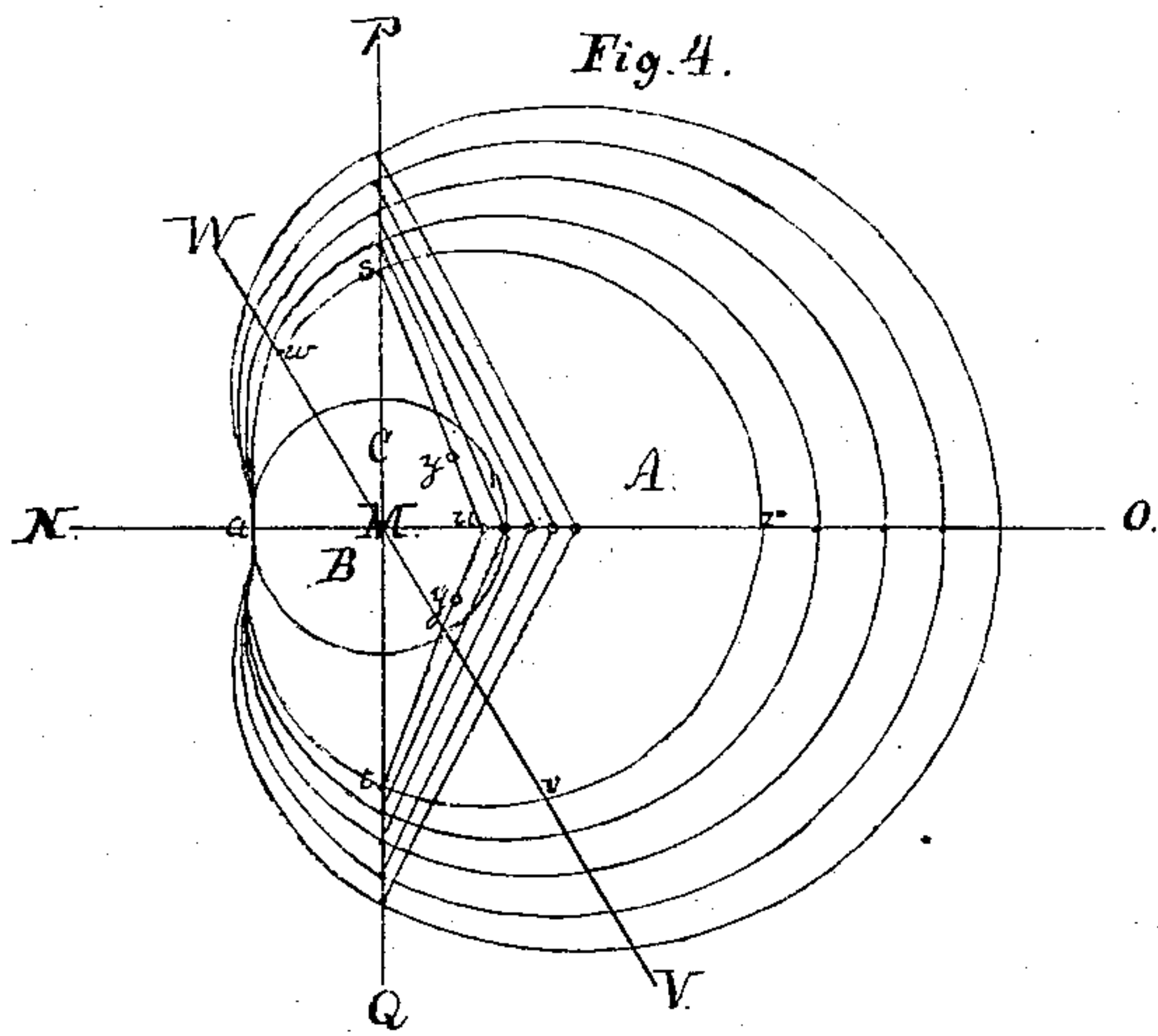
