

F. CHASE.
Valve-Actuating Mechanisms for Engines.
 No. 144,831 *Fig. 1.* Patented Nov. 25, 1873.

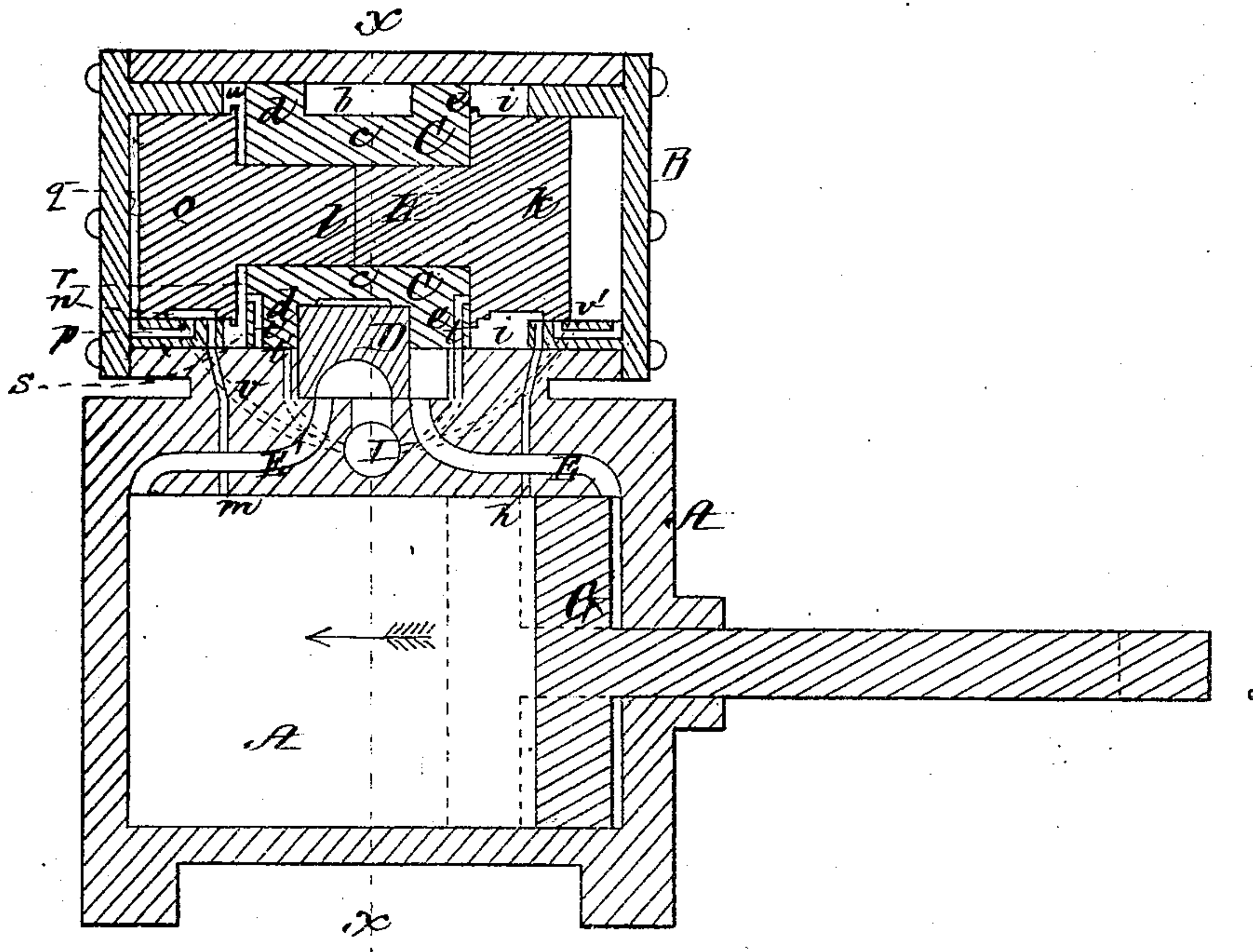


Fig. 2.

