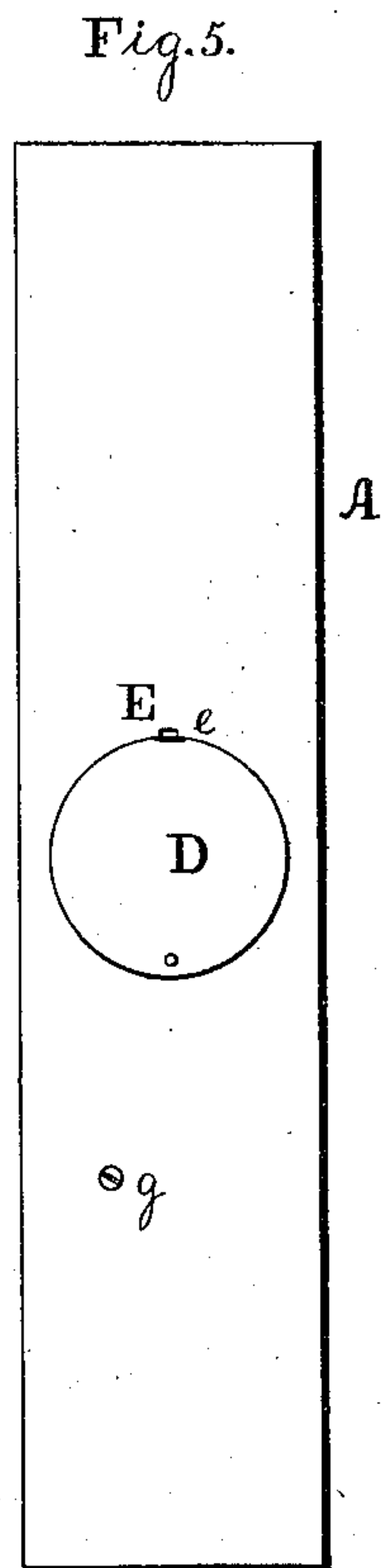
