

(No Model.)

3 Sheets—Sheet 1.

J. BOND, Jr.

VALVE FOR STEAM ENGINES.

No. 307,008.

Patented Oct. 21, 1884.

FIG. 1.

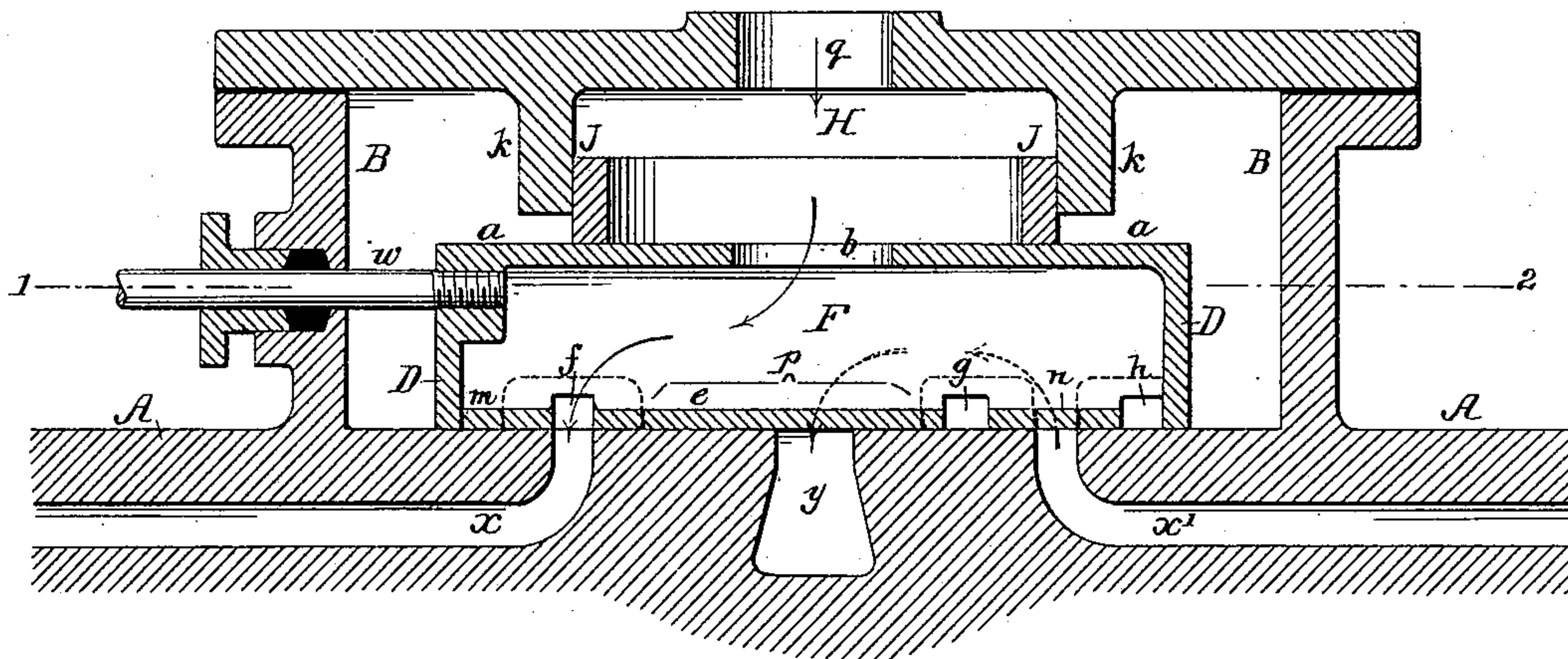


FIG. 3.

