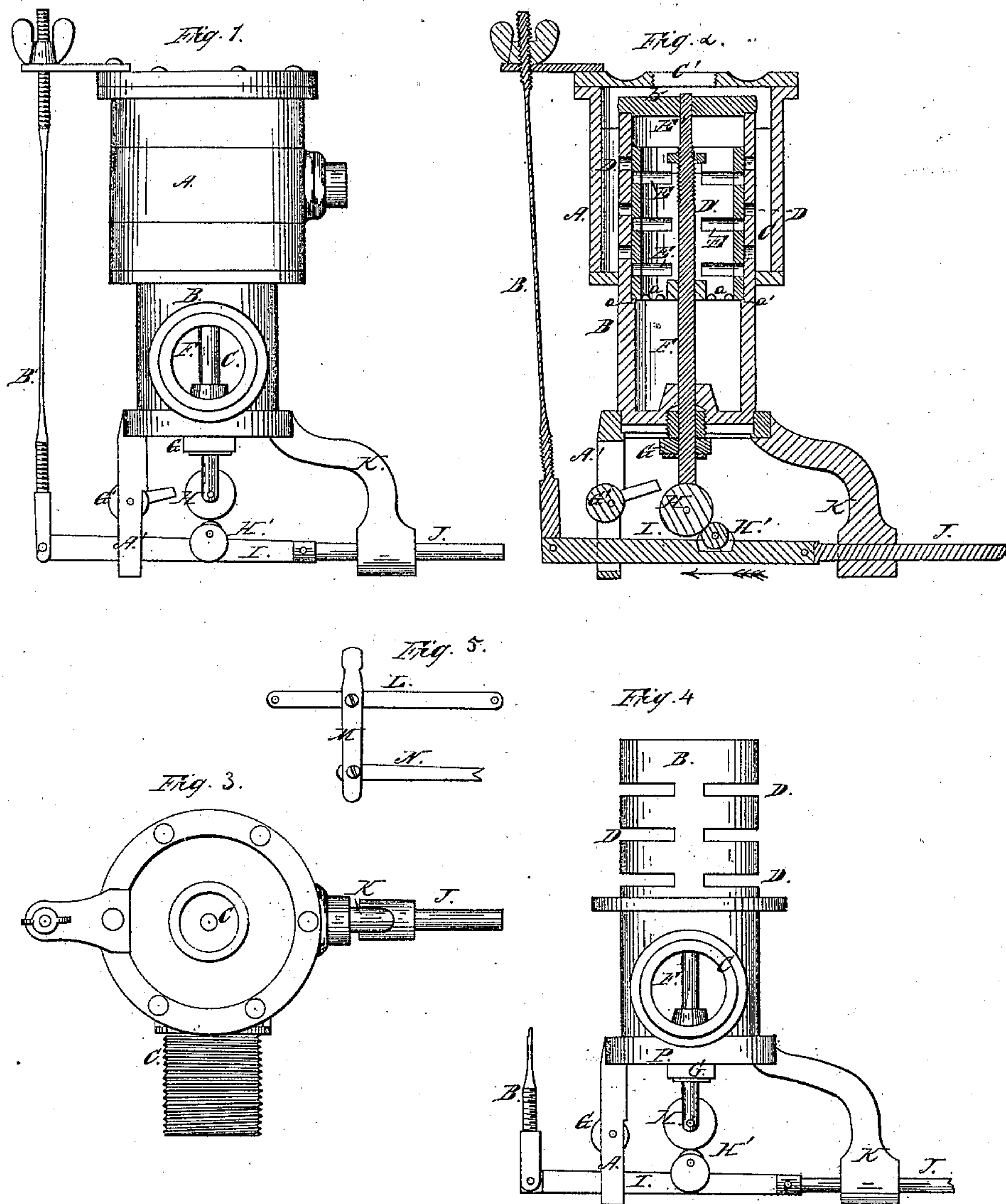


R. Sanderson,

Steam Cut-Off,

N^o 80,509

Patented July 28, 1868.



Witnesses.

J. H. Burdick
E. E. Waite

Inventor.

R. Sanderson

United States Patent Office.

ROBERT SANDERSON, OF CLEVELAND, OHIO.

Letters Patent No. 80,509, dated July 28, 1868.

IMPROVEMENT IN STEAM CUT-OFF 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, ROBERT SANDERSON, of Cleveland, in the county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Steam Cut-Off 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 a side view of the apparatus.

Figure 2 is a vertical transverse section.

Figure 3 is a view of the top.

Figure 4 is a detached view of the valve.

Figure 5 is a section, to which reference will be made.

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

A, fig. 1, is a cylindrical chamber or shell, in which is fitted a valve-seat, B, fig. 4, which is also cylindrical in shape, and forms the lower part of the apparatus, through which the steam escapes through the eduction-pipe C to the cylinder, as will hereafter be shown. This valve-seat, as will be seen, is hollow, and in the sides of which are cut horizontal circular openings or induction-ports, D, more or less in number, three being shown in the drawing.

D', fig. 2, is the valve, which is also hollow, and cylindrical in shape, and in the sides of which are cut horizontal circular openings or induction-ports, E, corresponding in number and size to the ports D, and with which they are related, as and for the purpose hereafter described.