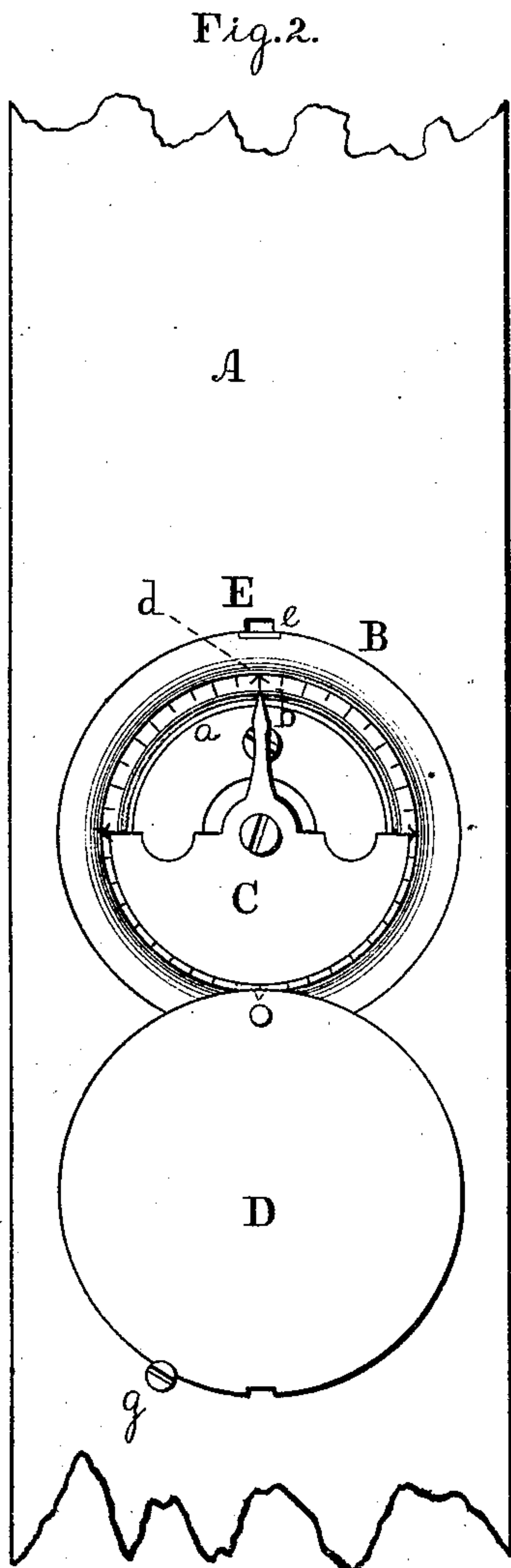
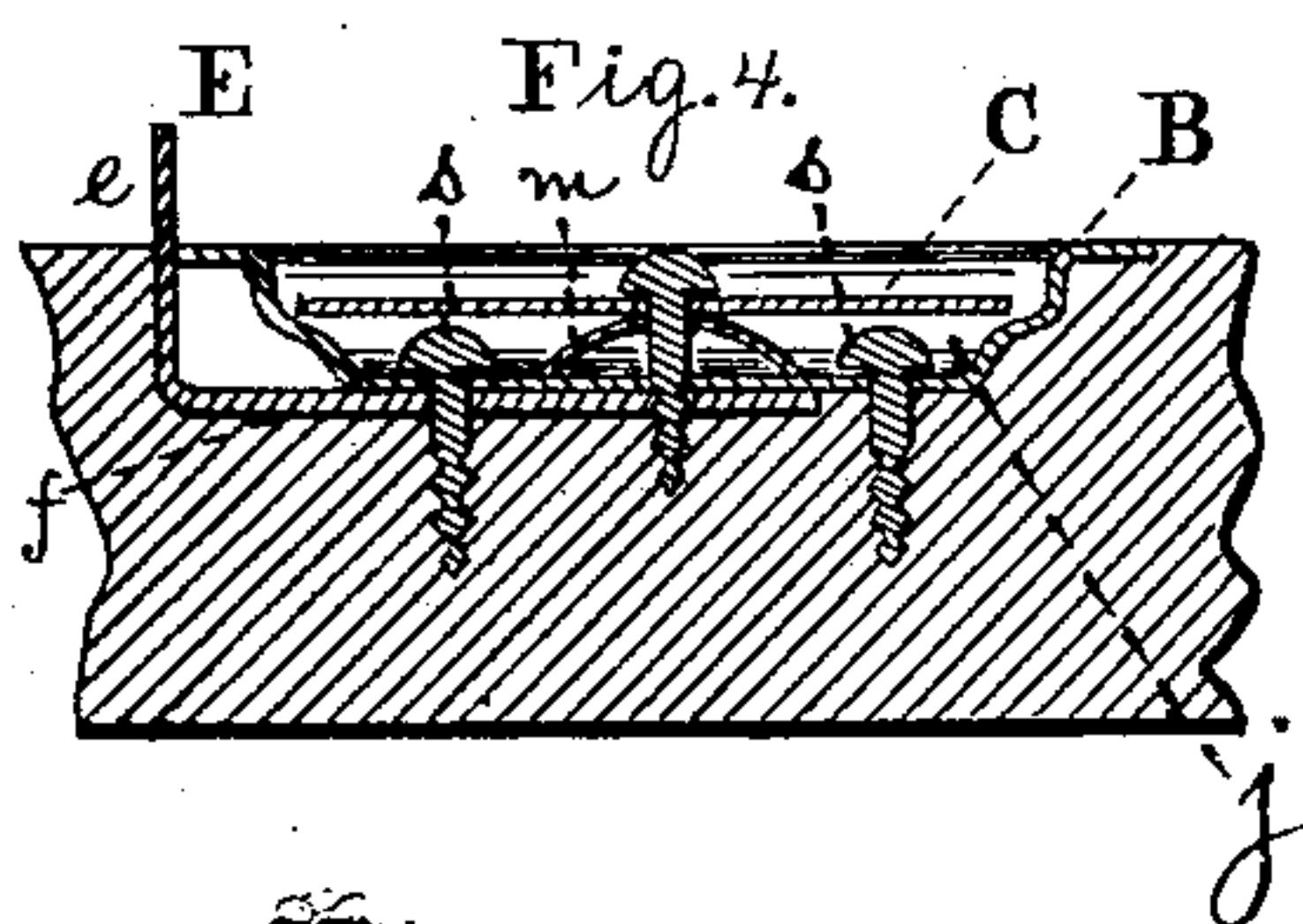