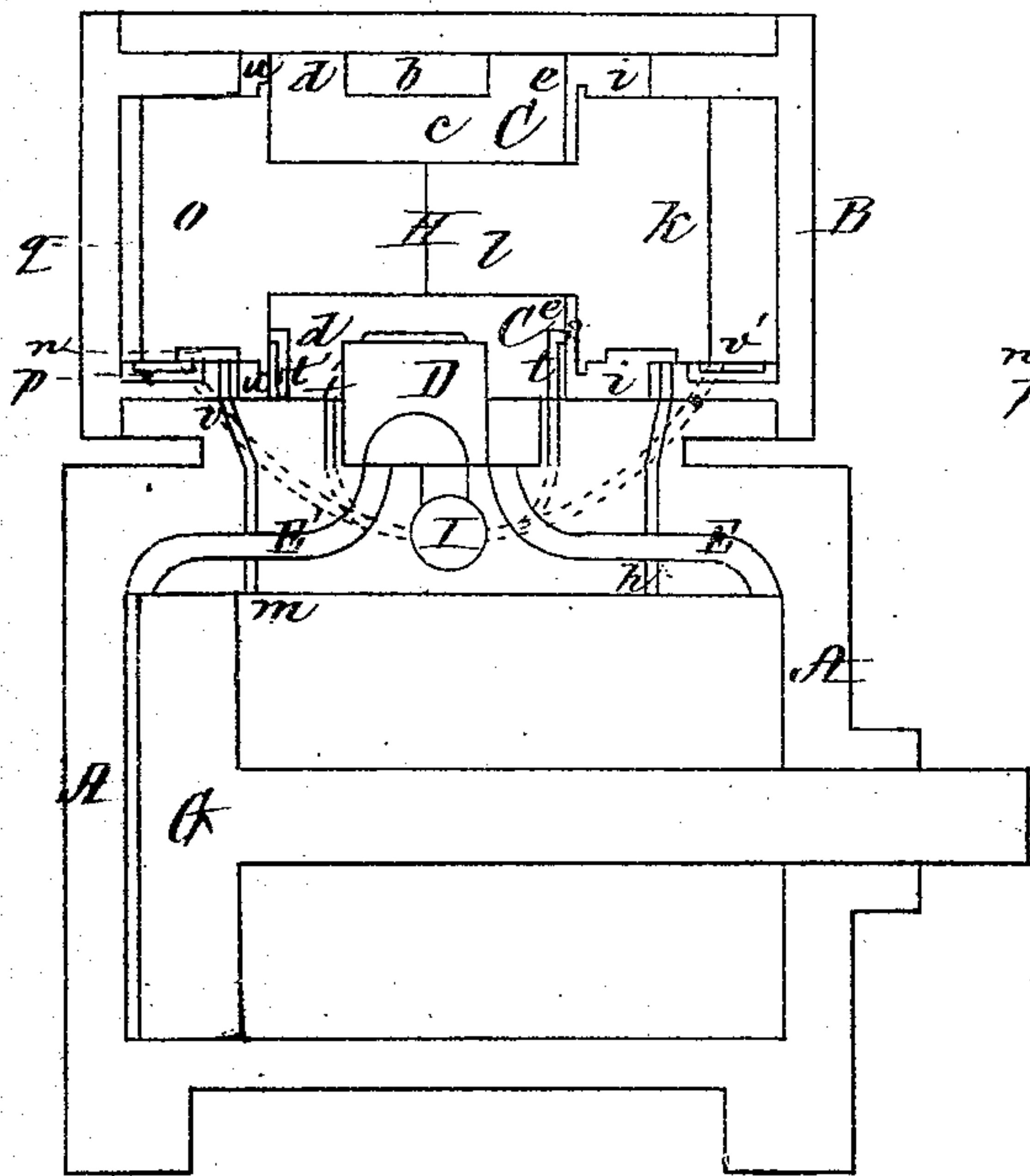
