

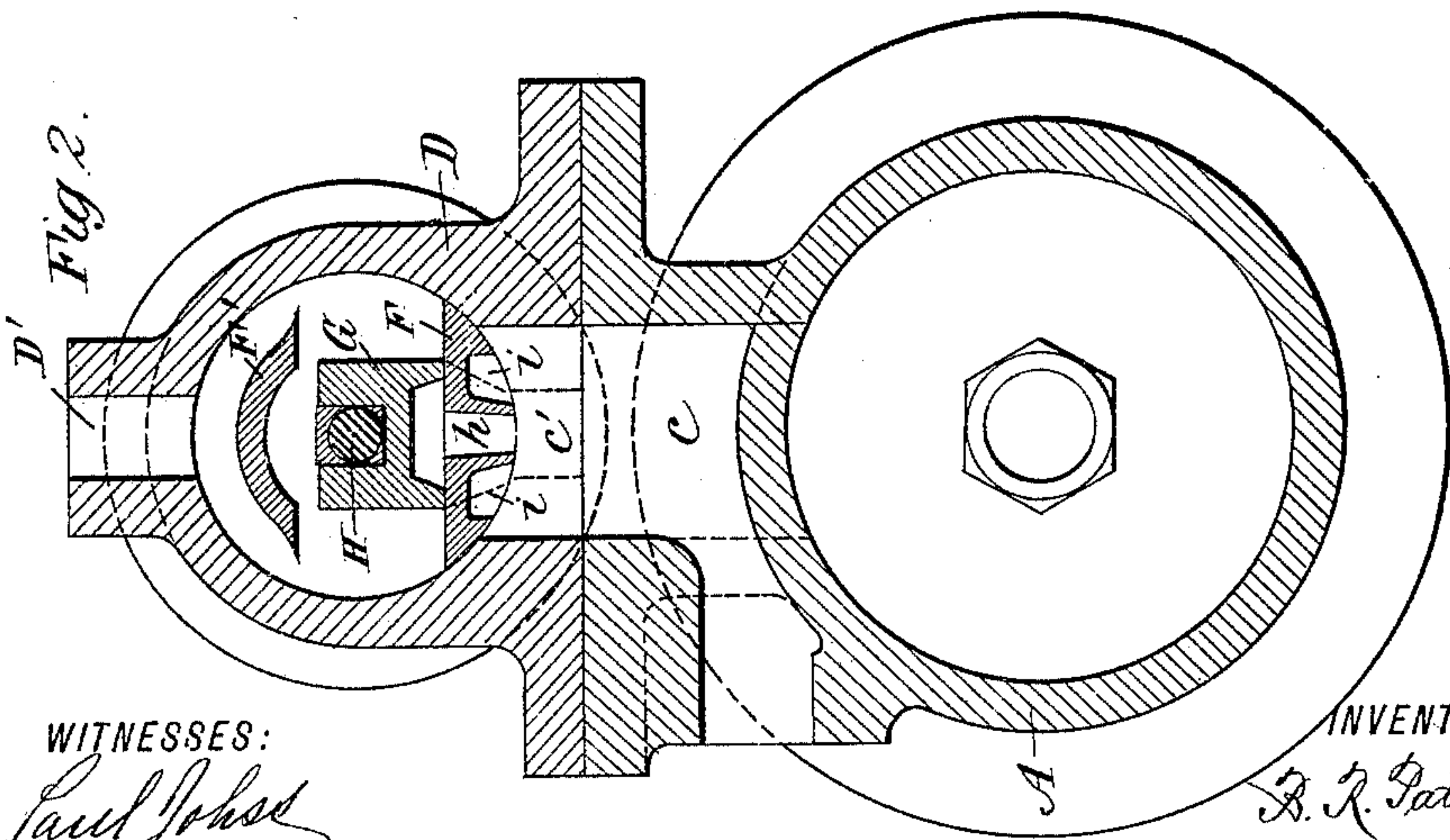