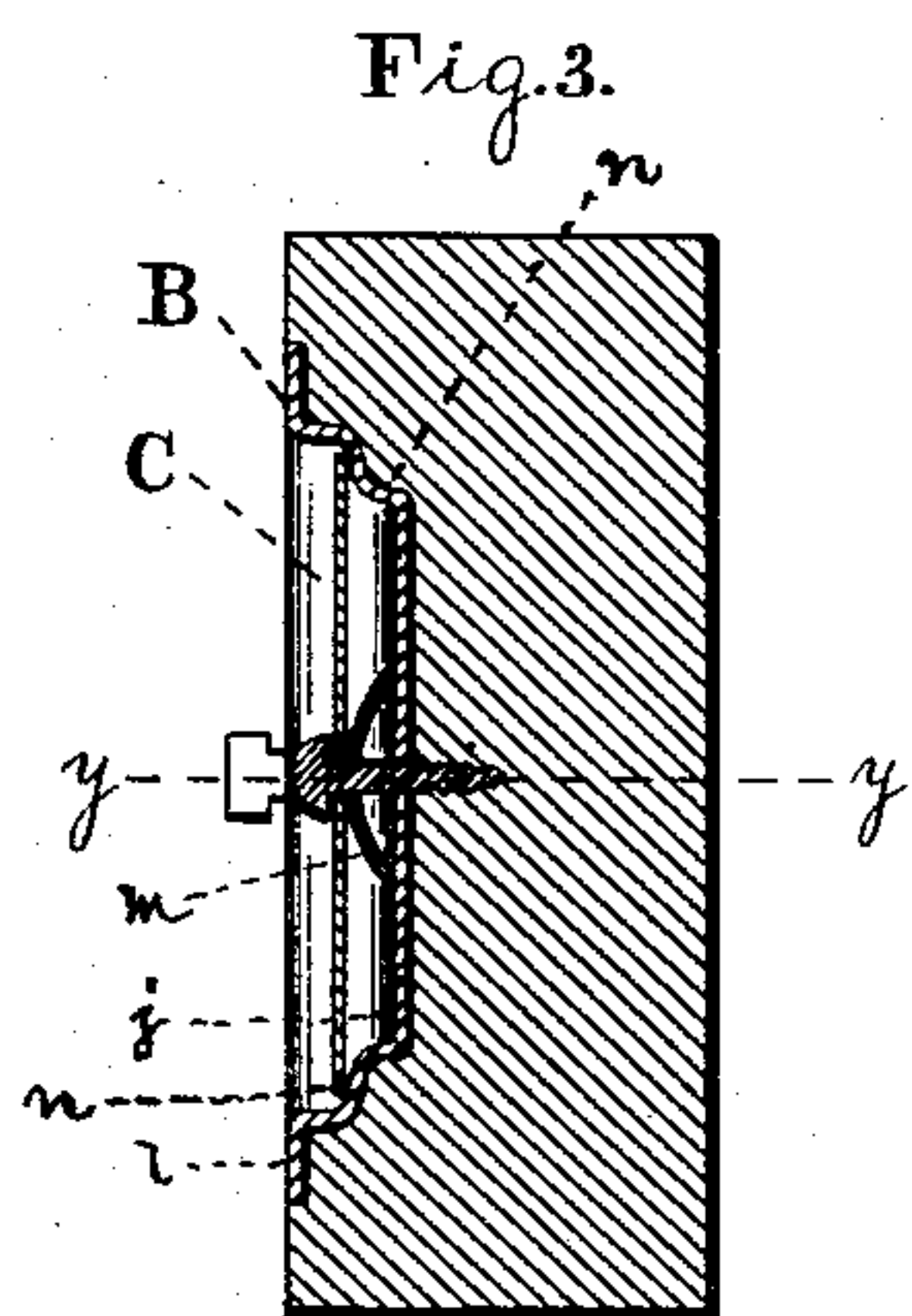
