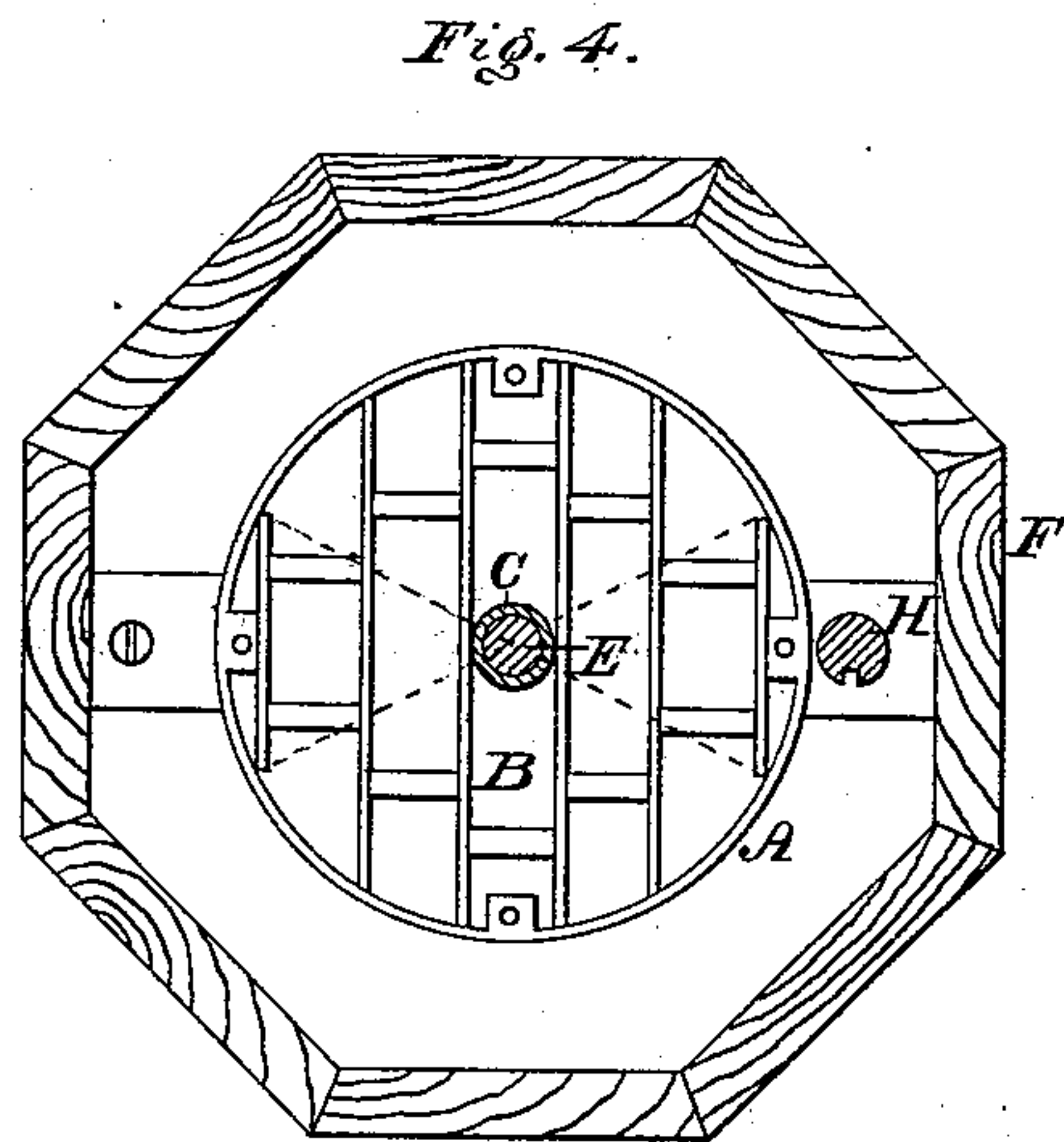
