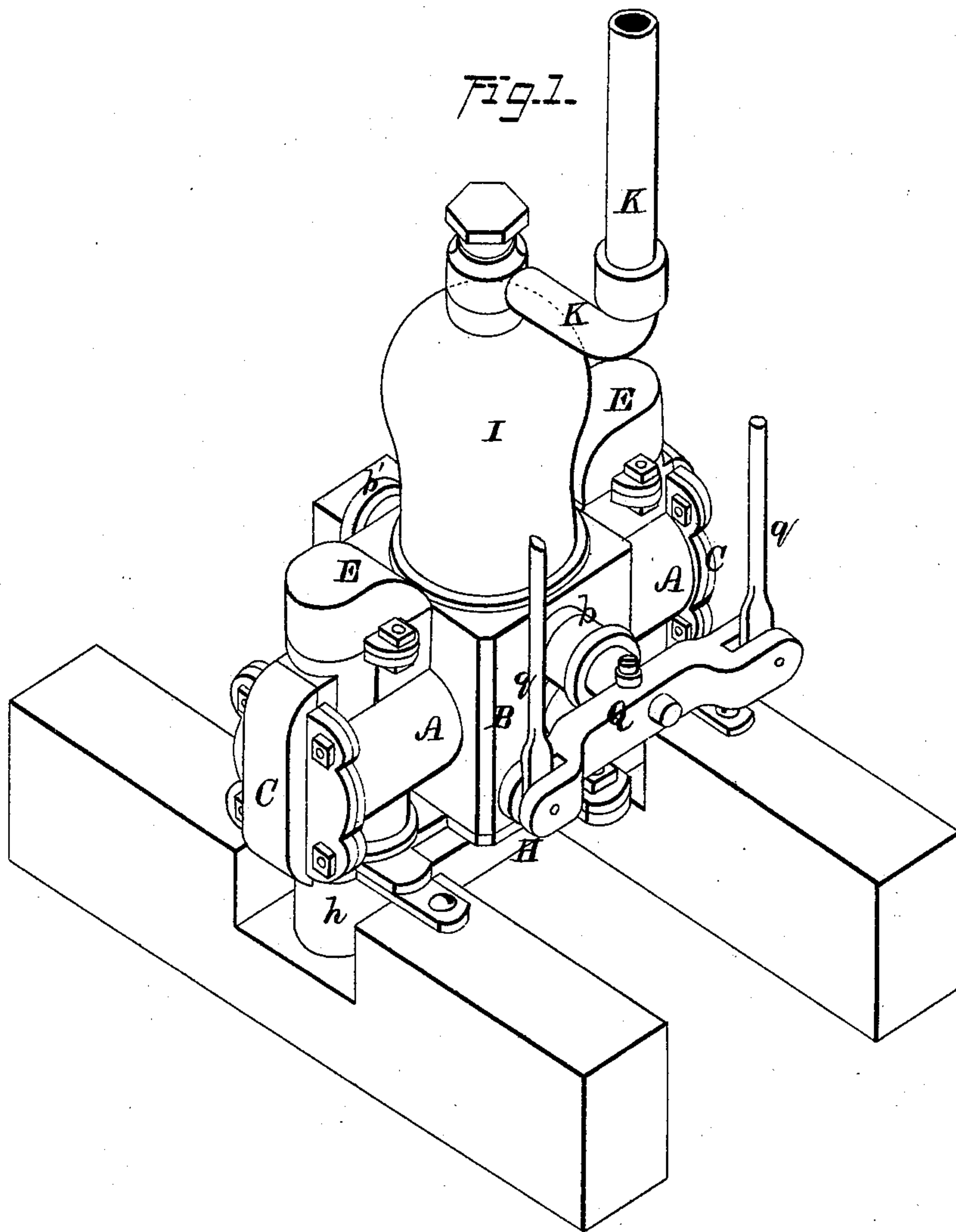


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No. 178,701.

Patented June 13, 1876.



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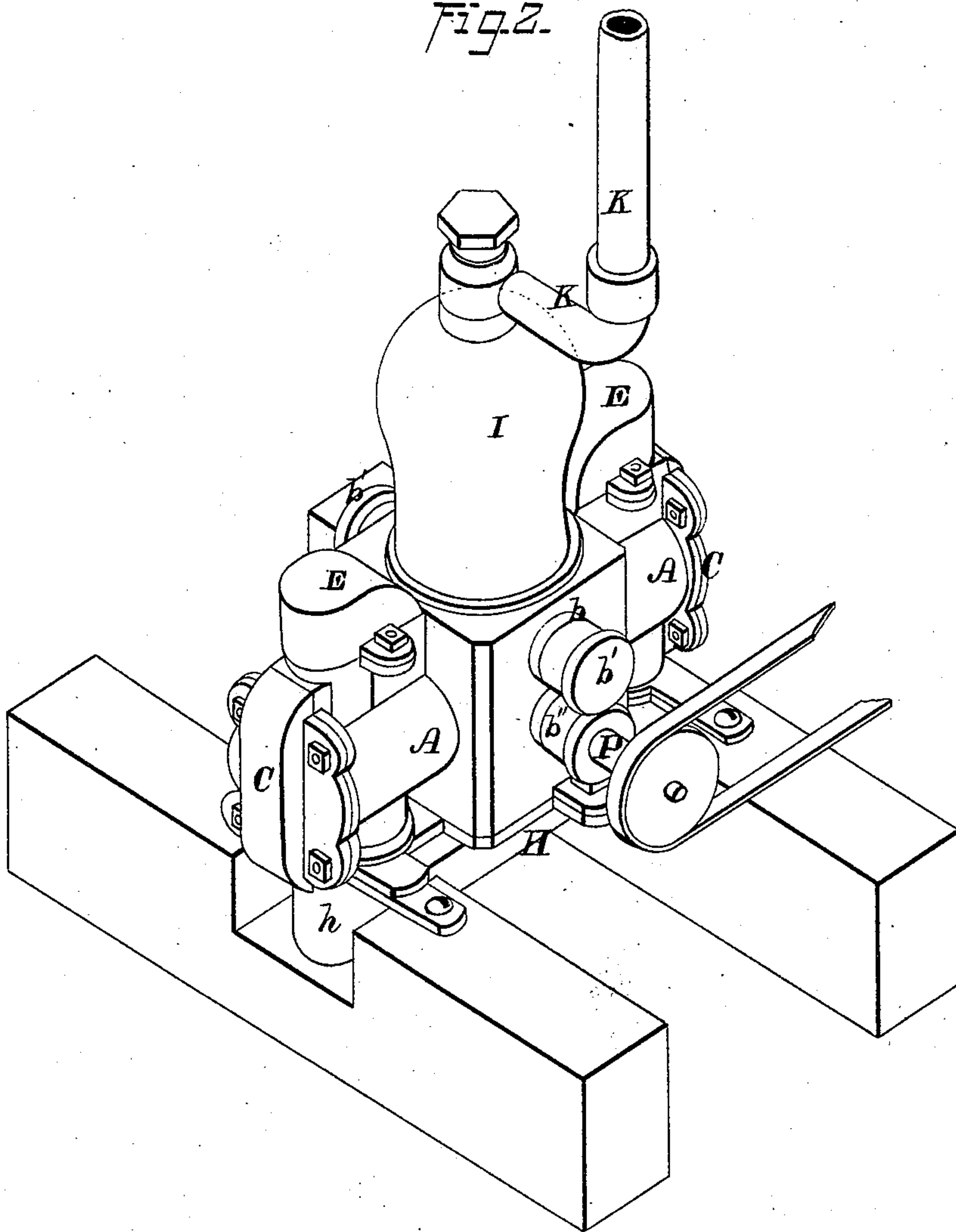
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Fig. 2.