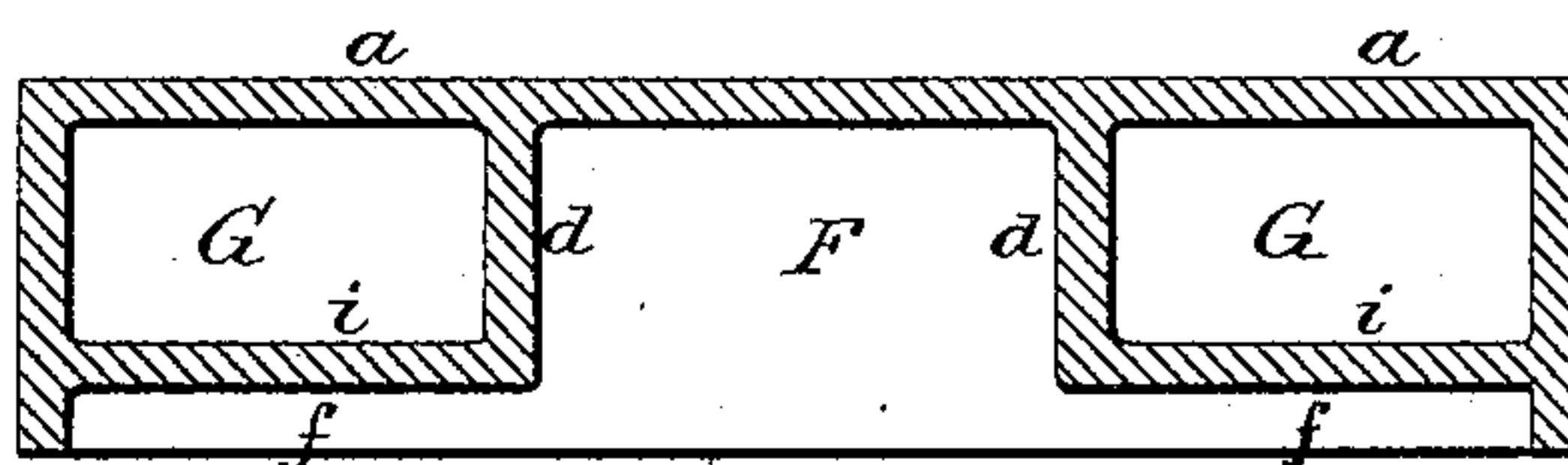
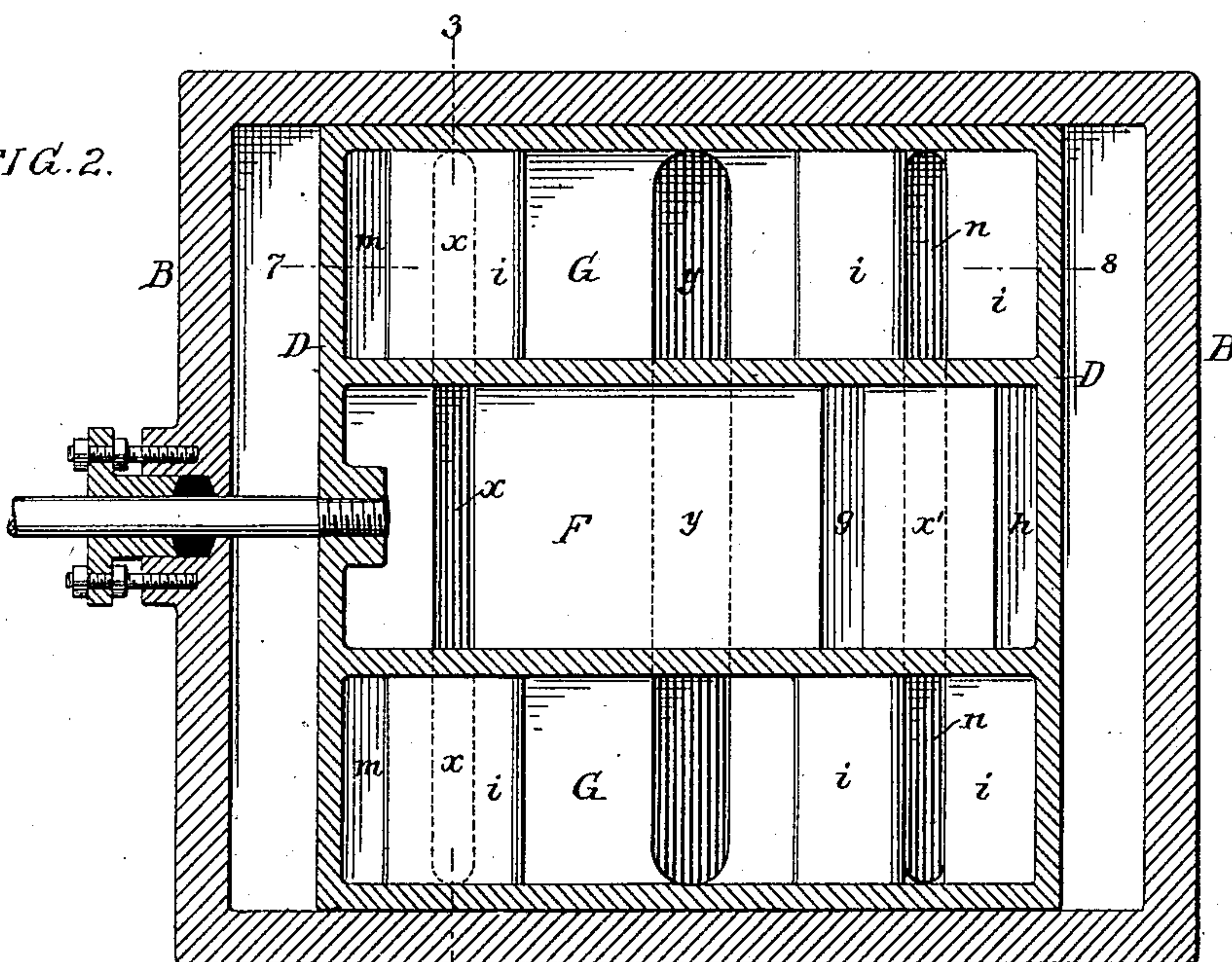