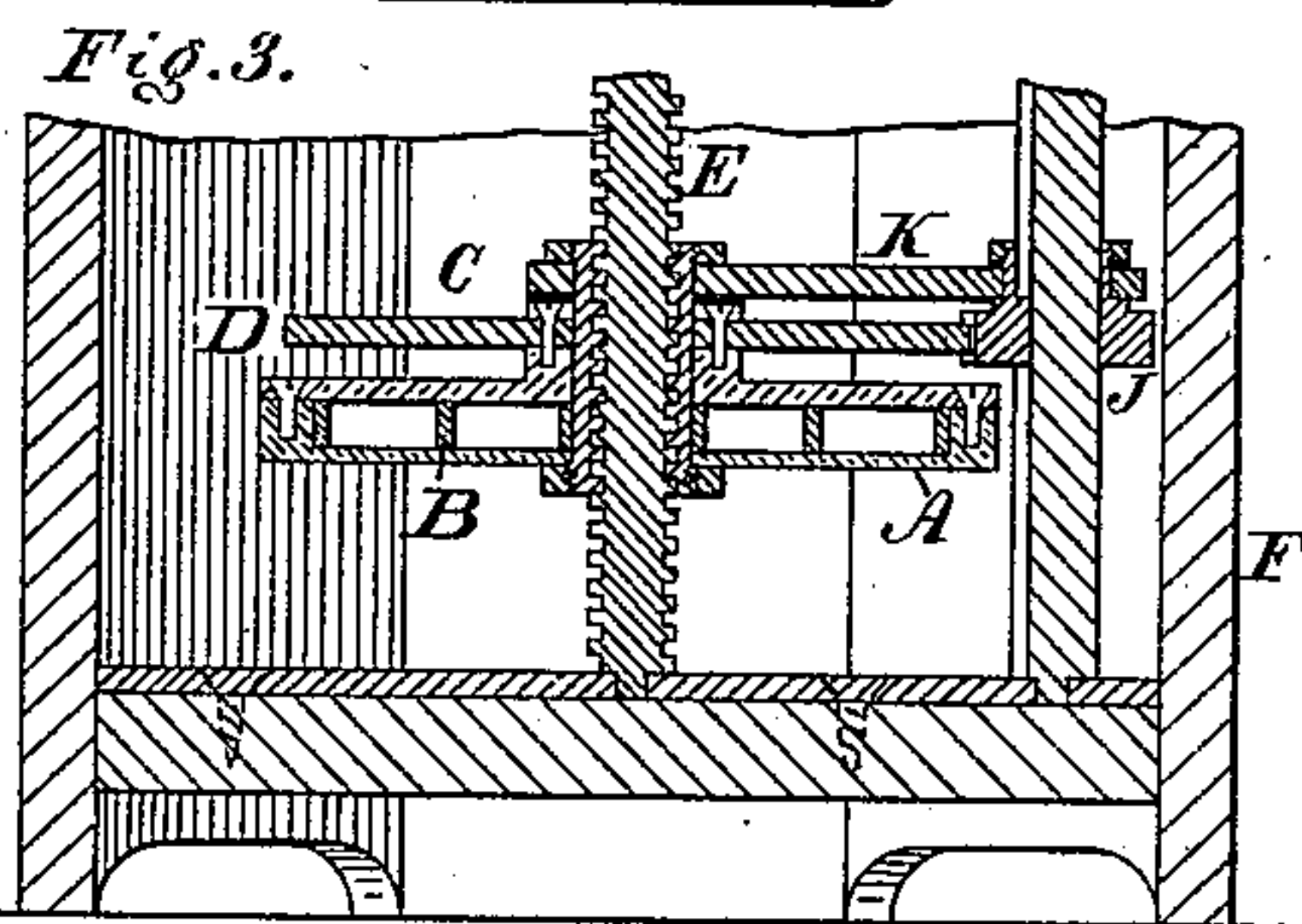
