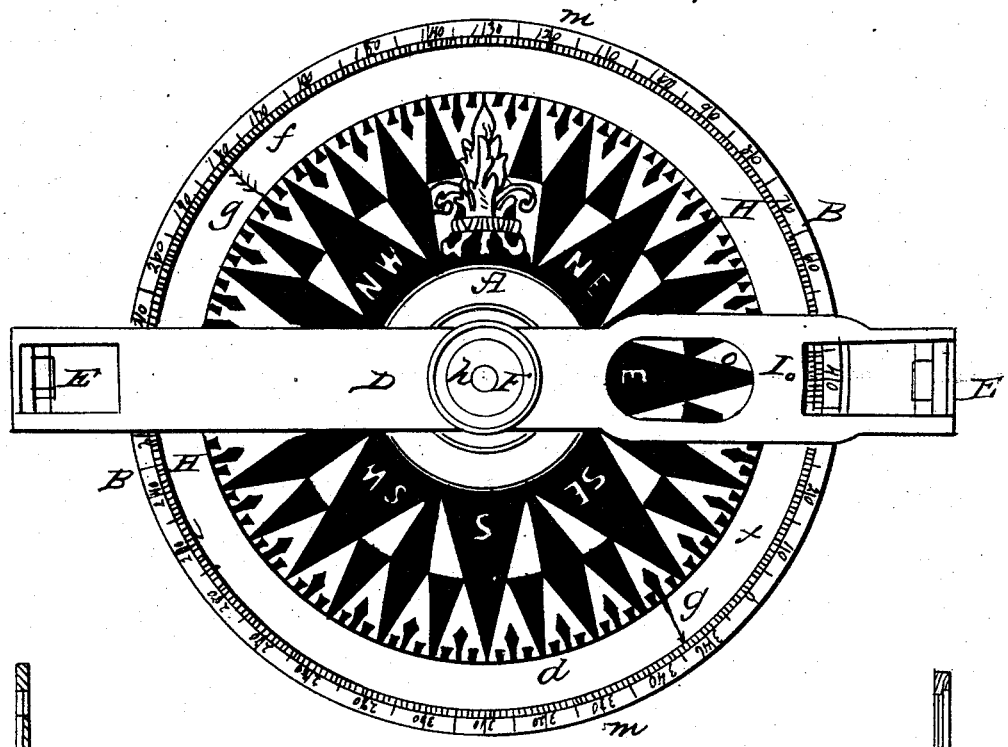
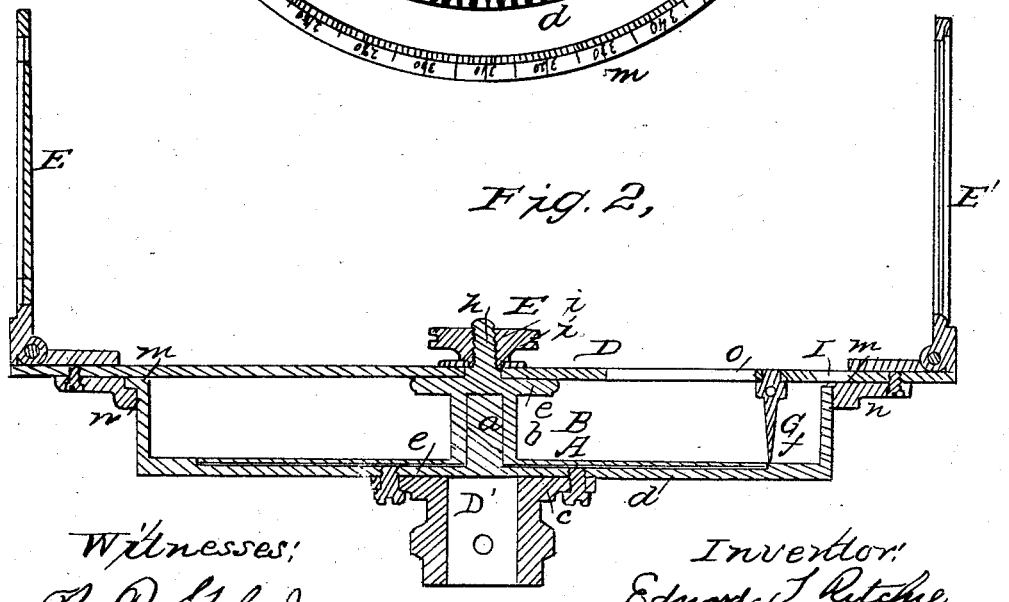


Fig. 2,



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UNITED STATES PATENT OFFICE.

EDWARD S. RITCHIE, OF BROOKLINE, MASSACHUSETTS.

IMPROVEMENT IN INSTRUMENTS FOR DETERMINING THE VARIATION OF THE COMPASS.

Specification forming part of Letters Patent No. **45,753**, dated January 3, 1865.

To all whom it may concern:

Be it known that I, EDWARD S. RITCHIE, a resident of Brookline, in the county of Norfolk and State of Massachusetts, have invented a new and useful Instrument for Enabling a Person to Determine the Variations of the Compass Caused by Local Attraction; and I do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a top view, and Fig. 2 a vertical and longitudinal section, of it.