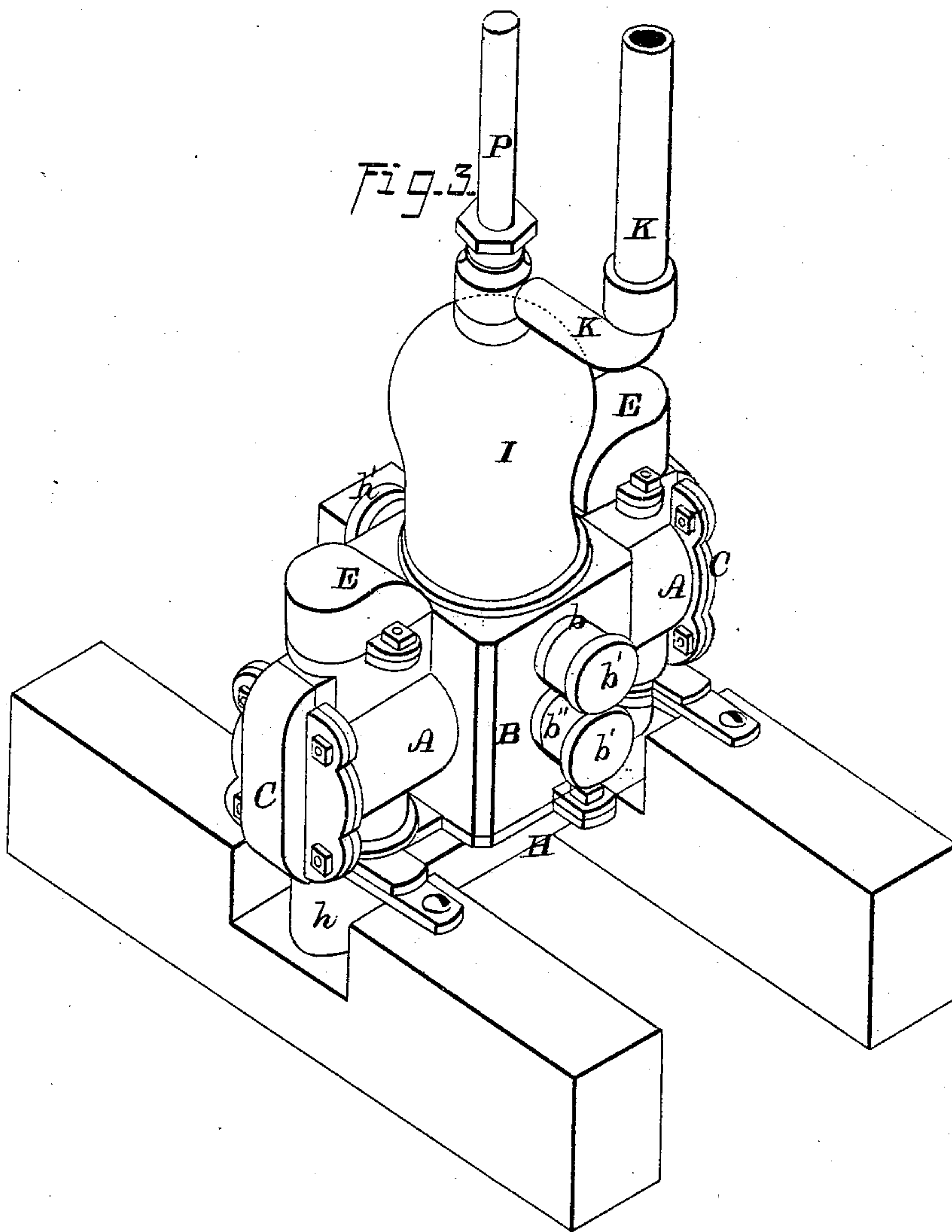
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Fig. 4.