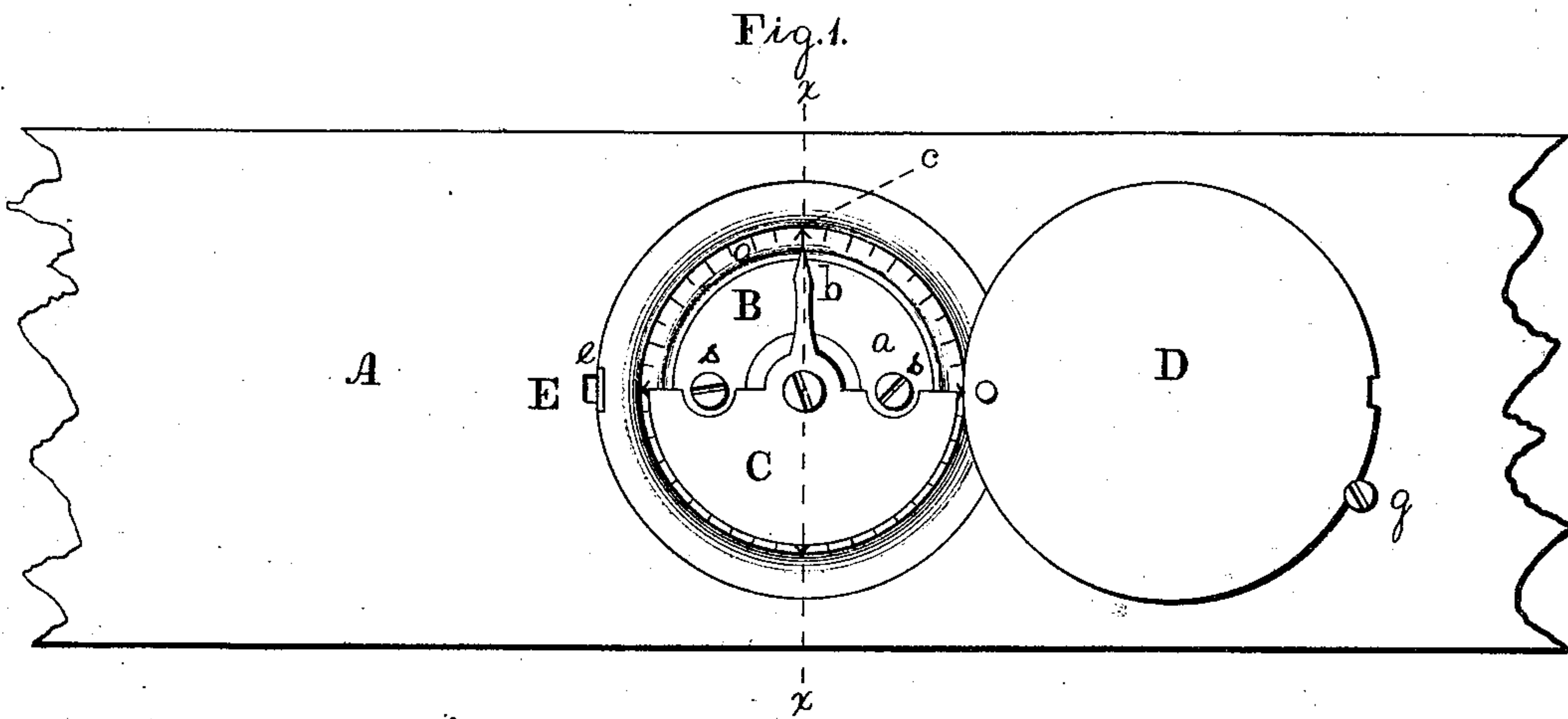


