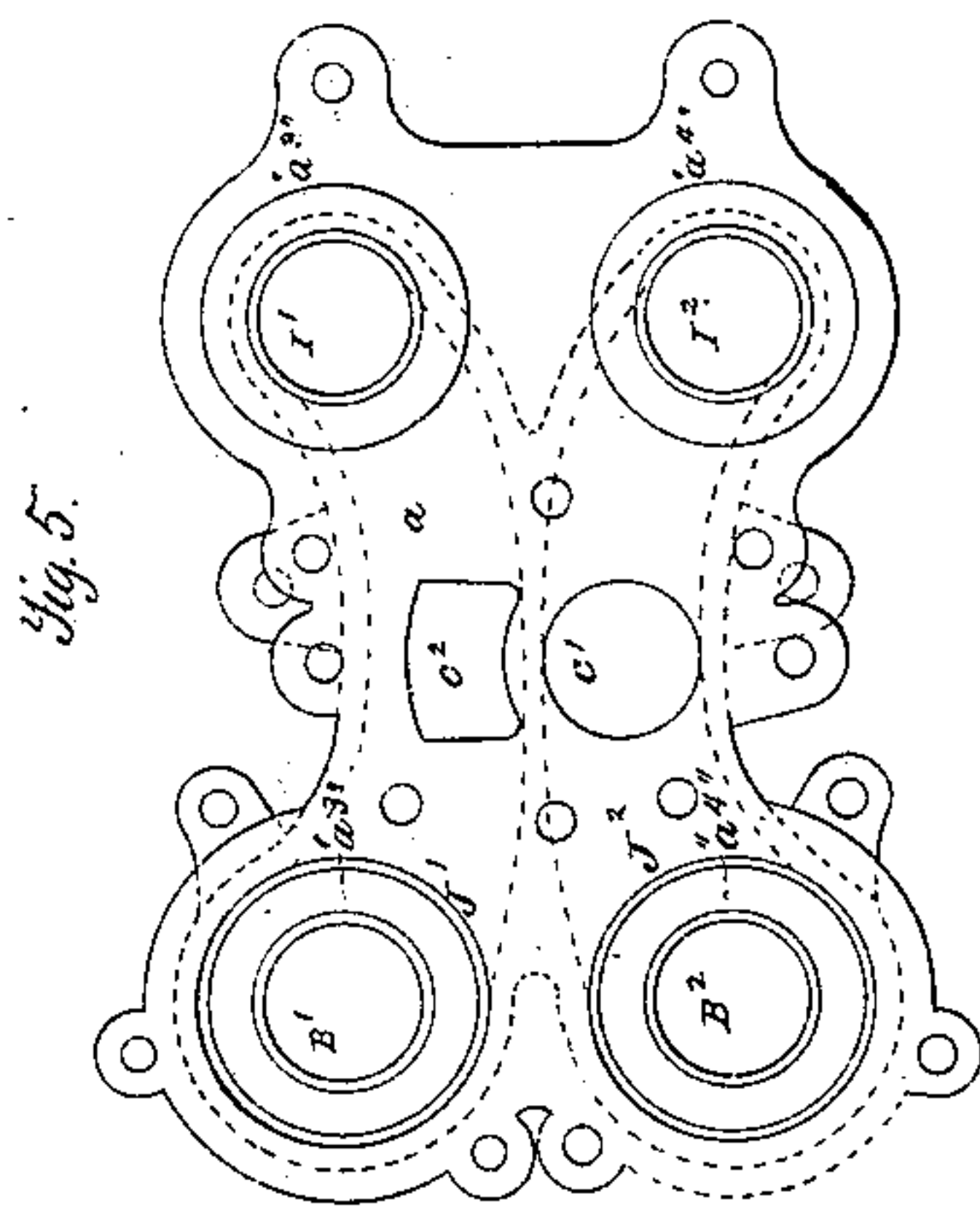