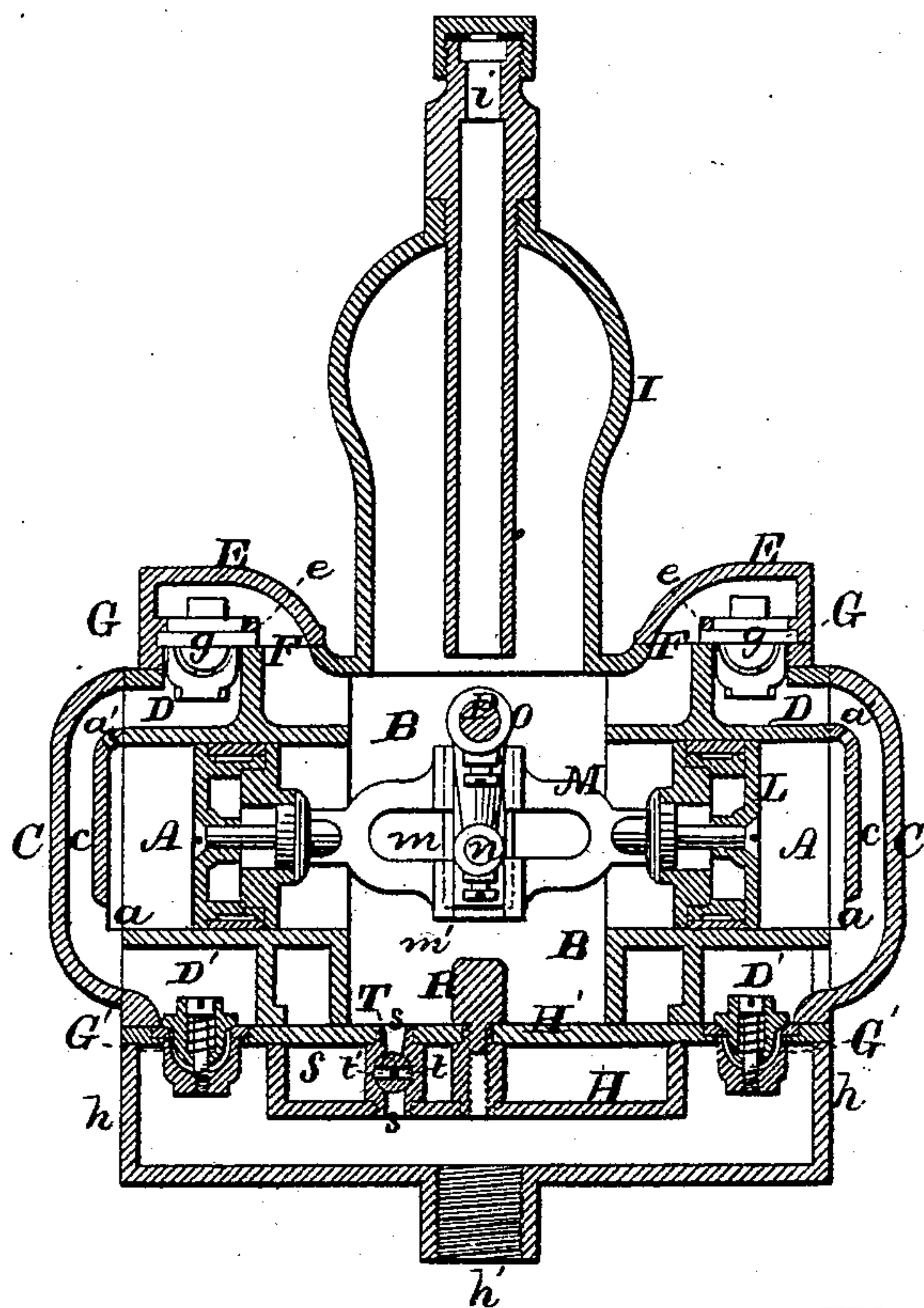


Fig. 5.