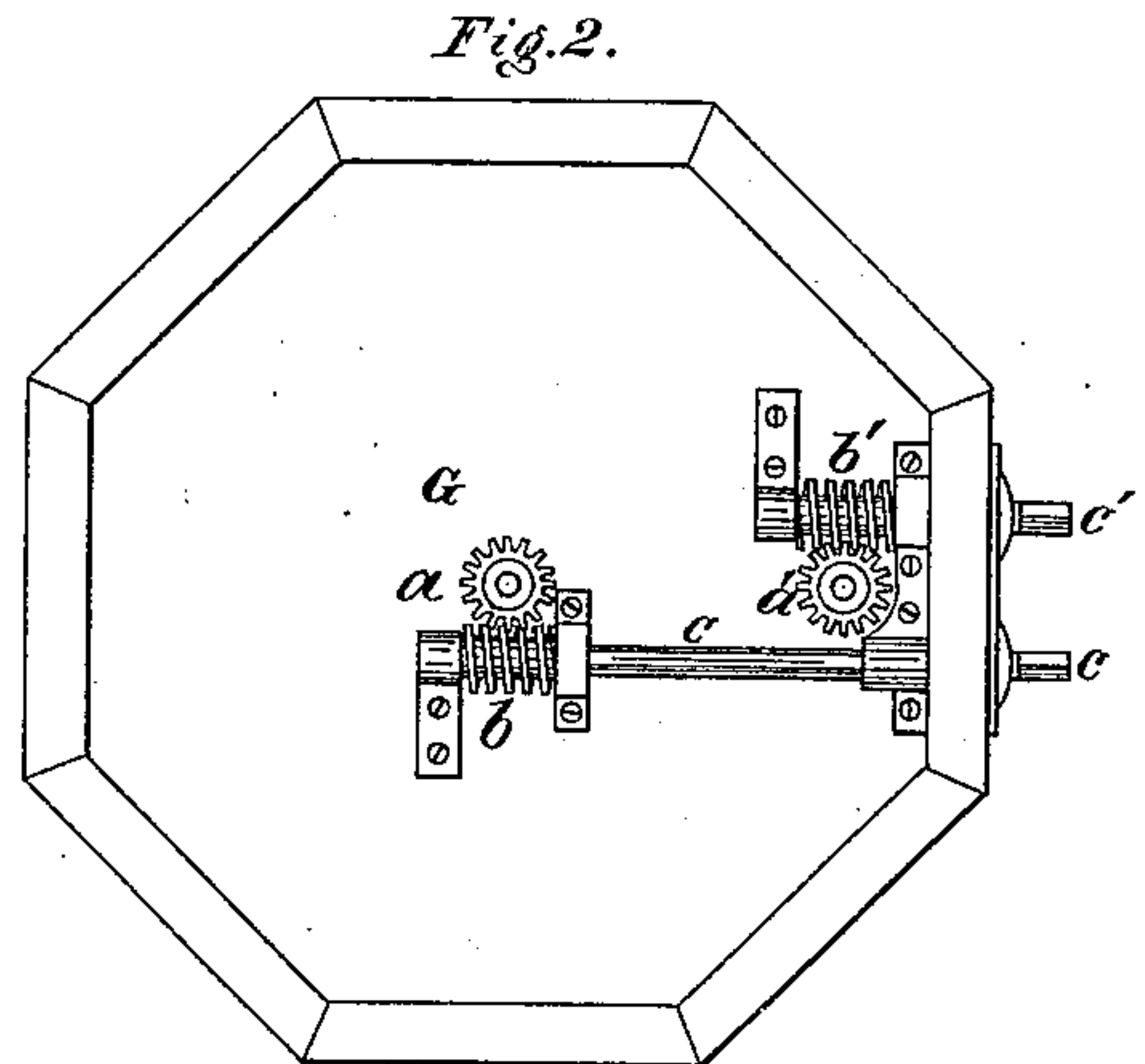