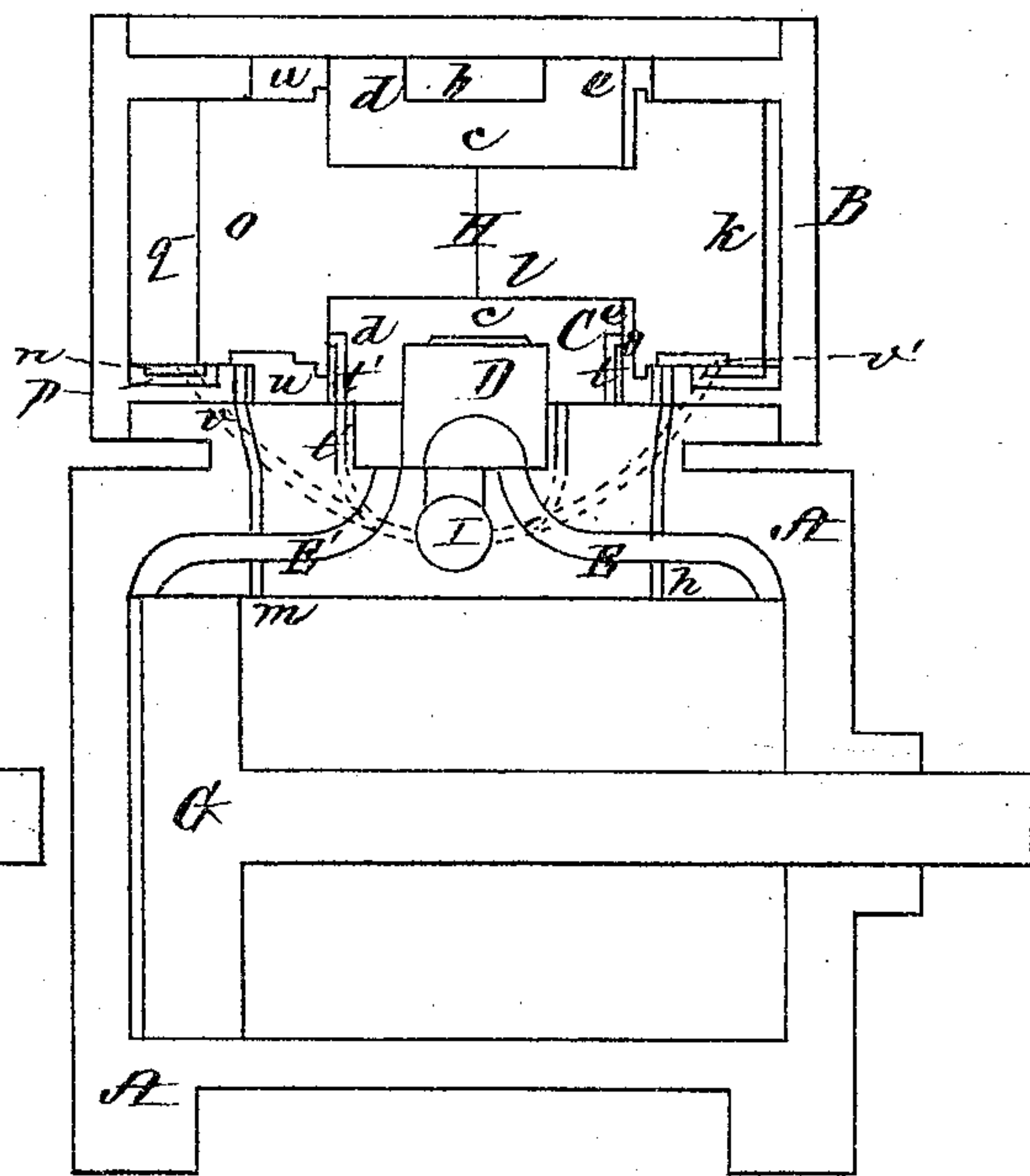


