

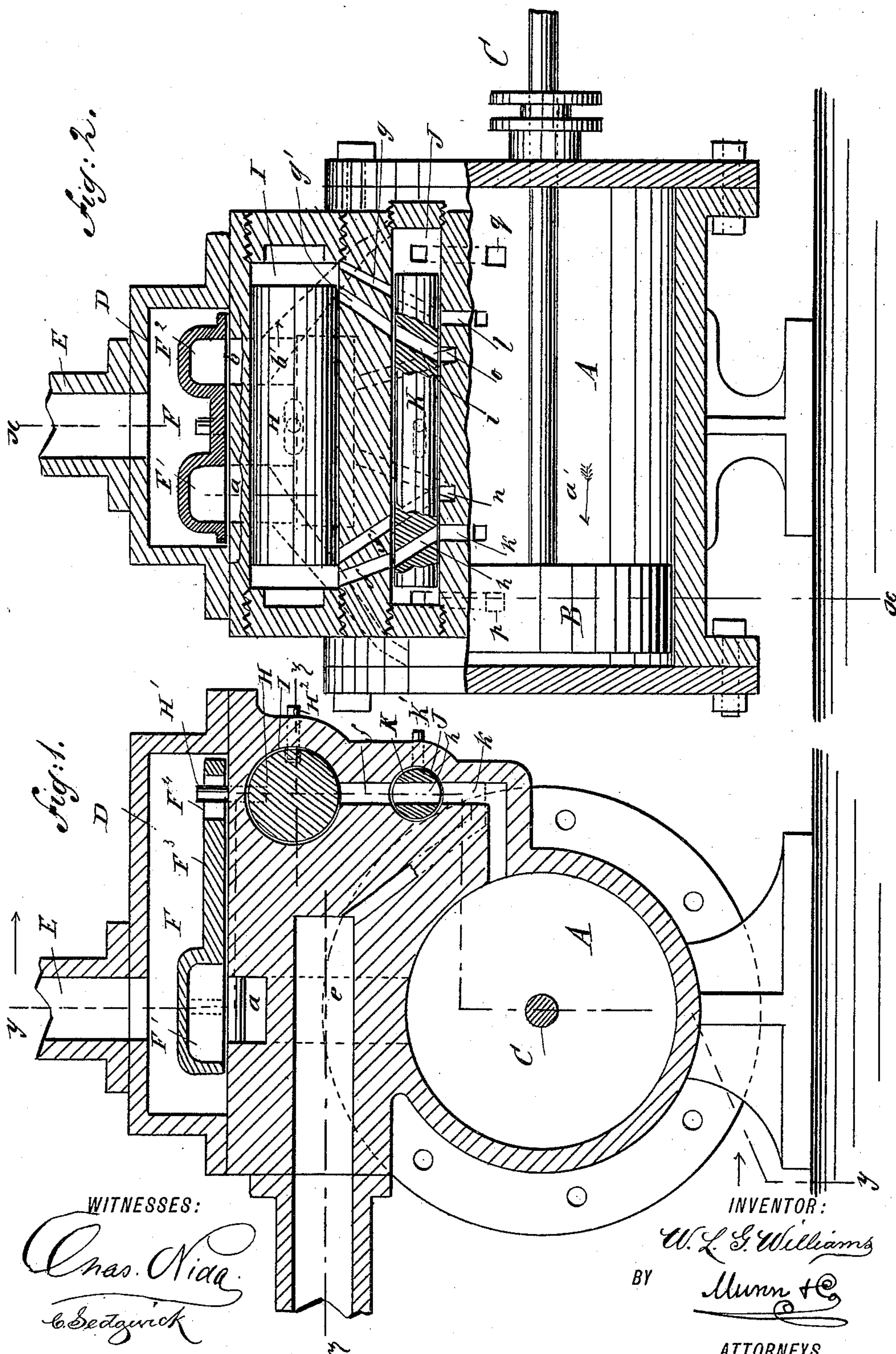
(No Model.)

2 Sheets—Sheet 1.

W. L. G. WILLIAMS.  
STEAM ACTUATED VALVE.

No. 411,234.

Patented Sept. 17, 1889.