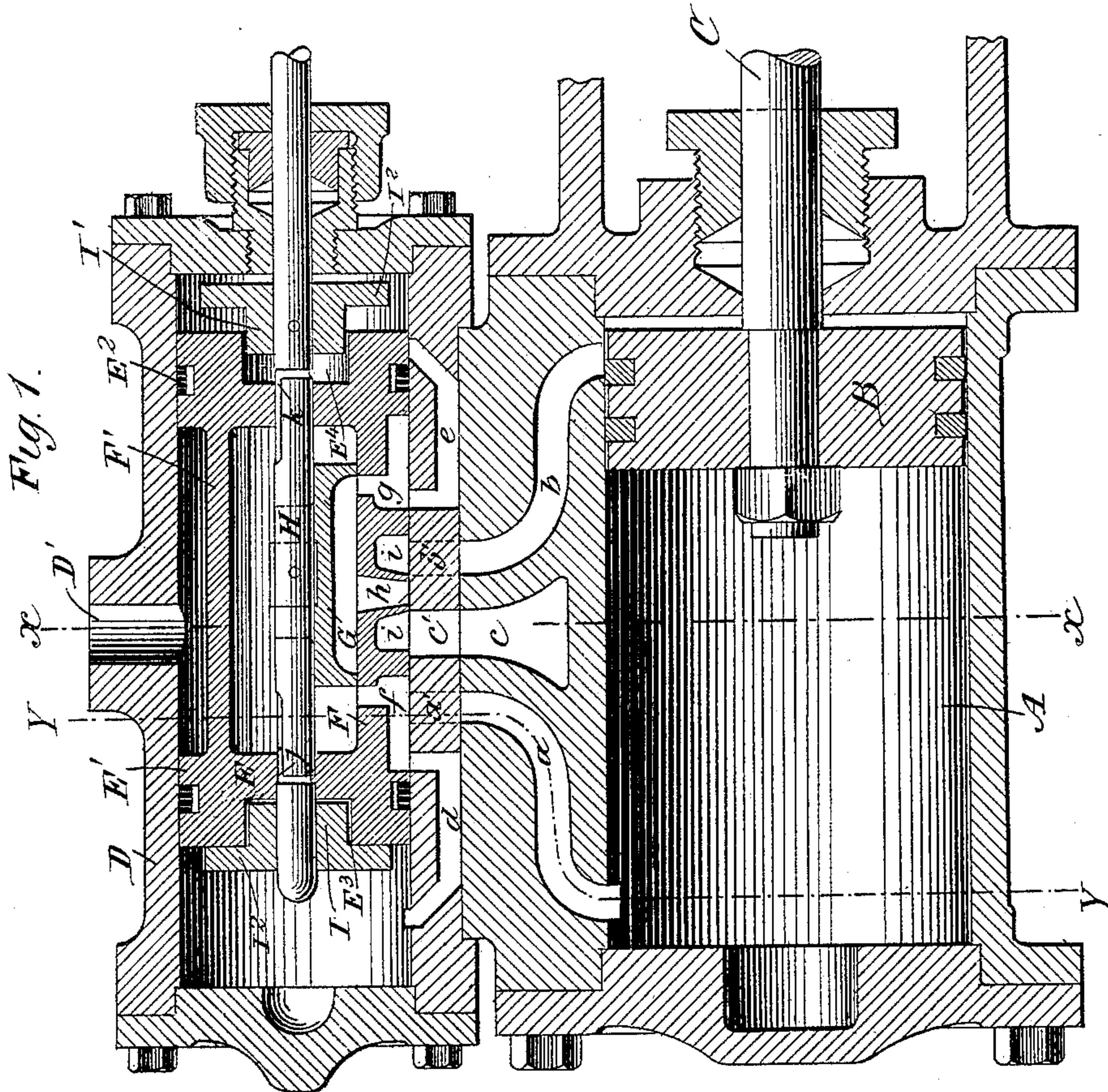
(No Model.)