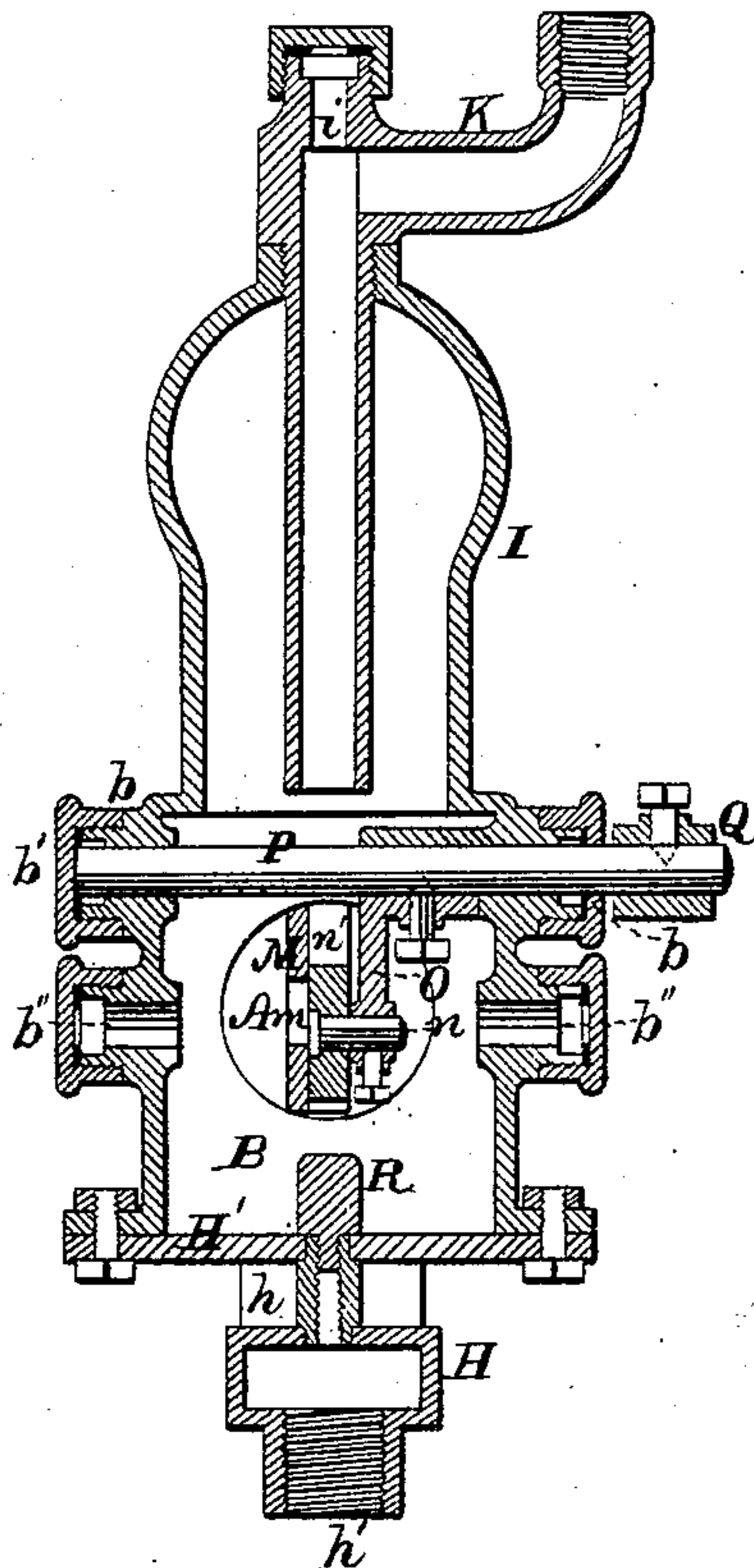
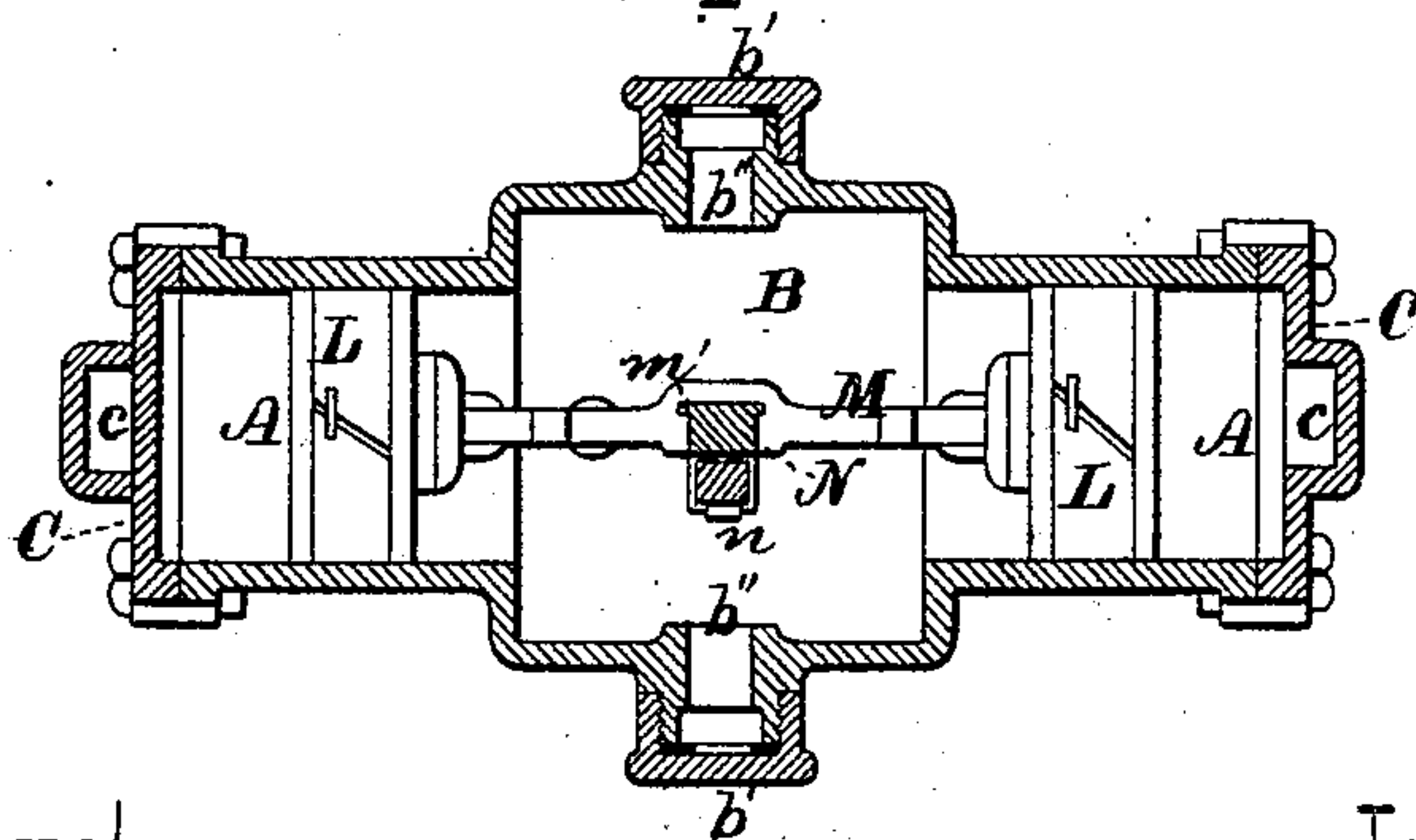


