

No. 619,618.

Patented Feb. 14, 1899.

L. RELLSTAB.
SHIP'S OR SIMILAR COMPASS.

(No Model.)

(Application filed Mar. 20, 1897.)

3 Sheets—Sheet 1.

Fig. 1.

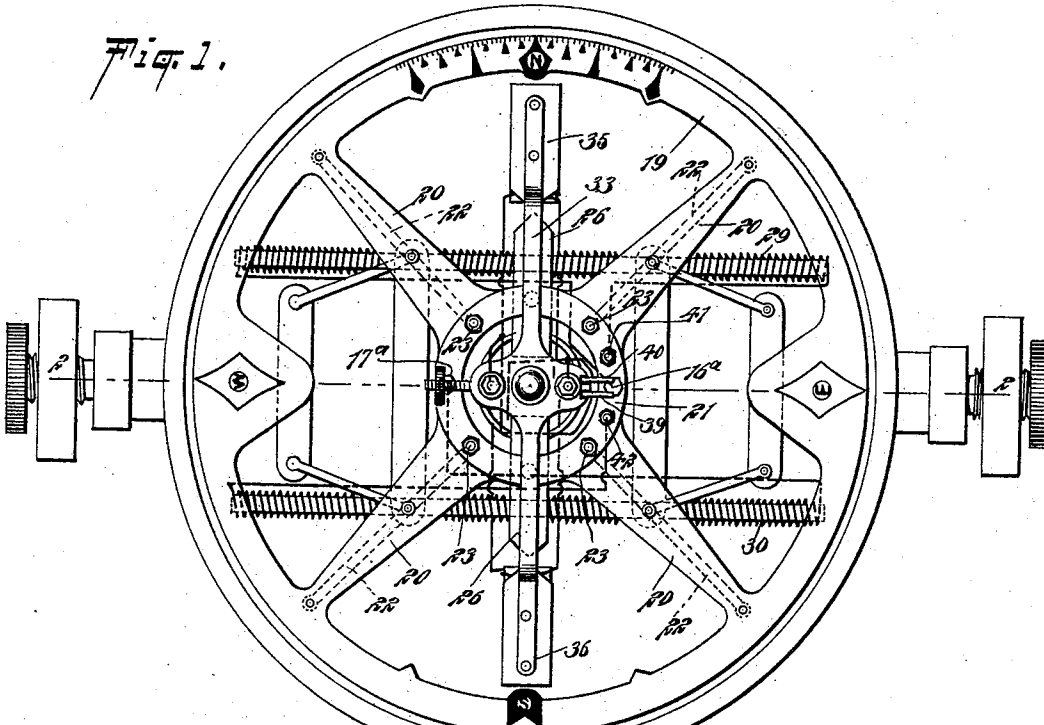
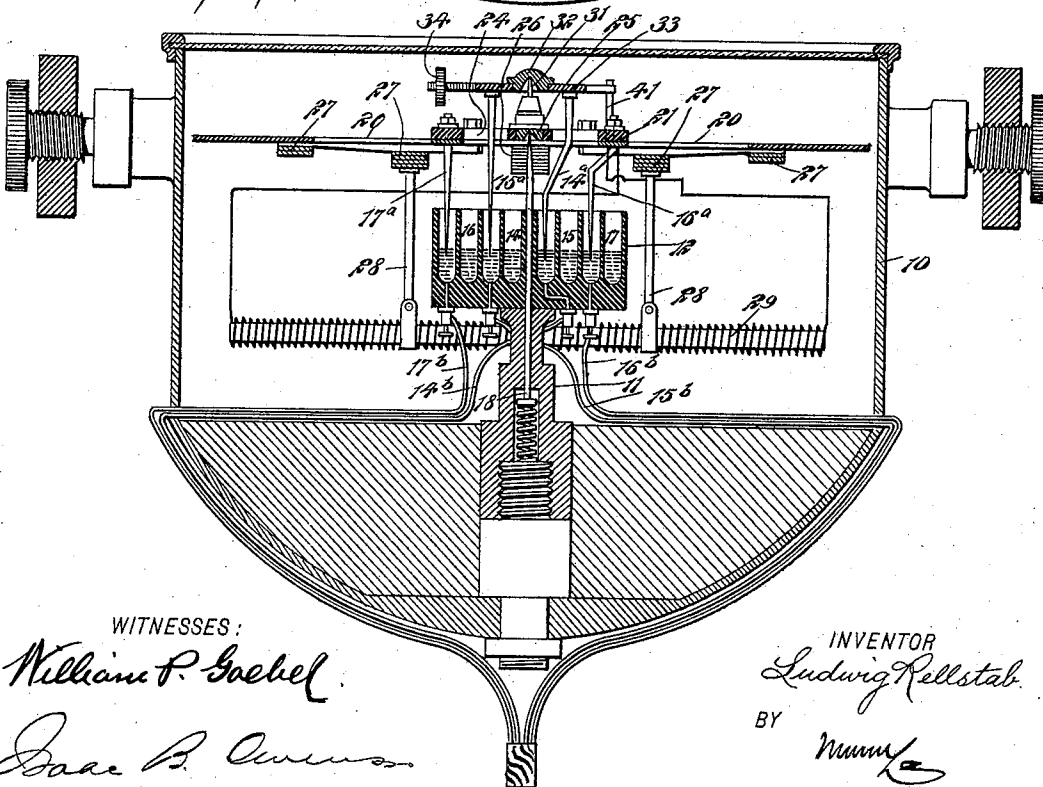