WITNESSES:

*Chas. Nida*  
*C. Sedgwick*

INVENTOR:

*W. L. G. Williams*  
BY *Munn & Co*

ATTORNEYS.

(No Model.)

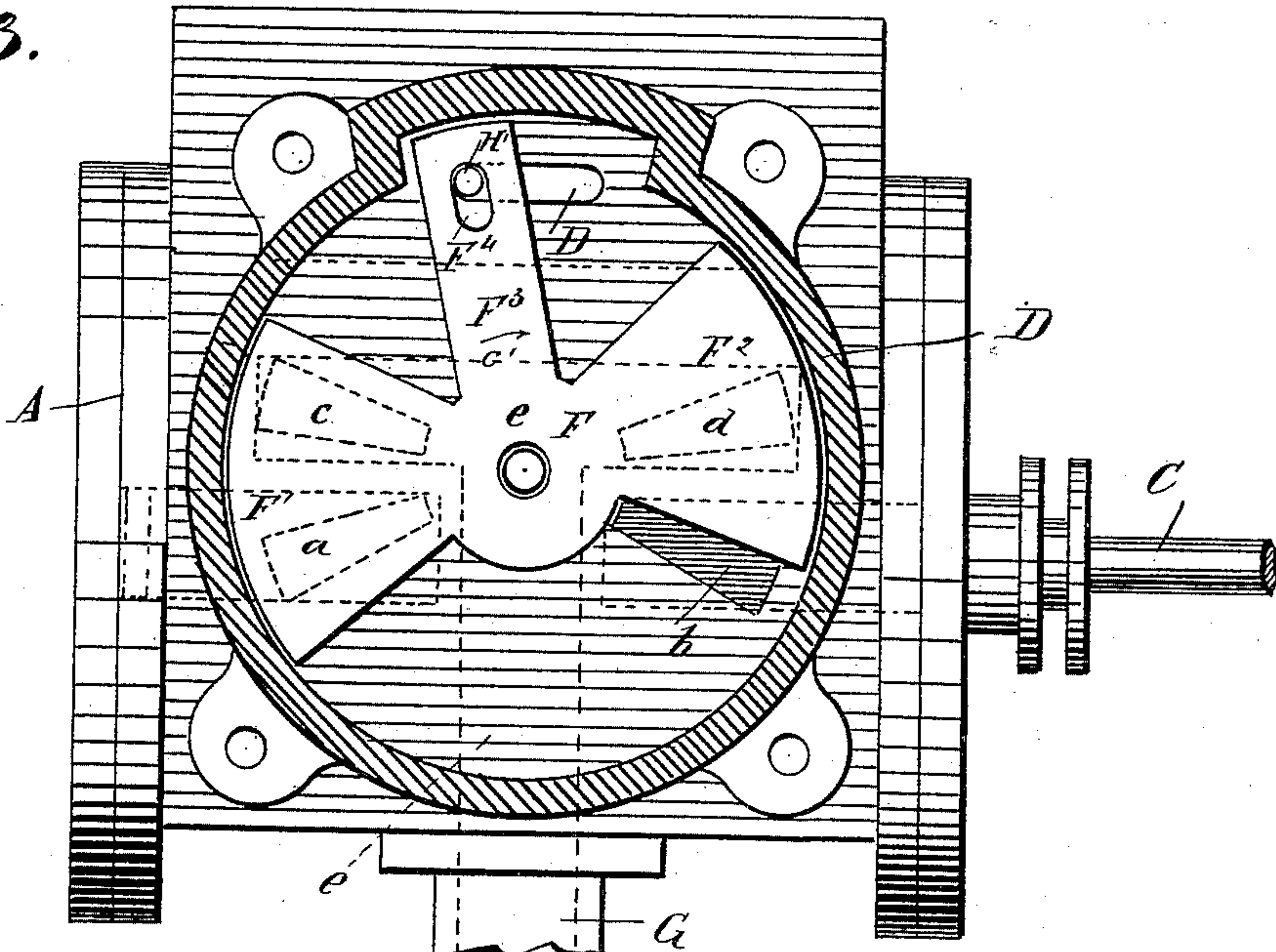
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W. L. G. WILLIAMS.  
STEAM ACTUATED VALVE.