Fig. 6.



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Fig. 7.

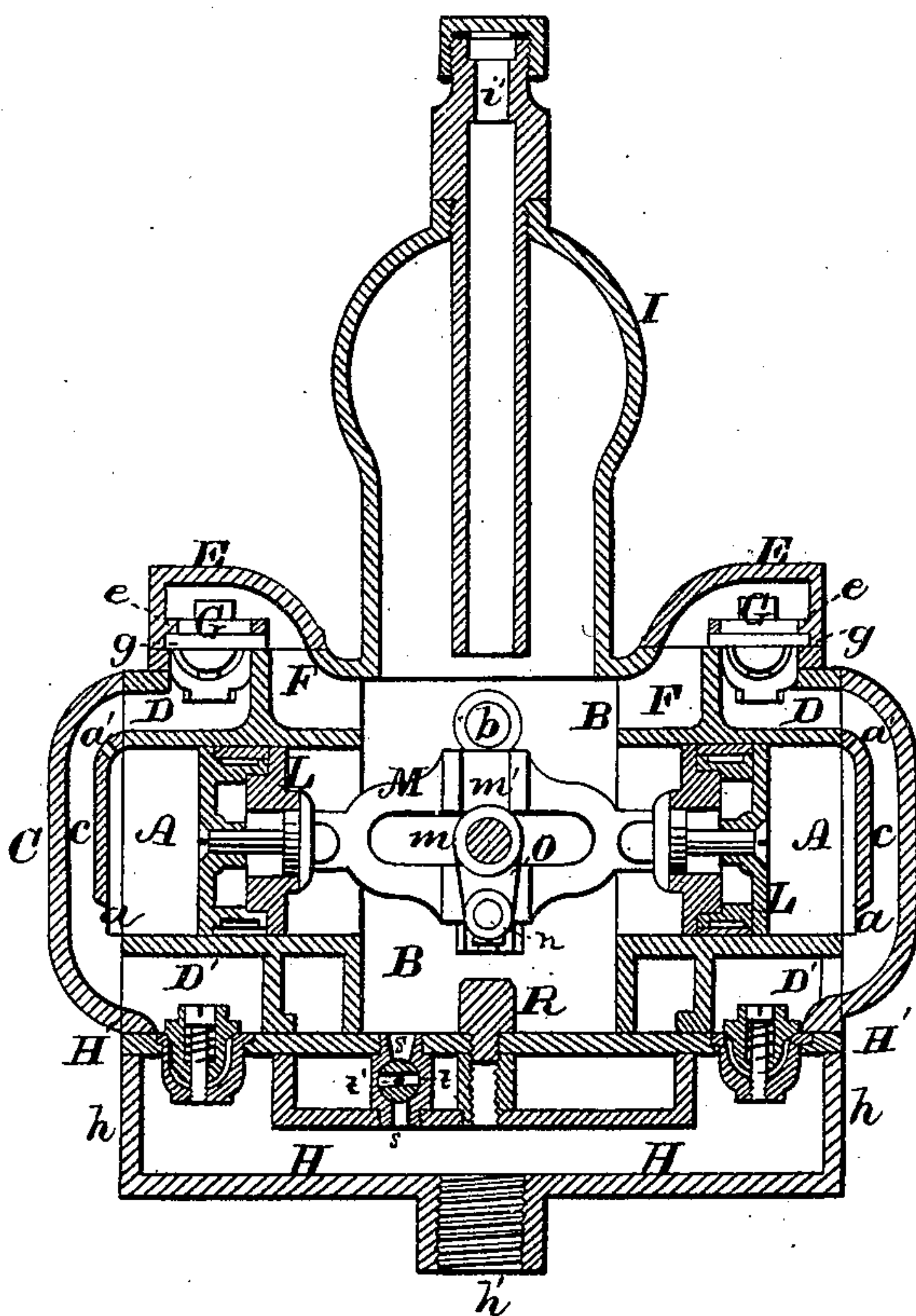
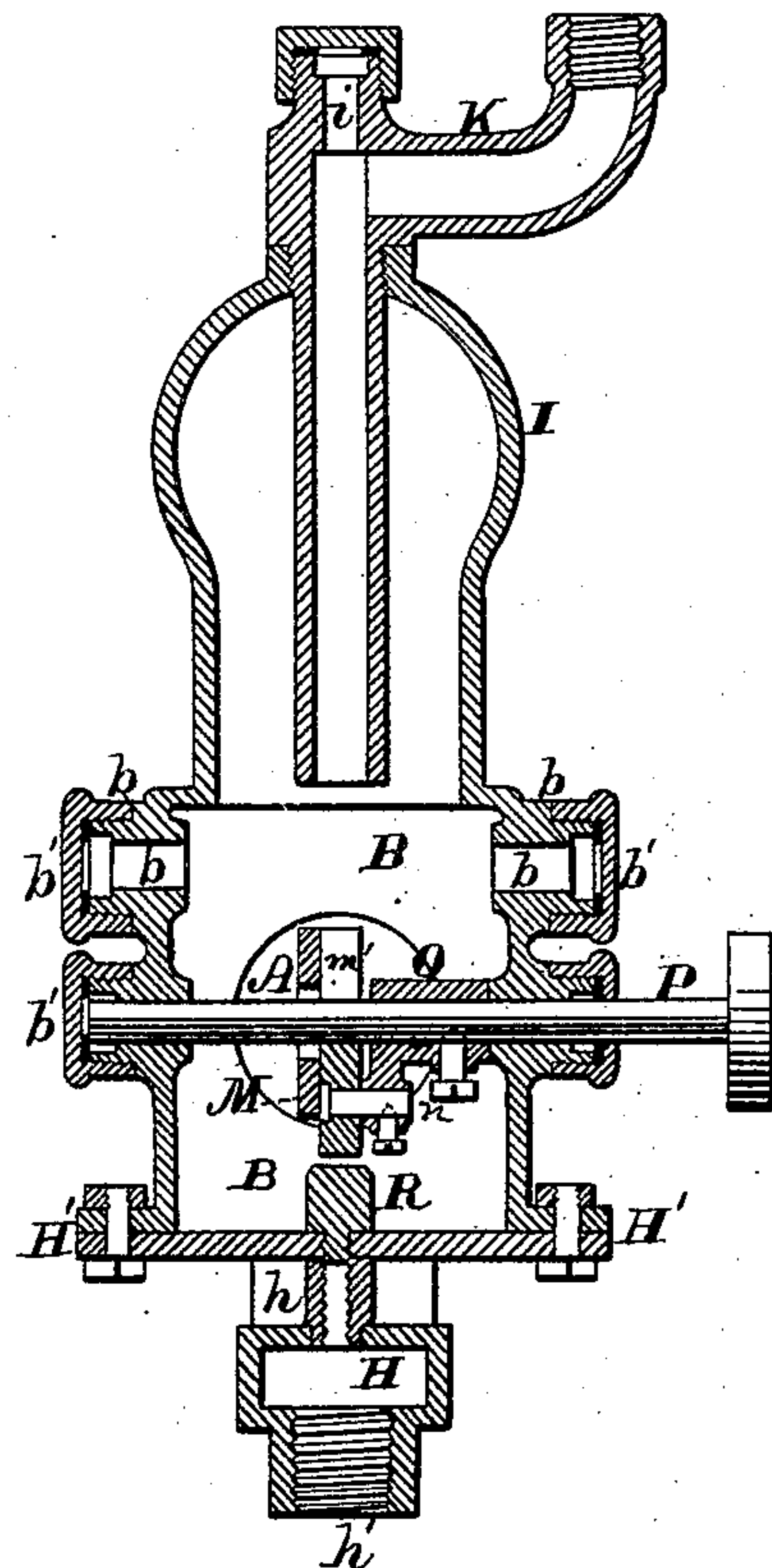