Fig. 2.



WITNESSES:

William P. Gabel.

Isaac B. Owens.

INVENTOR

Ludwig Rellstab.

BY

Munn & Co.

ATTORNEYS.

No. 619,618.

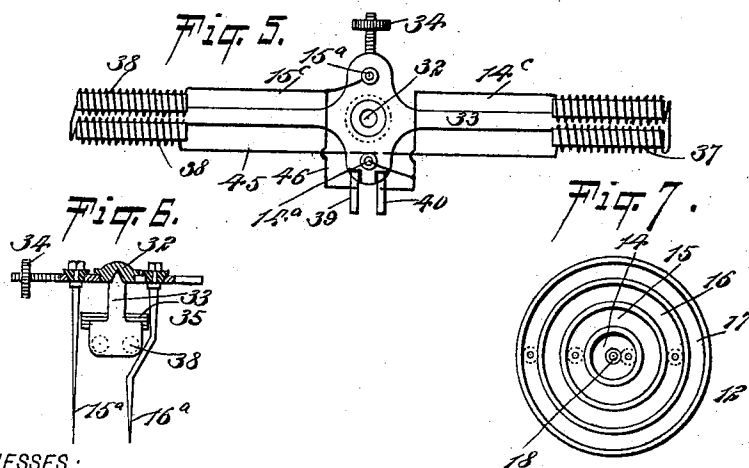
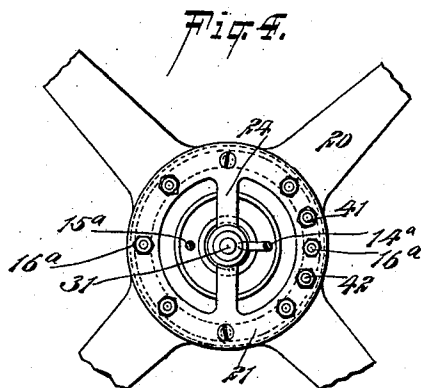
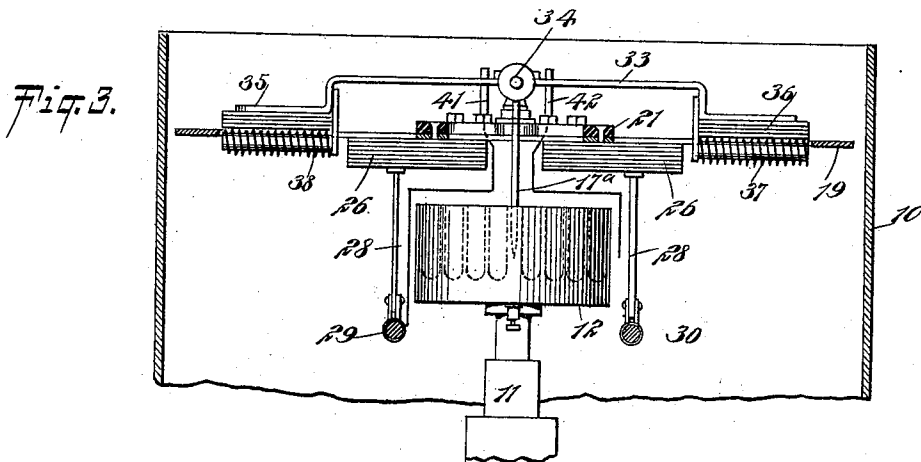
Patented Feb. 14, 1899.