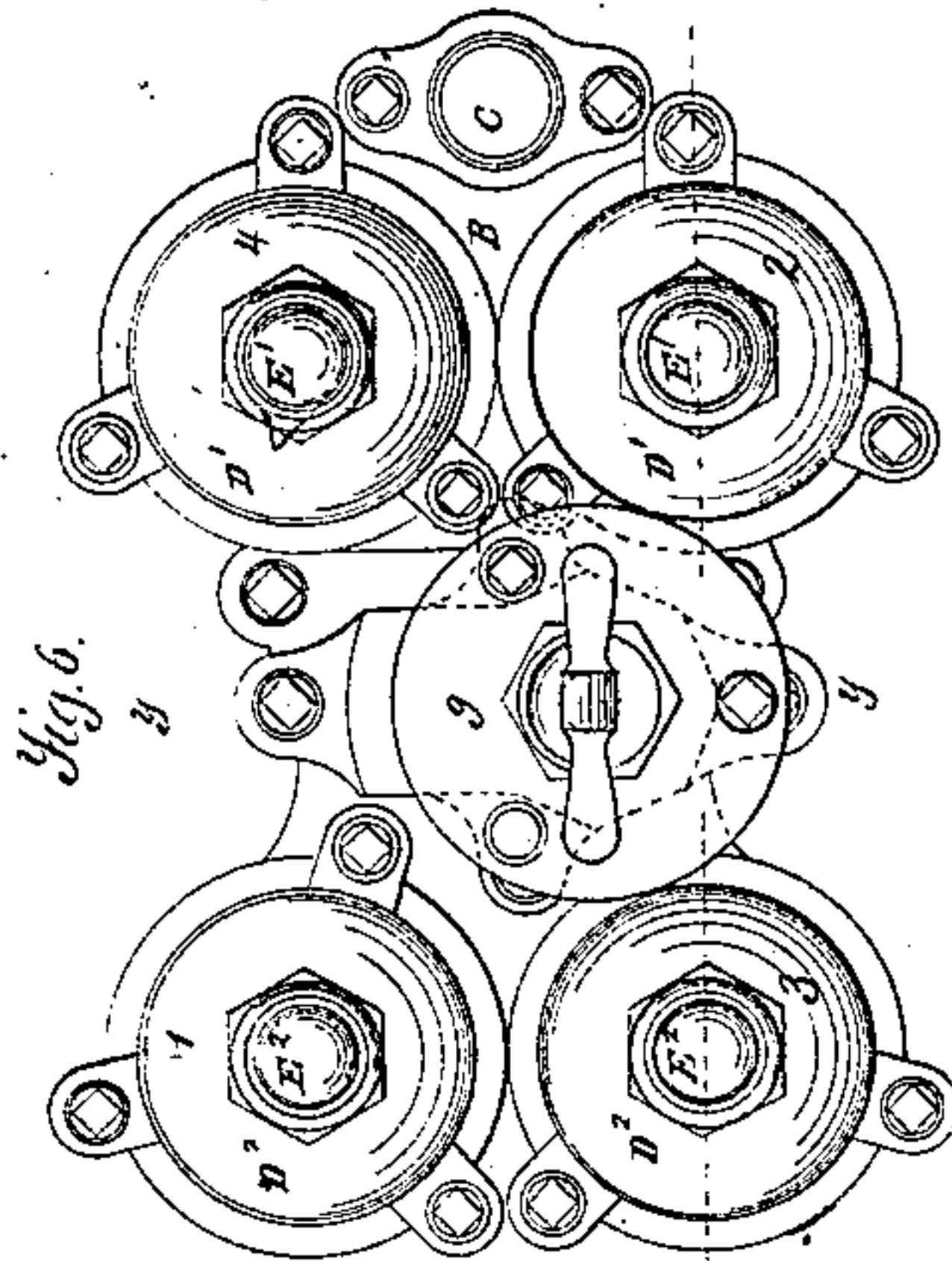