Fig. 8.



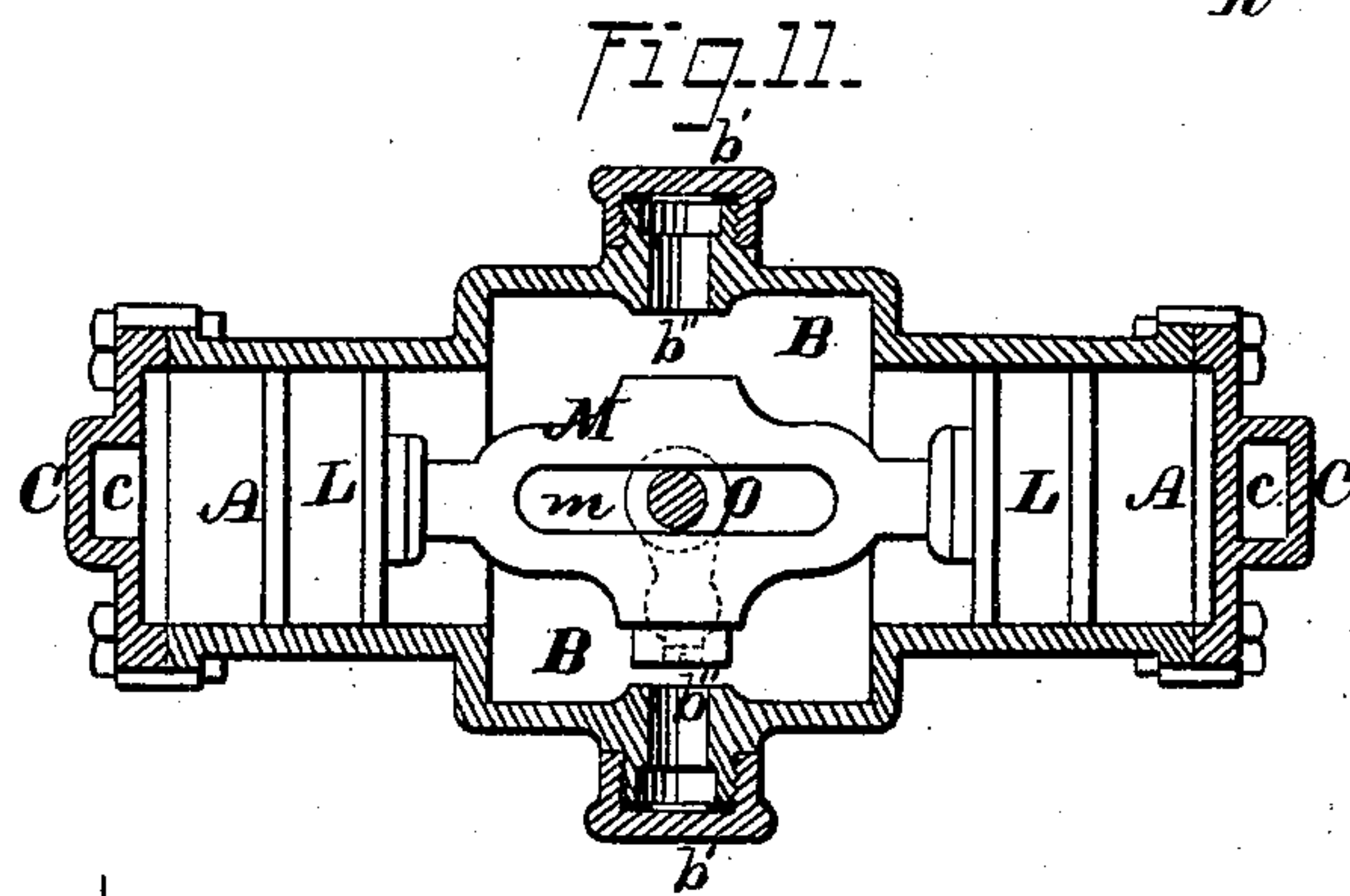
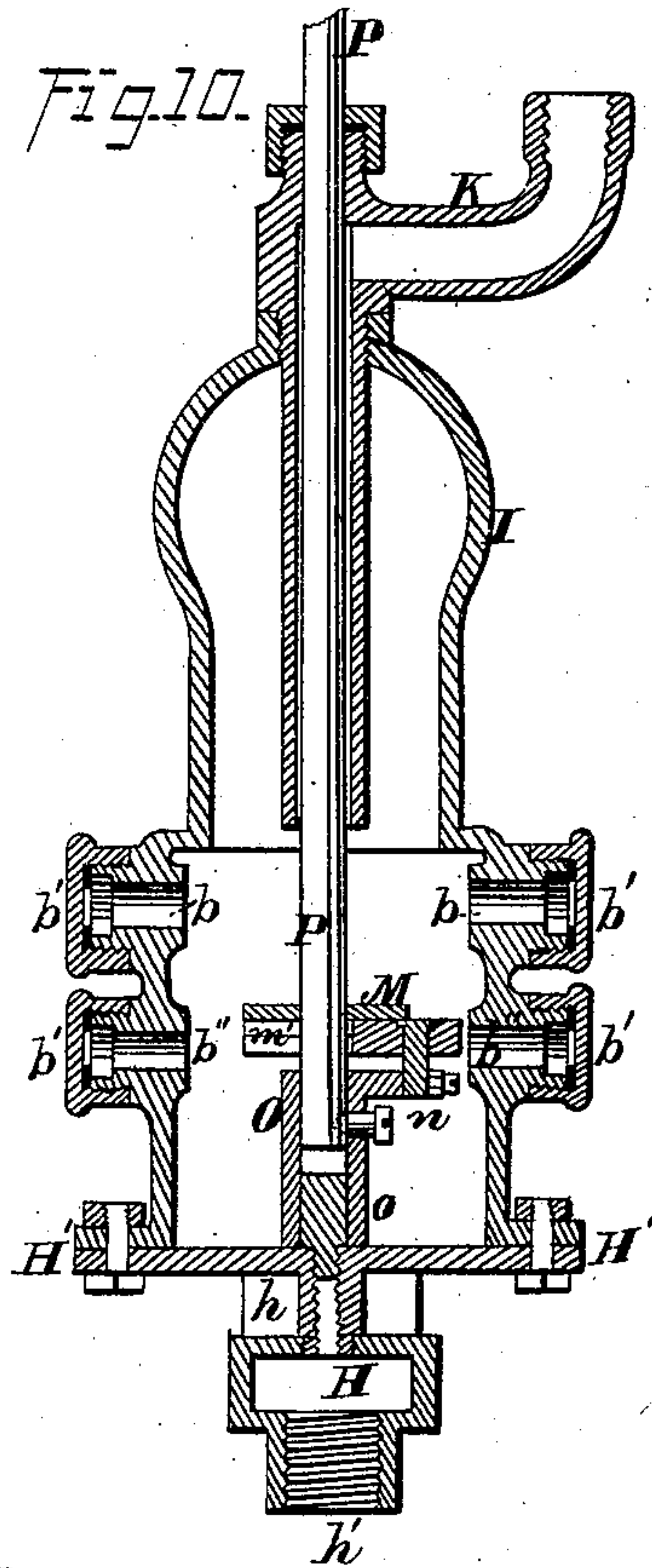
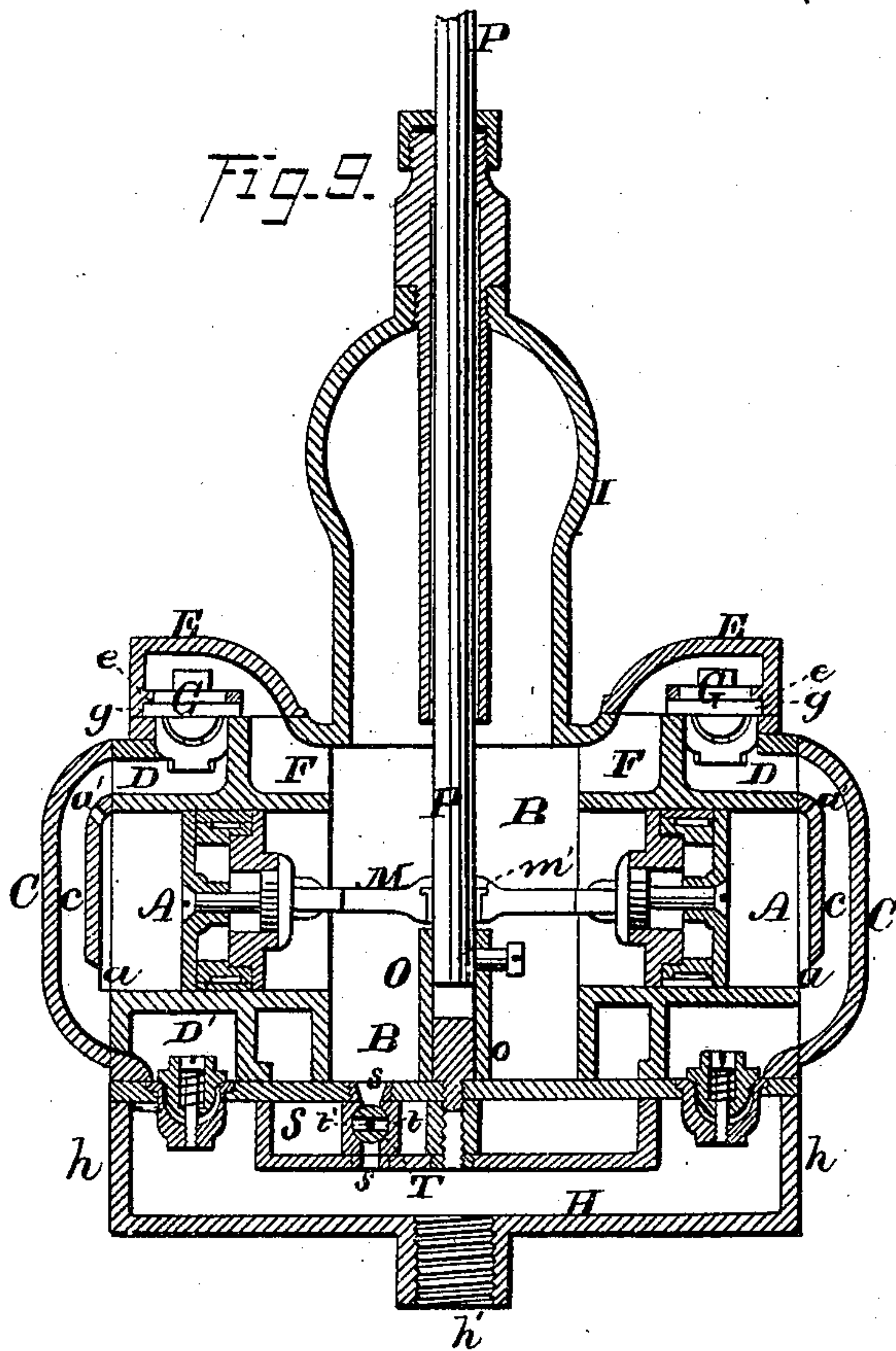
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UNITED STATES PATENT OFFICE.

