J. & G. H. BLISS.

Compass.

No. 103,287. Patented May 24, 1870.

Fig. 1.

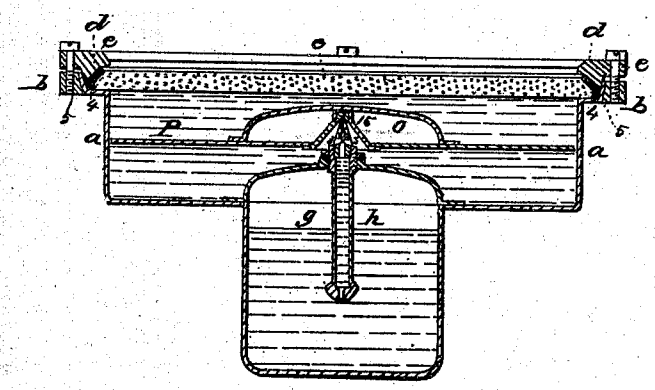
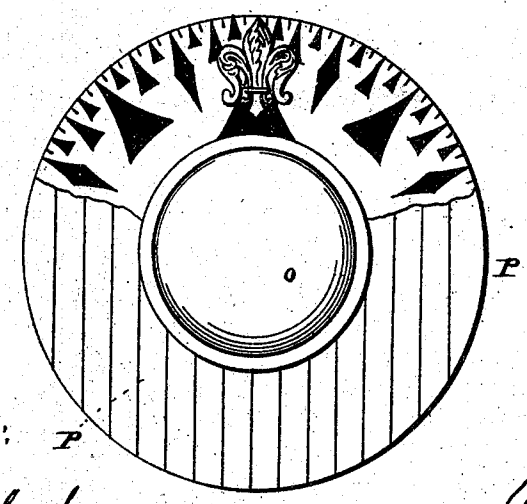


Fig. 2.



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JOHN BLISS AND GEORGE H. BLISS, OF BROOKLYN, NEW YORK.

Letters Patent No. 103,287, *dated May* 24, 1870.

IMPROVEMENT IN MARINERS' COMPASSES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that we, JOHN BLISS and GEORGE H. BLISS, of Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Compasses; and we do hereby declare the following to be a correct description of the same.

In the construction of the card, magnet, and float of a liquid compass, we find by experiment that all useless weight must be dispensed with, in order that the magnetism may overcome the inertia of the parts, and cause them, with their cardinal points, to assume, in the shortest possible time, the proper position, after having been moved from that position by the unsteadiness of the ship, or other causes.

The magnet or magnets heretofore used in compasses have been distinct and separate from the float or floating material. We lessen weight and increase the magnetic power by making the float itself, in whole or in part, of magnetized plates or sheet-steel, thereby dispensing with the materials which add weight, but possess no directive magnetic force.

The compass-cards and magnets heretofore employed have had transverse bars, cases, or projections, which form an impediment in the liquid to the movement of the card by the magnet. We therefore make the magnet as a disk or plate of metal, and avoid projections or cross-bars, and this magnet disk may be made of a single piece, or of several strips of steel soldered or attached together at the edges, so as to run parallel to the north and south lines of the compass-card. We find that a disk made up of strips has a superior directive force when magnetized, and is less influenced by extraneous forces.

The cardinal or other divisions have heretofore been made upon a disk or card, separate from the needle, and although such light materials as thin mica have been made use of, still the same interfere with the card coming rapidly to the point of rest.

We increase the directive force by making the magnet as described, and at the same time dispense with the weight of the card by making the divisions directly upon the plate of metal forming the magnet.

Difficulty has been experienced in making the bowl of a liquid compass perfectly tight under the varying pressure arising from expansion of the liquid by heat, especially where soldered joints are exposed to the liquid, and sometimes when cast-metal bowls are used, the metal is porous and the bowl is heavy.

On account of the greater density of sheet-metal, especially when spun up, we employ the same and construct the seat and flange for the glass and packing continuous with the bowl, in combination with rings, for clamping the packing and glass to the flange and seat.

In the drawings—

Figure 1 shows a vertical section of our improved compass, and

Figure 2 is a plan of the card and magnet, illustrating the mode of manufacture.

The case *a* is made with a chamber *g*, in which is an air-space, to allow of expansion of the liquid filling the compass-bowl, the liquid passing through the tube *h* and orifices 3 3, and *i*, as the expansion or contraction takes place, as in an application for a patent heretofore made by us.

The case *a* is of sheet metal, (we prefer copper,) and this is shaped to form a rest at 4 for the glass *c*, and a seat for the packing *d*, as at 5, and the ring *b* is attached to the rim of the sheet metal, and the clamping-ring *e* presses the packing to place, and makes the parts perfectly tight.

The ring *b* is shown as attached to the portion 5, of the sheet metal; it might, however, extend below the flange 4, and be either attached or not, as desired.

The magnet formed of the sheet-steel disk or plate *p*, may be made of a perfect circle or oval, and of one piece of metal, or of strips of steel soldered together edgewise, as seen in fig. 2 at *p'*, and magnetized as before mentioned.

The disk *p* is sustained by the bearing 15 upon the pivot *k*, and the float *o* is made above the disk *p*, and attached at the edges.

The disk *p* forms both the magnet, the compass-card, and part of the float. The divisions are to be made directly upon the disk *p*, by painting or engraving, so as to avoid the weight of a separate card.

The upper part *o* of the float may be made in whole or in part of sheet-steel, so as to be magnetized, and aid in the directive force of the compass; thus, there is very little material in the card or float, which is not magnetic, and, hence, but little inertia of non-magnetic material to overcome; therefore, the compass will come to the place of rest more rapidly than heretofore usual.

The sheet metal *o* of the float is shown as made in a convex form; the disk *p* may also be either flat, concave, or convex, and may have annular ribs pressed up in the sheet metal if desired, for stiffening the compass-card.

The divisions of the compass-card, when printed or painted upon a thin sheet of paper, and connected to the sheet metal of the needle, may be a convenient way of making the compass; in this case, the plate of mica, metal, or other substance heretofore

required to stiffen the card, will be dispensed with, the magnet itself performing both its own duty and that of a foundation for the divisions.

We claim as our invention—

1. The magnet of a compass made of a disk of steel, substantially as specified.

2. A compass, in which the divisions are made upon the metal forming the magnet, substantially as specified.

3. The float, made with magnetized sheet or plate metal, substantially as specified.

4. The seat and flange, for the glass and packing formed of the sheet metal of the bowl, in combination with the rings for clamping the packing and glass to the flange or seat, substantially as set forth.

Signed by us this 14th day of December, A. D. 1869.

JOHN BLISS.
GEO. H. BLISS.

Witnesses:
CHAS. H. SMITH,
GEO. T. PINCKNEY.