(No Model.)

L. SIRIEIX.

CORRECTING DEVICE FOR SHIPS' COMPASSES.

No. 378,528. Patented Feb. 28, 1888.

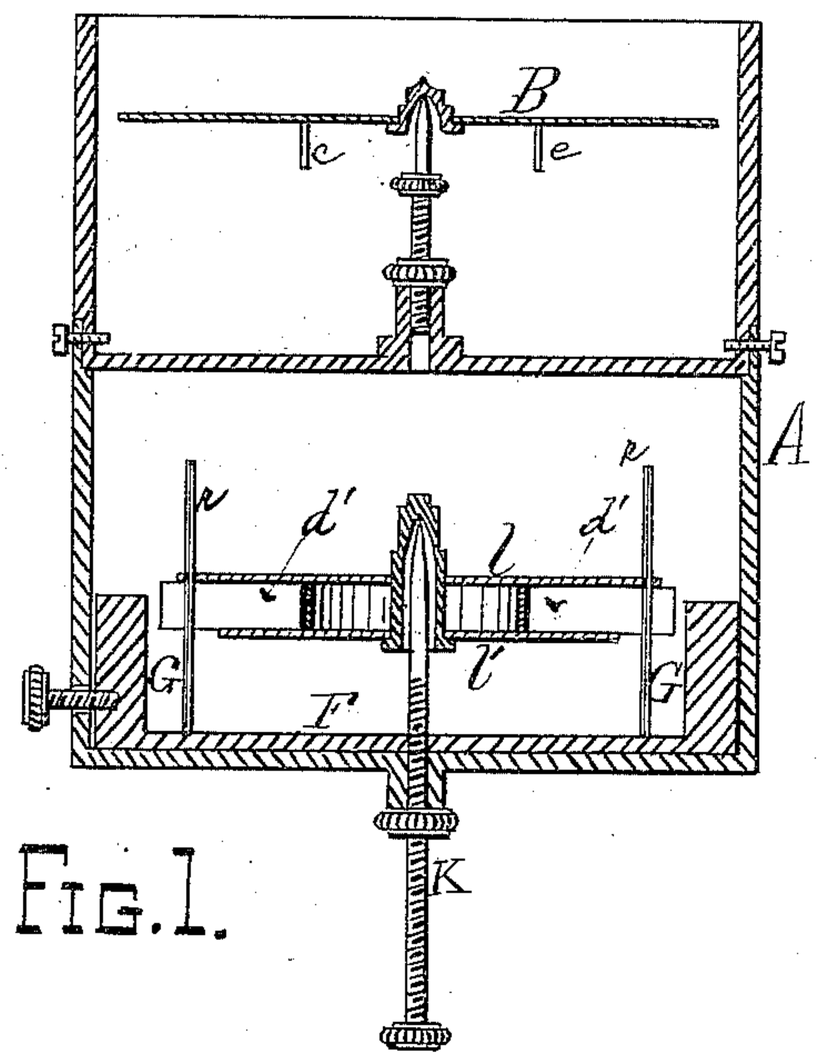


FIG. 1.

