

S. LONGFELLOW.
Mariner's Compass.

No. 217,014.

Patented July 1, 1879.

Fig. 1.

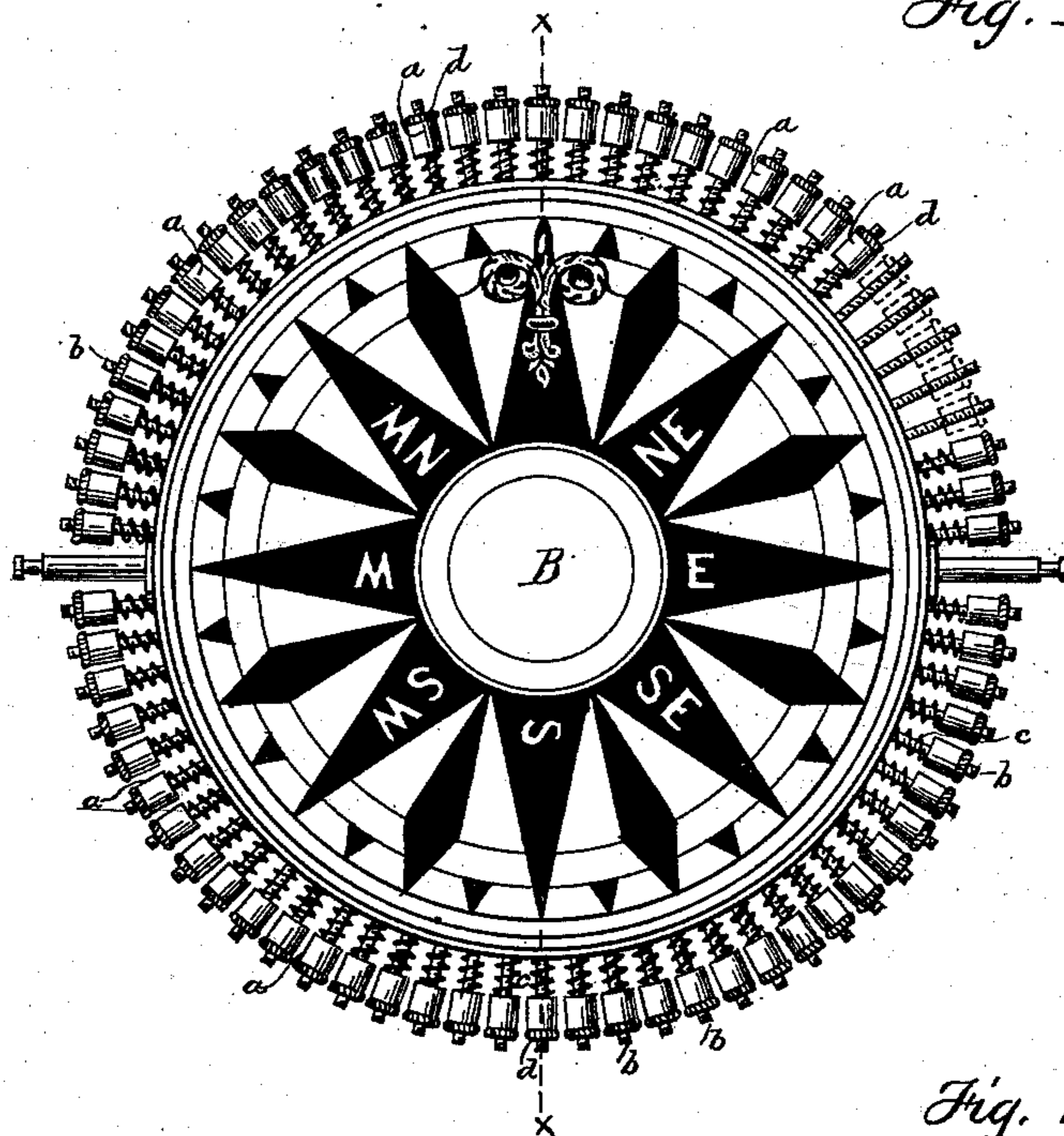
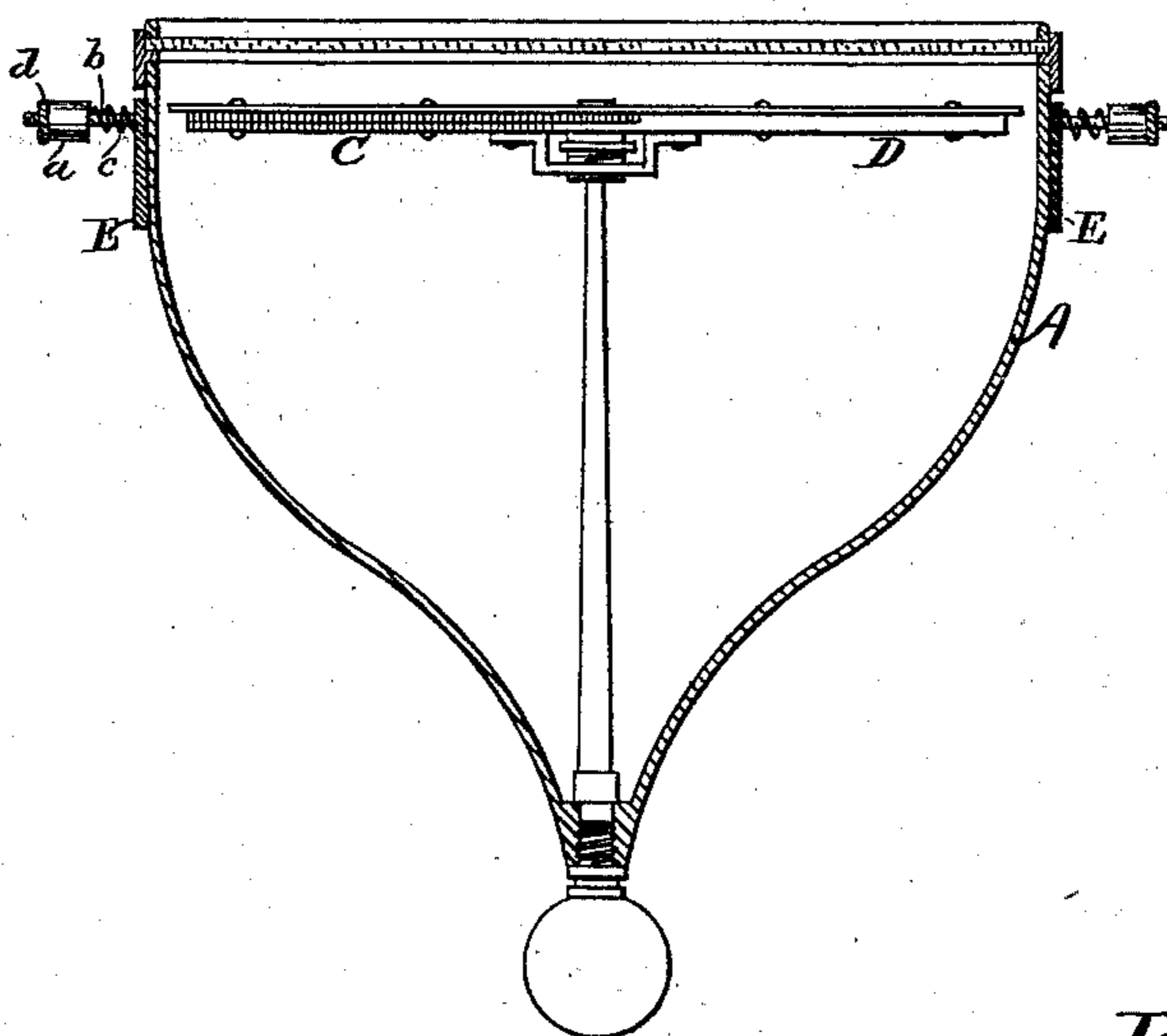


