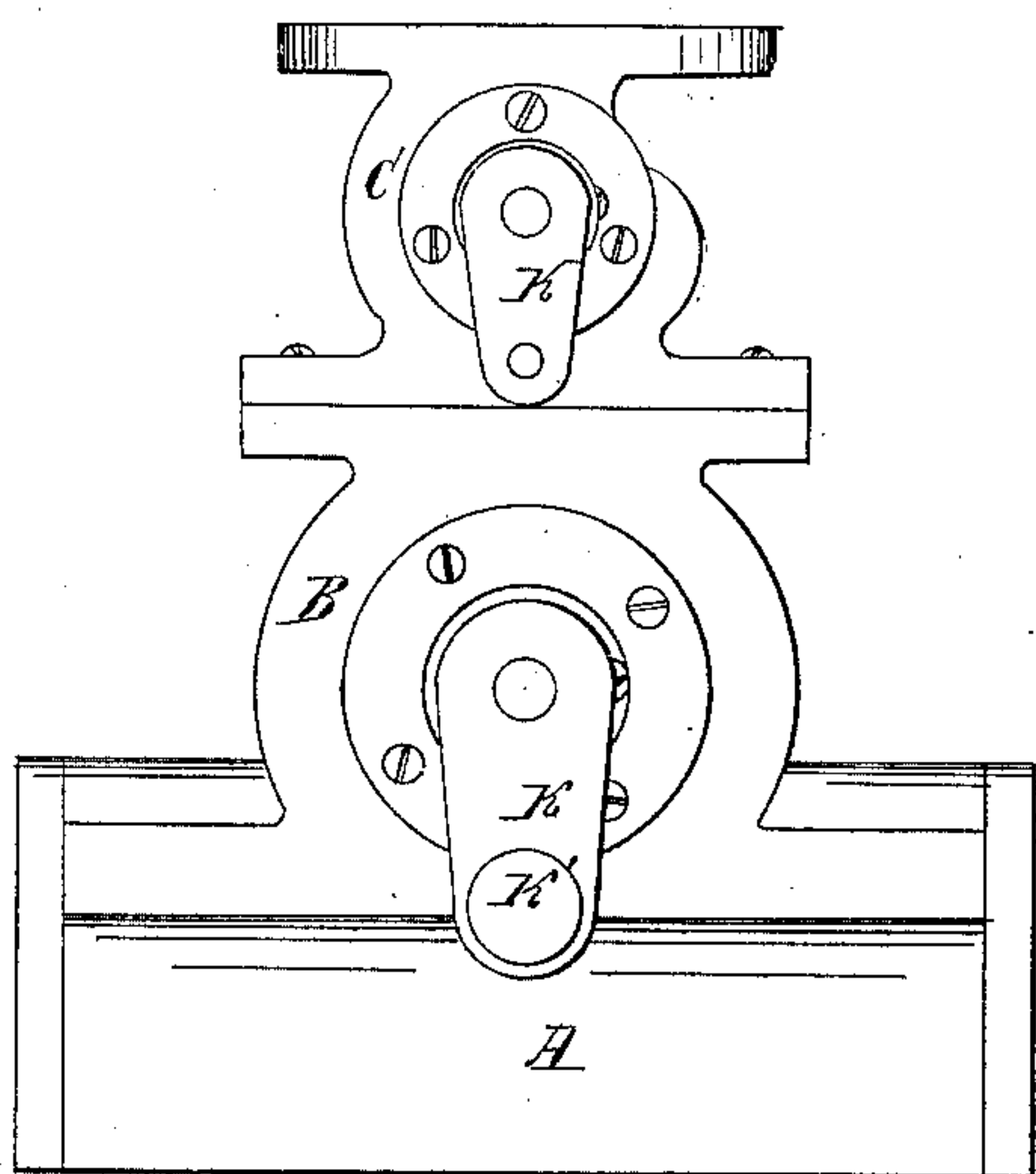


*F. W. Davidson,*  
*Rotary Steam Valve.*

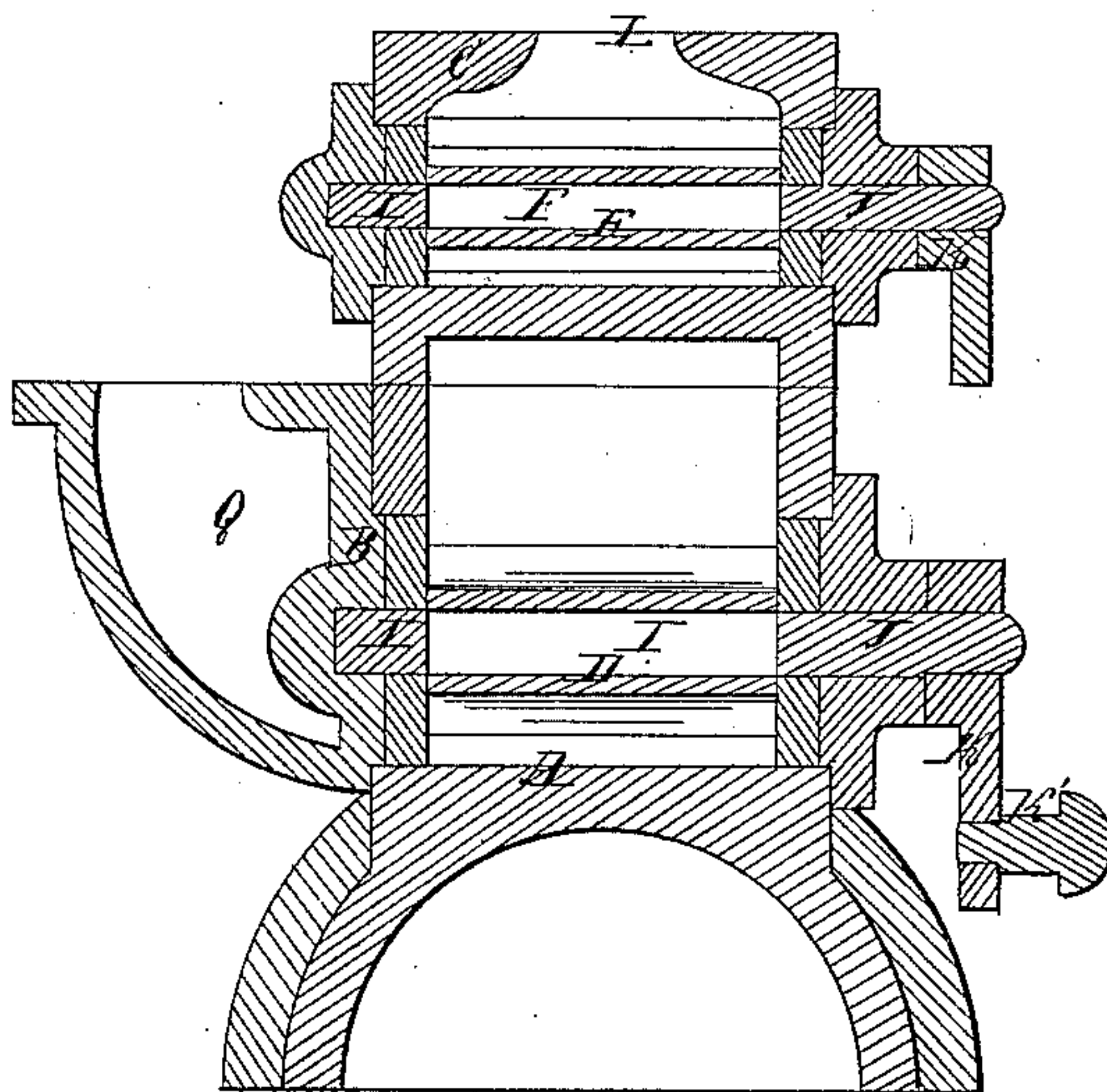
*No 63,368.*

*Patented Apr. 2, 1867.*

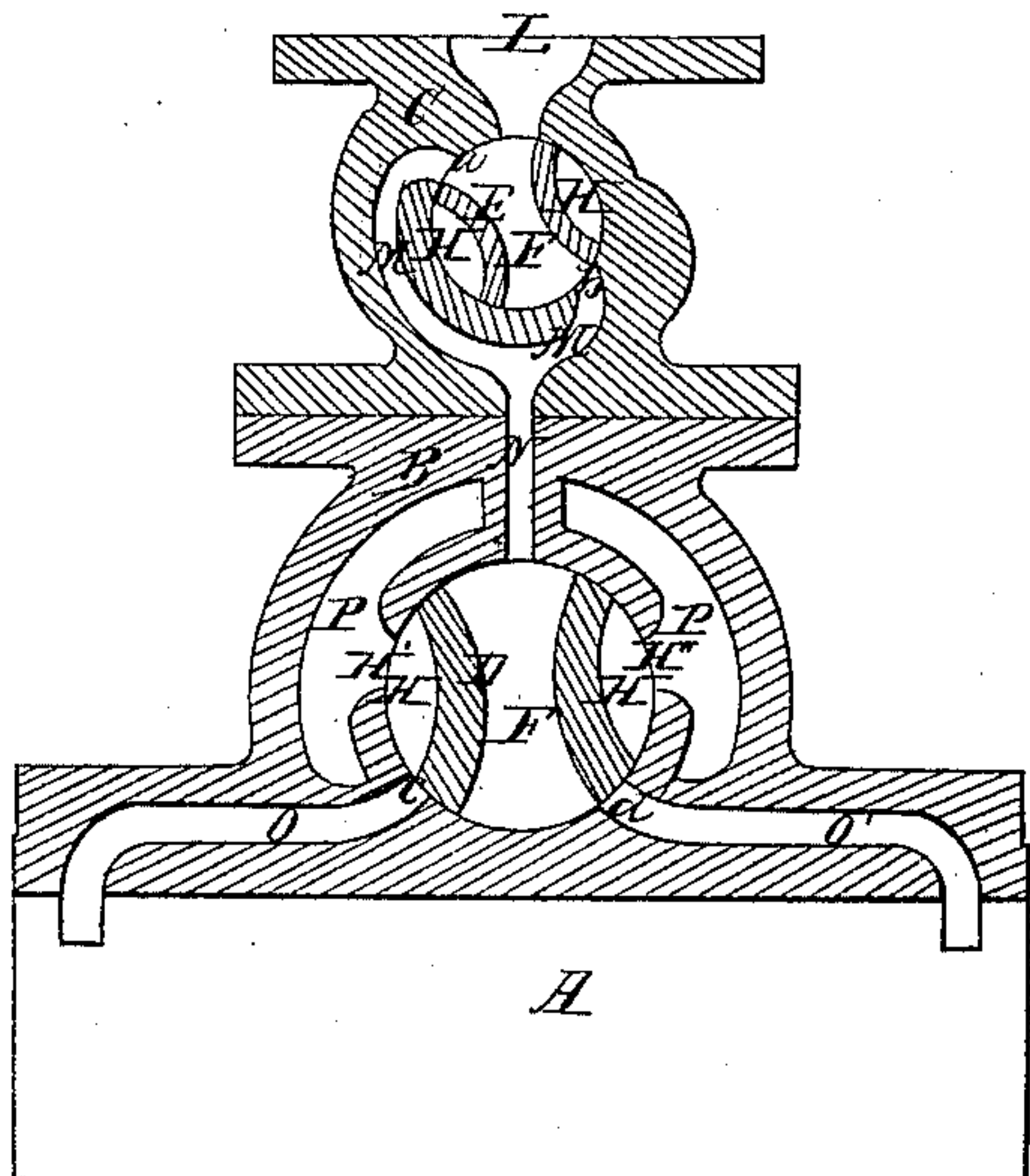
*Fig 1*