L. RELLSTAB.
SHIP'S OR SIMILAR COMPASS.

(No Model.)

(Application filed Mar. 20, 1897.)

3 Sheets—Sheet 2.



WITNESSES:

William P. Goebel.
Jesse B. Owens.

INVENTOR
Ludwig Rellstab.
BY *Mumford*
ATTORNEYS.

No. 619,618.

Patented Feb. 14, 1899.

**L. RELLSTAB.
SHIP'S OR SIMILAR COMPASS.**

(Application filed Mar. 20, 1897.)

3 Sheets—Sheet 3.

(No Model.)

Fig. 8.

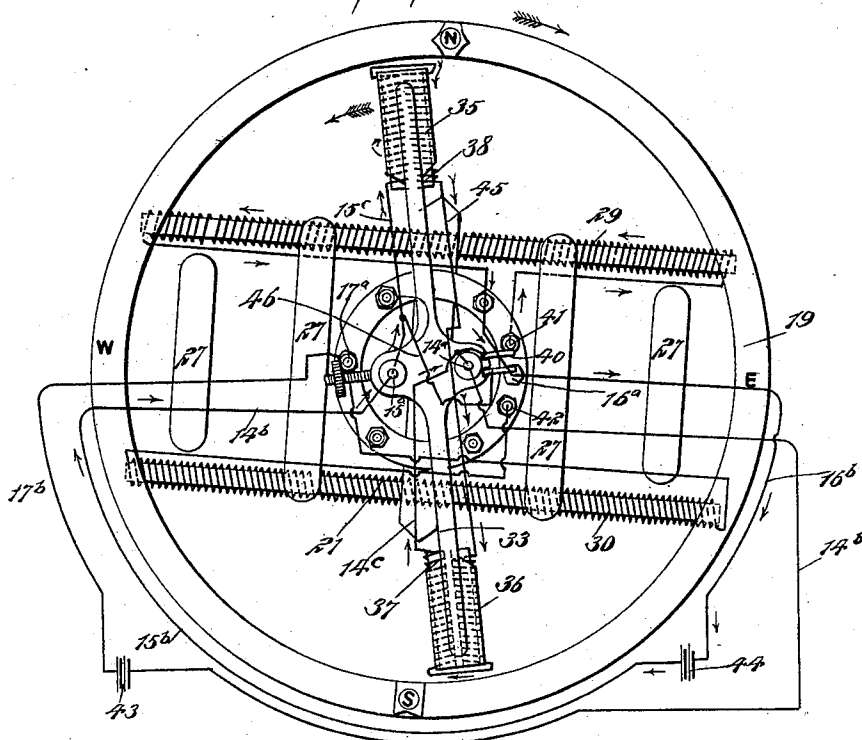
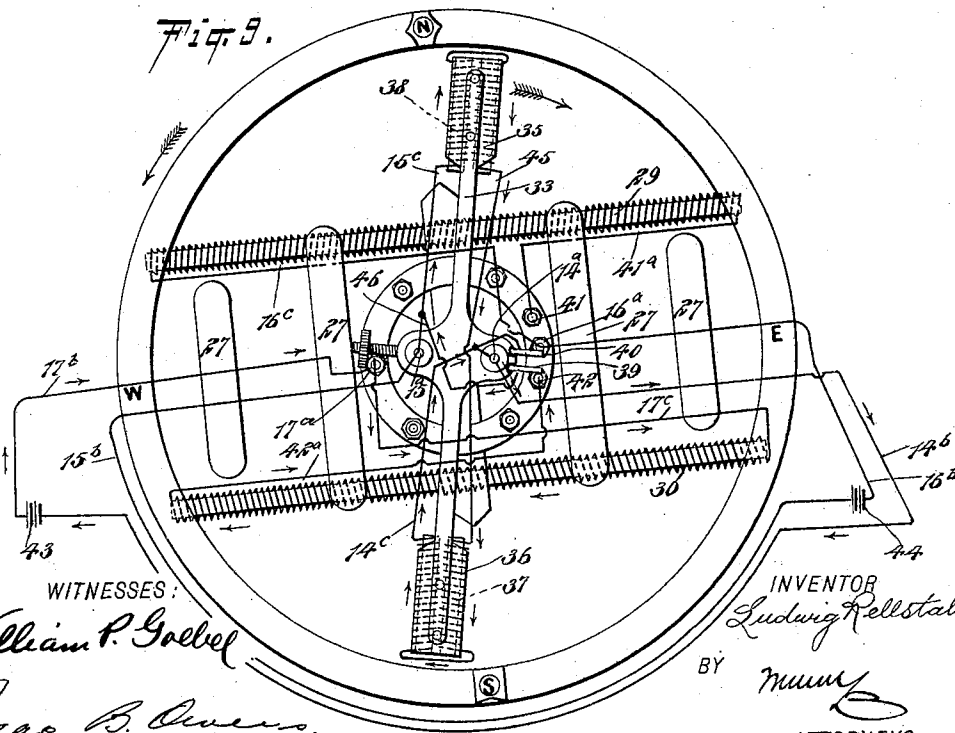


Fig. 9.



UNITED STATES PATENT OFFICE.

LUDWIG RELLSTAB, OF KIEL, GERMANY.

SHIP'S OR SIMILAR COMPASS.

SPECIFICATION forming part of Letters Patent No. 619,618, dated February 14, 1899.

Application filed March 20, 1897. Serial No. 628,475. (No model.)

To all whom it may concern:

Be it known that I, LUDWIG RELLSTAB, a subject of the King of Prussia, Emperor of Germany, residing at Kiel, in the Kingdom of Prussia, Germany, have invented new and useful Improvements in or Relating to Ships' or Similar Compasses, of which the following is a specification.

This invention relates to a compass designed especially for use on shipboard and constructed so that the deflection of the compass occasioned by the influence of adjacent magnetic bodies will be automatically corrected. This end is attained by mounting on the compass-card an electro magnet or magnets which upon the deflection of the card are energized, so that a counter influence will be exercised on the card and the card returned to its proper position.

This specification is the disclosure of one form of my invention, while the claims define the actual scope of the invention.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the invention. Fig. 2 is a vertical section thereof on the line 2 2 of Fig. 1. Fig. 3 is a fragmentary section of the invention, taken on a line at right angles to the line of Fig. 2. Fig. 4 is a fragmentary plan view of the hub or center of the card. Fig. 5 is an inverted and partly-diagrammatic view of the rider. Fig. 6 is a cross-section thereof. Fig. 7 is a plan view of the mercury-cup for forming mobile contacts in the several electrical circuits that are employed, and Figs. 8 and 9 are diagrammatic views illustrating the action of the apparatus.