Fig. 2.



Witnesses.
Samuel Snow
Alex. L. Hayes

Inventor.
Stephen Longfellow

UNITED STATES PATENT OFFICE.

STEPHEN LONGFELLOW, OF ST. LOUIS, MISSOURI, ASSIGNOR OF A PART OF HIS RIGHT TO FRANCIS AMORY, OF BEVERLY, AND SAMUEL SNOW, OF CAMBRIDGE, MASSACHUSETTS.

IMPROVEMENT IN MARINERS' COMPASSES.

Specification forming part of Letters Patent No. **217,014**, dated July 1, 1879; application filed August 26, 1878.

To all whom it may concern:

Be it known that I, STEPHEN LONGFELLOW, of the city and county of St. Louis, in the State of Missouri, have invented a new and useful Improvement in Compasses, of which the following is a full, clear, and exact description, reference being had to the drawings accompanying and forming part of this specification.

This invention consists in the combination, with a compass-needle, of a series of magnets arranged in a circle in close proximity and adjustable on radial pins. By such arrangement the magnets neutralize each other's effect upon the compass-needle, and by removing from or adjusting on said circle opposite to the source or sources of local attraction, and on the side nearest to said source or sources of local attraction, such a number of said magnets that all the forces then acting, both those due to the cause or causes of local attraction and those due to the remaining magnets, will be the same in effect as far as regards causing a deviation of the needle as when no source or sources of local attraction exist, and the magnets are so placed that the needle will point to the true north; and this invention consists, secondly, in the combination, with the series of independent detachable and radially-adjustable magnets heretofore described, of a compass-needle having one pole near the pivotal point of the needle.

In the accompanying drawings, Figure 1 is a plan view of a mariner's compass having a series of magnets arranged around the bowl, and attached thereto in a suitable manner, for preventing the effects of local attraction according to the method hereinbefore described; and Fig. 2 is another view of the same, showing the compass-bowl in section on the line *x x*, Fig. 1, and a view of the compass-needle in elevation.