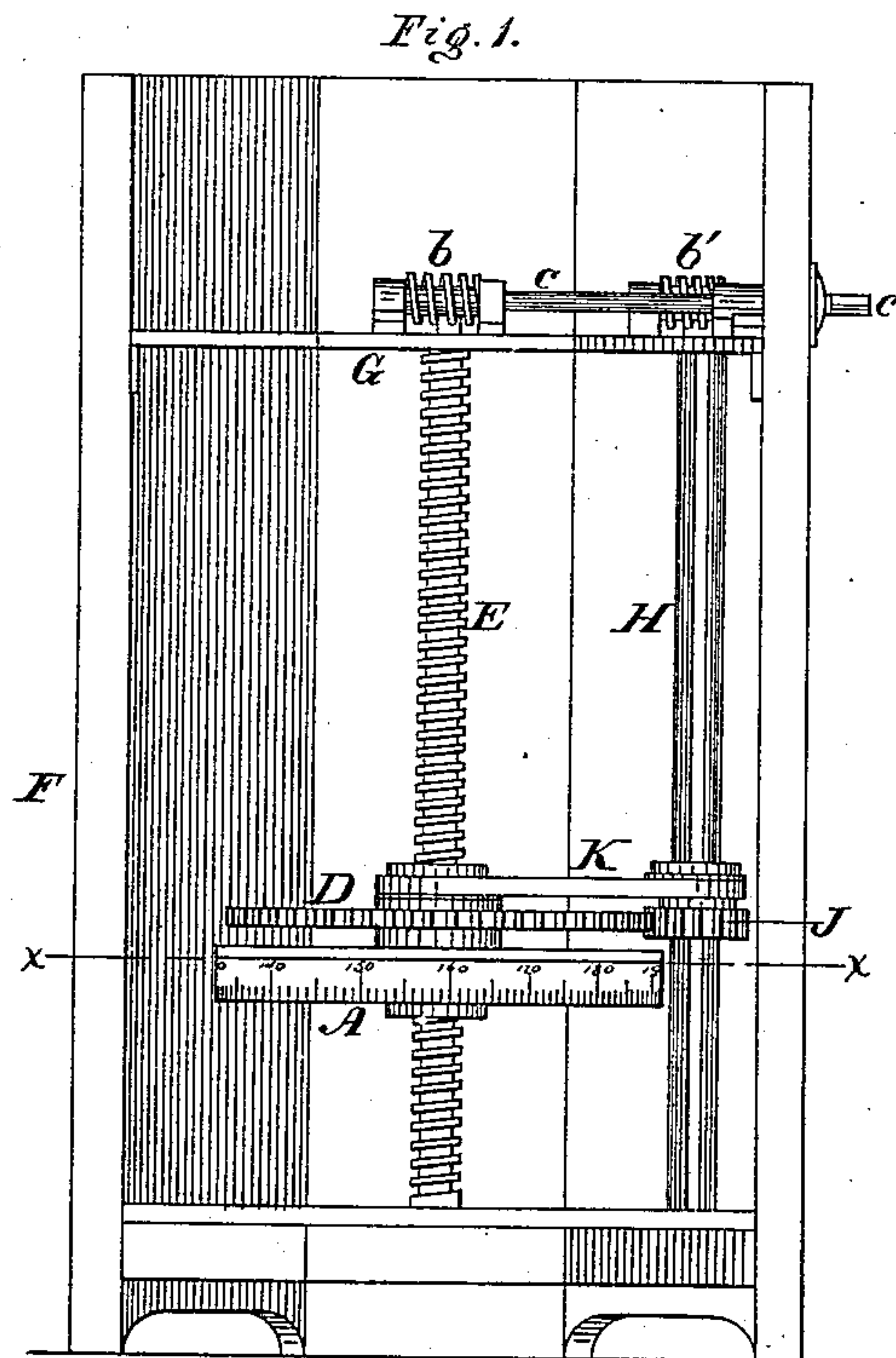