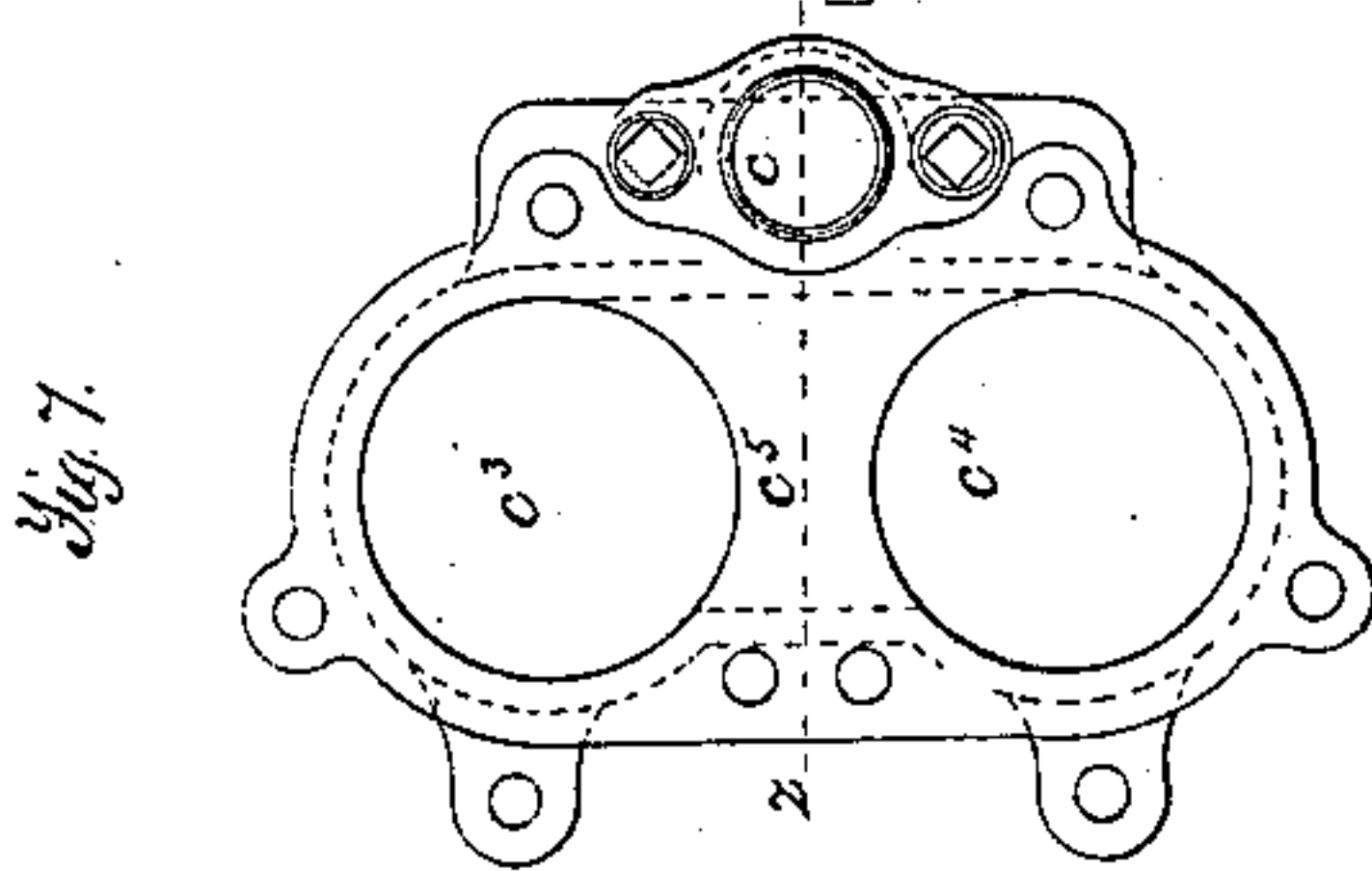
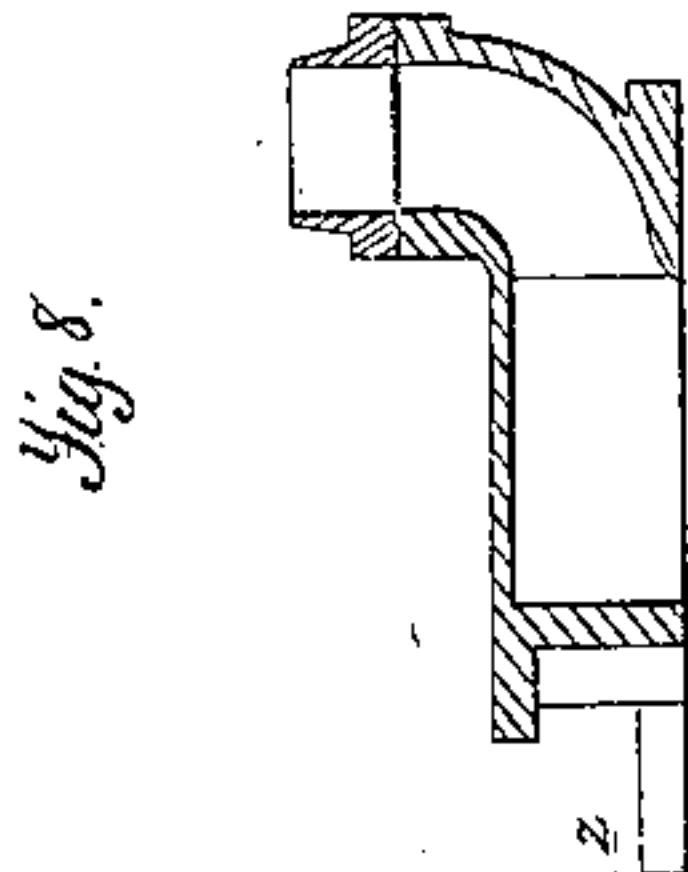