The valve, when closed and at rest, as shown in fig. 2, is supported on the shoulders of the seat at a, the section of the seat immediately enclosing the valve being made somewhat larger than the lower section, thereby relieving the valve-stem from the weight of the valve when not in operation.

F is the valve-stem alluded to, the upper end of which penetrates the centre of the valve and thereto secured, whereas the lower end plays in a stuffing-box, G, and to the extremity is attached a friction-roller, H.

I is a jointed horizontal lever. The rounded end, J, is fitted to and works reciprocally in the stay K, by means of the eccentric to which it is attached and operated, whereas the opposite end works vertically in the slotted stay A', by means of the governor, to which it is connected by the link B'.

Having thus described the construction and arrangement of the apparatus, the practical operation of the same is as follows, viz:

The valve, on being placed in proper position with the lever I, is then connected to the eccentric, and the link B' to the governor. Steam is then admitted through the top of the apparatus at C', therefrom entering the space b, fig. 2, above the cover E' of the valve-seat, thence down around the seat, filling the space c, between the walls of the valve-seat and shell A.

As above said, the valve is shown as being closed. Now, as the eccentric reciprocates the jointed lever I, the result will be that, as the lever is moved to the left, in direction of the arrow, the friction-wheels H H', impinging upon each other, will throw up the valve, and thereby bring the ports E of the lever in open relation to the ports D of the seat through which steam passes to the interior of the valve, from which it escapes through the lower section of the seat and pipe C to the cylinder.

The roller H', on having passed the centre of roller H, or the vertical axis of the valve, will begin immediately to descend, in consequence of its own weight, and the pressure of steam exerted upon it, and, when arrived to the opposite side, and assumes the same relative position to the roller that it now holds, the valve will have descended and closed the ports, as indicated, and so, on the reverse action or direction of the lever, the valve will be opened and immediately closed, as before opened by the direct action of the lever from below, and closed by the pressure of the steam exerted upon the valve from above.

The opening and closing of the valve, as thus described, represents the lever as being in a horizontal position; hence, the throw of the valve will be uniform under every degree of pressure of steam; but in order

to regulate the throw of the valve to a variable pressure, the lever is connected to the governor by the link B', as above said; hence, under a low head of steam, the contraction of the governor will cause the lever to rise and open the valve more or less, by shortening up the distance that the valve can descend, thereby keeping open the ports, or closing them, as the expansion or contraction of the governor may determine, thereby regulating to the nicest and most exact degree the admission of steam under the most variable pressure, thus establishing a uniformity to the movements of the engine.

I am aware that a reciprocating cylindrical valve has been used in construction analogous to this, but the valve alluded to has been operated from above, having an immediate or direct connection with the governor, which moved the valve in both directions. Said valve also had but one steam-opening or port of large dimensions, the area of which being equal to the full capacity of the cylinder-port, which required that the valve should traverse a long distance in order to open and close. The valve, in consequence of being thus operated by the governor, and the long distance it had to traverse, was not immediate and certain in its operation, hence was not reliable.

In order to avoid this difficulty, and cause the valve to act more immediately and with greater certainty, I have increased the number of ports in the valve, reducing their vertical-width, and, by this increased number, still obtain the same area and capacity of port, with a great reduction in the traverse of the valve, and being operated in one direction by the direct pressure of the steam, a more immediate action of the valve is obtained, and with greater certainty of purpose.

Fig. 5 is a modification of the lever I and rollers for operating the valve, which consists of a bar, L, to which is pivoted a lever, M. To the lower end of the lever is pivoted a rod, N, connecting with the eccentric. The upper end of the lever, as it is made to vibrate by the eccentric, acts upon the friction-roller, and thereby operates the valve, as does the roller and jointed lever above described.

It will be observed that the stays, K and A', are attached to the valve by a collar, P, fitted loosely, so that the lever may be turned in any direction to adapt it to the governor and eccentric.

The cam G', fig. 2, is for the purpose of regulating the throw of the lever, in case of accidental disturbance. Thus, on bringing the greatest radial distance of the cam downward towards the lever, the less will be the vertical play of the lever and valve, and so, on lessening the throw to the minimum of the shortest radial distance, the greater will be the throw. While running the engine, the cam is left with its shortest radial distance downward, which will allow the throw of the valve to be sufficient to close the ports on being thrown upward, and thereby shut off the steam, should the governor, by any accident, become deranged, so as to cause an upward movement of the lever, which, if the ports were not thus closed, a full open port would be the consequence, admitting a full volume of steam, to the great danger of breaking the engine by its accelerated speed; and so, on starting the engine, should the valve be closed, it can be opened by means of the cam depressing the lever, and allow the descent of the valve.

It will be observed that the lower edge of the valve is notched, so that when it is resting upon the shoulder α' , steam is admitted under the edge, thereby counteracting the pressure of the steam exerted upon the valve from above, so that, on first starting the valve, it can be moved with greater ease than if no pressure were exerted on the lower edge.

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

1. The arrangement of the ports or openings D and notches α , in the manner as and for the purpose set forth.
2. The pivoted lever I and roller H', as arranged in combination with the roller II and valve D', in the manner set forth.
3. The cam G', as arranged in relation to the lever I, as specified.

ROBERT SANDERSON.

Witnesses:

J. H. BURRIDGE,
W. H. BURRIDGE.