This instrument, which may be termed an "ektropometer" or "variation-detector," is particularly useful on board iron or iron-armored vessels, as by means of it the variations of the magnetic needle for any course or direction of the vessel may be readily discovered. The instrument can also be used to advantage for such purpose on board of other navigable vessels.

The nature of my said invention consists in a combination composed of a movable or rotary compass-card, a supporting index plate or case, a bar and sights, a clamp, and an index-pointer or its equivalent; also, in the combination of such with a divided limb and an auxiliary sight-index.

In the drawings, A denotes the rotary compass-card, which consists of a circular disk or plate having the points of compass painted or formed on its upper surface in manner as represented in Fig. 1. This compass-card at its center is supported by a pivot or journal, *a*, which projects upward from the bottom plate, *c*, of a circular box, B, within which the compass-card is arranged, it being placed in a circular recess, *d*, formed in the bottom of the box. The pivot *a* extends into the shank *b* of a knob affixed to the central part of and extending above the compass-card A, in manner as shown in Fig. 2, the said knob having a milled head, *e*, by which, with the thumb and fingers of a person's hand, when applied to it, the compass-card may be revolved on its pivot *a*.

On that portion of the index-plate B which surrounds the compass-card and is next to its circumference—viz., the portion *f* in Figs. 1 and 2—an index line or arrow, *g*, is drawn diametrically. The box B is mounted on a standard or hollow socket, D′, for supporting the box on the spindle of a tripod or on any convenient body.

A pivot or journal, *h*, extends upward from the knob C and has a male screw, *i*, at its upper part.

A bar, D, having two folding or vertical sights, E E′, extends across and on the top of the case or box B, and receiving the pivot *h*, which, after having been passed through the bar, receives a washer, *l*, and a milled head-clamp, F, which is screwed on the screw *i* and serves to clamp the sight-bar relatively to the compass-card, and so that they may be rotated simultaneously and through equal arcs.

Two clasps, *n n*, screwed to and projecting from the lower side of the sight-bar D, grasp or extend underneath a flange, *m*, which projects from the outer periphery of the box B. This flange and the two clasps serve to maintain the bar, the box, and the card in their proper connection.

An index point or pointer, G, projects downward from the sight-bar and just over the circumference of the compass-card, the said pointer being arranged at the middle of the bar or midway between its opposite edges and in line of the sights. Just in rear of the index-pointer the sight-bar has an opening or sight-hole, *o*, made through it, the same being for the purpose hereinafter mentioned. Furthermore, the upper edge of the box B has a divided limb or circle of divisions, as represented at H in Fig. 1. An auxiliary sight-index for this limb is represented at I, as made within the sight, such index being provided a nonius or vernier scale, when the same may be desirable. The object of the divided limb and its index I is to enable the amount of any angular movement of the sight-bar and the compass-card to be read to a greater nicety than by means of the compass-card and its index or arrow *g*.

The utility of this instrument and manner of its use may be thus described: Let us suppose a vessel to be riding at anchor. The first thing to be done is to find the magnetic bearing of some object sufficiently distant so that the parallax caused by the change of position as the vessel may swing around may be disregarded. Suppose the object to be a light-house at six or eight miles distant, and the direction to be east-south-east, as found by the

chart, or by taking careful observations with a compass in a boat beyond the attraction of any iron in the vessel. Next, place the instrument so that its arrow-line *g* may be in line with the direction of the keel in the vessel or the vessel's head, or, in other words, in or parallel to that line which may be supposed to go lengthwise through the middle of the vessel. Next, bring the index-pointer G to the east-south-east point of the compass-card A by turning the knob *e*, and tighten the clamp-screw F.

It will be evident that while the sights are kept to bear upon the light-house the pointer and the point east-south-east must be in the true magnetic direction of east-south-east, and consequently that the north and south line of the card A must be in the magnetic meridian without any reference to the direction of the ship's head, and also that the arrow-head (which is in the line of the ship and corresponds to the "lubber's line") must indicate the true magnetic diretion of the ship at the time. Let us suppose it to indicate north-west on the card A, and that the ship's compass indicates north-west by north, the latter must be wrong one point. It should then be noted down that the deviation on the north-west course is one point northerly, and that to steer a correct north-west course by his compass the helmsman must steer north-west by north. As the ship may swing around through all the points of the compass the error can be found for each and every course, and the table of errors or corrections should be made for every course. At sea the direction of the setting or rising of the sun, or of a star, if known, will answer perfectly for the object.

To find the direction of any object by the ship's compass, bring the compass-card A to correspond with the ship's compass—that is, bring the same point of the card A to the arrow-head line that the lubber's line of the ship's compass indicates, and, without tightening the clamp-screw F, bring the sights to bear upon the object. The pointer will then indicate the direction. The angle between any objects can be determined by the graduated limb or vernier.

This instrument although somewhat resembling a circumferenter or various other surveying-instruments, yet differs essentially therefrom.

I claim—

1. The combination of the rotary compass-card A, the separate supporting index-plate *c*, the rotary bar D, provided with sights or their equivalents, the clamp F, and the index-pointer G or its equivalent, the whole being arranged and applied substantially as specified.

2. In combination therewith, the divided limb H and the auxiliary sight-index I.

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