FIG. 2.



WITNESSES:

John E. Barker

James F. Jobin

INVENTOR:

Joseph Bond Jr.
by his Attys
Howson & Son

(No Model.)

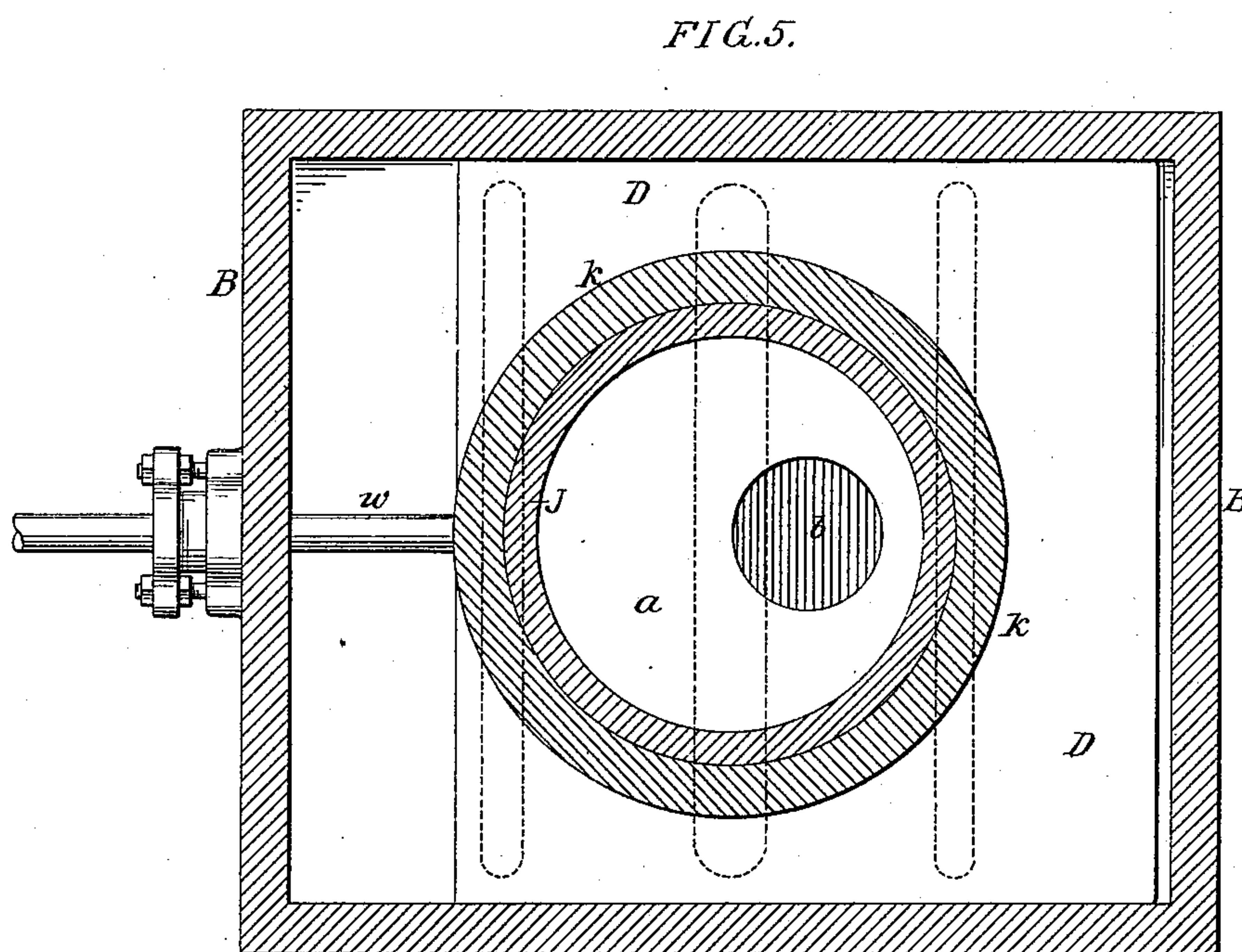
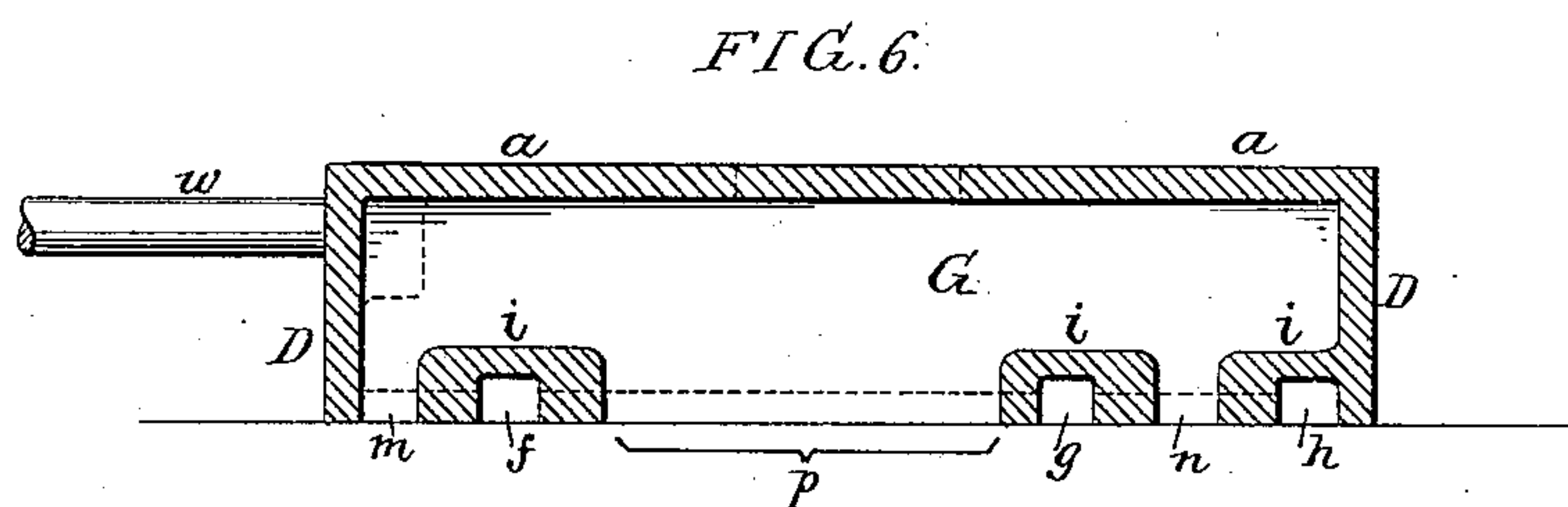
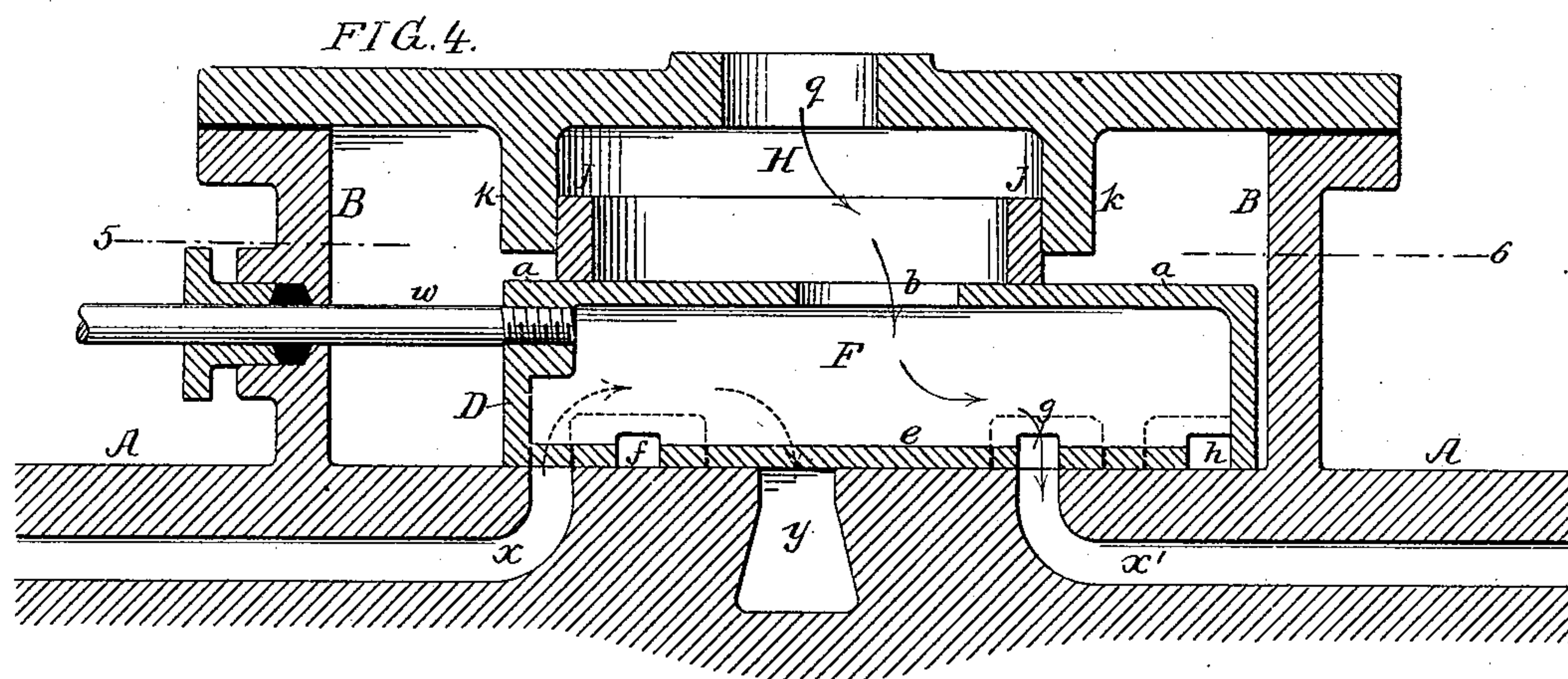
3 Sheets—Sheet 2.