2 Sheets—Sheet 1.

B. R. PATTEN.
STEAM ACTUATED VALVE.

No. 424,686.

Patented Apr. 1, 1890.



WITNESSES:

Paul J. Johnson
Bedgwick

INVENTOR:

B. R. Patten

BY

Munn & Co.

ATTORNEYS.

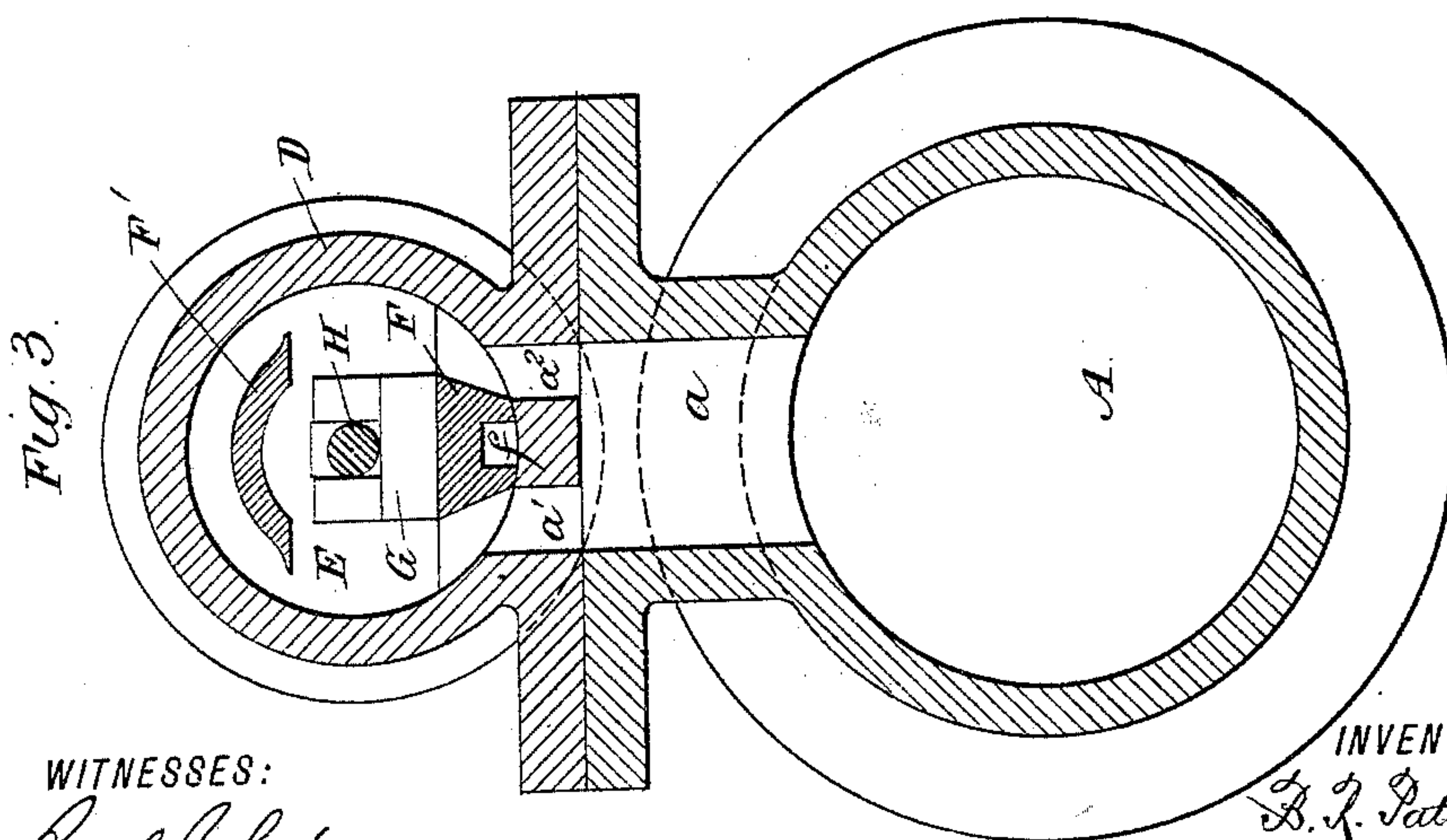
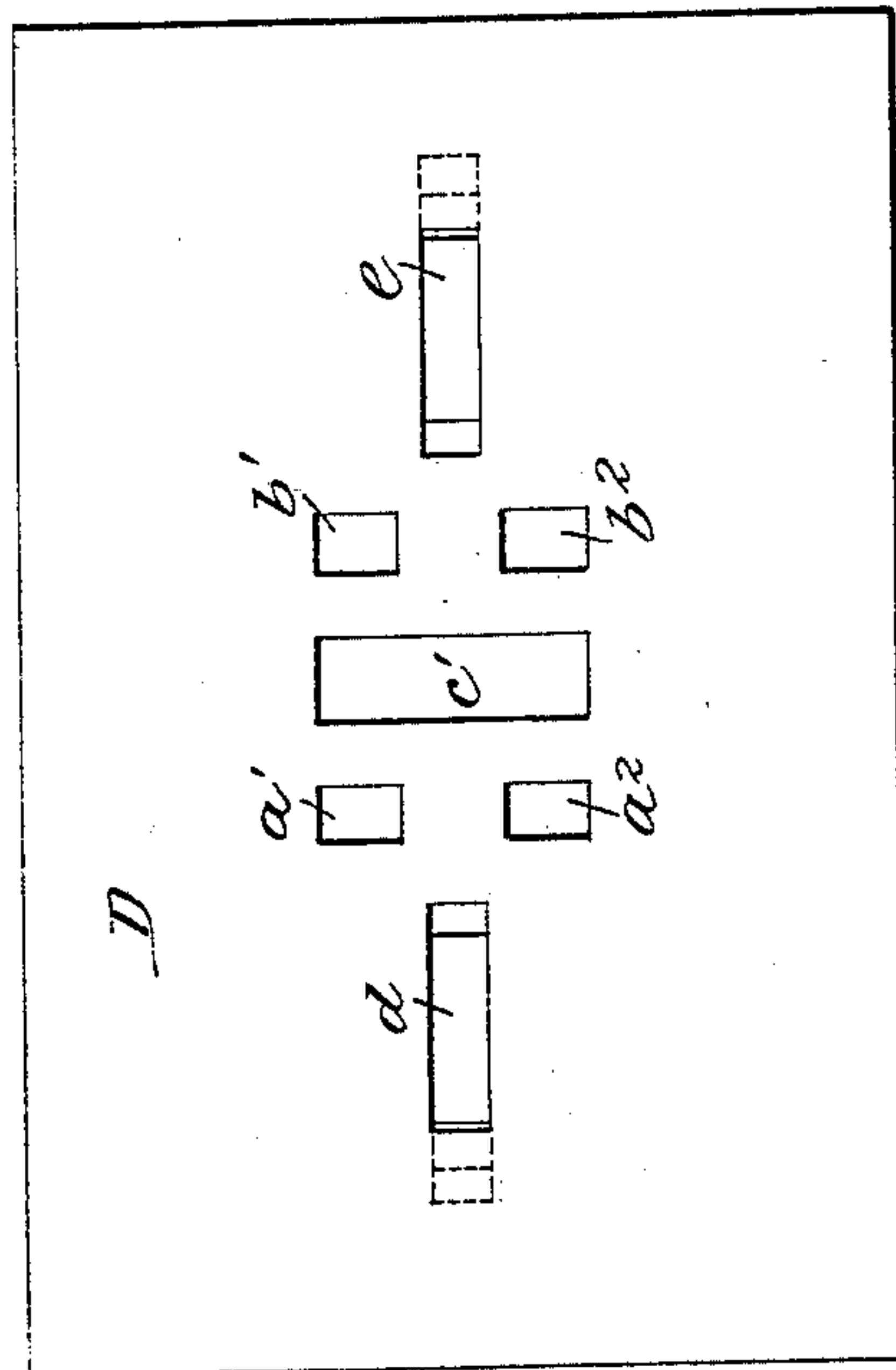
