E. S. RITCHIE.

AZIMUTH CIRCLES FOR ATTACHMENT TO SHIPS' COMPASSES.

No. 193,552. Patented July 24, 1877.

Fig. 1.

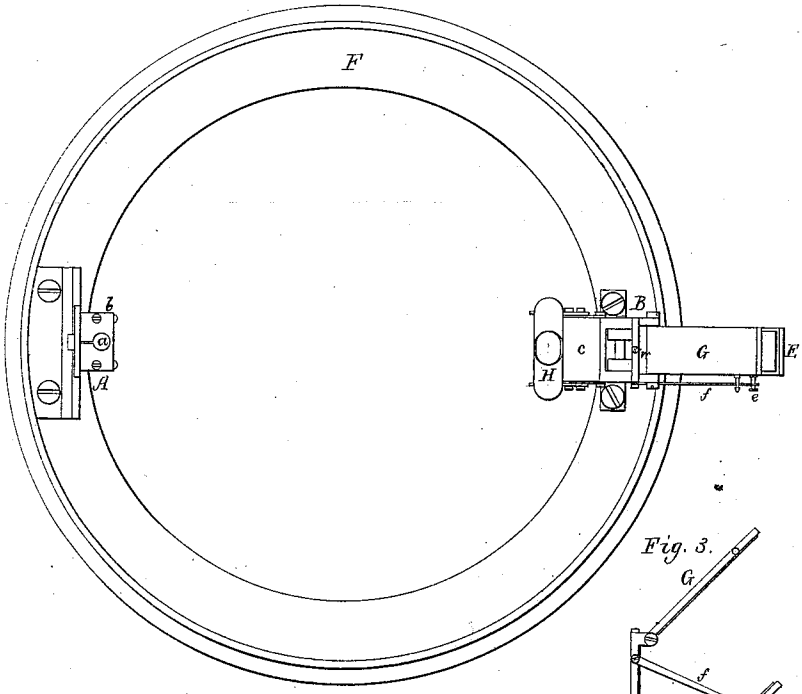


Fig. 3.

Fig. 2.

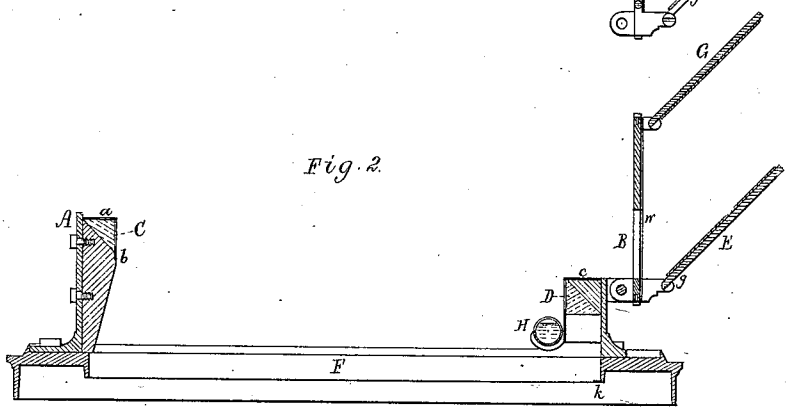
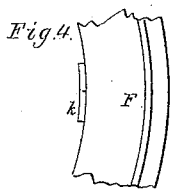


Fig. 4.



Witnesses.
S. N. Piper.
L. Wm. Müller.

Edward S. Ritchie
by his attorney.
R. H. Eddy

N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWARD S. RITCHIE, OF BROOKLINE, MASSACHUSETTS.

IMPROVEMENT IN AZIMUTH-CIRCLES FOR ATTACHMENT TO SHIPS' COMPASSES.

Specification forming part of Letters Patent No. **193,552**, dated July 24, 1877; application filed June 23, 1877.

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 invented a new and useful Improvement in the Azimuth-Circle; and do hereby declare the same to be described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 is a top view, and Fig. 2 a transverse section, of an azimuth-circle embracing my invention.

In the ordinary construction of an azimuth-circle the back sight or standard has been provided with a reflecting power, so arranged as to reflect to the eye of the observer those figures or markings of the compass-card which were next to him, such figures or markings having to be made in reverse, in order that they might be conveniently or properly read.

My improvement requires no such reversing of the figures or markings of the card of the compass to adapt it to my azimuth-circle, which may be applied to a compass having its figures or markings unreversed.