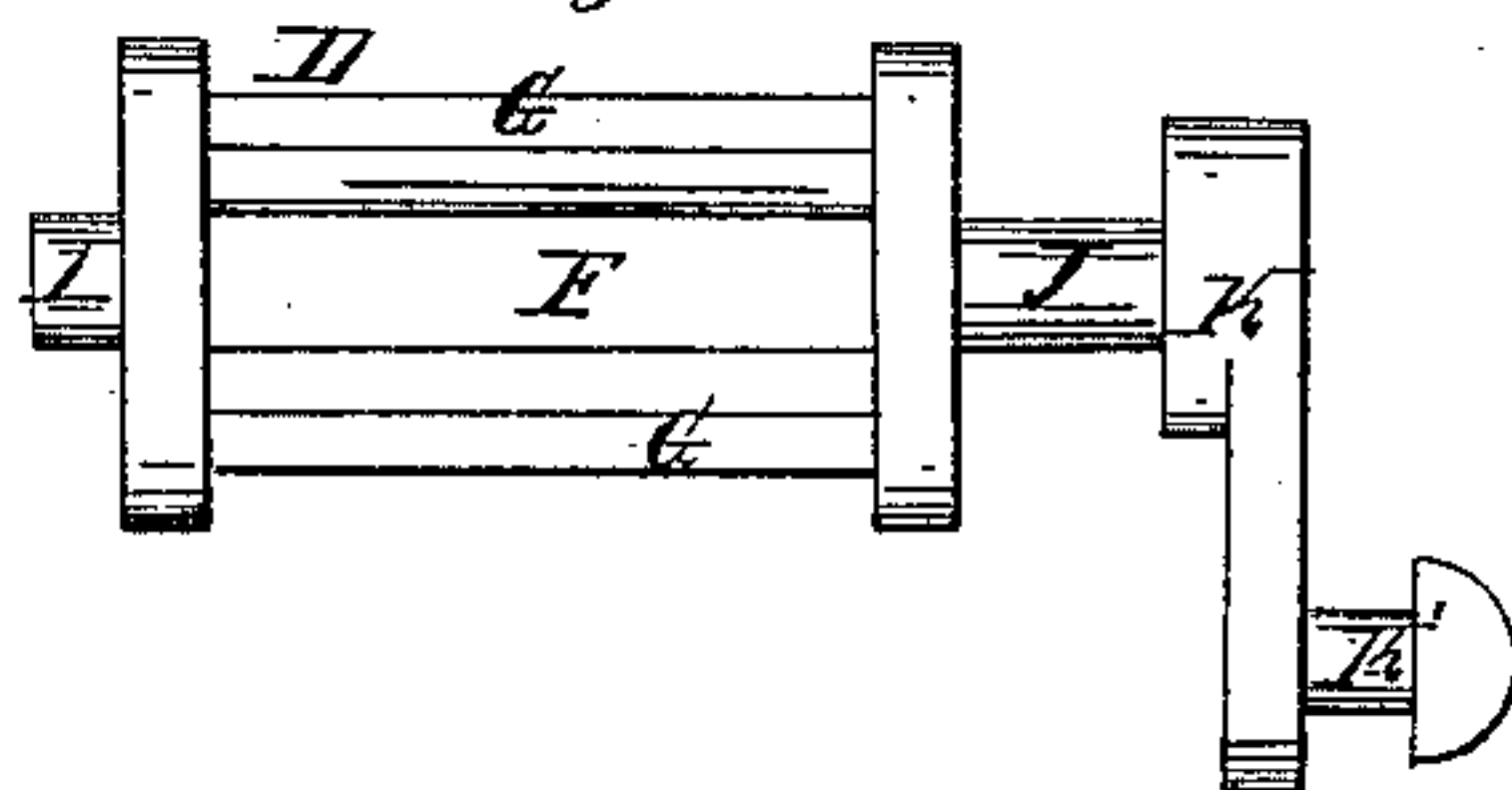
*Fig 2.*



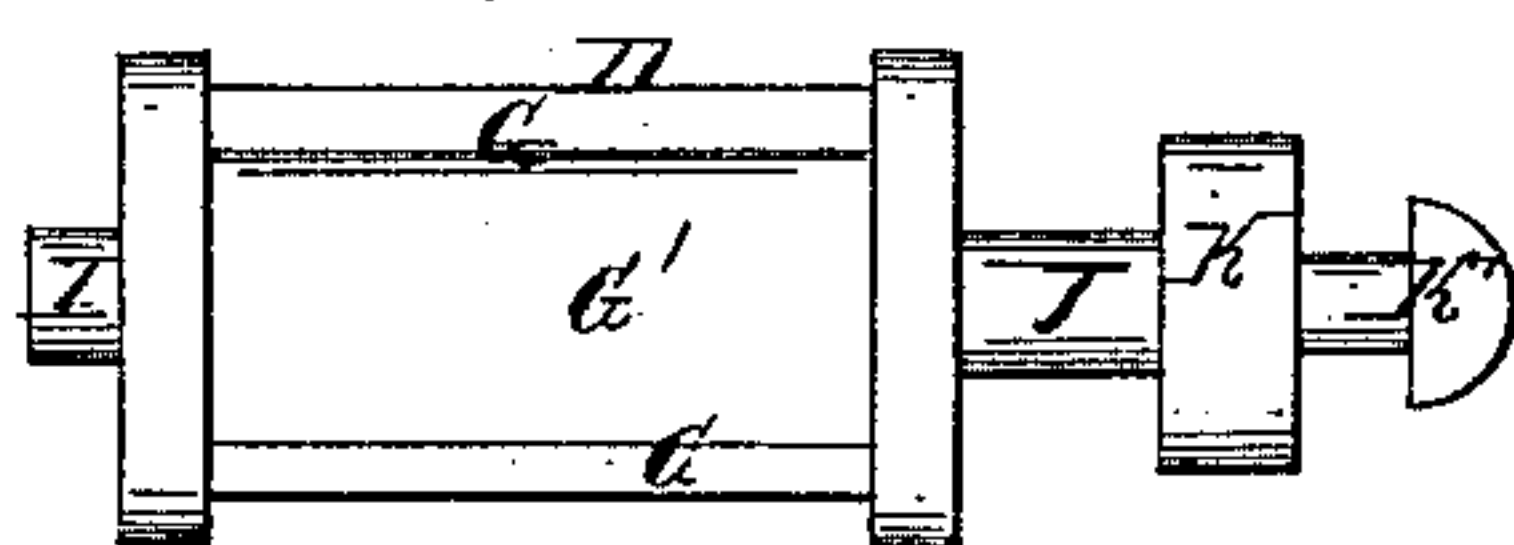
*Fig 3*



*Fig 4*



*Fig 5*



*Witnesses*  
*J. H. Burridge*  
*J. Holmes*

*Inventor.*  
*F. W. Davidson*



# United States Patent Office.

F. W. DAVIDSON, OF CLEVELAND, OHIO.

*Letters Patent No. 63,368, dated April 2, 1867.*

## IMPROVEMENT IN STEAM-ENGINE VALVES.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, F. W. DAVIDSON, of Cleveland, in the county of Cuyahoga, and State of Ohio, have invented certain new and useful improvements in Steam Valves; and I do hereby declare that the following is a full and complete description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is an end view of the valve and chamber.

Figure 2, a vertical longitudinal section.

Figure 3, a vertical transverse section.

Figures 4 and 5, a view of detached valves.