J. E. HAND.
Compass-Adjusting Binnacle.

No. 226,659.

Patented April 20, 1880.



Witnesses:

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JOHN E. HAND, OF PHILADELPHIA, PENNSYLVANIA.

COMPASS-ADJUSTING BINNACLE.

SPECIFICATION forming part of Letters Patent No. 226,659, dated April 20, 1880.

Application filed January 15, 1880.

To all whom it may concern:

Be it known that I, JOHN E. HAND, of the city and county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Compass-Adjusting Binnacles, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a side elevation of the binnacle embodying my invention. Fig. 2 is a top view thereof. Fig. 3 is a vertical section of a portion thereof. Fig. 4 is a horizontal section thereof in line *x x*, Fig. 1.

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

My invention consists of a series of magnets adapted to be raised and lowered and rotated for the purpose of correcting any magnetic deviation of the ship's compass caused by the local attraction of the iron, hull, machines, cargo, &c., of the vessel, as will be hereinafter set forth.

Referring to the drawings, A represents a case, circular or partly circular in form, and containing a series of magnets or magnetic bars, B, the periphery of the case being graduated.

C represents a collar passed centrally through the case A and series of magnets, and to the same is fitted a toothed wheel, D, located above and secured to said case. The inner face of the collar C is threaded, and with it engages a screw-shaft, E, which extends vertically, and has its lower end supported on a step at the bottom of a box, F. The upper end of said shaft is mounted on a plate, G, at the top of the box F, and carries a worm-wheel, *a*, with which meshes a worm, *b*, whose shaft *c* is mounted on the plate G, and has its end squared and conveniently accessible for engagement of an operating crank or handle.

H represents an upright shaft, which is stepped in the bottom of the box F, and its upper end is mounted on the plate G, and carries a worm-wheel, *a'*, with which meshes a worm, *b'*, whose shaft *c'* is mounted on the plate G, and has its end squared and conveniently accessible for engagement of an operating crank or handle, the rotation of the shafts *c c'* respectively imparting rotation to

the shafts E H. To the shaft H is connected a pinion, J, which, by means of a spline or feather, is caused to rotate with said shaft and permitted to slide vertically thereon.

K represents a yoke, whose ends are loosely fitted to the shafts E H, respectively, one end being clamped to the hub or collar of the pinion J and the other end to the collar of the case A.

It will be seen that when the shaft H is rotated the pinion imparts rotation to the larger pinion or wheel D, and when the shaft E is rotated the case A and said wheel D are raised or lowered, and owing to the yoke K the pinion J is likewise raised or lowered, so that the wheels D J constantly mesh.

It is evident that the rotation of the case A may be accomplished by means of a worm-wheel and worm-shaft or other suitable gearing and shaft, although the screw-shaft E and collar C are simple in form and operation, and may be preferred, the object being to raise or lower the magnet-case parallel with the ship's keel for correcting the semicircular errors, and likewise rotate said case for correcting the quadrantal points, instead of employing cast-iron correctors or chain-boxes.

The angle or position of the magnet-case is determined by the amount of error found by observation.

Example of Working the Binnacle.

By observation: Lat. $39^{\circ} 56'$; declin. 23° ; var. 6° west; sun's true bearing Dec. 16th, $11.24''$, 170° east; ship's head N. N. W.; correct magnetic head N. W., making two points W. deviation.

Turn the magnet-case to 180° , and raise it until the compass can be seen not to move any more. Then turn the magnet, the after part to port, until the compass points correctly. Put the ship on east to test correction, and if correct do not disturb it. If there is an error to the west, raise the magnet-case; if to the east, lower it.

It will be noticed that the magnets B are long and short. The outside or short or small magnets are proportionately made, so as to act on the quadrantal points, and the larger or longer magnets are intended to act on the semicircular points. It will be found that the out-

side or small magnets work independently of the large magnets on the quadrantal points, but work together on the cardinal or semicircular points. The poles of the small magnets are
 5 short or contracted, and form additional magnets across the case, as shown by the dotted lines, Fig. 4, and thus act on the quadrantal points, while the long magnets remain magnets of themselves, and thus act on the cardinal or semicircular points, and do not interfere with the attraction between the poles of the short magnets in correcting the errors of the quadrantal points.

Owing to the simplicity of construction and
 15 operation of my binnacle, any navigator can adjust his compass in any latitude without the aid of an adjuster.

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

1. The case A, provided with long and short magnets B, in combination with the toothed wheel D, shaft E, shaft H, and pinion J, substantially as and for the purpose set forth.

2. The shaft H, carrying the rising and falling pinion J, the case A, with toothed disk D, fitted to the shaft E, and the yoke K, combined and operating substantially as and for the purpose set forth.

JOHN E. HAND.

Witnesses:

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