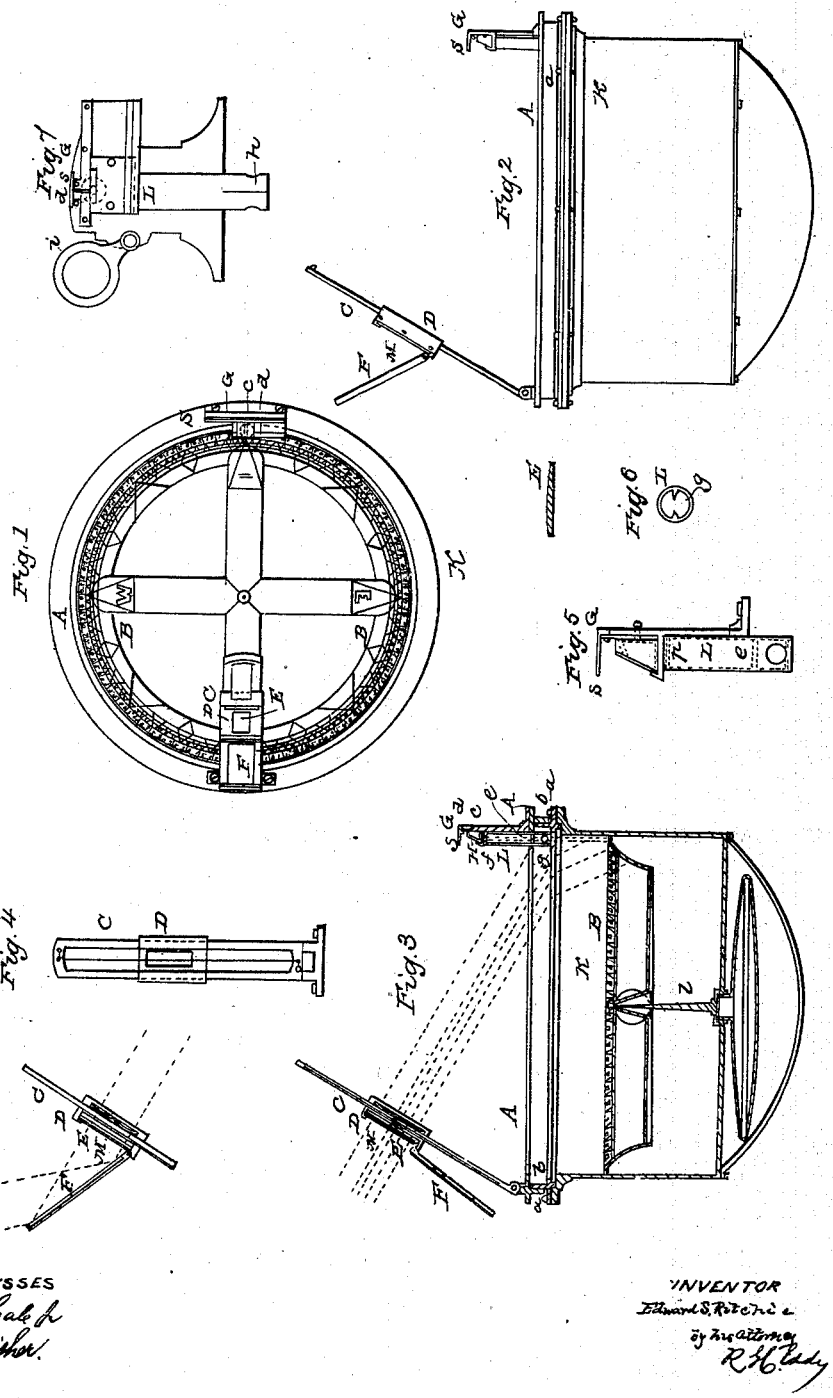
E. S. RITCHIE.

Compass.

No. 49,157. Patented Aug. 1, 1865.



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EDWARD S. RITCHIE, OF BROOKLINE, MASSACHUSETTS.

