C. KLINE.

Compass.

No. 22,125. Patented Nov. 23, 1858.

Fig. 1,

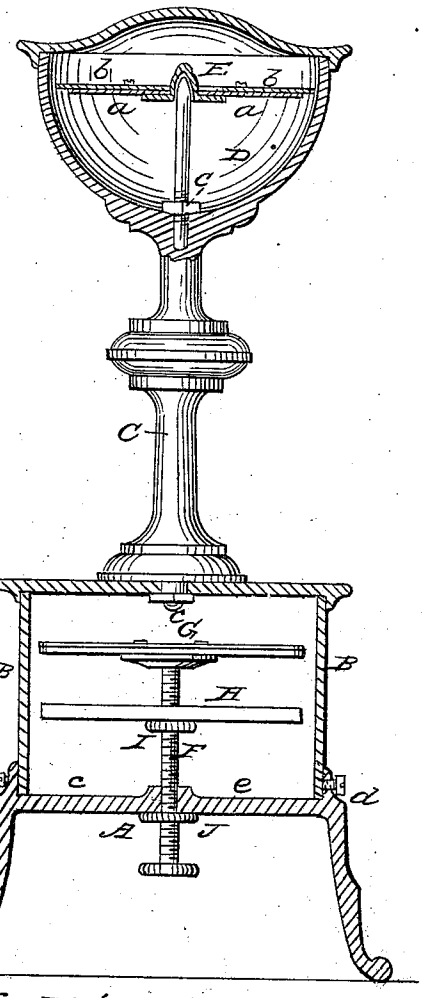


Fig. 2,

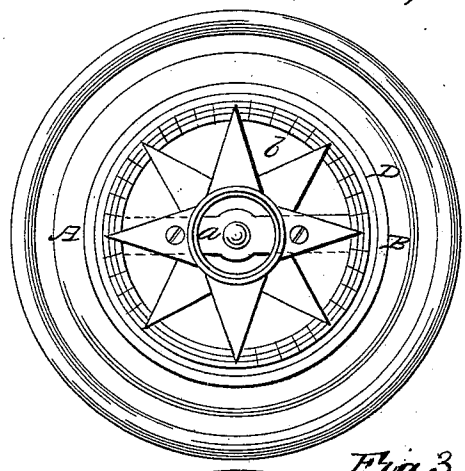


Fig. 3

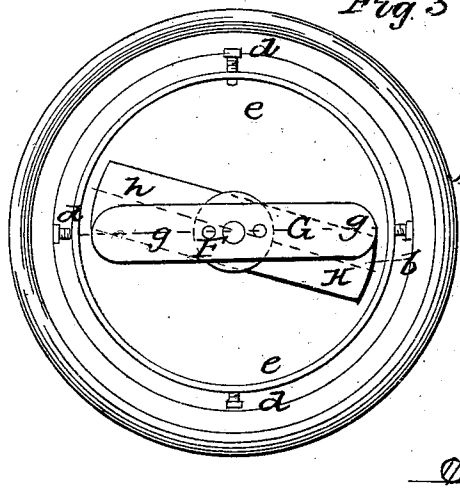
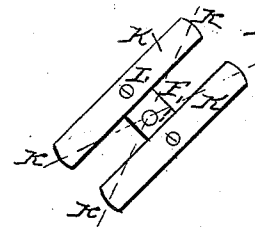


Fig. 4.



N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

CALVIN KLINE, OF BROOKLYN, NEW YORK.

IMPROVED METHOD OF NEUTRALIZING LOCAL ATTRACTION OF THE NEEDLE.

Specification forming part of Letters Patent No. **22,125**, dated November 23, 1858.

To all whom it may concern:

Be it known that I, CALVIN KLINE, of the city of Brooklyn, in the county of Kings and State of New York, have invented a new and improved method of arranging and applying magnets to counteract and compensate for the effects of local attraction on the mariner's compass; 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, making part of this specification.

The nature of this invention consists in the arrangement of one or more magnets in a horizontal position or positions below or above the needle of the compass, whose opposite poles lie in the horizontal planes, having their common neutral center in the needle's axis of rotation and on opposite sides thereof, by which arrangement the opposite poles of the magnet or magnets are caused to act upon the needle to force it into the same direction, and in so applying the so arranged magnet or magnets as to make it or them adjustable on a center coinciding as nearly as practicable with the vertical axis about which the needle turns, that their poles may be made to point in any direction necessary to compensate for the local attraction, and may have their direction varied to meet any variation in the point or points of local attraction that may be produced by different cargoes or by other causes.

The accompanying drawings represent the invention applied to a binnacle in such a manner as to make it constitute what may be termed a "compensating binnacle."

Figure 1 is a vertical central section of the binnacle. Fig. 2 is a plan of the same. Fig. 3 is a plan of the lower part of the same and the magnets. Fig. 4 is a plan view of a modified arrangement of the magnets.

Similar letters of reference indicate corresponding parts wherever they occur in the several figures.

A, Figs. 1, 2, 3, is the base of the binnacle, and B C is a pillar erected thereon to support the bowl D, in which the compass E may be suspended in a gimbal in the usual manner.

a is the magnetic needle, having the card *b* attached.

The pillar and bowl may be of wood, brass, or composition metal.

The pillar B C is made in two parts and secured together by a central bolt, *e*, which also secures the bolt to them. The lower portion, B, of said pillar is made hollow to constitute a box to contain the compensating magnets, and open at the bottom, and fitted into a recess in the top of the base and secured by screws *d d* at the sides.