J. BOND, Jr.

VALVE FOR STEAM ENGINES.

No. 307,008.

Patented Oct. 21, 1884.



WITNESSES:

John E. Barker
James F. Jobing

INVENTOR:

Joseph Bond Jr.
by his Atty
Howson & Son

(No Model.)

3 Sheets—Sheet 3.

J. BOND, Jr.

VALVE FOR STEAM ENGINES.

No. 307,008.

Patented Oct. 21, 1884.

FIG. 7.

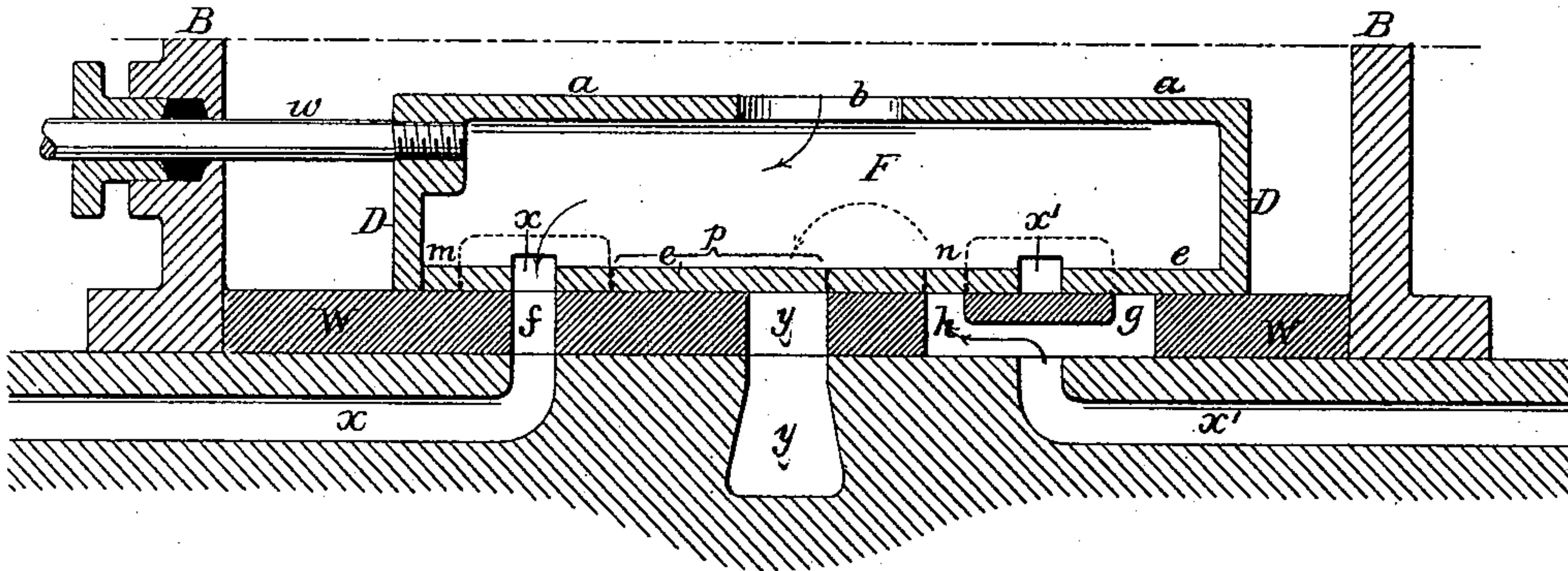
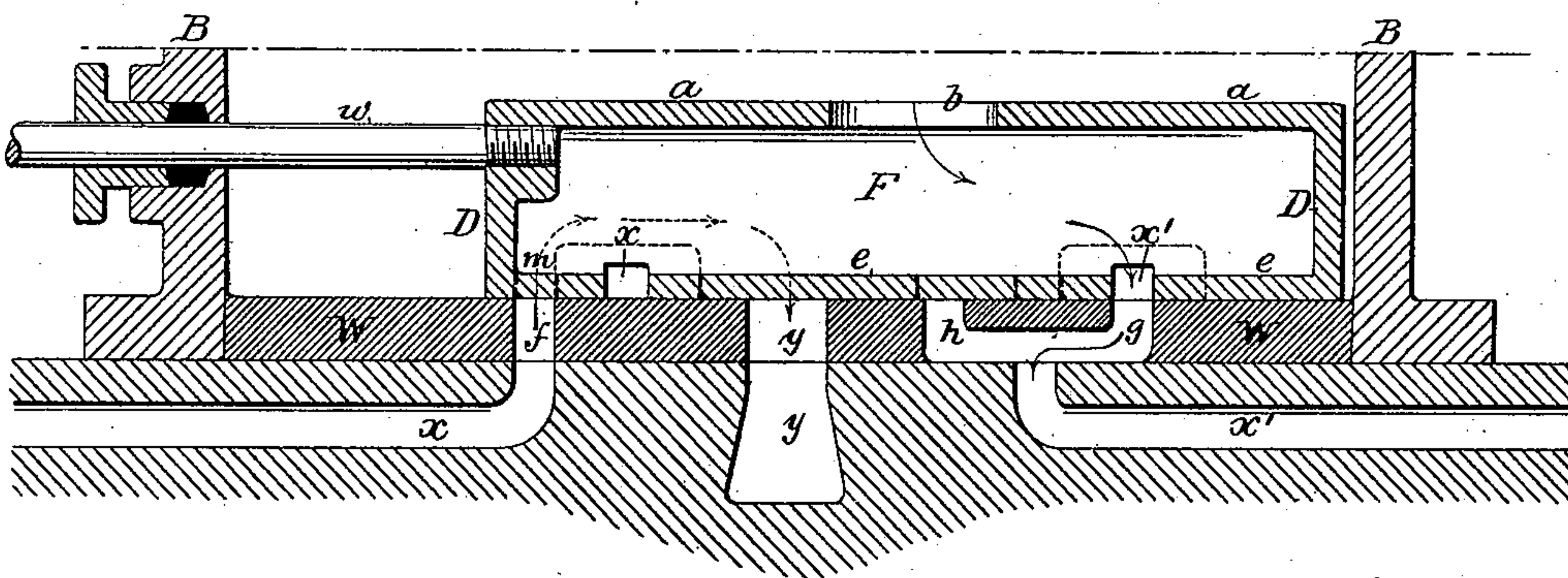