The compass-box 10 may be of the usual construction and mounted in the usual manner. Projecting upwardly and centrally from the bottom of the box is a column or pedestal 11, on which is mounted a hard-rubber cup 12, having therein four annular concentric cavities, (designated, respectively, 14, 15, 16, and 17.) Each of these cavities is supplied with a quantity of mercury, so that the contact-fingers 14^a, 15^a, 16^a, and 17^a in respectively moving through the cavities will make continuous contact with the mercury. Electrically connected with the mercury in the

cavities 14, 15, 16, and 17 are the respective lead-wires 17^b and 15^b and return-wires 16^b and 14^b. These leads and returns pass out of the bottom of the box 10 and downward therefrom to two sources of electrical energy, as will be fully explained hereinafter.

Yieldingly sustained in the column 11 is a perpendicular pin 18, which projects through the mercury-cup 12 and upward above the same and supports the compass-card, with the magnetic needle thereof. The card has a rim 19, to which are attached radial arms or spokes 20, running into and joined with an annular hub 21, that is formed of non-conducting material. The spokes 20 have each on its under side strengthening-ribs 22, (see the dotted lines in Fig. 1,) which are fastened at their inner ends by bolts 23, secured to the annular hub 21 of the card. To the hub 21 of the card are fastened the contact-fingers 16^a and 17^a, the arrangement being such that these fingers may swing with the card and at the same time maintain their contact with the mercury in the cup 12. Supported rigidly on the hub 21 of the card and by means of a cross-bar 24 (shown in Figs. 1 and 4) is a bearing 25, that is poised on the pin 18, by which means the compass-card is supported.

The compass-card carries the main or central magnetic needle 26 and four auxiliary magnetic needles 27, all arranged in parallelism and exerting concordant influences on the card to maintain the same normally in position. Supported by hangers 28, depending from the compass-card at suitable points, are two electromagnets 29 and 30, which range east and west and which are located the magnet 29 at the north half of the card and the magnet 30 at the south half of the card. These electromagnets swing with the card and form part thereof. They are projected by the hangers or arms 28 to a plane below that of the mercury-cup 12, so as to remove them as far as possible from the permanent magnets or needles of the card.

Mounted on the bearing 25 of the card is a pin 31, on which is poised a bearing 32, held by a rider-bar 33, which is mounted to swing on the point 31 and which may be balanced by a screw-poise 34. The rider is best shown in Fig. 5, where it may be seen that the rider is formed of a bar with a transversely-widened

middle portion. This rider is of a length equal to slightly less than the diameter of the card and carries at one end a permanent magnet 35 of southern polarity and at the other end a permanent magnet 36 of northern polarity. The result of this arrangement is that the position of the rider normally is that shown in Fig. 1—which is to say, with the southern pole 35 attracted to the northern pole of the compass and with the northern pole 36 attracted to the southern pole of the compass, and it being understood that for this purpose the magnets of the compass on the card thereof are stronger than the magnets 35 and 36. To the wide middle portion of the rider 33 the contact-pins 14^a and 15^a are attached, as is shown best in Fig. 2. Attached to each end of the rider and located beneath the respective magnets 35 and 36 are electromagnets 37 and 38. The rider 33 has at its wide middle portion a contact-finger 39 and a contact-finger 40. These contact-fingers are designed, respectively, to work between and make contact with fingers 41 and 42, mounted on the hub 21 of the card.

