No. 609,363. Patented Aug. 16, 1898.

R. OLIVER.

SHIP'S COMPASS.

(Application filed Sept. 11, 1897.)

(No Model.)

Fig. 1.

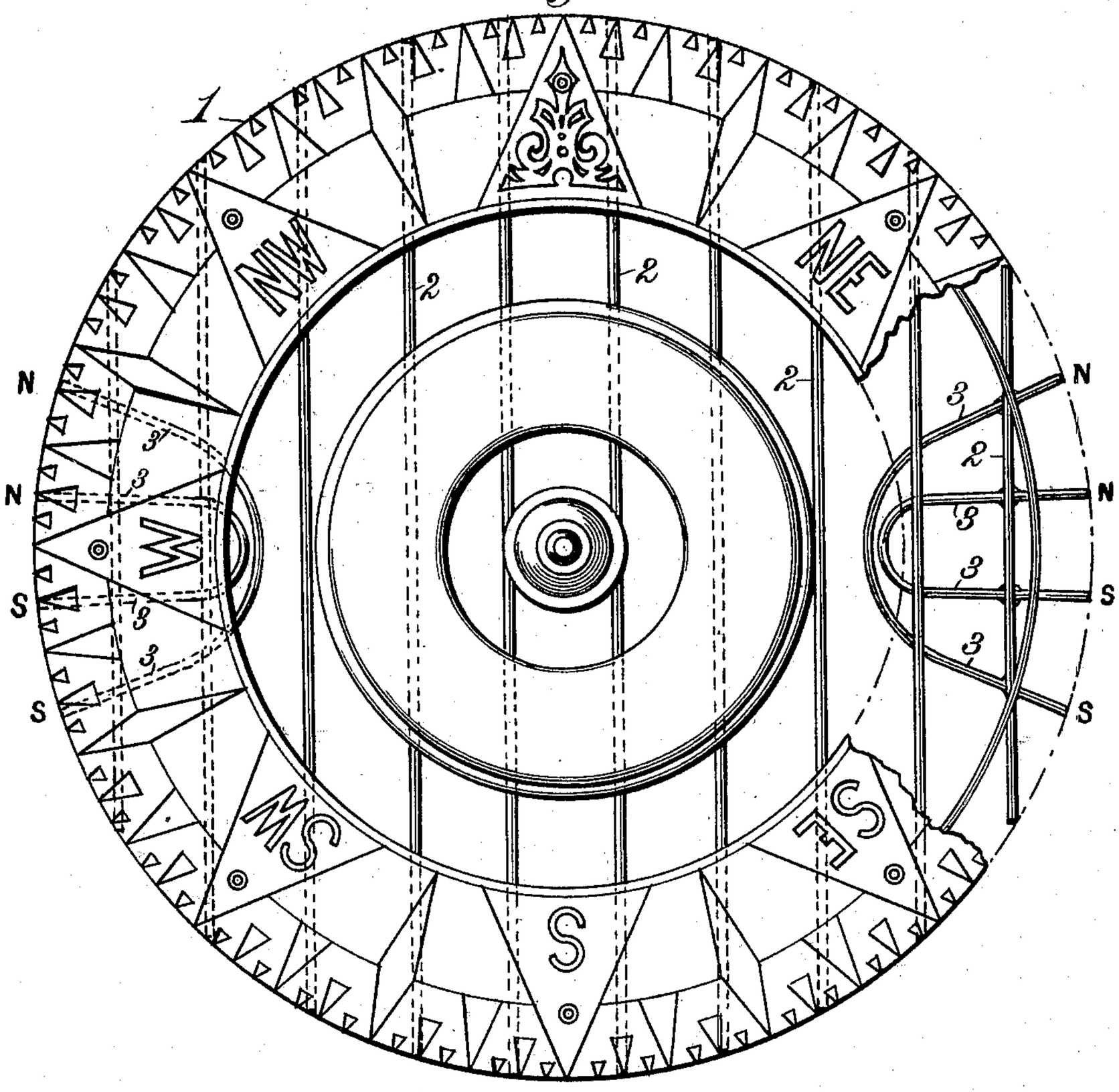
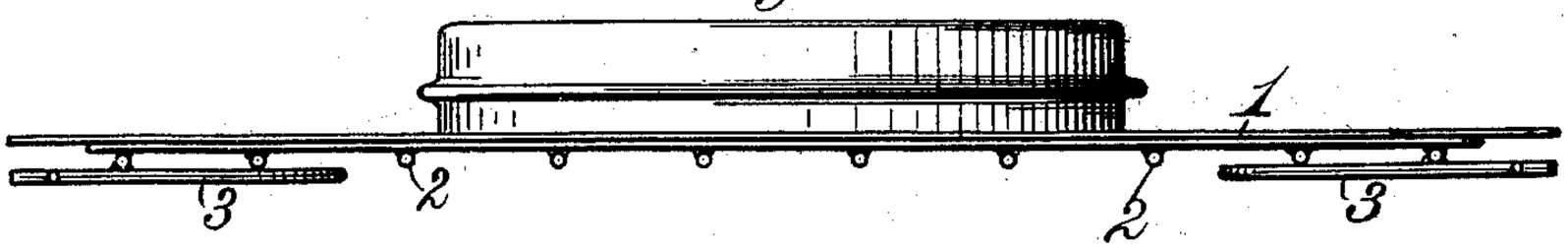