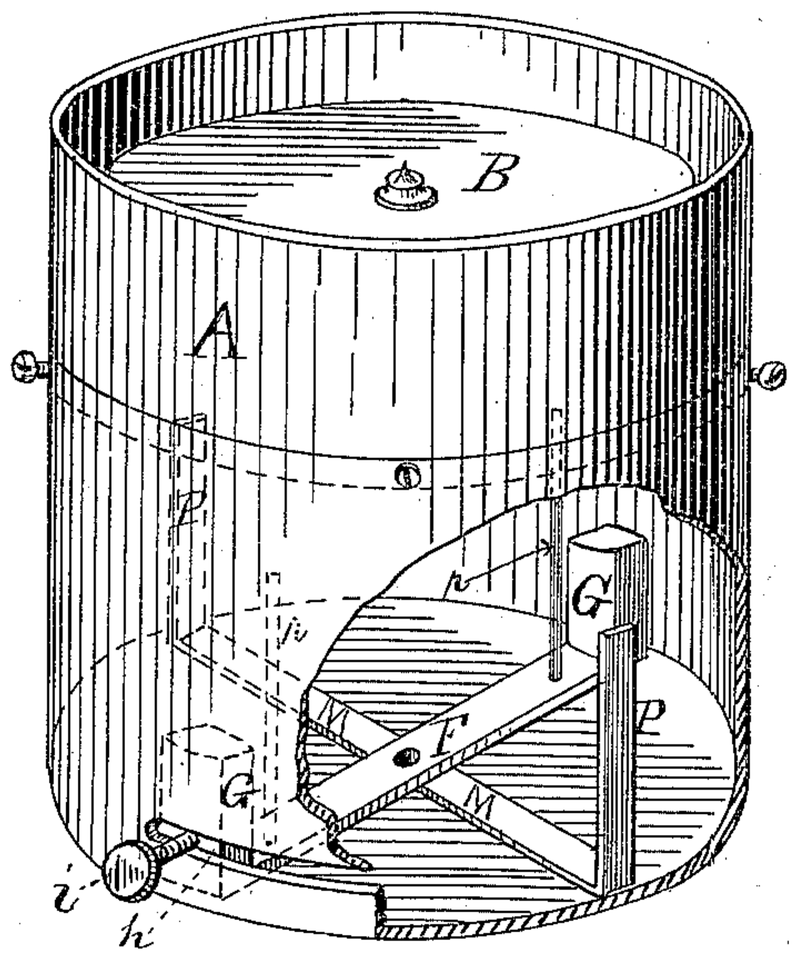


FIG. 2.

FIG. 3.

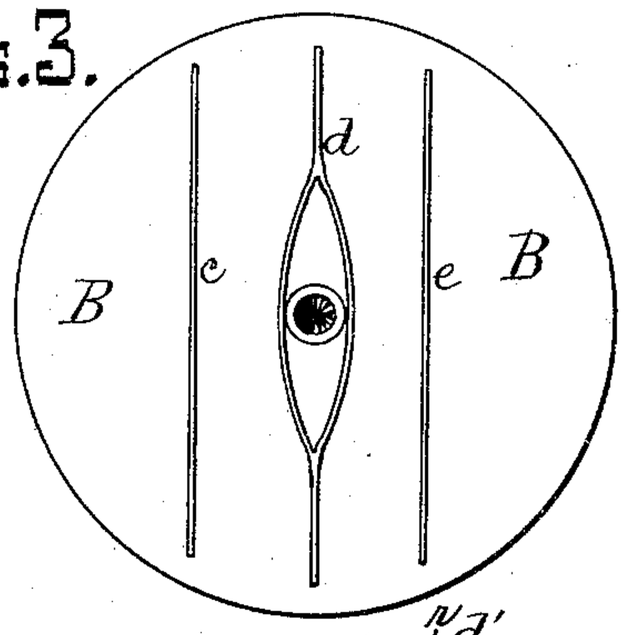


FIG. 4.

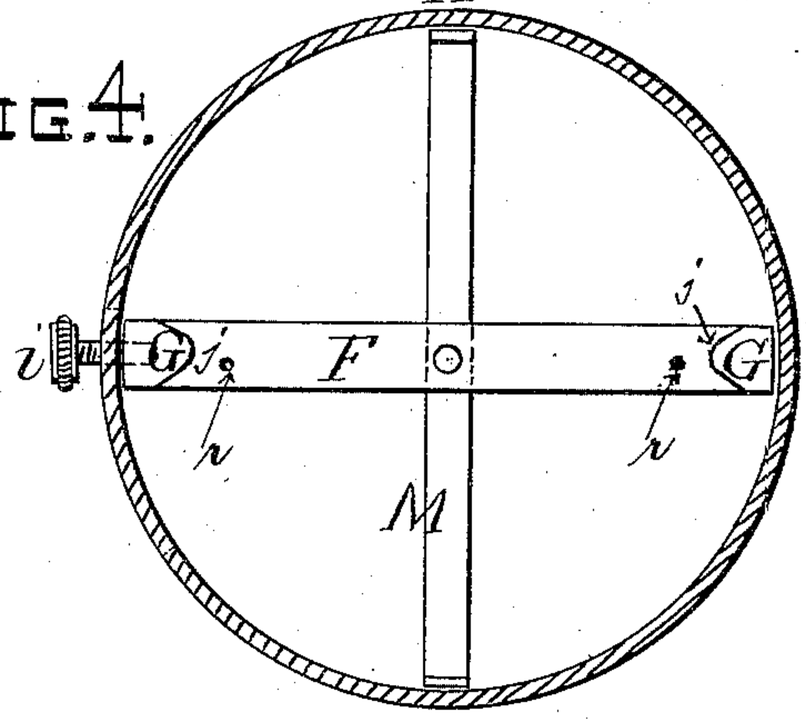


FIG. 5.