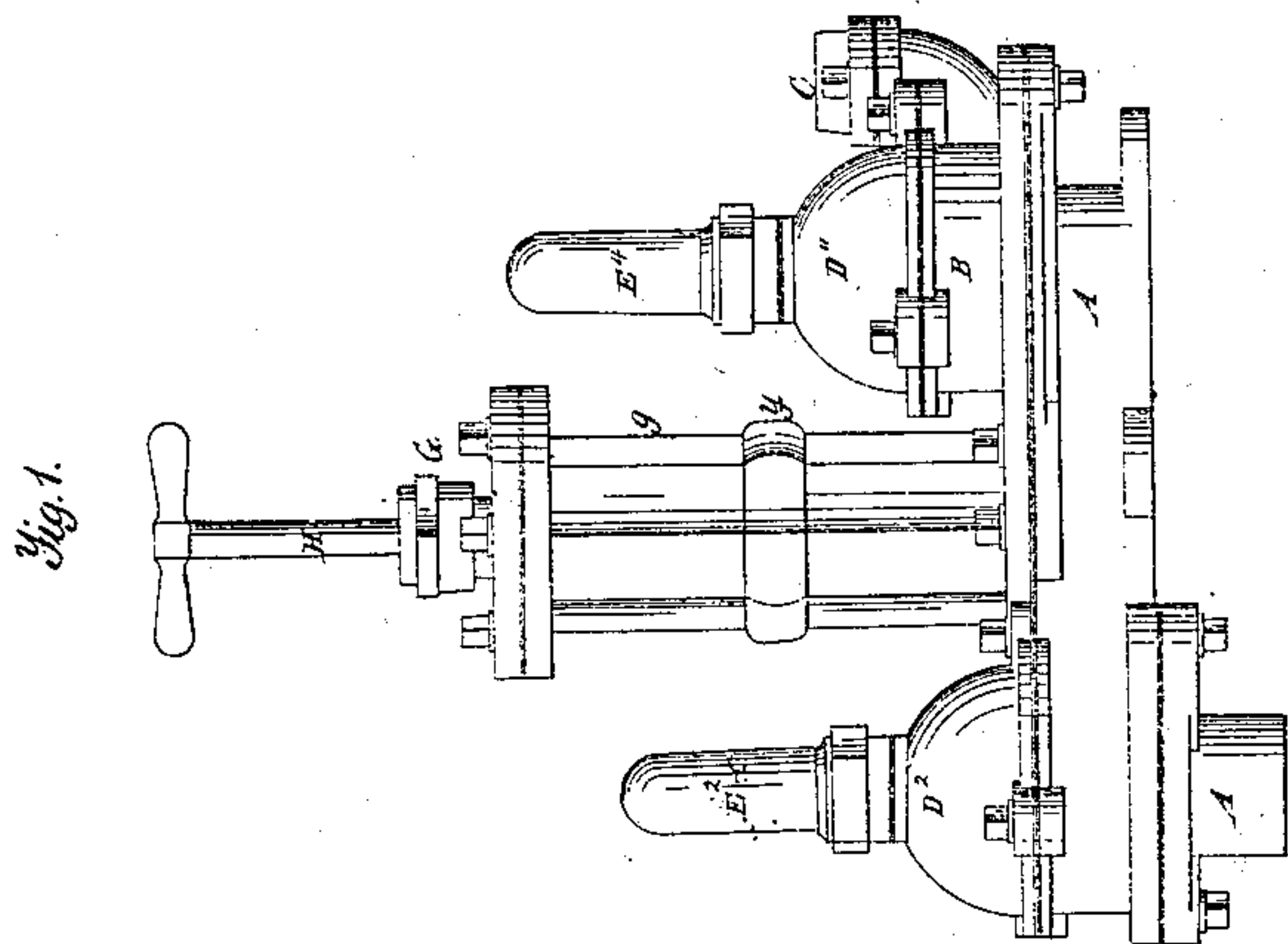
