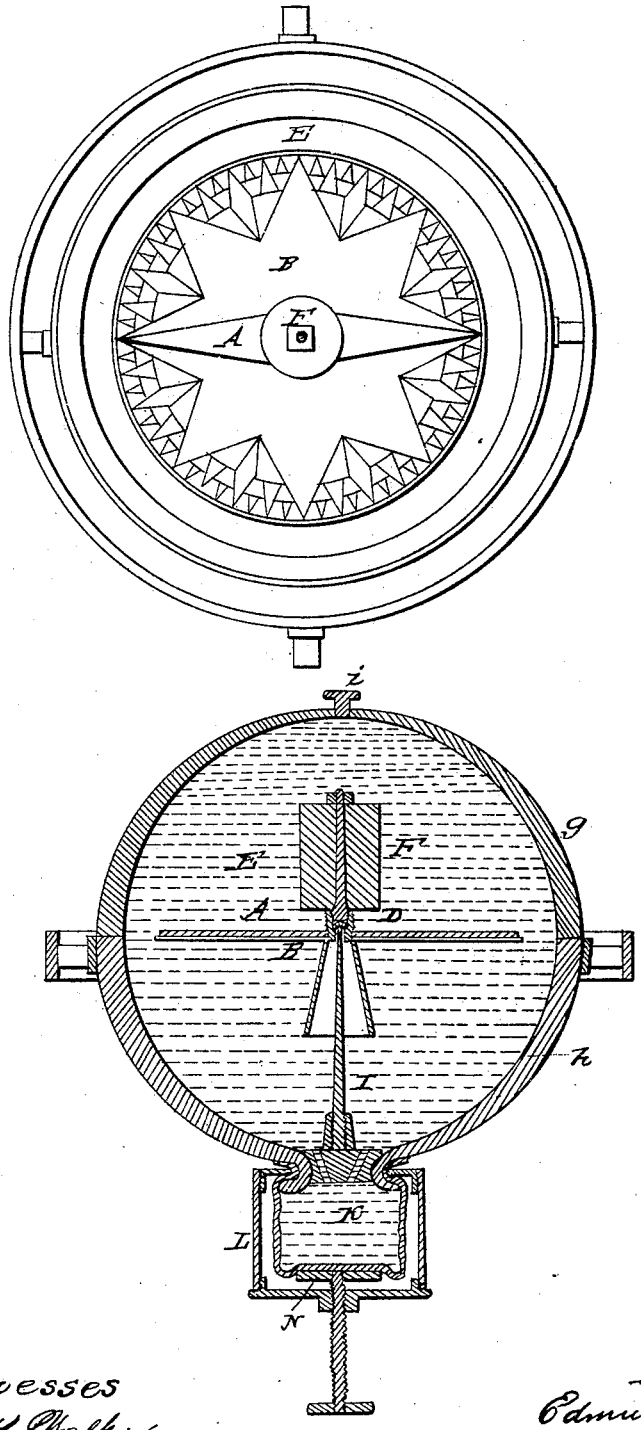
E. BLUNT.

Liquid Compass.

No. 51,290. Patented Dec. 5, 1865.



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EDMUND BLUNT, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN LIQUID-COMPASSES.

Specification forming part of Letters Patent No. **51,290**, dated December 5, 1865.

To all whom it may concern:

Be it known that I, EDMUND BLUNT, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Magnetic Compasses for Marine and other Purposes; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan of a compass constructed according to the principles of my invention, and with the upper half of the needle-vessel removed; and Fig. 2 represents a vertical section through the center of the same.

The objects of my inventions are to render the equilibrium of the needle of the compass more stable, to reduce the friction of it upon the center-pin on which it turns as a pivot, to maintain the horizontality of the needle without the application of a weight to counterbalance the tendency to dip due to magnetizing, and to magnify the image of the compass-card as desired.

To these ends the first part of my invention consists of the combination of the needle of the compass with a float situated above its center of gravity, and with a vessel to contain a liquid, so that when the compass is in operation the center of gravity of the needle with its card is suspended vertically beneath the center of the flotation of the float, with only about sufficient excess of weight in the needle (and card) to keep it upon its center pivot; hence the equilibrium of the needle is rendered stable, the friction is reduced to a minimum, the needle is free to vibrate horizontally with the least possible resistance, and, as the necessity of counterbalancing the dip is avoided by combining the needle with the central float above it there is no unbalanced weight at one side of the center of the needle to acquire momentum when the ship rolls.

