J. B. Gardner's Imp'ts in Steam Pumps

Springfield, Mass

Fig. III

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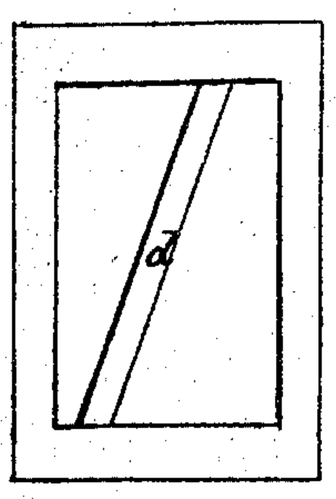
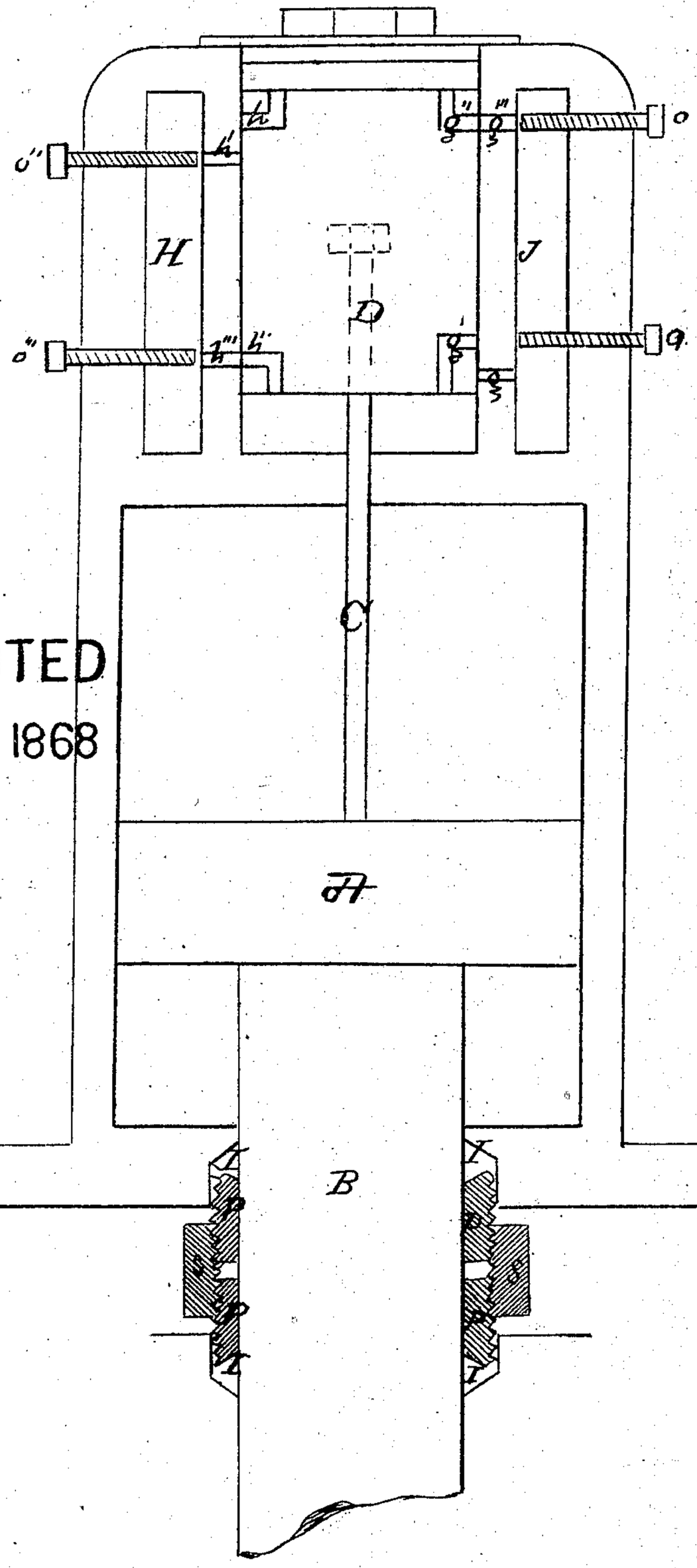
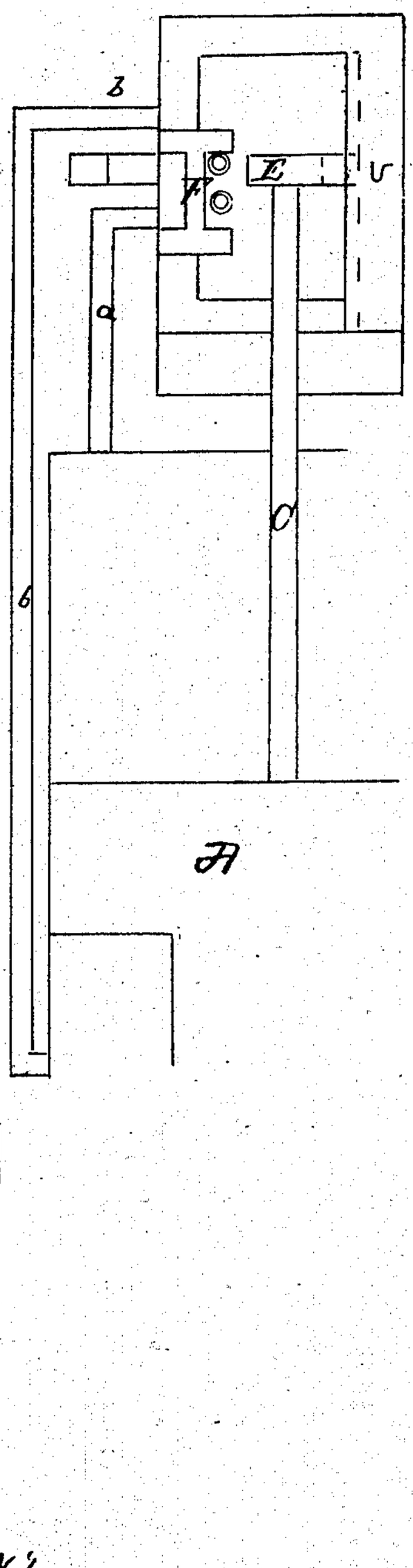
Fig. I