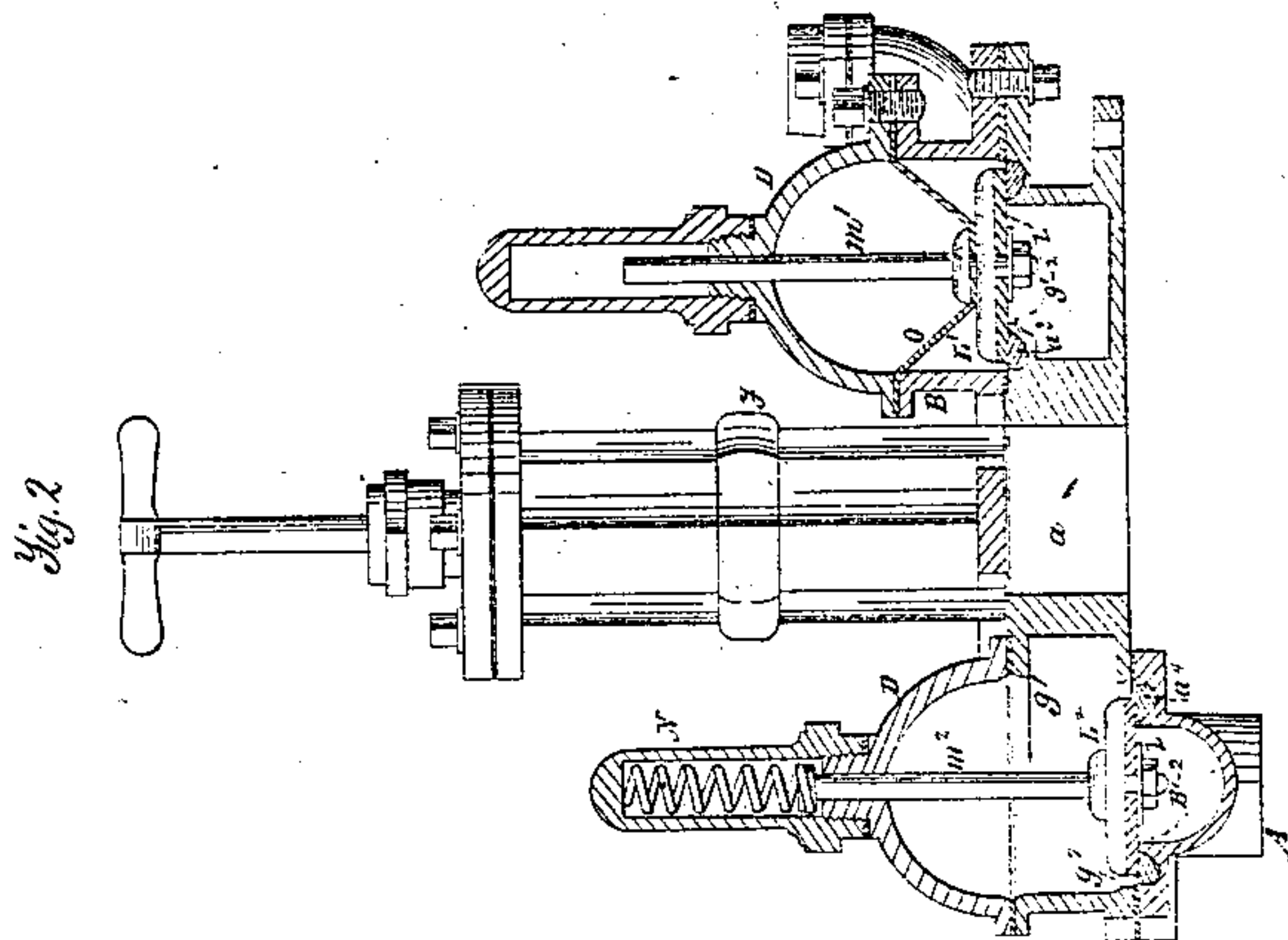