Fig. 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

ROBERT OLIVER, OF NEW YORK, N. Y.

SHIP'S COMPASS.

SPECIFICATION forming part of Letters Patent No. 609,363, dated August 16, 1898.

Application filed September 11, 1897. Serial No. 651,376. (No model.)

To all whom it may concern:

Be it known that I, ROBERT OLIVER, a citizen of the United States, residing at New York, (Brooklyn,) in the county of Kings and State of New York, have invented new and useful Improvements in Ships' Compasses, of which the following is a specification.

My invention relates to ships' compasses; and my purpose is to provide a compass-card with magnets so arranged that a complete circle of polar force is provided at equal radii from the center or suspension point of the card, so that there is an operative polar force at or near the thirty-two points of the compass, and in which the arrangement of the magnets is such that at one side of the equatorial line there shall be a uniform distribution of north-polar force at equidistant points and that at the other side of said line there shall be a like distribution of south-polar force.

By my invention I provide a compass having great directive force, which is more sensitive and steadier than those heretofore used, capable of far more perfect adjustment than has been possible with those manufactured prior to my invention, and which is not affected by the known eccentric action of the usual correcting-magnets to which compasses prior to my present invention are subject.

To enable those skilled in the art to which my said invention relates to fully understand and to make, construct, and use the same, I will now proceed to explain said invention in detail, reference being had for this purpose to the accompanying drawings, in which—

Figure 1 is a plan view of a compass-card removed from the binnacle, bowl, or flotation-chamber, part of the card being broken away upon one side to disclose the arrangement of bar-magnets and horseshoe-magnets which constitutes my invention. Fig. 2 is an edge elevation of the same.

Mariners' compasses as heretofore constructed have been provided with straight bar-magnets arranged at substantially uniform intervals beneath the card or with U-shaped or horseshoe magnets secured to the card at suitable intervals with their pole-pieces in or nearly in line with the periphery of the card. In one of these forms there was a space of about forty-five degrees of arc between the opposite poles of the magnets which crossed the equatorial line nearest to the east and west sides of the card which was entirely unoccupied and in which there was no polarity. In the other case this dead-space extended over ninety degrees of arc or thereabout, having about forty-five degrees north and an equal space south of the equatorial line in which no polar force was present. In the latter case also, as horseshoe-magnets were used each having two pole-pieces of north and south polarity, respectively, the one polarity negatives the other and the compass is impaired rather than benefited by the dead-weight of useless metal it must carry.