FIG. 8.



WITNESSES:
John E. Barker
James F. John

INVENTOR:
Joseph Bond Jr.
by his Attys
Howson & Sons

UNITED STATES PATENT OFFICE.

JOSEPH BOND, JR., OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO CHARLES M. SWAIN, OF SAME PLACE.

VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 307,008, dated October 21, 1884.

Application filed February 14, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BOND, Jr., a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Valves for Steam-Engines, of which the following is a specification.

The object of my invention is to so construct a valve for steam-engines that the engine can be reversed by a simple longitudinal movement of the valve without the use of the usual link-motion valve-operating devices.

In the accompanying drawings, Figure 1, Sheet 1, is a longitudinal section of part of the cylinder of a steam-engine, the valve and chest of which are constructed in accordance with my invention; Fig. 2, a sectional plan of the same on the line 1 2; Fig. 3, a transverse section of the valve on the line 3 4, Fig. 2; Fig. 4, Sheet 2, a view similar to Fig. 1, but with the valve in a different position; Fig. 5, a sectional plan on the line 5 6, Fig. 4; Fig. 6, a longitudinal section of the valve on the line 7 8, Fig. 2; Figs. 7 and 8, Sheet 3, views showing a modified arrangement of the ports in the cylinder and valve.

In Figs. 1 and 4, A represents part of the cylinder of a steam-engine, having the usual steam-inlet ports, $x x'$, and exhaust-port y , B being the steam-chest, and D the valve, the peculiar construction of which forms one of the features of my invention. This valve consists of a box closed at the top a , with the exception of a central opening, b , and having two longitudinal partitions, $d d$, whereby the interior of the valve is divided into a central chamber, F, and two chambers, G, one on each side of the chamber F. In the bottom e of the valve are formed three ports, f, g , and h , which extend completely across the valve, and are open to the central chamber, F, those portions of the ports within the chambers G, however, being covered by hoods i , so as to prevent any communication between said chambers G and the ports $x x'$ of the cylinder through the ports f, g , or h . There are in the bottom of the valve other ports, m, n , and p , which, however, are wholly within the limits of the chambers G, although they may, if desired, be extended across the steam-chamber F, and hooded in the same manner as the

ports f, g , and h . The cover of the chest B has an internal flange, k , inclosing a chamber, H, and to this flange is fitted a ring, J, which bears upon the top a of the valve D, and forms a steam-tight joint therewith. The chamber H communicates with the central chamber, F, of the valve through the opening b in the top of the same, and steam is admitted to the chamber H through an opening, q , in the top of the chest. The chamber F thus forms the steam-chamber of the valve, and is in constant communication with the steam-supply, the chambers G being in constant communication with the exhaust-port y through the port p . When the engine is running in one direction, the valve is adjusted, as shown in Fig. 1, so that the port f directs steam to the front port, x , of the cylinder, the port h directing steam to the rear port, x' , the exhaust-ports p and n working in connection with the front and rear ports, $x x'$, respectively, and the exhaust-port m and steam-port g being dead-ports—that is to say, not being brought into communication with the ports $x x'$ as the valve is moved by the eccentric.