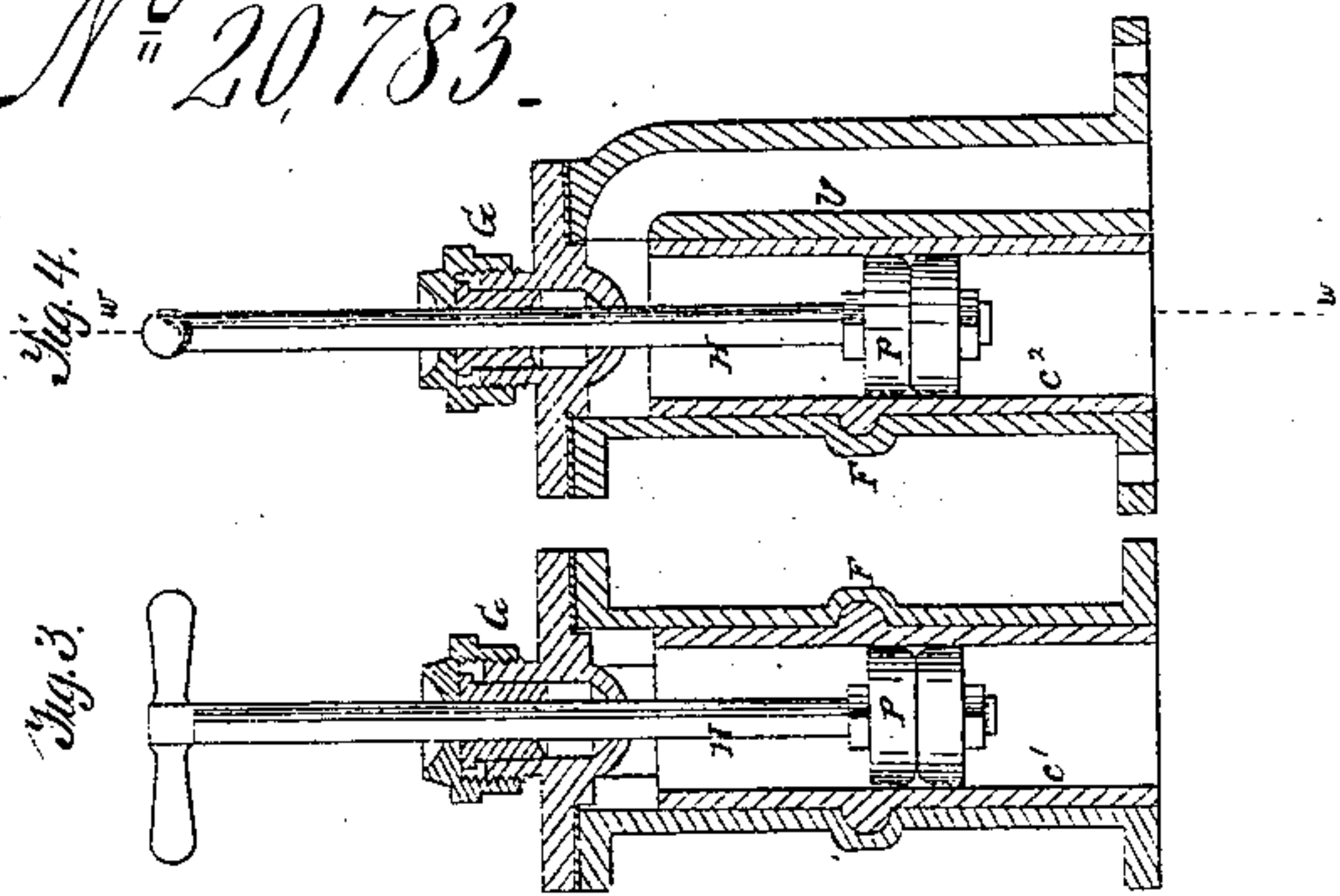