JOHN S. ADAMS, OF ELGIN, ILLINOIS.

IMPROVEMENT IN PUMPS.

Specification forming part of Letters Patent No. 178,701, dated June 13, 1876; application filed May 6, 1876.

To all whom it may concern:

Be it known that I, JOHN S. ADAMS, of Elgin, in the county of Kane, and in the State of Illinois, have invented certain new and useful Improvements in Pumps; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of my pump arranged for use with, or by means of, a horizontal shaft which has a partial rotation in opposite directions. Fig. 2 is a like view of the same arranged to be operated by means of a horizontal shaft revolving continuously in one direction. Fig. 3 is a perspective view of said pump arranged to be operated by means of a vertical shaft revolving continuously in one direction. Fig. 4 is a vertical central section of Fig. 1 upon a line passing through the axes of the cylinders. Fig. 5 is a like view of the same upon a line having a right angle to the axes of said cylinders. Fig. 6 is a central section of Fig. 1 upon a horizontal line. Figs. 7 and 8 are longitudinal and transverse sections, respectively, of Fig. 2 upon vertical central lines. Figs. 9 and 10 are like sections of Fig. 3, and Fig. 11 is a central section of said Fig. 3 upon a horizontal line.

Letters of like name and kind refer to like parts in each of the figures.

The design of my invention is to enable a pump having reciprocating pistons or plungers to be adapted for operation either by means of a horizontal shaft that has a partial rotary motion in opposite directions, or by means of a horizontal or a vertical shaft arranged to revolve continuously in one direction, as convenience may require; and to this end it consists, principally, in two pistons or plungers arranged in a line with each other, and connected together by means of a rod that has a central longitudinal slot for the passage of an operating-shaft, and is provided at its longitudinal center with a transverse guide or way, for the reception of a sliding crank-block, substantially as and for the purpose hereinafter specified.

It consists, further, in combining, with the longitudinally-slotted piston-rod, a shaft which passes horizontally through the casing of the

pump above the former, and is provided with a crank, that engages with the crank-block, whereby a partial revolution of said shaft in opposite directions will impart to said piston-rod and its pistons a reciprocating motion, substantially as and for the purpose hereinafter shown.

It consists, further, in combining, with the longitudinally-slotted piston-rod, a shaft which passes horizontally or vertically through the casing of the pump, and through the central longitudinal slot of said piston-rod, and is provided with a crank-arm, that engages with the sliding crank-block, whereby a continuous rotary movement of said shaft in one direction will impart to said piston-rod and its pistons a reciprocating motion, substantially as and for the purpose hereinafter set forth.

It consists, further, in the peculiar construction of the body or casing of the pump, by means of which it is adapted to the purpose required, substantially as is hereinafter shown and described.

It consists, further, in the peculiar construction of the detachable valve-seats, and their combination with the casing of the pump, substantially as and for the purpose hereinafter specified.

It consists, further, in the means employed for removing water and sand from the working-chamber and upper portions of the pump without interference with the operation of the valves, substantially as is hereinafter shown.

In the annexed drawings, A and A represent two cylinders, which have one common axis, are open at their outer ends, and at their inner ends open into a central rectangular chamber, B, that is preferably cast with, and forms a portion of, said cylinders. The outer end of each cylinder A is inclosed by a head, C, upon the outer face of which is formed a vertical passage, c, that is inclosed exteriorly, and at its ends communicates with valve-chambers D and D', which are formed upon the upper and lower sides, respectively, of the casing of said cylinder. The upper side of each valve-chamber D is inclosed by a recessed cover, E, that forms a vertical extension of said chamber, and, being extended inward, also incloses the upper end of a passage, F, which from thence extends downward

and inward, and opens into the chamber B. The upper end of that portion of the valve-chamber D below the cover E is circular, and within the same is loosely fitted a removable valve-seat, G, which latter is provided with a flange, *g*, that projects horizontally beyond the edge of the opening, and rests upon the metal face that receives the cover E. Within the lower bearing-face of the cover E is formed a recess, *e*, which corresponds in horizontal and vertical dimensions to the like features of the upper flanged end *g* of the valve seat. As thus constructed, it will be seen that the lower face of the cover E and the lower side of the flange *g* are flush with each other, so that if packing is placed between the same and the upper face of the chamber D the bolts employed for confining said cover in position will at the same time confine the valve-seat, and produce a water-tight joint between said parts and said chamber, by which means the removal or replacement of said valve-seat is rendered comparatively easy. The lower valve-chambers D' and D' are inclosed by the upturned ends *h* and *h* of a pipe, H, which pipe extends horizontally between said ends, and at its longitudinal center is provided with a branch pipe, *h'*, that communicates with the water-supply. The lower valve-seats G' and G' are in all respects like those before described, and are secured in place in the same manner. The upper end of the central chamber B is inclosed by an air-chamber, I, from whence a discharge-pipe, K, conveys water from the pump, while the lower end of said chamber B is inclosed by means of a plate, H', which is preferably cast upon and forms part of the cross-pipe H. An opening, *a*, which corresponds in dimensions to the transverse area of the passage *c*, formed between the lower portion of each cylinder A and said passage, and a small opening, *a'*, provided between the upper portion of said cylinder and passage, completes the casing of the pump. Within each cylinder A is fitted a piston, L, which is connected with the piston L within the opposite cylinder by means of a rod, M, and moves simultaneously with the same. The central portion of the piston-rod M is flattened, and within such portion is formed a slot, *m*, which is arranged lengthwise of said rod, and extends transversely through from one face to the opposite face of said part. At the longitudinal center of the rod M, upon one of its sides, is formed a T-shaped transverse groove, *m'*, within which is fitted a block, N, that is capable of longitudinal motion within said groove, and has such length as to enable it to pass across the slot *m* without disengagement from its said groove.

The sliding block N is fitted to receive a pin, *n*, which pin is journaled within its center at a right angle to its line of motion and to the line of motion of the rod M, and has its outer end secured within a crank, O, that is attached to and operated by means of a shaft, P, as is hereinafter described.

As the arrangement of the operating-shaft with relation to the piston-rod and casing is changed for each kind of pump, such arrangements will be described successively, commencing with that shown in Figs. 1, 4, 5, and 6.

The shaft P passes horizontally through the chamber B, immediately above the piston-rod M, and equidistant from the inner ends of the cylinders A and A, and is journaled within suitable bearings *b* and *b*, which are formed upon or within the walls of said chamber. At one end the shaft P extends only to the outer end of the bearing, and the latter is covered and rendered water-tight by means of a cap, *b'*, that screws over its end, while the opposite end of said shaft projects sufficiently to enable it to receive a cross-bar, Q, which projects in opposite directions to equal distances, and to each end has pivoted one end of a rod, *q*. The rods *q* and *q*, being extended upward to the point where the operator is to be placed, are connected to or with suitable mechanism that will give to each a longitudinally-reciprocating motion, and will cause said rods to move simultaneously, but in opposite directions.