The second part of my invention consists in combining the needle and central float with a vessel of internal spherical form to contain the liquid, so that advantage is taken of the equilibrium of a sphere of fluid, in the center of which the needle is suspended.

The third part of the invention consists of the combination of the needle and float with a vessel, a portion at least of which has the form of a lens, so that the image of the compass-card, magnified by the fluid in which it is suspended, is reduced according to the relative curvatures of the interior and exterior of the lens portion of the vessel.

The fourth part of the invention consists of the combination of the needle, float, and vessel to contain the liquid with a supplementary vessel of variable capacity, so that the vessel in which the needle is suspended may be kept full (notwithstanding contraction or evaporation) by varying the capacity of the supplemental vessel by a screw-press or other means.

All my improvements are embodied in the marine compass represented in the accompanying drawings. The needle A of this compass is provided with a card, B, and with a center, D, of the usual conical form, and is placed within a vessel, E, to contain the liquid. The needle is sustained by the point of a center-pin, I, which projects upward from the bottom of the vessel, and it is connected with the central float, F, either by a rod projecting upward from the needle center or in some other convenient manner.

The vessel E, in which the needle is contained, is of glass, and is in this instance composed of two parts, *g* and *h*, each of which has the form of a meniscus, the inner curve of which is a half-sphere, so that when the two parts are connected at their basis the interior cavity is a sphere. Moreover, as the radius of the exterior curve of each part of the vessel is greater than that of its interior, each part with the liquid contained therein forms a magnifying-lens, for the image of the compass-card within the vessel. The upper part of the vessel is perforated at its center to permit the introduction of the liquid, and the opening is fitted with a stopper, *i*. The lower part of the vessel is connected with a supplementary vessel, K, of variable capacity, which is formed of india-rubber, is inclosed in a case L made of parts screwed together, and is provided with a screw-press, N, by which its capacity may be reduced. The needle-vessel E is sustained in a hoop, and is suspended in gimbals in the usual manner.

In constructing this compass the point of suspension of the needle center D is arranged a little above the center of gravity of the nee-

dle, and the needle is carefully balanced before it is magnetized. It is then magnetized and connected with its compass-card B, which should be carefully balanced, and with the float F, which may be made of cork, or may be a tight vessel of some denser material filled in whole or in part with air. The whole is then placed in water, and the float is adjusted either by cutting it away, or by loading it, until it will float the needle and its appurtenances with the top of the float even or thereabout with the surface of the water. The center of flotation is thus vertically above the center of gravity, and consequently the equilibrium of the whole is stable. The whole is then removed from the water and is inclosed in the needle-vessel E of the compass, which is filled with a mixture of alcohol and water. As this mixture is of less specific gravity than water, the float is now insufficient to sustain the entire weight of the needle and its appurtenances; hence it rests upon the center-pin with a very slight pressure, and the friction which opposes its traversing is exceedingly minute.

The compass may be suspended above, so as to be seen from beneath, in which case the bubble that forms at the top of the vessel from the evaporation of the liquid or other causes does not interfere with the view, and the supplementary variable vessel K may be dispensed with.

If the compass be suspended so as to be viewed from above the supplementary variable vessel is advantageous to supply liquid from beneath to the needle-vessel above and keep the latter nearly full, so that but a small bubble remains.

The variable vessel may be a cylinder of rigid material fitted with a piston if deemed best.

If it is necessary to construct a standard compass for accurate observations on shipboard the card is dispensed with and a ring is attached to the needle-vessel, divided into degrees, so that it may be used in the same manner as a circumferenter or surveyor's compass, as if for determining the course of the ship zero is to be placed in a line parallel with the keel of the vessel, and if it is deemed expedient to isolate the needle from the fluid, it may be done by inclosing it in a tube with glass ends or entirely of glass. In this case the magnetic course is read at either end of the needle.

Having thus described a marine compass embodying all my improvements, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the needle of the compass with a central float and with a vessel to contain a liquid, substantially as before set forth.

2. The combination, in a compass, of the following instrumentalities, viz: the needle, central float, and vessel having a spherical form internally, substantially as before set forth.

3. The combination, in a compass, of the following instrumentalities, viz: the needle, central float, and vessel, a portion at least of which is of a lens form, substantially as before set forth.

4. The combination, in a compass, of the following instrumentalities, viz: the needle, central float, needle-vessel, and supplemental vessel of variable capacity, substantially as before set forth.

In witness whereof I have hereunto set my hand this 25th day of July, A. D. 1865.

EDMUND BLUNT.

Witnesses:

F. M. NASH,

JAMES KENNEDY.