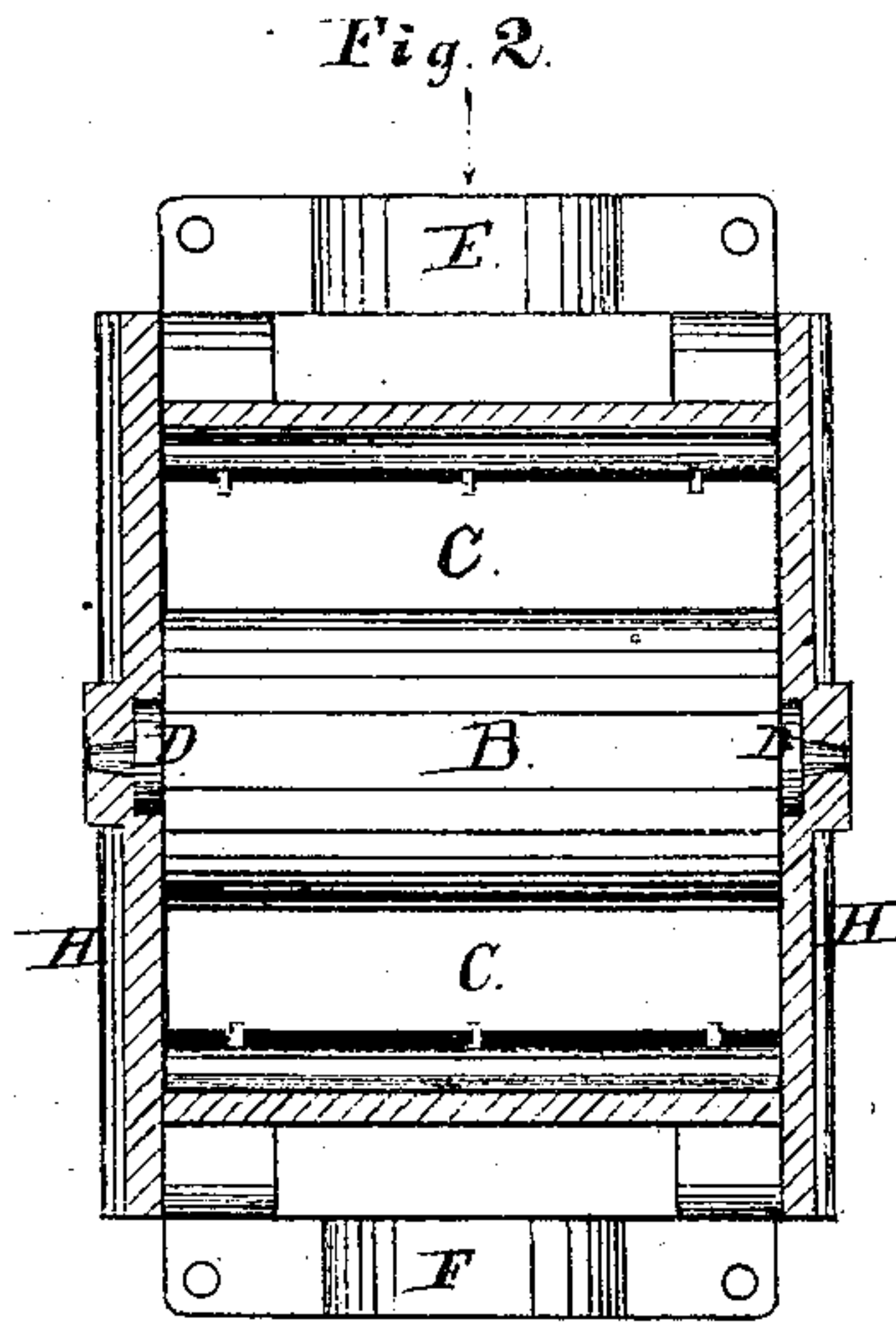