The crank O has such length as to cause the block N to be near the lower end of the groove *m'*, when said crank occupies a vertical position, when, by giving to the shaft P a partial rotation in either direction, the piston-rod M will be moved longitudinally, so as to draw inward one piston and force the opposite piston outward, said block N being caused to move upward in its groove, as said crank follows the circle of its revolution in moving to either side of a vertical central line.

As thus arranged, it will be seen that the rocking motion of the operating-shaft, before described, will impart to the pistons a reciprocating motion within their cylinders, and cause each to alternately draw water from the pipe H through the lower valve-chamber and the opening *a*, and to expel said water, through said opening *a*, the passage *c*, the valve-chamber D, the upper valve, and the passage F, into the central chamber B, from which said water escapes through the discharge-pipe K.

When it is desired to operate the pump by rotating the shaft P continuously in one direction, the latter is removed from the bearings *b* and *b*, and placed within other similar bearings, *b''* and *b''*, which are provided below the former, in a line with the vertical center of the cylinders A and A, after which caps *b'* and *b'* are placed over said upper bearings and one of the said lower bearings, as before. The shaft P now passes through the slot *m*, that is formed within the rod M, and is provided with a crank, O, that is in all respects like that before employed, except that it has less length, so that when placed in a vertical position the sliding block N shall not pass out of the end of its groove. If, now, the shaft is revolved, the pistons will be caused to reciprocate, as before, but the crank will describe a full circle, and move constantly in

one direction, instead of oscillating to and fro, as before.

When it is desired to operate the pump by means of a vertical shaft moving continuously in one direction, the shaft P is removed from position and its bearings made water-tight by caps, and the piston-rod M is turned one-fourth of a revolution, so as to bring its sliding block N downward, after which said shaft, or a similar but longer shaft, is passed vertically downward through a bearing, *i*, that is formed at the upper end of the air-chamber I, and, passing through the slot *m* of said piston-rod, has its lower end supported by or upon a step, R, that is secured within, and projects upward from, the bottom of the chamber B. Upon the lower end of the shaft P is secured a crank, O, which engages with the pin *n* of the sliding block N, and is in all respects similar to the crank last used, except that its hub *o* is extended downward, so as to embrace the entire surface of the step R, and insure the lateral position of said shaft. If, now, the shaft P is rotated, the operation of parts will be the same as in the last-described arrangement.

In consequence of the liability to injury of the pump should water freeze within the chamber B, a pipe, S, extends between said chamber and the pipe H, and between the latter is provided with a cylindrical tapering opening, that extends horizontally through its center, and receives and contains a cock-plug, T, of ordinary shape. The plug T is provided with the usual transverse opening *t*, which, by the rotation of said plug, may be caused to coincide with, or be placed at a right angle to, the opening *s* of the pipe S; and, in addition thereto, said plug is provided with a small axial opening, *t'*, that extends from said opening *t* outward through its smallest end. The portion of the opening *s* above the pipe S has a considerably larger transverse area than the portion below said plug, so that the latter may be turned sufficiently to open communication between the said upper portion and the port *t* without causing the lower portion of said opening to be uncovered, in which event water from the chamber B would pass into said port *t*, and from thence would escape through the axial opening *t'*. As constructed, the cock enables the contents of the chamber B and of the discharge-pipe to be quickly "let down" or discharged for the purpose of removing any sand or other like substance which may have accumulated therein; or said cock may be adjusted to permit a sufficient quantity of water to flow outward constantly, and to cause the said discharge-pipe to be emptied of its contents, when not in use, with sufficient rapidity to prevent freezing, and not interfering materially with the quantity of water raised when said pump is in operation.

When the cock is turned so as to furnish communication between the chamber B and pipe H, the contents of the former will be dis-

charged into the latter, and the contents of said pipe will escape into the well; but if said cock is only turned until the contents of said chamber can escape through the axial opening *t'*, the contents of said pipe will be undisturbed and the pump will be in condition for instant use.

When the pump is used in deep wells the let-off cock will be operated by means of a rod which extends to the surface of the ground.

The object sought by making the opening *a*, which furnishes communication between each cylinder A and the passage *c*, at the lower side of said cylinder is to prevent sand, if any is carried inward with the water, from accumulating in said cylinder as would be the case were said water permitted to escape at a higher point, as in the latter case the sand would be deposited upon the bottom of said cylinder and remain undisturbed by the flow of said water.

The small opening *a'* between the upper portion of each cylinder and the passage *c* prevents an accumulation of air at such point, which air would form a cushion and materially interfere with the proper working of the pump.

Having thus fully set forth the nature and merits of my invention, what I claim as new is—

1. The pistons L and L, arranged in a line with each other and connected together by means of the rod M, which is provided with a central longitudinal slot, *m*, and transverse central groove *m'*, for the reception of the crank-block N, substantially as and for the purpose specified.

2. In combination with the piston-rod M and sliding block N, the shaft P, which is journaled horizontally above, and at a right angle to, said rod, and is provided with a crank, O, that extends downward and engages with the pin *n* of said sliding block, substantially as and for the purpose shown.

3. In combination with the piston-rod M, provided with the longitudinal central slot *m* and transverse groove *m'*, and with the crank-block N, arranged to slide within said groove, the shaft P, which passes horizontally through said slot at a right angle to said rod, and is provided with a crank, O, that engages with the pin *n* of said crank-block, substantially as and for the purpose set forth.

4. In combination with the piston-rod M, provided with the central longitudinal slot *m* and transverse groove *m'*, and with the crank-block N, which is arranged to slide within said groove, the shaft P, that passes vertically through said slot at a right angle to said rod, and is provided with a crank, O, which engages with the pin *n* of said crank-block, substantially as and for the purpose shown and described.

5. The body or casing of the pump, consisting of the cylinders A and A, central chamber B, shaft-bearings *b* and *b*, heads C and C, provided each with a passage, *c*, openings *a* and

a', valve-chambers D and D', recessed covers E and E, passages F and F, bottom or supply pipe H *h h'*, air-chamber I, and discharge-pipe K, constructed and arranged in the manner and for the purpose substantially as specified.

6. In combination with the valve-seat G, resting upon the upper side of the valve-chamber D, the cover E, fitted upon said chamber, and provided with the recess *e*, which corresponds to and incloses the flange *g* of said valve-seat, substantially as and for the purpose shown.

7. In combination with the chamber B and

supply-pipe H, the pipe S, extending between the same, and provided between its ends with a transverse cock-plug, T, which is constructed with a transverse port, *t*, and an axial opening, *t'*, that extends from said port through one end of said plug, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 25th day of April, 1876.

JOHN S. ADAMS.

Witnesses:

JOHN H. WELLS,
FRANK PRESTON.