In these several figures similar letters refer to similar parts.

A is the compass-bowl, which is shown as of the form described in a previous application for a patent, filed by me November 27, 1877; but it may be of the ordinary form or of any other form.

B is the compass-card, to the under side of which is attached a single compass-needle, in two parts, C D.

a a a a are a series of magnets, each of which is loosely mounted upon a pin, *b*, extending radially from the compass-bowl, and attached to a ring of metal, E, which is sprung upon the compass-bowl, or is otherwise suitably attached thereto. These pins, instead of being secured to a ring of metal, may be attached to the bowl directly in any suitable manner. The magnets *a a a a* are made of steel, and should have a diameter equal to their length. Their size and number should be about the same as shown in the drawings; but it may be advisable to make them somewhat larger, and their number must necessarily depend upon their size and the size of the compass-bowl. They should be placed as near to one another as will admit of their being brought in contact with the compass-bowl without touching each other.

For the purpose of obtaining radial adjustment there is a spiral spring on each pin, which spring bears against the magnet on the pin, and acts to force the magnet outward from the compass-bowl; and by means of a nut, *d*, on each pin each magnet can be readily fixed at any desired distance from the bowl.

I have described this device as a suitable means of effecting the adjustment of the magnets; but instead of this device any other suitable device can be used.

The compass-needle is made in two parts, C D, the part C, which is the north pole of the needle, being of steel or hardened iron, and the other part being of brass or of some other non-magnetic metal. The south pole of the needle is thus near the center of the card, and therefore the position of the needle is not affected by the influence of local attraction upon its south pole; but the described arrangement of magnets may be used with a needle of the usual form.

If the magnets *a a a a* are each placed at an equal distance from the compass-card no effect will be produced upon the needle, for the reason that the forces exerted by these magnets upon the needle are neutralized by each

other, and consequently, if there is no source of local attraction acting upon the needle, it will point correctly to the true north. If, however, there is a deviation, caused by local attraction exerted at any point or points upon the needle, the needle can be brought into the correct position by removing from or adjusting on the circle of magnets, as shown by dotted lines in Fig. 1, opposite the point or points from which the local attraction is exerted, such a number of the magnets as are equal in magnetic effect to the cause of local attraction; and if this removal of some of the magnets does not bring the needle to the correct position, this can be effected by adjusting nearer to or farther from the compass-bowl, as may be necessary, the proper number of the remaining magnets of the circle, which will be determined by experiment.

In some cases it may not be necessary to wholly remove any of the magnets, a radial adjustment of the same being sufficient to bring the needle to the true north.

It will thus be seen that all the effects of local attraction can be neutralized and the needle maintained in its proper position.

It is preferable to place the magnets in the same plane and in the plane of the card, as by this arrangement the dip of the needle is prevented.

The arrangement of magnets and the manner of attaching them to and adjusting them on the bowl which I have thus particularly set forth is described as a suitable way of carrying the principle of my invention into effect; but any other form of magnets, or any other arrangement of them in relation to the bowl, or any other method of rendering them removable or adjustable may be adopted, whereby the needle, whatever may be the force or forces exerted by the cause or causes of local attraction, will be constantly maintained under the influence of magnetic forces acting around the circle described by the needle in its rotation, in such a manner that any force having a tendency to cause a deviation of the needle from the true north will be neutralized in its effect by the effect of an opposing force; or, in other words, any arrangement of magnets maintaining the needle under the influence of mag-

netic forces which permit the needle to point to the true north in the absence of causes of local attraction, and which admit of the neutralization of the effect of any cause or causes of local attraction by the removal or adjustment of such portion of said forces as shall be equivalent in force or direction to the force or forces exerted by the cause or causes of local attraction.

It will be seen that by this method of preventing the effect of local attraction upon the compass-needle the earth's magnetic force is left free to direct the needle to the pole, while every cause of local attraction is neutralized by an opposing force.

The dip of the needle is prevented by the position of the series of magnets in the plane of the rotation of the compass-needle.

This invention is applicable to any form of compass, surveyors' or mariners'.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. The combination, with a compass-needle, of a series of magnets arranged in a circle in close proximity to each other and adjustable on radial pins *b b*, as set forth.

2. In combination with the compass-bowl, the series of small straight removable magnets *a a a a*, the projecting pins *b b b b*, the spiral springs *c c c c*, and the nuts *d d d d*, substantially as and for the purpose set forth.

3. In combination with the compass-bowl, the series of small straight removable magnets *a a a a*, the projecting pins *b b b b*, the spiral springs *c c c c*, the nuts *d d d d*, and the ring *E*, substantially as and for the purpose set forth.

4. In a compass, the combination, with a series of independent detachable and radially-adjustable magnets, as described, of a needle, having one pole near the pivotal point of said needle, substantially as and for the purpose set forth.

In witness whereof I have hereunto set my hand.

STEPHEN LONGFELLOW.

Witnesses:

SAMUEL SNOW,
ALEX. L. HAYES.