Fig. 3.



Witnesses,
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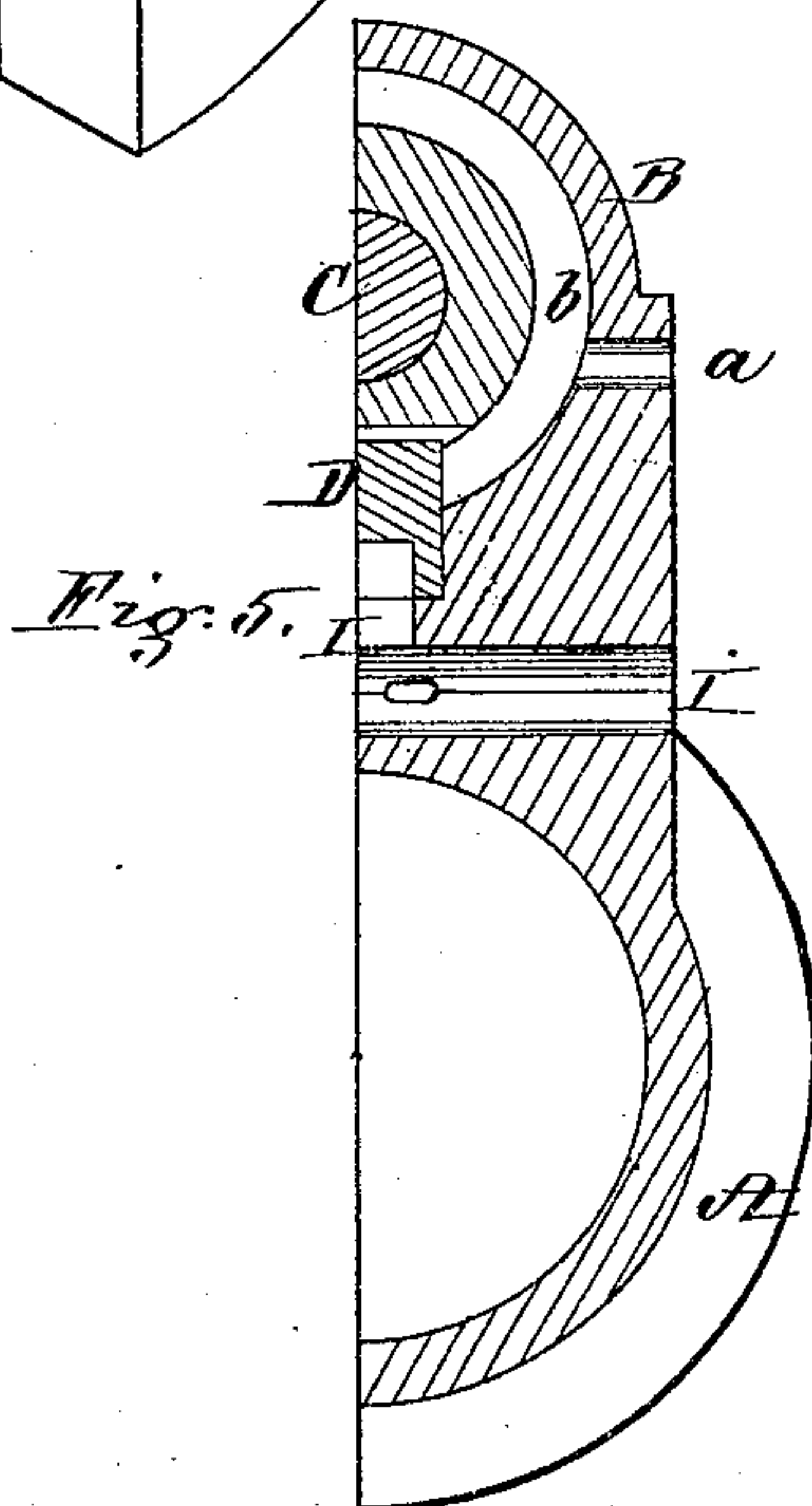