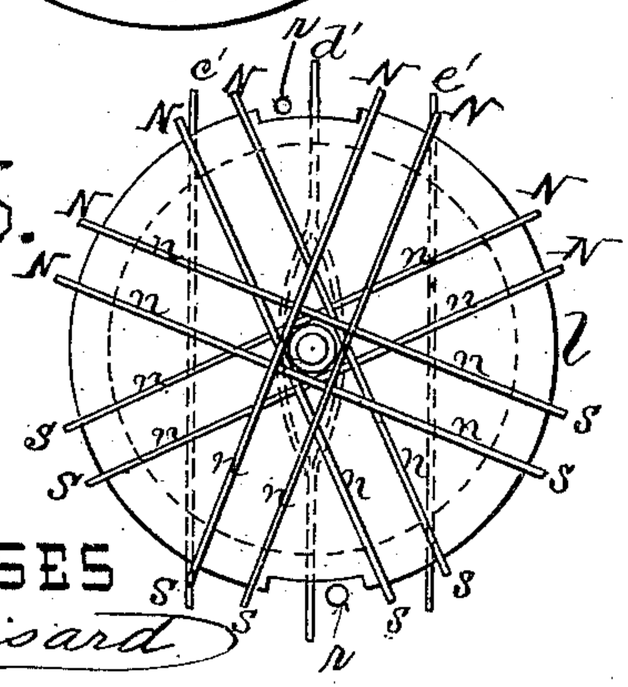
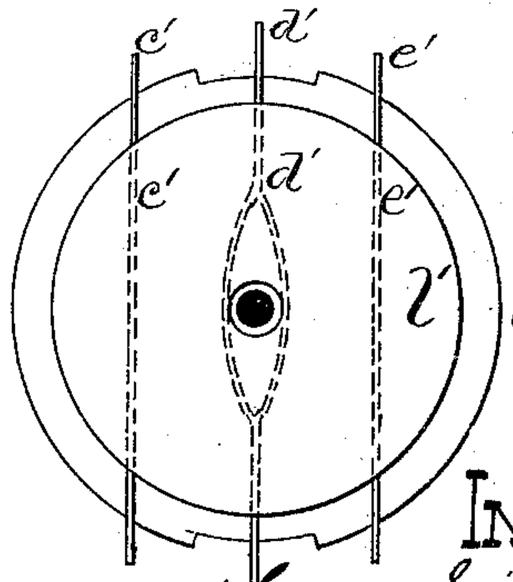


FIG. 6.



WITNESSES

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UNITED STATES PATENT OFFICE.

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CORRECTING DEVICE FOR SHIPS' COMPASSES.

SPECIFICATION forming part of Letters Patent No. 378,528, dated February 28, 1888.

Application filed April 16, 1887. Serial No. 235,116. (No model.)

To all whom it may concern:

Be it known that I, LÉON SIRIEIX, of the city and county of San Francisco, State of California, have discovered and invented an Improved Apparatus for Correcting the Deviations of the Magnetic Needle or Compass; and I do hereby declare that the following is a true and correct description thereof.

My invention has for its object the provision of a simple and effective arrangement for correcting the deviations of the magnetic needle, whether such deviations arise from general or local influences.