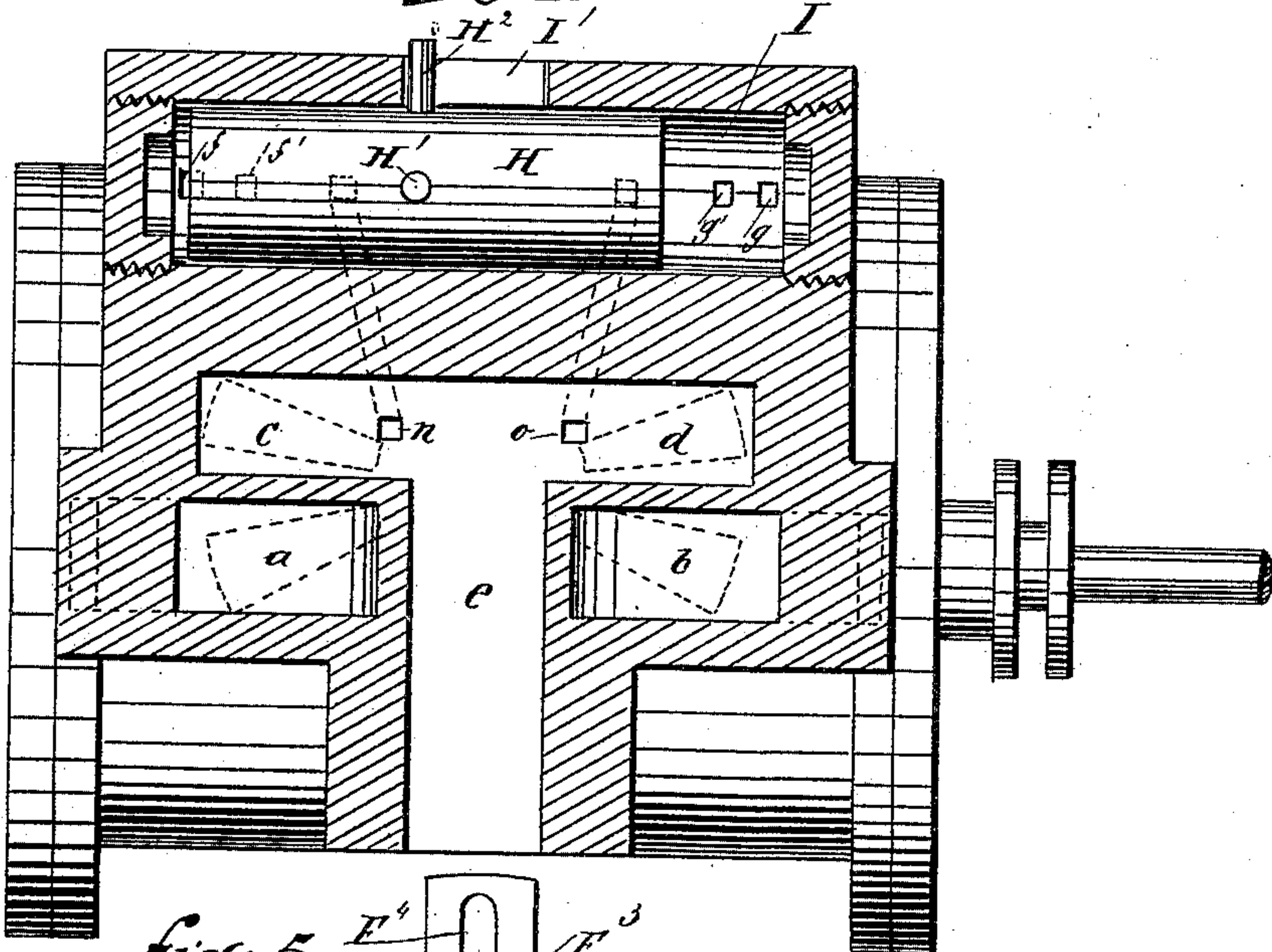
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