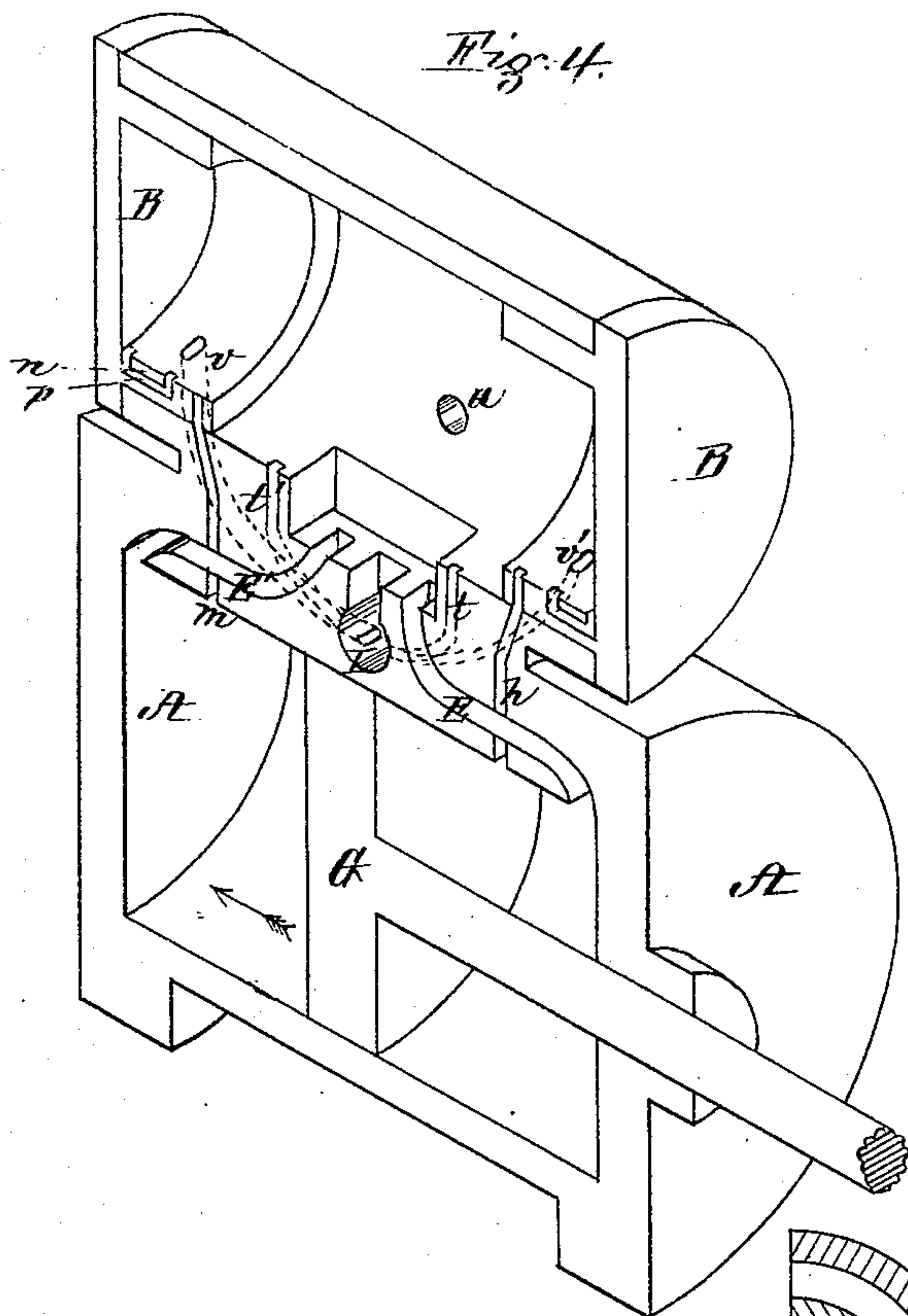
Inventor,
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UNITED STATES PATENT OFFICE.