I will now describe the several electrical circuits and the manner of making the connections in the apparatus. Referring to Figs. 8 and 9, the leader 17^b passes from a source of electrical energy 43 and the leader 14^b passes from a source of electrical energy 44, which are both placed out of the compass-box, as may be understood. From the leader 17^b the current passes through the mercury-cavity 17 to the finger 17^a. From the leader 14^b the current passes from the cavity 14 to the finger 14^a. Therefore the leader from one battery runs to the compass and card and the leader from the other battery runs to the rider. The return-wire to the battery 43 passes down the contact-finger 16^a through the mercury in the cavity 16 and to the leader 16^b, and the return-wire to the battery 44 passes down the contact-finger 15^a to the mercury in the cavity 15, and from the same by the return-wire 15^b. Figs. 8 and 9 illustrate, diagrammatically, the positions of the several circuits. The electromagnet 29 is so wound that when energized it will have the north pole at its right-hand or easterly end and the magnet 30 is so wound that when energized it will have the north pole at its left-hand or westerly end. The magnet 38 is so wound that when energized it will exert a northerly influence and the magnet 37 is so wound that when energized it will exert a southerly influence. The strengths of the magnets 37 and 38 are greater than the strengths of the magnets 35 and 36, so that when the magnets 37 and 38 are energized their influence preponderates over that of the magnets 35 and 36. The magnet 29 is adapted to correct easterly deviation of the card and the magnet 30 is adapted to correct westerly deviation of the card. The magnet 38 is adapted to return the rider to the meridian upon the westerly deflection of the rider and the magnet 37 is adapted to re-

turn the rider to the meridian upon the easterly deflection of the rider. From the contact-pin 15^a on the rider passes a conducting-wire 15^c, leading to the electromagnet 38 of the rider. From this electromagnet 38 passes a conducting-wire 45, leading throughout the length of the rider to the electromagnet 37 at the other end thereof. From the electromagnet 37 passes a conducting-wire 14^c, that has contact with the pin 14^a of the rider. This pin 14^a is in electrical connection with the contact-finger 40 of the rider. The wire 15^c is in electrical connection with the contact-finger 39 of the rider by means of a branch wire 46. The contact-finger 17^a has a conducting-wire 17^c in connection therewith, which wire 17^c passes to the electromagnet 30. The contact-finger 42 of the hub 21 of the card has a wire 42^a in connection therewith, which wire passes from the electromagnet 30. The contact-finger 41 of the compass-card has a wire 41^a in connection therewith, which wire passes to the magnet 29, and the contact-finger 16^a of the card has a wire 16^c in connection therewith, which wire passes from the magnet 29.

The apparatus operates in the following-described manner: Should the compass-card be deflected easterly, as shown in Fig. 8, the rider will be deflected westerly, because that influence which would throw the north pole of the compass easterly will act on the south pole (the magnet 35) of the rider and throw the same westerly. Normally the contact-fingers 40 and 39 are at a position midway between the contacts 41 and 42; but the instant a disturbance occurs a contact is made between the fingers 40 and 41, if the card be deflected easterly, and between the pins 39 and 42 if the card be deflected westerly. Fig. 9 shows a westerly deflection of the card. Assuming now that the deflection be easterly, contact will be made between the points 41 and 40. This is shown in Fig. 8. The electrical current will now flow from the source of the energy 44 through the leader 15^b to the contact-finger 15^a, from which it passes to the wire 15^c of the rider, thence to the electromagnet 38, from said magnet along the wire 45 to the magnet 37, from the magnet 36 along the wire 14^c to the contact-point 40 of the rider. From this point the current passes to the contact-point 41 of the card, thence through the wire 41^a to the magnet 29, and from the magnet 29 by the wire 16^c to the contact-finger 16^a, from which the current finally passes by the return 16^b to the source of energy 44. The current so passing will serve to energize the magnet 29 and the magnets 37 and 38. The card having been deflected easterly and, as before explained, the magnet 29 being wound to make its north pole at the right-hand end of the magnet the instant that the magnet is energized the north pole of the magnet 29 will be attracted or thrown westward by the action of the same influence that served to deflect the card, and the magnet 38 being energized becomes a north pole and is attracted to the normal or