IMPROVEMENT IN AZIMUTH-COMPASSES.

Specification forming part of Letters Patent No. **49,157**, dated August 1, 1865.

To all whom it may concern:

Be it known that I, EDWARD S. RITCHIE, of Brookline, in the county of Norfolk and State of Massachusetts, have made a new and useful Invention having reference to Azimuth as well as Prismatic Compasses; 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, Fig. 2 a side elevation, and Fig. 3 a vertical section, of my invention as applied to a compass.

In such drawings, A denotes an annulus provided with a flange, *a*, extending down from it at a right angle and about a similar flange, *b*, elevated on the top of the compass-case K, and arranged concentrically with the axis of revolution of the compass-card B, such being so as to allow the annulus A, while on the top of the said compass-case, to be rotated concentrically relatively to the card or the axis thereof.

Instead of the flanges *a b*, as above mentioned, other proper means of guiding the annulus in its rotary motion may be adopted; and, instead of the compass-card having the form as exhibited in the drawings, it may have any other that may be sufficient for the purposes of my invention.

To the upper surface of the ring or annulus A, I so hinge the front sight, C, (an inner side view of which is represented in Fig. 4,) as to enable it to be turned from a vertical into a horizontal position, or vice versa, the middle of the sight during such movement being in a plane diametric and perpendicular to the annulus. The sight C of itself is such as is in use in ordinary azimuth and prismatic or other compasses. The same may be said with respect to the back sight, as hereinafter described. On the said front sight I so arrange a slider or frame, D, as to be capable of being moved longitudinally on the sight, such slider serving to carry a lens, E, so made as to converge into a line the rays of light when passing through it. For this purpose the lens may have a rectangular shape and be constructed with a transverse section which is the segment of a circle having a radius about equal to the inner diameter of the annulus A. The object of such lens is to so converge the rays of the sun, when such may be passing through it, as to throw on the compass-card such rays in or about in a short line of light which shall be in a vertical plane passing diametrically through the card.

To the lower part of the slider D, I hinge a reflecting plane mirror, F, and, furthermore, I so affix to the slider a screen, M, as to enable such screen to be slid transversely across the slider in order to intercept more or less of the light which at any time may be directed upon or toward the lens, the same being to diminish the intensity of light which may be thrown by the lens upon the compass-card.

Diametrically opposite to the fore sight I erect on the annulus A a back sight, G, formed, as represented in side elevation in Fig. 5, and particularly with an eye-hole, *c*, and a slit, *d*, extending radially and vertically from such hole.

A double reflecting-prism, H, is arranged on the inner face of the back sight, and applied thereto so as to be capable of being moved over and off a convex lens, *f*, as well as directly in front of or away from the eye-hole of the back sight, as occasion may require. A tube, L, extends downward from the lens *f*, and in a direction toward the range of cardinal divisions on the compass-card, and has arranged within it a concave lens, *e*, to operate with the convex lens *f*.

Just below the concave lens, and at or near the bottom of the tube L, are two indicators or pointers, *g g*, (see Fig. 6, which is a horizontal section of them and the tube L,) which stand radially within the tube, and have their points in a plane passing diametrically through the compass and the middles of the back and fore sights. Furthermore, on the front of the tube L, and in the plane last mentioned, I arrange a vertical index-line, as shown at *h* in Fig. 7, which is an inner side view of the back sight with its tube L. I also arrange directly over the convex lens, and so as to project horizontally from the top of the back sight, an auxiliary sight, *s*, formed with an eye-hole or slit extending through it in the axis of the tube L produced. To the said back sight there may be so applied one or more colored screens or glasses, *i i*, as to render each of them capable of being turned down in front of the slit of the back sight.

The compass-card B, provided with cardinal divisional marks and one or more magnets, arranged in the usual manner, is supported on a

pivot, *l*, the compass, as represented in the drawings, being what is known as a "liquid-compass"—that is, one whose box is filled with a liquid, within which the card is submerged.