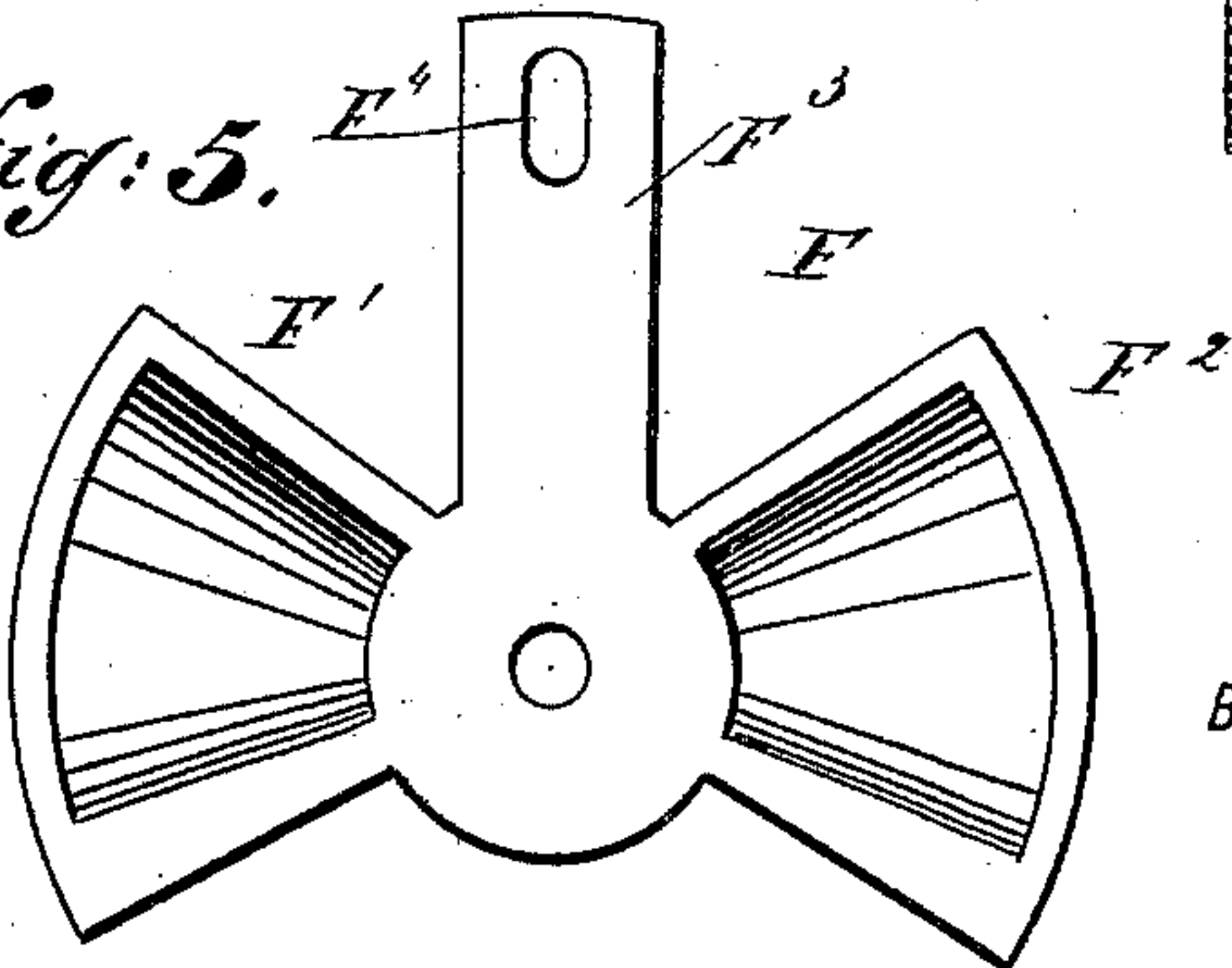
*Fig: 3.*