In carrying out my invention I provide each of the sights with a reflector or reflector-prism, arranged as shown in Fig. 2, in which A is the back sight, B the fore sight, C the back-sight reflector, and D the fore-sight reflector. The latter is intended to be directly over those divisions or markings of the compass-card which are farthest from the observer when his eye is at the back sight.

It will thus be seen that, by the arrangement of the two reflectors or prisms, not only will the markings of the compass-card be twice reflected before reaching the eye of the observer looking downward into the rear prism, but the rays from the sun, or an object reflected by the main reflector E through the back sight A, will be received in the back prism, and by it be reflected into the eye.

The back sight, which extends upward from a supporting-annulus, F, has its eye-piece *a* directly over the rear reflector, which is suitably supported in a case, *b*, projecting from the back sight or standard A.

Opposite to the back sight and its reflector is the fore sight B, provided with its line, hair, or wire, *w*, and with the fore reflector D, the case *c*, containing the latter, being fastened to the ring F. The fore sight is so hinged to the said case *c* as to be capable of being either turned down into parallelism with the ring or raised into right angles therewith.

The main plain reflector or mirror E has its frame *g* hinged at its lower end to the fore sight, and provided with means of fixing it at a suitable inclination for reflection—that is, at an angle of forty-five degrees, or thereabout, to the plane of the ring F. The means for this purpose shown in the drawings consist of a stud, *e*, and a hooked arm, *f*, the latter being pivoted to the fore sight. The stud is extended from the edge of the reflector-frame *g*. When the arm is hooked on the stud, the mirror or reflector E will be at the proper inclination.

In further carrying out my invention I combine with the fore sight B and its mirror E an auxiliary mirror or reflector, G, which I hinge to the upper part of the fore sight. This auxiliary mirror is intended to reflect the rays of the sun, or object to be observed, into the main mirror, by which they will be reflected to the prism of the eye-piece, and by the latter into the eye of an observer.

Fig. 3 is a side elevation of the fore sight, the main and auxiliary mirrors, and the mechanism for supporting the main mirror at its proper inclination.

The auxiliary reflector or mirror G is to be used when the sun or object to be observed is in a position which does not admit of the main reflector being conveniently employed alone. By means of the auxiliary reflector the rays may be reflected upon the main reflector, and thence to the eye-prism, often to great advantage.

In further carrying out my invention I combine with the back and fore sights and their prismatic reflectors and supporting-ring a small spirit-level, H, arranged just in rear of and below the prism D, or in a position to enable it (the said spirit-level) to be seen by the eye of an observer while at the eye-piece of the back sight. By means of this level the observer can be assured that the instrument is properly horizontal while he may be engaged in reading by it from the card of a compass, over which it, the said instrument,

may be placed. The spirit-level thus prevents the error in observation that would follow or result by reason of the sights not being held properly vertical.

From the inner periphery of the annulus F a small shelf, *k*, projects directly under the fore reflector D. This shelf has in its middle an index line or mark (see Fig. 4, which is a top view of the shelf and part of the ring) which, to an observer at the eye-piece, would be seen as close against or touching the edge of the compass-card. The arc between this mark and the north point of the card will indicate the apparent course of the vessel.

The back-sight reflector is so arranged that an observer in using the instrument looks directly downward into the said reflector, which is very much more convenient for him to do than to look horizontally into a reflector and over it, to and through the fore sight. With the two reflectors he sees entirely by reflection the object, the wire or hair of the fore sight, the spirit-level, and the divisions or markings of the compass-card.

To the fore sight a lens or one or more colored glasses may be so applied as to be capable of being moved across or away from such fore sight, as occasion may require. The reflecting-prisms may be either plain or lenticular, as may be desirable.

When the object is on or very near the horizon the mirror E may be lowered down, and the rays from the object received on the reflector C direct.

I claim as my invention as follows:

1. An azimuth-circle provided with the fore and back reflectors or reflecting-prisms C D, arranged with its sights and main reflector substantially in manner and to operate as specified.

2. An azimuth-circle provided with the fore and back reflectors C D, and a spirit-level, H, arranged with its fore and back sights and main reflector substantially in manner and to operate as set forth.

3. An azimuth-circle provided with fore and back reflecting-prisms C D, and main and auxiliary reflectors E G, arranged with its fore and back sights B A, and annulus F, substantially in manner and to operate as set forth.

EDW. S. RITCHIE.

Witnesses:

R. H. EDDY,

JOHN R. SNOW.