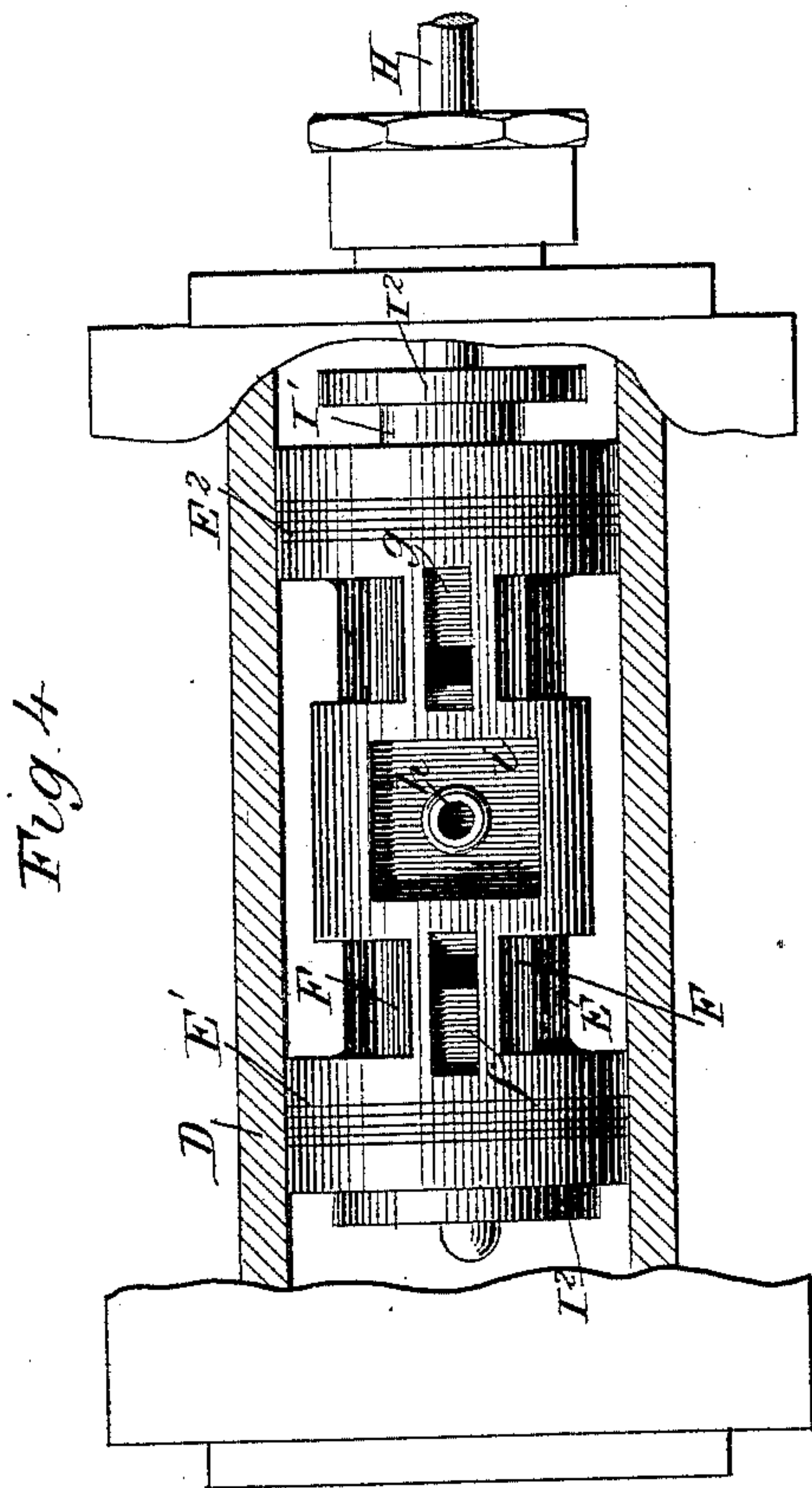
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2 Sheets—Sheet 2.