In my present invention I employ the compass-card 1, with a series of bar-magnets 2, arranged in parallelism one with another and at substantially uniform intervals of separation. These magnets are of hardened steel, and being once saturated with magnetism they retain it, their ends being of opposite polarity. They cross the equatorial line or east and west meridian at right angles thereto; but as the ends of said line are closely approached two unoccupied arcs or portions of the card periphery are left deprived of polar force, this being due to the fact that the reduction in length of the permanent bar-magnet rendered it so weak as to be of no value. The dead-space thus produced extended from the east-northeast point to east-southeast or thereabout and also west-northwest to west-southwest or thereabout, as shown in Fig. 1 of the drawings.

As thus far described, the construction is like that disclosed in my Letters Patent No. 478,017, dated June 28, 1892.

My present invention is designed to overcome the faults heretofore existing, as above referred to, and to attain the positive advantages hereinbefore set forth. To these ends I attach to the card 1 two or more U-shaped or permanent horse-shoe magnets 3, secured to and lying beneath the bar-magnets 2, with their legs upon opposite sides of the equatorial line and possessing a polar force equal to that of the bar-magnets. Thus those legs which have north polarity will lie north of the equatorial line, while those having an opposite polarity will be at about equal distances south of said line. In this construction the polar

attraction of the horseshoe-magnets is so arranged as to augment the polarity of the bar-magnets 2, instead of counteracting the same. Moreover, I utilize the entire periphery of the card, leaving no dead-spaces, and thereby gain the advantages heretofore specified by imparting a greater directive force, increased sensitiveness and accuracy, greater steadiness, and more perfect adjustment.

As shown, the horseshoe-magnets 3 are mounted upon and secured to the bar-magnets 2, to which they may be soldered or attached in any other manner preferred.

As before stated, the improved construction herein set forth is not subject to the known eccentric action of the correcting-magnets, which is a distinct advantage over prior constructions.

In the compasses in general use on board ship the card is the only real fixture, the compass-bowl and box and the binnacle and the ship itself having partial rotation or movement with respect to the card, which maintains a fixed position under the polar influence of the earth. As is well known, correcting-magnets are provided to compensate for local magnetic attraction, and these correcting-magnets partake of the described movement with respect to the compass-card. The correcting-magnets are disposed in part with their poles pointing fore and aft the ship and in part pointing transversely thereof, and as they rotate or move with relation to the compass-card constructed prior to my present invention they approach and recede from the needles or poles of the magnets of the compass, and this approaching and receding movement is what I have hereinbefore termed the "eccentric action" of the correcting-magnets. This action existed in the construction shown in my Letters Patent mentioned, but was limited to that portion of the card twenty-five degrees north and south of the equatorial line. The increase or decrease of the distance between the poles of the correcting-magnets and the card-magnets resulting in a progressive increase or decrease of the mutual attractive force constitutes a material disadvantage in the prior constructions, taking from the sensitiveness and accuracy, and is entirely overcome by my present invention, in which the provision of the horseshoe-magnets establishes a uniform and equidistant polar force around the periphery, because the poles of the correcting-magnets are always equally distant from the card needles or magnets.

What I claim is—

1. In a mariner's compass, a compass-card having straight permanent bar-magnets arranged thereon parallel to a north and south meridian, and permanent U-shaped, or horseshoe magnets, arranged with their legs on opposite sides of the equatorial line, substantially as described.

2. In a mariner's compass, the combination with a compass-card of straight, permanent bar-magnets arranged at intervals in parallelism with a north and south meridian, and one or more permanent horseshoe-magnets attached to said bar-magnets and having the legs of north polarity upon the same side of the equatorial line as the ends of the bar-magnets having a like polarity, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ROBERT OLIVER.

Witnesses:
EDWARD W. TAPP,
HENRY MARTIN.