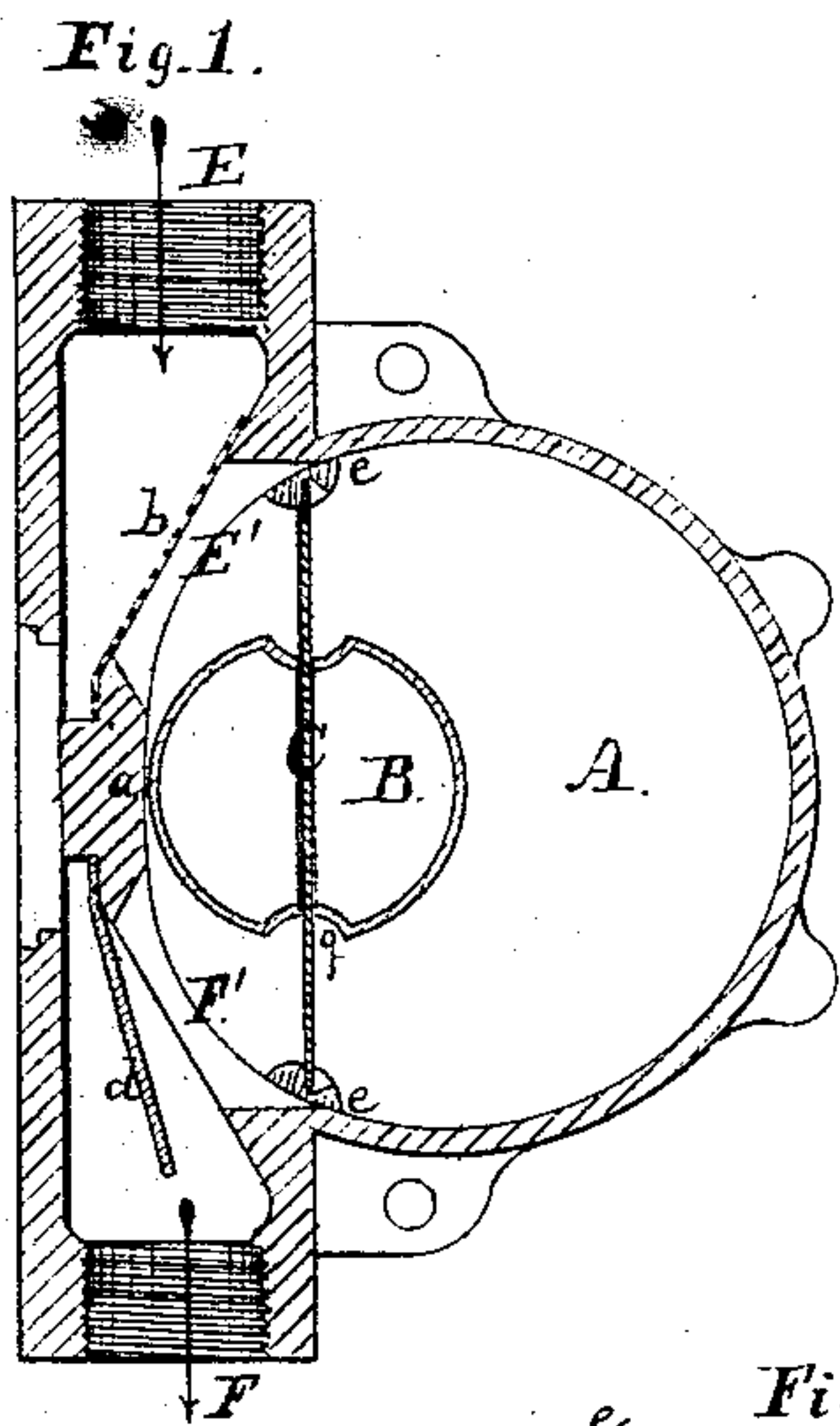