B. R. PATTEN.
STEAM ACTUATED VALVE.

No. 424,686.

Patented Apr. 1, 1890.



WITNESSES:

Paul J. Schott
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UNITED STATES PATENT OFFICE.

BENJAMIN R. PATTEN, OF YARMOUTH, NOVA SCOTIA, CANADA.

STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 424,686, dated April 1, 1890.

Application filed August 2, 1889. Serial No. 319,497. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN R. PATTEN, of Yarmouth, in the county of Yarmouth, Province of Nova Scotia, Dominion of Canada, have invented a new and Improved Steam-Actuated Valve, of which the following is a full, clear, and exact description.

The invention relates to steam-engines and steam-pumps; and its object is to provide a new and improved valve which is simple and durable in construction and very effective in operation.

The invention consists in certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement. Fig. 2 is a transverse section of the same on the line $x x$ of Fig. 1. Fig. 3 is a like view of the same on the line $y y$ of Fig. 1. Fig. 4 is an under side view of the piston-valve, parts of the steam-chest being in section; and Fig. 5 is an under side view of the steam-chest.

The cylinder A, to which the improved valve is applied, is provided with the usual piston B, held on the piston-rod C, connected with the machinery to be driven. In the cylinder A are formed the usual inlet-ports a and b and the exhaust-ports c , and it also supports the steam-chest D, cylindrical in form and provided in its bottom with the side ports a' and a'' , registering with the inlet-port a and also with the side ports b' and b'' , registering with the inlet-port b . A port c' extends transversely in the bottom of the steam-chest D between the ports $a' a''$ and $b' b''$, said port c' registering with the exhaust-port c in the cylinder A.

In the steam-chest D is held to travel a piston-valve E, provided with two pistons E' and E'' , connected with each other by arms F and F', of which the former is flattened on top to form a seat for the auxiliary slide-valve G, secured on a valve-stem H, passing loosely through the centers of the pistons E' and E'' , and through suitable stuffing-boxes in one end of the steam-chest D. The valve-stem H is operated by a suitable tappet or other connection from the piston-rod C. The steam-

inlet D' in the steam-chest D opens into the interior of the steam-chest between the two pistons E' and E'' , as is plainly shown in Fig. 1.

In the bottom of the steam-chest D are arranged the ports d and e , adapted to connect the outer ends of the steam-chest D with the middle or steam compartment of the said steam-chest. The inner ends of the ports d and e are adapted to register with ports f and g , formed in the arm F of the steam-actuated valve E. In the middle of the said arm F is formed a port h , over which and above the ports f and g operates the auxiliary slide-valve G, previously mentioned. The slide-valve is adapted to alternately connect the ports f and g with the port h , which latter is adapted to connect with the port c' , leading to the exhaust c . In the under side of the arm F is formed a cavity i , adapted to register with the port c' , leading to the exhaust c , and also with the ports $a' a''$ and $b' b''$ alternately.

In the valve-stem H, near the pistons E' and E'' , are arranged the ports j and k , adapted to connect the steam-space in the steam-chest D with cylindrical recesses E^3 and E^4 , respectively, formed in the outer ends of the pistons E' and E'' . In the recesses E^3 and E^4 are held to slide pistons I and I', respectively, secured by suitable means on the valve-stem H, and each provided on its outer end with an annular flange I², adapted to abut against the outer face of the respective piston E' or E'' .

The operation is as follows: The live steam entering through the opening D' into the steam-chest D fills the space in the latter between the two pistons E' and E'' . When the steam-actuated valve E is in the position shown in Fig. 1, live steam passes through the port f into the port d , and from the latter to the left-hand end of the steam-chest D, so as to press against the outer face of the piston E' , thus holding the steam-actuated valve in the position shown. The live steam also enters through the port a' into the port a . This forces the piston B into the position shown. The exhaust steam in front of the piston B passes through the port b into the ports b' and b'' , and from the latter into the cavity i , formed in the under side of the arm F. As the cavity i is connected with the port c' , the exhaust steam passes into the exhaust-port c , and from the latter to the outer air. When