J. R. FRAILEY.  
Combined Level, Plumb, &c.

No. 162,641.

Patented April 27, 1875.



Witnesses

L. F. Brous.

A. P. Grant.

Inventor  
John R. Frailey,  
by  
John A. Diederheim  
att'y.



# UNITED STATES PATENT OFFICE.

JOHN R. FRAILEY, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVEMENT IN COMBINED LEVELS, PLUMBS, &c.

Specification forming part of Letters Patent No. **162,641**, dated April 27, 1875; application filed August 5, 1874.

*To all whom it may concern:*

Be it known that I, JOHN R. FRAILEY, of the city and county of Philadelphia, and the State of Pennsylvania, have invented a new and useful Improvement in Combined Level, Plumb, &c.; and I do hereby declare the following to be a clear and exact description of the nature thereof, sufficient to enable others skilled in the art to which my invention appertains to fully understand, make, and use the same, reference being had to the accompanying drawings making part of this specification, in which—

Figures 1 and 2 are face views of the device embodying my invention, a portion thereof being broken away. Fig. 3 is a transverse section in line *x x*, Fig. 1. Fig. 4 is a longitudinal section in line *y y*, Fig. 3. Fig. 5 is a face view of the complete device on a smaller scale.

My invention consists of a protractor having a universally-swinging motion over an annulus or plate, which is graduated and struck up or formed in such a manner that the protractor will rotate without binding with or striking adjacent parts.

Referring to the drawings, A represents a rectangular block of the order usually employed in levels. To one face thereof there is secured an annulus or plate, B, which is dished or struck up, and marked with graduations *a* to the extent of three hundred and sixty degrees, which thus extend the entire circumference of the plate. This annulus is struck up with a shoulder, *n*, which leaves a chamber, *j*, in the center of which is secured a raised bearing or spring, *m*, and on the horizontal face of the shoulder *n* there are marked the graduations *a*.

To the center of the annulus B I pivot a protractor, C, which consists of an arc-shaped piece having an index or pointer, *b*, on the upper or lower side, said piece being adapted to swing on its axis and always stand with the index or pointer truly vertical.

It will be seen that the protractor has a universal axial motion, and the index *b* can sweep over every point of the graduations of the annulus B. It will also be seen that the

raised bearing *m* acts as a guide for the protractor C, as well as receives the axial pin or screw of the protractor, whereby the latter will not bind with the bottom face of the plate B; and the bearing *m* also prevents the protractor striking the heads of the screws *s*, by which the plate is secured to the block, the heads of said screws occupying the chamber *j*.

When the device is to be employed as a level the block A is laid horizontally on the work, as usually. Should the work be level the index *b* will stand true to the starting or level point *c* of the graduations of the annulus B. Should the work not be set level the index will stand at one side of said point *c*, and the degree of variation or departure from level may be read off.

In case the device is to be employed as a plumb, the block A will be brought vertically to the work and laid thereagainst, the result of which will be readily determined by observing the standing of the index with reference to the starting or plumb point *d*. The device is also readily serviceable for the purposes of an inclinometer by properly applying the block A to the inclined surface and noticing the degree of inclination indicated at *b*. It will also be seen that it is not essential to have any special side of the block as the working side or face of the level or plumb, since the protractor, regardless of whatever side of the block is presented, will always adjust itself, owing to the universal swing or axial movement.

The dished or struck-up annulus B will be set in flush with the block A, and over the same will be placed a cover, D, which is hinged to the annulus or block A, so as to be moved on and from the annulus, and thus cover and uncover the protractor and annulus.

The cover will be held in its closed position by a catch, E, which consists of an angular piece, one limb, *e*, of which projects above the edge of the annulus B, and the other limb, *f*, extends below the annulus, and is secured to block A, preferably by the screws *s*, which secure the annulus to the block.

When the cover is to be opened, the upper

limb *e* of the catch, which engages with the cover, is drawn back so as to release the cover from the catch, and the cover may then be swung open, its extent of opening being limited by a pin or other stop, *g*.

The cover, in the operation of closing, has its circular face force back the catch until the notch of the cover clears the upper limb of the catch, in which case the latter springs into the notch, and thus the cover is locked and the parts of the device protected.

Having thus described my invention, what

I claim as new, and desire to secure by Letters Patent, is—

The universally-swinging protractor C, in combination with the dished plate B, having a chamber, *j*, graduated shoulder *n*, and raised bearing or spring *m*, substantially as and for the purpose set forth.

J. R. FRAILEY.

Witnesses:

JOHN A. WIEDERSHEIM,  
A. P. GRANT.