*Fig: 4.*



*Fig: 5.*



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# UNITED STATES PATENT OFFICE.

WILLIAM LLOYD GIBBON WILLIAMS, OF JERMYN, PENNSYLVANIA.

## STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 411,234, dated September 17, 1889.

Application filed December 12, 1888. Serial No. 293,345. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM LLOYD GIBBON WILLIAMS, of Jermyrn, in the county of Lackawanna and State of Pennsylvania, have  
5 invented a new and useful Improvement in Steam-Actuated Valves, of which the following is a full, clear, and exact description.

The invention relates to automatic valves for steam-engines, steam-pumps, &c.; and the  
10 object of the invention is to provide a new and improved valve which is simple and durable in construction, very effective in operation, reducing the friction to a minimum, and dispensing with all outside mechanisms for op-  
15 erating the valve.

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

20 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 end elevation of the improvement on the line *xx* of Fig. 2. Fig. 2 is a sectional side elevation of the improvement on the line *yy* of Fig. 1. Fig. 3 is a plan view of the improvement with the steam-chest in section. Fig. 4 is a sectional plan  
25 view of the improvement on the line *zz* of Fig. 1, and Fig. 5 is an inverted plan view of the main valve.

In the cylinder A operates, in the usual manner, the piston B, connected by the piston-rod C with suitable mechanism to be driven.  
35 On top of the cylinder A is formed a steam-chest D, into which leads a steam-inlet pipe E, connected with a suitable source of steam-supply. In the steam-chest D is mounted the main valve F to turn, provided with the arms F' and F<sup>2</sup>, placed diametrically opposite each other and recessed on their under sides.

From the steam-chest D lead the steam-inlet ports *a* and *b* to the ends of the cylinder A, and the exhaust-ports *c* and *d*, placed along-  
45 side the ports *a* and *b*, respectively, lead to an exhaust-channel *e*, connected with the exhaust-pipe G. The cavities in the under sides of the arms F' and F<sup>2</sup> are so arranged  
50 as to connect the ports *a c* and *b d*, respectively, with each, or to disconnect the said

ports, so that the respective ports *a* and *b* serve as inlets for the steam to the cylinder A. On the valve F is also formed a third arm F<sup>3</sup>, provided near its outer end with a  
55 slot F<sup>4</sup>, in which extends a pin H', secured to the auxiliary piston H, held to slide longitudinally in the cylinder I, formed alongside the cylinder A. A pin H<sup>2</sup>, secured in the aux-  
iliary piston H, passes through a longitudinal  
60 slot I' in the cylinder I and serves to hold the said piston H in place when sliding forward and backward in the cylinder I. The pin H', before referred to, passes through a  
65 slot D' in the bottom of the steam-chest D, as is plainly shown in Fig. 3.

From the ends of the cylinder I lead the ports *f* and *g* into a cylinder J, located below the cylinder I and in line with the same. In this cylinder J is held to slide longitudinally  
70 a second auxiliary piston K, provided with a pin K', extending through a longitudinal slot in the cylinder J and serving to hold the piston K from turning when moving forward or  
backward in the cylinder J. Alongside the  
75 ports *f* and *g* are arranged the ports *f'* and *g'*, respectively, also leading from the cylinder I to the cylinder J. The ports *f f'* and *g g'* are adapted to register with the ports *h*  
and *i*, formed in the piston K, and arranged  
80 in such a manner that when the port *h* registers with the port *f*, as shown in Fig. 2, the port *i* registers with the port *g'*, while the ports *f'* and *g* are disconnected. The ports  
85 *h* and *i* are also adapted to register with the ports *k* and *n* and the ports *l* and *o*, respectively, of which the ports *k l* lead from the cylinder J into the cylinder A, while the ports *n* and *o*  
connect with the exhaust-channel *e*, as is  
90 plainly shown in Fig. 4. From the ends of the cylinder J also lead the ports *p* and *q* into the ends of the cylinder A.