It is well known that any local attraction—such as the proximity of iron or loadstone—will greatly disturb the normal position of the needle and produce more or less deviation, according to the condition under which the needle is placed. This is especially noticeable on iron or steel vessels or ships, or where such magnetic bodies are carried by wooden vessels. In such cases the deviation of the magnetic needle is often so great and uncertain as to render it almost useless as a guide to navigation. I have discovered that this deviation can be corrected by means of a correcting-compass provided with certain magnetic bars, the principal ones of which are set or held transversely to the length of the vessel, and that the action of the magnetic current passing through these bars will correct the prime needle or compass, and that the power of this correcting influence can be regulated by the vertical adjustment of the correcting-compass so as to produce a differential or differentiated action upon the needle of the prime compass, and also that by the addition of inductors of soft iron placed at the poles of the correcting-compass all quadrantal deviation arising from induction will be compensated and the action of the correcting-compass aided.

In this specification I use the term "differential" to designate the position which the needle assumes when caught between the two forces derived, the one from the terrestrial magnetism and the other from the sub-permanent and induced magnetism of the vessel.

The accompanying drawings illustrate a practical means for carrying the invention into practice and use.

Figure 1 is a vertical section of the compass-box, showing the true or prime compass and the correcting-compass in position. Fig. 2 is a perspective view of the compass-box with a portion broken away to show the magnetic inductors and their means for adjustment. Fig. 3 is a bottom view of the prime compass. Fig. 4 is a plan view of the bottom of the compass-box. Fig. 5 is a plan view of the upper card of the corrector-compass, and Fig. 6 is a bottom view of the same.

Let A represent the case, binnacle, or box in which a compass or magnetic needle, B, is mounted in the usual and ordinary way. For the purposes of brevity and perspicuity the compass B will be termed the "prime" compass throughout the specification.

I may divide the case, binnicle, or box A by a horizontal partition into an upper and a lower compartment; or, if preferred, it may have only a single compartment, in which the entire mechanism is placed and mounted.

When the case, binnacle, or box is divided into two compartments, the prime compass is mounted in the upper compartment and the correcting-compass and parts used with it in the lower compartment. On the under side of the prime-compass card B, I secure three parallel magnetic bars, of steel or other magnetic metal, *c d e*, placed edgewise. The middle bar, *d*, coincides exactly with the magnetic line indicated on the face of the prime compass by N and S, while the bars *c* and *e* are parallel with it and equidistant from it on each side, the distance being thirty degrees (30°) from the middle bar. I have found in practice that three bars thus arranged give better results than I can otherwise obtain, or have thus far obtained, and consequently I prefer the three arranged as described.

Upon the pointed upper end of a rod or spindle, K, which extends into the box A and can be adjusted from the outside thereof, the correcting-compass is mounted beneath the prime compass. The correcting-compass consists of two disks of card-board, mica, or other non-magnetic substance, the upper disk, *l*, being somewhat larger in diameter than the lower disk, *l'*. These disks are fixed on the central hub or center pivot-block at a short

distance apart, as shown in Fig. 1, and are separated by three magnetic bars, *c' d' e'*, parallel with each other, and thirty degrees (30°) from each other, as above stated in relation to the bars on the prime compass, and for the same reason. The middle bar, *d'*, is somewhat heavier than the side bars, *c' e'*, and it is secured on a line corresponding with N and S on the face of the upper disk, *l*. On the upper face of the disk *l*, I secure four pairs of narrow magnetic bars, *n n*, placed diagonally across each other and across the disk, so that each pair of bars from the center to the periphery of the disk will point to one of the cardinal points of the compass, the four pairs of cross bars or strips forming eight radial pairs leading from the center outward. The poles of these small bars *n n* are arranged to balance each other, half north and half south, as indicated in Fig. 5 by N and S.

Upon the bottom of the lower compartment of the binnacle or box I secure a brass or other non-magnetic bar, F, by means of a pivot at its middle, which pivot is preferably the rod K. To each end of the bar F is secured a short upright block of soft iron, G. A horizontal slot is made in the side of the case A opposite one of the blocks G, through which a threaded pin from the block passes, and a thumb or set nut, *i*, serves to fix the blocks and the connecting-bar F in place by tightening the nut against the outside of the case. By loosening the nut the bar F, with its blocks G G, can be adjusted a distance equal to the length of the slot in order to put them in the line of the induced magnetism. Each of the blocks G has the edge of its inner face beveled, so as to present two narrow blunt edges, *j j*, toward the middle of the bar. The correcting-compass *l l'* is held in place between the blocks G G by means of guides or stops *r r*, so that the magnetic bars *c' d' e'* are set transversely to the length of the ship, while their poles coincide in direction with the blocks G G. The guides or stops *r r* are non-magnetic, and the arrangement is such that the correcting-compass can be freely adjusted vertically, and will be allowed a slight rotary movement to feel its true position in respect to the parts G G.