J. A. STENBERG.

Liquid and Gas Meters and Motors.

No. 158,995.

Patented Jan. 19, 1875.



Witnesses:

Wm. H. Condon
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Inventor:

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by *Munday & Evans*
his Attorneys

UNITED STATES PATENT OFFICE.

JOHN A. STENBERG, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN LIQUID AND GAS METERS AND MOTORS.

Specification forming part of Letters Patent No. **158,995**, dated January 19, 1875; application filed August 29, 1874.

To all whom it may concern:

Be it known that I, JOHN A. STENBERG, of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Liquid and Gas Meters and Motors, of which the following is a specification:

The nature of my invention will be fully understood from the following description and claim, and the accompanying drawing, which forms a part of this specification, and in which—

Figure 1 is a central longitudinal section, and Fig. 2 a cross-section, of the peculiarly-formed chamber or cylinder. Fig. 3 is a face and end view of the piston-shoe. Fig. 4 is a diagram, showing the method of describing the sectional outline of the interior of the cylinder.

Like letters of reference made use of in the several figures indicate like parts.

In the said drawing, A represents the chamber in which the diametric wing or piston rotates, and which, although it is by no means a true cylinder in form, I term the "cylinder." Within the cylinder A, and touching it at the point *a*, is the smaller true cylinder or enlarged shaft B, slotted to receive the rotating sliding wing C, which passes through its center, is shod at each end with a shoe, *e*, and performs the part of a piston.

The machine illustrated at Figs. 1, 2, and 3 is adapted as a water-meter, but by a slight and easily-understood alteration it may be made into a steam-engine, as any one skilled in the art will readily see.

The operation is as follows: The water enters the ingress-pipe E, and passes through the ingress-port E' into the cylinder behind the wing, rotates said wing until the egress-port F' is reached, when it passes out and discharges by way of the egress-pipe F. This rotation continues so long as the water is allowed to flow. A piece of wire-gauze, *b*, at the inlet-port serves as a strainer to keep out dirt or grit, and a leather flap or valve, *d*, at the egress-port resists the back flow of the water.

This meter may be used in any desired position—in fact, it is shown upside down in the drawing—if the position in which the leather flap will work best may be regarded as the

normal position. It may be well, however, to remark that, from reasons other than the improved operation of the valve *d*, the meter will work best when the ingress-port is below and the egress-port above. The meter may, however, be placed in any position, the difference is so inconsiderable. The shoes *e* applied to the two edges of the wing C are for the purpose of giving a larger bearing-surface at the sides of the cylinder A, to prevent rapid wear. The edges of said wing rest in V-shaped grooves in said shoes to accommodate the various positions assumed in traversing the cylinder-surface. The small bridge-like projections *i* in said groove fit into notches in the edge of the wing, to prevent any end motion and to strengthen said shoes. The ends of the small cylinder or enlarged shaft B come out flush to the heads of the cylinder A, and trunnions D supporting said small cylinder are recessed into the heads H H of said cylinder A, so that the wing C may be of such width as to fill the cylinder A laterally. The small cylinder B is formed with a long recess of the full length of the slot, to receive the shoes when the wing stands with one end at the point *a*.

I am well aware that rotary engines have heretofore been made with a sliding diametric wing or piston passing through a slotted small cylinder inside of a larger eccentric chamber in many general features similar to my invention, but not like it in respect to the form of the cylinder A, which is peculiar to my invention; hence I will now proceed to describe minutely the form of said cylinder A' by especial reference to the diagram at Fig. 4 of the drawing.

To construct an outline of the interior of my improved cylinder, I first, from the center M, describe the circle B, representing the diameter of small interior cylinder marked in the previous figures with the same letter. Through this center M I draw a straight line, N O, and perpendicular thereto a straight line, P Q. From the point *a* at which the circle B cuts the line N O, I lay off toward O any desired distance, say, *a r*, which will be the length of the wing C. From the center M on the line P Q I lay off in each direction half of the distance *a r*, making M *s* and M *t*

added together equal to $a r$ or the length of the wing. Now, through the three points $r s t$, from a center easily found upon the line $N O$, as at u , I describe the circle-line $r s t$, which will be a part of the required line. Produce the line $V W$ through the center M , and from the point v , where it cuts the circle $r s t$, lay off $r w$ equal to $a v$. From the points s and t draw lines to the center u . Now, at some point in the lines $s u$ and $t u$ may be easily found centers y , from whence a circle-line may be drawn, cutting at the one side through $s w a$, which will be the remaining line required, and which is to be repeated through $t a$. These instructions will apply to any size cylinder A or any size cylinder B , or any proportion between the two, and will always give a figure composed of parts of circle-lines, so that it may be produced upon a common lathe, and will be found to be measuring through the center M of the same diameter in every direction through said center. Thus it will be

seen that the wing C may be a simple sheet or piece of metal without any arrangement of springs or flexible or changeable widths or ports to slide one upon another, as must be the case if the cylinder be not of the proper form, as described.

The outer curved lines in the diagram represent different proportions to the same size cylinder B , which may be extended to an indefinite number.

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

A cylinder or case, A , whose outline is composed of segments of three circles, the centers and radiuses of which are determined by the formula represented in Fig. 4.

JOHN A. STENBERG.

Witnesses:

JOHN W. MUNDAY,
EDW. S. EVARTS.