When it is desired to reverse the engine, the valve D is shifted longitudinally, this movement being independent of the throw of the valve, and being of such extent as to bring the exhaust-port m and steam-port g into action, and to throw the steam-port h and exhaust-port p out of action with the ports $x x'$, the effect being to change the flow of steam to the cylinder of the engine and reverse the direction of movement of the piston. This will be understood on reference to Figs. 1 and 4, which represent the position of the valve when the engine is at or near mid-stroke, the valve having reached the limit of its throw in the direction of the arrow, due to the action of the eccentric. When the valve is in the position shown in Fig. 1, the steam-port f and exhaust-port n are fully open, steam entering the front end of the cylinder, and the rear end of the same being open to the exhaust. On shifting the valve to the position shown in Fig. 4 the ports f and n are thrown out of line with the ports $x x'$, the exhaust-port m being brought into line with the port x , and the steam-port g with the port x' . The effect of this will be to open the front end of the cylinder to the ex-

haust and the rear end to the steam, these conditions being the reverse of those existing previous to the shifting of the valve. The ports *h* and *p* are now the dead-ports.

5 While I prefer the construction of valve shown in the drawings, this is not absolutely essential. For instance, the valve may have a single central partition, with steam-chamber on one side and exhaust-chamber on the other; 10 or, if the valve has the three chambers shown, the outer chambers may be steam-chambers and the central chamber an exhaust-chamber. The relation of the steam-ports may also be reversed without departing from the spirit of 15 my invention—that is to say, the ports *x* *x'* may be formed in the valve, and the ports *f*, *g*, and *h* in the cylinder, as shown in Figs. 7 and 8, on reference to which it will be observed that the shifting of the valve effects a 20 change in the flow of steam in the same manner as I have before set forth in describing the valve shown in Figs. 1 and 4.

The construction shown in Figs. 1 and 4 is preferred for the reason that it necessitates no 25 change in the usual cylinder-ports. If the arrangement shown in Figs. 7 and 8 is adopted, it is advisable to form the ports *y*, *f*, *g*, and *h* in a plate, *W*, which can be applied to the ordinary three-ported valve-seat of the cylinder, as shown in said figures. The downward 30 pressure of steam on the bottom *e* of the valve is counterbalanced by the upward pressure of steam on the top *a*, the downward pressure of steam on the ring *J* and on that portion of the 35 top of the valve within the limits of the chamber *H* being relied upon to keep the valve to its seat. If desired, the exhaust-steam may

flow through the chest *B*, the valve being without the inclosed chambers *G*, but the top of the valve being of sufficient width to provide a proper bearing for the ring *J*. 40

The valve-balancing device forms no part of my present invention; nor do I limit myself to any special device for shifting or operating the valve, although I prefer for this purpose 45 the device shown and claimed in my application No. 133,478, filed June 2, 1884.

I claim as my invention—

1. The combination of a cylinder and valve with steam-ports *x*, *x'*, *f*, *g*, and *h* and exhaust- 50 ports *y*, *m*, *n*, and *p*, located in respect to each other as described, whereby, in the ordinary throw of the valve one steam-port and one exhaust-port are ineffective, but by a longitudinal movement of the valve the previously in- 55 effective ports are thrown into action and two previously effective ports rendered ineffective, thereby causing a change in the flow of steam and a reversal of the engine, as set forth.

2. The combination of the cylinder, having 60 steam-ports *x* *x'* and exhaust-port *y*, with the valve *B*, having steam-ports *f*, *g*, and *h* and exhaust-ports *m*, *n*, and *p*, arranged in respect to each other and to the ports *x*, *x'*, and *y* of the cylinder as set forth, whereby the reversal 65 of the engine is effected by a longitudinal movement of the valve, as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH BOND, JR.

Witnesses:

JOHN E. PARKER,
HARRY SMITH.