meridian position by the same influence that disturbed the card. To further explain the action of the parts upon an easterly deviation of the card, let it be assumed that the disturbing influence bears two points eastward of the northern meridian and that this influence operates to attract the north pole of the card. The same influence will repel the south pole or permanent magnet 35. The instant that these relative movements of the two magnetic bodies in the compass occur the several electromagnets will be energized, as before explained, and consequently a north pole superior to the magnets 26 and 27 will be established eastward of the disturbing influence. The result is that this north pole of the magnet 29 will be attracted to the disturbing body, and consequently the card will be returned to its proper position. It now remains to return the rider to its proper position, which is effected by changing the polarity of the rider, because if the rider has normally a south pole or magnet 35 it follows that upon changing this polarity to a northern polarity the rider will be drawn back or moved in the opposite direction. The magnet 29 therefore serves to return the card from easterly deviation and the magnet 38 serves simply to return the rider from westerly deviation, it being understood that the card deviates to the east as the rider deviates to the west, which is owing to the fact that the card and rider are of opposite polarity. Upon a westerly deviation of the card the action of the several parts is exactly the same, except that the magnet 30 is energized to the exclusion of the magnet 29. When the card deviates to the west and the rider to the east, as shown in Fig. 9, the current passes from the source of energy 43 along the leader 17^b to the contact-finger 17^a, from said finger through the wire 17^c to the magnet 30, from the magnet 30 along the wire 42^a to the contact-point 42, from the contact-point 42 to the contact-point 39, from the contact-point 39 along the branch 46 to the wire 15^c, through the wire 15^c to the magnet 38, along the wire 45 to the magnet 37, from the magnet 37 to the wire 14^c, from the wire 14^c to the contact-finger 14^a, and from the contact-finger 14^a along the return 14^b to the source of electrical energy 42.

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

1. A compass having an electromagnet mounted to swing with the needle thereof, the magnet having its poles placed in positions respectively on the sides of the compass-needle, and means for controlling the circuit of said magnet, whereby to return the needle from deflection upon the energization of the electromagnet.

2. A compass having a magnet mounted to swing with the needle thereof, the magnet having its poles placed in positions respec-

tively on the sides of the compass-needle whereby to return the needle upon the deflection thereof.

3. A compass having an electromagnet mounted to swing with the needle of the compass, the poles of the electromagnet being placed in positions respectively on the sides of the compass-needle, and a magnetic rider mounted to swing independently of the needle and serving to control the circuit of the electromagnet.

4. A compass having an electromagnet mounted to swing with the needle thereof, the poles of the electromagnet being placed in positions respectively on the sides of the compass-needle, a magnetic rider mounted to turn independently of the needle and controlling the circuit of the electromagnet, an electromagnet mounted on the rider and energized upon the deflection of the rider, the first-named electromagnet serving to return the needle, and the second-named electromagnet serving to return the rider.

5. In a compass, the combination of a box, a compass-card mounted to turn therein, an electromagnet mounted on the compass-card and having its poles placed respectively on the sides of the compass-needle, a rider mounted to turn on the compass-card, the rider serving to control the circuit of the electromagnet, an electromagnet mounted on the rider, the first-named electromagnet serving to return the compass-card upon the deflection thereof, and the second-named electromagnet serving to return the rider upon the deflection thereof, contact-fingers mounted on the card and rider, and a cup having mercury-concavities therein, into which concavities the contact-fingers of the card and rider extend, so as to transmit an electrical current to and from the card and rider.

6. In a compass, the combination of a compass-card, two electromagnets mounted on the compass-card and respectively at the north and south halves thereof, a magnetic rider mounted to swing independently of the compass-card, the rider having a polarity opposite to that of the card, electromagnets mounted on the rider, and contact devices controlled by the rider whereby to magnetize and demagnetize the several electromagnets.

7. In a compass, the combination of a compass-card, an electromagnet mounted on and moving with the card, and a magnetic rider serving to control the circuit of said magnet, whereby to energize the electromagnet upon the deflection of the rider and compass-card and thus return the compass-card.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LUDWIG RELLSTAB.

Witnesses:

H. WULLENWEBER,
F. MÜLLER.