*G. B. Farnam,*

*Double Acting Pump,*

*N<sup>o</sup> 20,783.*

*Patented July 6 1858.*





# UNITED STATES PATENT OFFICE.

GILBERT B. FARNAM, OF MERIDEN, CONNECTICUT.

## PUMP.

Specification of Letters Patent No. 20,783, dated July 6, 1858.

*To all whom it may concern:*

Be it known that I, GILBERT B. FARNAM, of the town of Meriden, State of Connecticut, have invented new and useful Improvements in the Construction of Vertical and Horizontal Double and Single Acting Lift and Force Pumps, and do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, figures and letters of reference thereon marked.

Figure 1 represents a vertical and external view of the pump in "line  $x x$  Fig. 6." A is the bed, and is divided into two compartments by a partition running lengthwise in "line  $x x$  Fig. 5.

B, is the top box secured to the upper side of the bed A by means of bolts into which the water is received from the cylinder  $g$  as either one of the two egress valves  $L'$  opens; thence out through the egress passage C.  $D'' D^2$  are caps covering the ingress and egress valves  $L' L^2$ , which when repairs or examinations of the valves are necessary, can be removed. Either one or all four of them may require examination or repairs without disturbing either the ingress or egress pipes, the piston and its connection, or if either one of the ingress valves becomes deranged the same may be examined without disturbing the operation of the pump, the opposite valve performing its duty, said arrangements of caps, being applicable in pumps where leather hinge or other valves are used.  $E'' E^2$  are hollow tubes closed at the upper end and screwed to the top of the caps,  $D'' D^2$  and act as covers to the openings in the top of said caps which act as a guide for each valve  $L' L^2$  guided by their stems  $M'' M^2$ . "In Fig. 2"  $f$ , is the bottom box which is secured to the bottom of the bed A by means of bolts, upon the upper side of which are the two ingress valve openings  $B'—^2$ , "Figs. 2 and 5," to the bottom of which the ingress pipe is secured.  $g$  is the cylinder secured to the bed A by means of bolts with its head and stuffing box G, through which the piston rod H passes.

Fig. 2, is a vertical and sectional view of the pump "in line  $x x$  Fig. 6." A is the bed with the egress valve openings  $I'—^2$  on its upper surface.  $J'—^2$  are openings on the upper and lower side of the bed A, both the same size and in line with each other for the ingress valve  $L^2$  to pass through, resting upon the top of the bottom box  $f$  covering the ingress valve openings  $B'—^2$ .

$L'—^2$  are the ingress and egress valves, with their guide stems  $M'—^2$  projecting from the upper side, passing through the opening in the top of each cap,  $D'—^2$  respectively, which, with the stem acts as guides to each respective valve, while all communication around said stem for the escape of water from the egress valve or the drawing in of air around the stem of the ingress valves is cut off by the thimbles  $E'—^2$ . By this arrangement the valve becomes a puppet valve and varies from all other forms of puppets inasmuch as the stem for guiding the valve projects from the upper side of each valve and guided from above, whereby when the valves are open the liquid has a free passage into and out of the cylinder without being interrupted in its passage, as with other puppet valves when the guiding stem projects from below the valve and guides them as well by the bridge passing across the throat of the ingress and egress passages. The lower face of the valve may be ground or faced with leather or india rubber as the case may be, the guide stem being separate from the valve and passing through it with a nut and washer on the same for holding the leather or india rubber facing in its place.

N, is a spiral spring within each of the thimbles  $O' O^2$  and resting upon the top of the valve stem  $M'—^2$ . The object of this spring is when the pump is worked at quick speed, or the lift of the water on the ingress pipe is great, the valves will close with greater precision, more especially the ingress ones  $L^2$ . Thus placing the spring within the thimbles and above the point in the cap D which acts as guide to the stem and valves two objects are gained—1st the spring is free from any form of sediment that may be drawn into the pump, and might collect upon the same, interfering with the valves operating; 2d, if any derangement of the valve occurs, or the stem becomes choked in the guide, the same may be relieved by removing the thimbles and raising or pressing the valve by means of the stem without disturbing the cap, thereby not interfering with the working of the pump, as would be the case if the spring were placed upon the stem below the opening in the cap, and resting upon the top of the valve, for in this case the cap would have to be removed.