the piston B is at the inner end of its stroke, the tappet on the piston-rod C shifts the valve-stem H, so that the auxiliary slide-valve G is moved to the left and closes the port *f* to the live steam, while it opens the port *g* to the live steam between the pistons E' and E². The movement of the valve-stem H also moves the piston I' against the live steam in the recess E⁴, so that the steam-actuated valve E is moved slightly to the left until the piston E² opens the port *e*. The live steam in the steam-chest D can now pass through the port *g* into the port *e*, and from the latter to the right-hand end of the steam-chest D, thus pressing against the said piston E² and forcing the entire valve E to the left. The piston E' now causes the steam in the left-hand end of the steam-chest D to exhaust through the port *d* into the port *f*, and from the latter through the cavity in the slide-valve G into the port *h*, and from the latter the exhaust steam passes into the port *c'* and to the exhaust *c* during the time that the valve E shifts to the left. When the valve E shifts to the left, as previously described, the ports *b'* and *b*² open into the steam compartment of the steam-chest D, so that the live steam can pass through the port *b'* and *b*² into the port *b*, and from the latter to the right-hand end of the cylinder A, so as to force the piston B to the left, the exhaust steam in front of the piston passes through the port *a* into the ports *a'* and *a*², and from the latter through the cavity *i* into the ports *c'* and *c* and to the outer air. When the piston B arrives at the outer end of its stroke, the valve-stem H is again shifted, and the above-described operation takes place in a manner similar to that previously described.

It is understood that the pistons I and I' are steam-cushioned by live steam from the steam-chest D, so that the movement of the said steam, the auxiliary valve G, and the pistons I and I', as well as of the steam-actuated valve E is very easy and without noise. It will further be understood that the port *h* in the steam-actuated valve E forms the exhaust-port for the auxiliary slide-valve G, and in traveling to the exhaust-port *c'* passes over the bridges between the ports *a'* and *b'*, so as to cut off the exhaust-steam from the recesses E³ and E⁴ of the valve E, thereby entrapping some of the exhaust-steam at the respective end as well as preventing the live steam admitted through the ports *j* or *k* from passing out through the ports *d* or *e*, respectively, thence to the ports *f* or *g*, respectively, and port *h* to the outer air. It will also further be seen that the entire valve is very simple in construction, and can be easily repaired when worn out.

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

1. In a valve, the combination, with a steam-chest provided with ports, of a steam-actuated piston-valve held to travel in the said steam-chest and provided with two pistons connected

with each other by arms of which one has a flat upper side which forms a valve-seat, a flat auxiliary slide-valve held on the said valve-seat of one of the said arms, and a valve-stem to which the auxiliary valve is attached and operated from the cylinder-piston, substantially as shown and described.

2. In a valve, the combination, with a steam-chest provided with ports *a' b' c'* at its central port and the opposite ports *d e* leading to its ends, of two pistons held to slide in the said steam-chest over the said ports, an arm connecting the said pistons with each other and forming a valve-seat, which valve-seat is provided with the ports *i h*, operating over ports *a' b' c'*, and the ports *f g*, operating in connection with ports *d e*, and an auxiliary slide-valve held to travel on the said valve-seat, substantially as shown and described.

3. In a valve, the combination, with a steam-chest provided with ports, of two pistons held to slide in the said steam-chest over the said ports, an arm connecting the said pistons with each other and forming a valve-seat, an auxiliary slide-valve held to travel on the said valve-seat, and a valve-stem carrying the said slide-valve and provided with separate and independent ports *j k* beyond the ends of the auxiliary valve, substantially as shown and described.

4. In a valve, the combination, with a steam-chest provided with ports, of two pistons held to slide in the said steam-chest over the said ports, an arm connecting the said pistons with each other and forming a valve-seat, a slide-valve held to travel on the said valve-seat, a valve-stem carrying the said slide-valve, and provided with ports, and a second set of pistons secured on the said valve-stem and adapted to slide in the ends of the said first-named pistons, substantially as shown and described.

5. In a valve, the combination, with a steam-actuated valve, provided with two pistons connected with each other, of a valve-stem passing loosely through the said pistons and provided with ports, and a second set of pistons secured on the said valve-stem and adapted to slide in the said first-named pistons, substantially as shown and described.

6. A steam-actuated valve comprising two pistons, and arms connecting the pistons with each other, one of which forms a valve-seat and is provided with ports *f g* and *h i*, substantially as shown and described.

7. A steam-actuated valve comprising two pistons, and arms connecting the pistons with each other, one of which forms a valve-seat and is provided with ports *f g* and *h i*, and an auxiliary slide-valve held to slide on the said valve-seat, over its ports, substantially as shown and described.

BENJAMIN R. PATTEN.

Witnesses:

W. O. GRAY,
NORMAN S. PORTER.