In using my invention when applied to a compass, the fore-sight lens is to be elevated on the sight and the latter set to such an angle with the plane of the annulus A as will cause the rays of light from the sun to pass through the lens in a converging beam and strike either on the circle of divisions of the compass-card or on the index-line *h*, or on both, the glass plate forming the top of the compass-case operating to refract the beam more or less or turn it downward. On placing the eye at the eye-hole of the back sight and looking into the double reflecting-prism when it is directly in front of the said eye-hole, we shall not only see the indicators *g g*, but the line of sunlight cast on the compass-card. Now, by rotating the annulus A horizontally on the compass-box until the indicators *g g* are brought directly over the line of light on the compass-card the azimuth of the sun will be truly taken, and may be read from the card by the eye while so at the eye-hole. By sliding the prism away from the eye-hole and from underneath the auxiliary sight *s*, an observer may look directly downward through the said sight *s* and see the indicators *g g*, the line of sunlight, and the divisions of the compass-card. In this way he will be able to read the azimuth from the card.

I would remark that were we to dispense with the concave lens *e* we might clearly perceive, by means of the lens *f*, the divisions of the compass-card; but, as the indicators *g g* would be much nearer to the lens *f* than the said divisions, the said indicators would not be clearly visible. To render the divisions and indicators clearly perceptible at one and the same time is the object of the employment of concave lens.

When it may be desirable to ascertain approximately the azimuth of the sun without looking into either the lenticular prism or the auxiliary sight, this may be done by turning the annulus A until the beam of convergent rays may strike on the index-line *h* and on the divisions of the compass-card. By looking through the glass cover of the box the azimuth may be ascertained.

The screen or shutter M, instead of being in one piece, may be formed in two parts, to slide in opposite directions—that is, either toward or away from the upright middle of the lens E. By means of the adjustable mirror E the reflected rays of the sun may be thrown upon the convergent lens in manner as circumstances may require.

I would also state that, instead of the double reflecting-prism and the lens *f*, a single reflecting-prism may be employed; but in this case the divisions and figures of the compass-card would be seen in reverse, or bottom upward, and could not be read to so good advantage as with the double reflecting-prism.

The invention is applicable either to liquid or common magnetic compasses, and does not interfere with the ordinary use of the same, whether as azimuth or steering compasses.

It will be perceived that the frame carrying the lens E and its reflector may be removed from the fore sight and inverted, and so as to present the reflecting-surface downward, if necessary, the object of such being to reflect rays from the sun when near the horizon.

Having thus described my invention and its use and application relative to a compass, what I claim to be such invention is as follows, viz:

1. The combination of the light-converging cylindro-segmental lens E, or its equivalent, with the limb or annulus A, or its equivalent, and its sights, to be used on a magnetic compass in manner substantially as specified.

2. The combination of the adjustable screen or shutter M, or its equivalent, with the light-converging lens E, combined with the fore sight of the annulus A, or its equivalent, and for use substantially as hereinbefore specified.

3. The combination of the reflector F and the light-converging lens E, or its equivalent, with the annulus A, or its equivalent, and its fore sight or fore and back sights, to be employed on a compass in manner substantially as hereinbefore explained.

4. The combination of the indicators *g g* with the auxiliary sight *s* and the annulus A, or its equivalent, its fore sight or fore and back sights, and the light-converging lens F, the same being as specified.

5. The combination of the indicators *g g* with the two lenses *e f*, or the same and the auxiliary sight *s*, and with the annulus A, or its equivalent, its fore sight or fore and back sights, and the light-converging lens E, the same being as specified.

6. The combination of the indicators *g g* with the two lenses *e f*, the prism H, and the annulus A, or its equivaleht, its fore sight or fore and back sights, and the light-converging lens E, the same being as specified.

7. The combination of the index-mark *h*, or its equivalent, with the light-converging lens E, the annulus A, and the fore sight, C, or the equivalent thereof, the whole being arranged substantially in manner and for the purpose as specified.

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Witnesses:
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