In practice the case, binnacle, or box A is so placed that the soft-iron blocks G G are on the sides of the correcting-compass next to the sides of the vessel. The soft-iron blocks G will then be induced by the sub-permanent magnetism of the iron sides of the ship. The blunt inner edge of the block on one side will be a negative pole and the inner edge of the opposite block will be a positive pole, according to the position of the magnetic poles of the vessel. The correcting-compass being mounted between the two blocks G G, with liberty for some rotation, the center bar, *d'*, will arrange itself exactly opposite the poles of said blocks; and this great certitude and nicety of position is insured by the parallel flat bars *n n* on the upper face of disk *l*. These bars compensate the magnetic influence and enable me to reach an exactness of position which I cannot otherwise obtain, as I have found in my experiments that the employment of these bars in the manner described corrects the compass to a great nicety and compensates several degrees of deviation which would otherwise affect the needle.

With the correcting-compass mounted as described the prime compass will be found to be completely corrected and deviations compensated for in a manner to render the prime compass a reliable indicator and guide for navigation. I have found that good effects are also produced in cases where it is desired to counteract or correct the magnetic influence of vertical iron on a vessel by the employment of two blades of soft iron, P, united by a non-magnetic strip or bar, M, in the box or compartment containing the correcting-compass. The strip M is set transversely to the bar F fore and aft. These supplemental inductors P P are only needed where there is a great quantity of induction from vertical iron, and in other cases they may be omitted.

The combined action of the correcting-compass and the soft-iron blocks G, which act as inductors, is to correct the deviations due to both sub-permanent and induced magnetism of the ship. The constant deviation is compensated by the vertical adjustment of the correcting-compass, and the allowance for the changes of magnetic latitude and magnetic longitude is made in the same way, said changes as well as the constant deviation being ascertained in the usual way by observations. The semicircular deviation is compensated by the soft-iron blocks G, in conjunction with the magnetic bars on the correcting-compass, the inductors G being influenced by the magnetism from the ship's sides and in turn influencing the main bar *d'* of the correcting-compass, and the quadrantal deviation is corrected by the soft-iron blocks or inductors, which, according to natural laws governing the induction of soft iron, change their polarity as the ship's course is changed in azimuth, in correspondence with the changes of polarity of the induced magnetism of the ship's sides. The heeling error is corrected or overcome by the construction and arrangement of the prime and corrector compasses, by means of which they are held always parallel with each other; and, so far as my experiments and tests have demonstrated, this difficulty of the heeling error will not manifest itself to any appreciable extent in my compass. If it should, it can readily be corrected in the usual manner well known to seamen.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A correcting-compass, *l l'*, provided with two sets of magnetic bars, one set being underneath the card of the compass and the other

set on its top, in combination with a prime compass having magnetic bars, substantially as specified.

2. In a compensating compass, the combination, with a prime compass and a correcting-compass, of the soft-iron blocks G, mounted beside and moved with the correcting-compass, as set forth.

3. In a compensating compass, the combination, with a prime compass and a correcting-compass, of the soft-iron blocks G, mounted beside and moved with the correcting-compass, and means, substantially as described, for adjusting the said blocks and correcting-compass in a horizontal plane, as set forth.

4. In a compensating compass, the combination, with the prime compass and a correcting-compass, of the soft-iron blocks G G, and bar F, on the ends of which they are mounted, and the guides or stops *r r* on bar F, to hold the correcting-compass within slight limits of rotation, as set forth.

5. In a compensating compass, the combination of a prime and a correcting compass, and the upright soft-iron blades P, arranged relatively to the correcting-compass, as described, to compensate the magnetism from vertical iron, substantially as specified.

In witness whereof I have hereunto set my hand.

LÉON SIRIEIX.

Witnesses:
E. P. VOISARD,
J. J. SCRIVNER.