O, represents an india rubber diaphragm which is connected with each valve respectively by means of the valve stem  $M'—^2$



passing through it and securing it to the upper side of the valve as by means of the shoulder upon said stem and held by means of the nut on the under side of the valve  
 5 screwing the valve and stem together, which also holds the leather or india rubber facing of the valve—L'—'—in its place. This diaphragm is secured to the upper surface of the top box B by means of the caps D' D'  
 10 and forms said joint while the cap acts as guides to the valves and stems. Being thus secured a perfect air tight chamber is formed above the diaphragm. When either the ingress valves open or the egress, as  
 15 the water is drawn in or forced out, the diaphragm rises, thereby compressing the atmosphere above it into a smaller compass, which at the completion of the stroke of the piston and the valve closes, the air compressed expands and acts as a spring in  
 20 closing the valve sooner and with greater precision than it would otherwise, performing the same duty as the spring. This diaphragm performs another and a more important duty. When the liquid is of such  
 25 a nature as will clog the stem and guide, thereby preventing the valves from working, it protects them from this difficulty, as the stem and guide are above the valve and  
 30 diaphragms, thereby all communication of the liquids is cut off from these parts, which with the expansion of the air within the space above the diaphragm compressed as the valves lift, they are sure to close when  
 35 each one respectively has performed its duty.

Figs. 3 and 4 represents a sectional view of the cylinder in line *x, x, y, y*, Fig. 6. P is the ordinary piston with two cup leathers—one secured toward the top, one toward the  
 10 bottom of the cylinder. This piston is secured onto the end of the piston rod H, which passes through the cylinder-head and stuffing box G. V shows the side pipe which connects with the upper end of the  
 15 cylinder, through which the water is drawn in and forced out above the piston, while all communication is cut off from without by means of the head and stuffing box G.

Fig. 5 represents a top sectional view of the bed A, showing by the dotted lines where the same is divided into two compartments. C' shows the opening to supply the cylinder under the piston. C<sup>2</sup> is the opening to supply the cylinder over the piston  
 55 through the side pipe. I'—<sup>2</sup> shows the two egress valve openings on the upper surface of the bed A. J'—<sup>2</sup> are openings on the upper and lower side of the bed of the same size and in line to pass the ingress valve  
 30 L<sup>2</sup> through. B<sup>12</sup> are the ingress valve openings in the upper side of the bottom box. A<sup>3</sup>—<sup>4</sup> are the circular grooves around each valve opening for the composition valve seat.

Fig. 1. represents a top external view of 65 the pump with the cylinder *g* in its place, also the top box B, egress passage C, four caps D'—<sup>2</sup> with their respective thimbles E'—<sup>2</sup>.

Fig. 7 represents a top sectional view of 70 the top cup. C<sup>3</sup> C<sup>4</sup> are openings in the top of it to permit the egress valve to pass through, divided by the partition C<sup>5</sup>, while the underside is entirely open. C is the egress passage, to which the egress pipe is attached. 75

Fig. 8 is a longitudinal section of the top box in line Z Z Fig. 7. As the piston P ascends the ingress valve 1 opens "Fig. 6" to permit the water to pass in and follow the vacuum formed. As said piston moves up- 80 ward, while the water that is above the piston is forced out through the side pipes into the top box, thence out through the egress passage C, in which case the egress valve 2 rises. The piston having finished its stroke 85 and again descends, the ingress and egress valves 1—2 close. And the ingress and egress ones 3—4—open (under such respective cap) to permit the water to pass in and out as on the upward stroke of the piston, 90 so vice versa at each and every stroke of the piston P upward or downward, while each spring or diaphragm expands or contracts upon their respective valve as each rises or falls to admit the liquid to flow in and out of 95 the cylinder.

The position of the valves may be changed by removing the two egress valves and placing them where the cylinder now stands, reversing the top cup so that the egress pas- 100 sage C will be over the ingress valves and their respective caps, while the cylinder can take the place of the egress valves, changing the form of the bed only. In single acting pumps requiring but one ingress and 105 one egress valve the cylinder can stand between the two valves, or the valves may be so set as to stand at right angles with each other, using in connection the above arrangements for the valves. 110

That which I claim and wish to secure by Letter Patent is—

The use of the thimble E<sup>2</sup>, cap D', guide rod *m'*, having a reacting spring N attached to its upper end and confined within the air 115 tight thimble, in combination with the valve L', and elastic diaphragm O, for the purpose of lifting and dropping said valve squarely from and to its seat, and at the same time protecting the guide rod, and re- 120 acting spring attached thereto from the rust of the liquids acted upon by the pump.

GILBERT B. FARNAM.

Witnesses:

S. W. BALDWIN,  
 OLIVER SNOW.