FRANK CHASE, OF BOSTON, ASSIGNOR TO HIMSELF AND GEORGE S. SCAMMON, OF MALDEN, MASSACHUSETTS.

IMPROVEMENT IN VALVE-ACTUATING MECHANISMS FOR ENGINES.

Specification forming part of Letters Patent No. 144,831, dated November 25, 1873; application filed November 3, 1873.

To all whom it may concern:

Be it known that I, FRANK CHASE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Mechanism for Actuating the Valves of Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 is a section through the center of a steam-cylinder and its chest with my improvements applied thereto. Figs. 2 and 3 are sectional elevations of the same, the position of the parts being changed and the section-lines omitted. Fig. 4 is a perspective view of the same with the valve and its operating-plungers removed from the steam-chest. Fig. 5 is a transverse section on the line *x x* of Fig. 1.

In steam pumps or engines as ordinarily constructed, where the valve is operated by a single plunger without tappets, the friction of the parts causes them to wear away, and the steam leaks into the space between them, and exerts a pressure in the contrary direction to move the valve back before the piston has completed its stroke, the effect of which is to stop the pump or engine.

To obviate the foregoing objection, and to hold the valve at rest till it is ready to be returned on the completion of the stroke of the piston, is the purpose of my invention, which consists in an auxiliary plunger made separately from the principal or ordinary plunger, the steam from the cylinder being made to act alternately on the heads of the auxiliary plunger, to keep one of them constantly against one of the heads of the principal plunger, whereby the force which would be exerted in the wrong direction by the steam escaping into the spaces produced by the wearing away of the parts is counteracted, and the position of the valve is not changed till the completion of the stroke of the piston.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A represents the cylinder of an engine, upon which is secured the steam-chest B, into which steam is admitted

at *a*, Figs. 4 and 5, by an induction-pipe leading from the boiler. (Not shown.) The steam enters an annular opening, *b*, surrounding the central portion *c* of the principal or ordinary plunger C, the ends of which are provided with heads *d e*, fitting snugly the interior of the steam-chest. The steam passes around this opening *b*, and over the top and around the sides of a valve, D, through one, E, of the main receiving-ports E E', into the cylinder. The piston G, being in the position seen in full lines, Fig. 1, is driven by the steam in the direction of the arrow; and after it has passed in front of a small port, *h*, as seen dotted in Fig. 1, the steam enters therein and passes into an annular opening, *i*, surrounding one head, *k*, of an auxiliary plunger, H, the central portion *l* of which (intended to be made in two or more sections) passes longitudinally through the principal plunger C, the length of the portion *l* being slightly greater than the extreme length of the plunger C, whereby a small amount of play may be allowed between them. On entering the opening *i*, the steam exerts a pressure on the head *k* of the plunger H, against the head *e* of the plunger C, sufficient to keep the valve at rest in the position seen in Fig. 1, any pressure of the steam which might be exerted in the opposite direction by leaking in between the parts being thereby counteracted—an incident of frequent occurrence where a single plunger without tappets was used. After the piston has passed beyond the small port *m*, (see Fig. 2,) the steam enters therein, and passes into a recess, *n*, formed in the bottom of the opposite head *o* of the plunger H, and thence through another small port, *p*, of the form seen, into the space *q* at the back of the head *o* of the plunger H, which now commences to move in the opposite direction, in its passage first closing the aperture *r* between its head *o*, and that *d* of the plunger C, which movement brings these two heads together and separates the two heads *e* and *k*, so as to form an aperture, *s*, between them, whereby a communication therewith is opened into a small exhaust-passage, *t*, through which the steam in the annular opening *i* escapes into the main exhaust-passage I, thus relieving the pressure on the head *e* of the plunger C. (See Fig. 2.) As the plunger

H continues to return, its head *o* is moved so as to open communication between its recess *n* and an annular opening, *u*, surrounding the head *o*, whereby the steam is allowed to act on the corresponding head *d* of the plunger C, causing it to move the valve toward the opposite end of its seat, (see Fig. 3,) the steam being permitted to work expansively on the back of the head *o* of the plunger H at about the latter half of its stroke, when it passes over so as to close the small port *p*, the expansive force of the steam assisting the plunger to complete the movement of the valve, immediately before which an exhaust-passage, *v*, (see Fig. 4,) is opened, through which the steam is allowed to escape down into the main exhaust-passage I, the steam exerting a constant pressure on the heads *d* *o*, to keep the auxiliary plunger in contact with the principal plunger till the piston has finished its stroke, by which arrangement any contrary pressure of steam which leaks into the opposite end of the chest, incident to the wearing of the parts, is readily counteracted. *t'* and *v'* are exhaust-passages similar to those *t* and *v*, Fig. 4, and lead from

the opposite end of the steam-chest into the main exhaust-passage I, those *t'* and *v* entering it at the same point on one side, and those *t* and *v'* entering it at another point opposite thereto.

From the foregoing description of the construction and operation of the plungers to move the valve in one direction, it will be evident how they will be actuated by the steam to move the valve in the opposite direction on the return stroke of the piston.

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

The auxiliary plunger H and the principal annular plunger C, for actuating the valve D, in combination with the steam-cylinder A and chest B, provided with ports and exhaust-passages, constructed and arranged for operation substantially as and for the purpose described.

Witness my hand this 30th day of October, A. D. 1873.

FRANK CHASE.

In presence of—

N. W. STEARNS,
W. J. CAMBRIDGE.