F is a long spindle, having on its exterior a screw-thread, which screws through the center of the top part, *e*, of the base, and arranged in such a position that when the binnacle is perfectly upright its axis will coincide or be in line with the vertical center or axis about which the needle turns. To this spindle F the compensating magnet or magnets is or are attached.

The drawings represent two compensating magnets, G H, consisting of straight flat bars, one, G, being permanently secured to the top of said spindle, and the other, H, having a hole through it, which is screwed internally to fit to the thread of said spindle and permit it to be adjusted higher or lower thereon and nearer to or farther from the upper one, G.

I is a jam-nut on spindle F for securing the magnet H in any position.

The spindle F has a head or handle at its lower extremities by which to turn it to make the magnets point in any direction, and to raise and lower both together to bring them nearer to or farther from the compass.

J is a jam-nut fitted to the screw-thread of the spindle F below the head *e e* of the base, and intended to secure the screw by its being screwed up against the bottom of said head *e e*. An opening should be provided in the base to admit a person's hand to manipulate the spindle F and nut J.

It will be understood by reference to the two red lines *g h*, drawn through the center of the spindle F in Fig. 3, what is meant in the before-recited statement of the nature of this invention by the arrangement of the magnets with respect to their poles, said lines passing through the axis of the spindle F and through the poles of the two magnets, respectively—*g* through G and *h* through H. It will be also understood that by the well-known law in magnetism which causes like polarities to repel and opposite polarities to attract each other both poles of either magnet thus arranged will act upon the needle with similar

effect—that is to say, with a tendency to bring the south pole of the needle over the north pole of the magnet, and vice versa.

The adjustment of the magnets H G to compensate for local attraction is as follows: The local attraction being apparent, its seat or the direction thereof is ascertained by the usual or any suitable method; and it must also be ascertained whether it attracts the north or south pole of the needle. If said attraction be all toward one point, as is most frequently the case, the magnets H G, of which there may be any number, must all be adjusted to point the same way, or with their north poles all in the same direction, and vice versa, so as to constitute, in effect, a single magnet, which is all that is really necessary in this case, and are thus secured to the spindle. The spindle is then turned till the projection of a horizontal line passing through its axis and through the poles of the magnets is directed toward the point of attraction, or to a point in the same vertical line, the north pole being set toward said point if the local attraction is for the north pole of the needle, or vice versa. If the north pole of the needle does not then point in the true direction, it is because the action of the magnets is either not sufficiently intense or too much so, and the spindle is raised or lowered by screwing it up or down to increase or diminish the intensity of the action of the magnets till, when they are directed, as above mentioned, to the point of the local attraction, the needle is true, and the spindle being then secured by the nut J, the compensation for the local attraction thus effected will be true in all positions of the vessel, which is seldom the case when the compensation is effected by magnets arranged entirely at the side or sides of the compass. In case the local attraction is toward two or more different points the adjustment is more difficult, as the said points having to be ascertained, and also the relative intensities of the attraction ascertained, one or more magnets have to be directed in the manner above described toward each point, and then adjusted higher or lower till the degree of compensation is perfect and the needle points in the true direction.

Fig. 4 represents the arrangement of the magnets in pairs instead of singly, as represented in Figs. 1, 2, 3. The two straight-bar magnets K K, constituting the pair, are arranged parallel with each other side by side, with their north poles both pointing in the same direction, and are connected together rigidly by a cross-bar, L, of brass or other unmagnetic metal, which bar is attached at the center of its length, or exactly midway between the magnets, to the spindle F, in the same manner as either of the magnets G H, their poles being arranged relatively to the axis of rotation, as before described, as indicated by the red lines R R in Fig. 4. Instead of a pair a set consisting of a greater number of magnets may be connected in the same way—an equal number on each side of the spindle; but they must be arranged as before described. A central magnet placed between the pair or pairs, and arranged midway between them and relatively to the spindle, like G or H, may be used in combination with a pair or set applied like K K. In case of the pairs or sets of pairs being used arranged in this way, they are so set for compensation that both or all are parallel with a plane passing through the axis of the spindle and the point of local attraction. Though it is preferable, either with the singly-arranged magnets represented in Figs. 1, 2, 3, or with the modified arrangement in pairs or sets, as illustrated in Fig. 4, to have the spindle F attached at or opposite to the center of the length of the magnets, this is not absolutely necessary.

For a "tell-tale" compass substantially the same mode of applying the magnets may be adopted; but it might be preferable to arrange them above instead of below the compass, which latter is the most convenient arrangement for a binnacle-compass.

The arrangement of and mode of applying the magnets herein described not only affords much greater convenience for adjusting the compensation than when the magnets are arranged at the side or sides of the compass, and affords a more correct compensation for all positions of the vessel, but, provided the magnets are arranged at the same distance from the needle, their effect is greater than that of magnets of corresponding power arranged at the side or sides of the compass by reason of their double action—that is to say, the action of the opposite poles upon the needle, both with a tendency to move it in the same direction, and their arrangement in lines directly toward or parallel with lines that are directed toward the point of local attraction.

I do not confine myself to the arrangement of the magnets within a binnacle; but

What I claim as new and of my invention is—

Applying and arranging the magnet or magnets in a horizontal position or positions below or above the needle of the compass with opposite poles in the vertical plane of the axis about which the needle turns and on opposite sides thereof, and in such a manner as to be adjustable on centers lying in or as nearly as practicable in the vertical axis about which the needle turns, that their poles may be made to point in any direction necessary to compensate for local attraction, and have such direction varied as may become necessary, substantially as herein set forth.

CALVIN KLINE.

Witnesses:

WM. TUSCH,

EDWARD A. TUTTLE.