The operation is as follows: When the machine is in the position shown in the draw-  
ings, the live steam entering through the pipe  
95 E passes into the steam-chest D, and from the latter through the open port *b* into the right-hand end of the cylinder A. The piston B is thus propelled in the direction of the arrow  
100 *a'*, and when it nearly reaches the end of its stroke it uncovers the port *k*, so that the steam in the cylinder A can pass through the port



5 *k*, the port *h* in the second auxiliary piston K into the port *f*, and from the latter into the left-hand end of the cylinder I, thereby forcing the auxiliary piston H in the direction of the arrow *b'*, whereby the pin H' of the said piston, acting on the arm F<sup>3</sup> of the main valve F, turns the latter in the direction of the arrow *c'*, so that the port *a* is uncovered and disconnected from the exhaust-port *c*, while the inlet-port *b* is covered and connected with the exhaust *d*. The live steam now passes through the port *a* into the left-hand end of the cylinder A, so that the piston B is propelled in the inverse direction of the arrow *a'*, whereby the port *p* is uncovered and live steam rushes through the port *p* into the left-hand end of the cylinder J, whereby the second auxiliary piston K is moved to the right in the direction of the arrow *b'*, so that the port *h* is disconnected from the ports *f* and *k* and connects the ports *f'* and *n* with each other. At the same time the port *i* disconnects the ports *g'* and *o* and connects the ports *g* and *l* with each other. The exhaust-steam in front of the piston B passes through the port *b* and the cavity in the arm F<sup>2</sup> into the exhaust-port *d*, and from the latter through the channel *e* into the exhaust-pipe G. When the piston B, traveling in the inverse direction of the arrow *a'*, nears the end of its stroke, it uncovers the port *l*, so that the live steam passes through the said port *l* to the port *i* and the port *g* into the right-hand end of the cylinder I, so that the first auxiliary piston H is shifted to the left in the inverse direction of the arrow *b'*, whereby the pin H' again moves the arm F<sup>3</sup> of the main valve F into its former position, as illustrated in Fig. 3. The engine is again reversed as above described. The exhaust from the ends of the cylinder I takes place through the respective ports *f'* and *g'*, connected by the ports *h* and *i*, respectively, with the ports *n* and *o*, leading to the channel *e*, as illustrated in Fig. 4, and above described. The exhaust from the cylinder J takes place through the respective ports *q* and *p*. Thus it will be seen that by the peculiar arrangement of the auxiliary piston H with the main valve F the latter is automatically changed so as to reverse the movement of the piston B whenever it comes to the end of its stroke.

It is understood that the auxiliary piston H is controlled primarily by the second auxiliary piston K, actuated by the live steam entering the cylinder A.

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

1. In a steam-actuated valve, the combination, with a cylinder and its piston, of a steam-chest communicating with the cylinder, an oscillating valve in the steam-chest, and an auxiliary piston below the steam-chest and connected with the said valve, the said auxiliary piston being operated by live steam from the cylinder, substantially as described.

2. In a steam-actuated valve, the combination, with a main valve mounted to turn and provided with an arm, of an auxiliary piston operated by live steam from the cylinder and provided with a pin engaging the said valve-arm, substantially as shown and described.

3. In a steam-actuated valve, the combination, with a main valve mounted to turn and provided with an arm, of an auxiliary piston operated by live steam from the cylinder and provided with a pin engaging the said valve-arm, and a second auxiliary piston actuated by live steam and controlling the motion of the said first auxiliary piston, substantially as shown and described.

4. In a steam-actuated valve, the combination, with a cylinder and a piston operating therein, of a steam-chest provided with inlet and outlet ports, the former leading to the said cylinder, a valve mounted to turn in the said steam-chest and operating over the said ports, an auxiliary piston connected with the said main valve for turning the same, and an auxiliary cylinder controlling the said auxiliary piston and in communication with the said cylinder, substantially as shown and described.

5. In a steam-actuated valve, the combination, with a cylinder and a piston operating therein, of a steam-chest provided with inlet and outlet ports, the former leading to the said cylinder, a valve mounted to turn in the said steam-chest and operating over the said ports, an auxiliary piston connected with the said main valve for turning the same, an auxiliary cylinder containing the said auxiliary piston, a second auxiliary cylinder held parallel with the said first-named auxiliary cylinder and connected with the same by inlet and outlet ports, and also connected by ports with the main cylinder, and a second auxiliary piston held to slide in the said auxiliary cylinder and provided with ports for connecting the said exhaust and inlet ports of the second auxiliary cylinder with the said main cylinder and with the main exhaust-ports, substantially as shown and described.

WILLIAM LLOYD GIBBON WILLIAMS.

Witnesses:

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 WM. S. HUTCHINS.