Like letters of reference refer to like parts in the several views.

A, fig. 1, is a section of a steam cylinder upon which are placed and secured the valve-chambers B C, and in which are placed and operate the valves D E, figs. 2 and 3. Of these valves, D is the main valve, and E the governor valve, and which are constructed alike, as shown in figs. 4 and 5, in which it will be seen that they are cylindrical, with a longitudinal opening, F, through the centre. G, the faces of the valves, are on each side of the opening, and the side G', between the two, are fluted, so that when the valves are in the chambers the fluted section of the valve and side of the chambers together make a sub-chamber, H, as shown in fig. 3, to which reference will hereafter be made. I is a pivot by which the rear end of the valve is supported; J, a short shaft supporting the front end of the same, and which is projected through the head of the chamber, and to which are keyed the crank and pin K and K', by which the valves are operated. L, fig. 2, is the induction opening leading the steam from the steam pipe into the cylinder, first passing through side channels M and valves down the throat N into the chamber B, from which, into the cylinder A through the throats O O'.

Having thus indicated the several parts of the apparatus, the practical operation of the same is as follows: The valve E is connected to the governor by the crank and pin referred to, and by which it is made to oscillate, thus opening and closing the valve, more or less, as the case may be. The position of the valve as shown in the drawing is such as to open the ports *a b*, and through which the steam passes to the valve below. The two ports being of equal capacity, the steam passes with equal volume through each, but in order to pass through the port *b*, it must first pass through the valve, and partially so in order to pass the port *a*. Thus it will be seen that the steam fills the space F in the valve at all times, and exerts an equal pressure on each side; thus the valve is equally and truly balanced by the equal pressure of the steam while passing through it into the chamber B. The valve D is connected to the eccentric and made to oscillate thereby. The position of this valve is such as to partially close the two ports *c d*. It will be evident that in order for the steam to enter the port *d*, it must first pass down through the valve, as in the former case, and thus the pressure of the steam is exerted equally on each side of the valve, and is therefore equally balanced. As the valve is moved to the right, the port *d* is opened and the steam enters the cylinder through the channel O'; at the same time the port *c* is opening and the inducted steam returns through that port into the sub-chamber H, through the port H' into the induction chamber P, and exhausts into the pipe Q, fig. 2, and so on to the reverse action of the valve. The steam enters the port *c*, thence along the channel O into the cylinder. At the same time the inducted steam returns through the port *d*, through the port H'', into the induction chamber P, and exhausts into the pipe Q as before. Thus the steam is made to pass directly through the valve to the cylinder and exhaust at the sides through the sub-chambers referred to. The valve by this means is at all times filled with steam, it forming a section of the channel through which the steam must pass to the cylinder, and whatever the pressure of the steam may be, it is equally exerted upon both sides of the valve, and which is therefore equally balanced in its oscillation.

The advantages resulting from a valve constructed as above described, are viz: Acting as a main valve its operation is attended by a large reduction in the amount of friction under the same pressure of steam, hence the valve will wear longer, and therefore will not require facing so often. By exhausting the steam at the sides of the cylinder it finds a more direct and immediate passage to the air. Acting as a governor valve it offers but little obstruction to the steam in its passage to the cylinder. The valve can be made smaller in diameter than an ordinary valve, and therefore will require less material and room, and, while operating as a throttle,

is at the same time a balanced valve, tight and always reliable. As this valve is constructed slightly tapering, it is therefore more easily and cheaply fitted to the chamber than the ordinary valve. In an economical point of view it is much cheaper than any other valve in use, and by its reducing largely the friction of the engine a proportionate amount of power is gained, hence the engine can be run at a much less expense.

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

The arrangement of the valves D and E with reference to each other, and the arrangement of the ingress and egress steam passages upon the principle and in the manner as herein set forth.

F. W. DAVIDSON.

Witnesses:

J. H. BURRIDGE,  
FRANK ALDEN.