Fig. II







PATENTED
FEB 4 1868

Inventor
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Witnesses
C. F. Hyde
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United States Patent Office.

J. B. GARDINER, OF SPRINGFIELD, MASSACHUSETTS.

Letters Patent No. 74,075, *dated February* 4, 1868.

IMPROVEMENT IN STEAM-PUMPS.

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, J. B. GARDINER, of Springfield, county of Hampden, State of Massachusetts, have invented certain new and useful Improvements in Steam-Pumps, of which the following is a full and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

In the drawings accompanying this description—

Figure 1 represents a vertical section through the steam-chest, steam-cylinder, and stuffing-box.

Figure 2 is a vertical section, showing the arrangement of the valves; and

Figure 3 is another view of the valves.

This invention, so far as the movement of the steam-piston is concerned, is of that class of engine commonly applied to direct-action steam-pumps, in which the main slide-valve is operated by means of a secondary piston, which is in turn operated by steam let on in some positive manner by the steam-piston, for the purpose of reversing the motion of the latter by the movement of the slide-valve.

This motive-piston may be independent from the valve operated by the steam-piston for the purpose mentioned, namely, letting on of the steam to the motive-piston, as shown in the patent to Gardiner & Hyde, dated December 17, 1867, or it may be combined into and with it, as in this case.

My improvements are, first, a new and improved method of moving the motive-valve; second, an improved arrangement of the valve, in connection with its rod and the steam-cylinder and piston; third, an improved construction of the valve-chest; fourth, an improved form of stuffing-box.

In addition to the ordinary letting on of steam to the end of the motive-piston for the purpose of moving it, and, consequently, the slide-valve, I also simultaneously with this letting on, or just previous thereto, place the valve in such a position that the steam upon the opposite end of the motive-piston shall exhaust, and leave the valve free to move, thus rendering the motion of the valve more positive.

In order to show the manner of accomplishing this and my other improvements, I will now describe the construction and operation of the invention.

A is the steam-piston; B, the plunger of a single-acting, or the piston-rod of a double-acting pump; C is the valve-rod, connected directly to the centre of the piston, and passing through into the interior of the combined secondary valve and motive-piston D. This valve-rod C has a head, E, formed on it, for the purpose of moving the secondary valve, as hereafter described. F is the main slide-valve, operated by the compound motion of the piston-valve D.

The operation of the steam-ports is as follows: We will suppose the steam-piston in the position shown in the drawing. Steam is being let on at the top of the piston through the port *a*, and exhausted from below through the port *b*. When the piston arrives near enough to the end of its stroke, the valve D is moved by the operation of the projection *v*, on the head of the valve-rod, operating in the slot *d* in the valve, in such a manner as to bring the exhaust-ports *g g'*, on the end of the valve, in line with each other perpendicularly, and the ports *h h'*, on the opposite end, also in a similar manner in line with each other. There is, however, no communication between the steam-chamber H and the upper end of the valve, nor between the exhaust-chamber J and its lower end, until the further downward motion of the piston carries them opposite each other horizontally, when steam is let on to the upper end and off from the lower, thus moving the valve D, and with it the slide-valve F, thus reversing the movement of the main piston. This movement is repeated at either end of the steam-cylinder, thus causing a continuous reciprocating motion of the same.

The other improvements in the construction of the pump are, the arrangement of the steam-chest and steam-cylinder one above the other, and of the same piece, as shown, thus saving much labor, and avoiding a joint which is apt to leak, and also the arrangement of the valve, valve-rod, and steam-piston, in such a manner that they operate centrally with each other, thus saving much friction, and avoiding all complication attendant on outside and eccentric valve-rods and tappets; also the arrangement of the steam-chamber H upon one side, and the exhaust-chamber J upon the other, renders the formation of the ports communicating therewith more direct, and enables me to regulate the movement of the valve by allowing more or less steam to pass from the steam-chamber to one end, and from the other end to the exhaust-chamber, by means of the adjusting-screws *o o'*, as shown.

My improved stuffing-box consists of followers, P P′, which enter the ends of the steam and water-cylinders, and press upon the packing in the recesses I I′. These followers have screw-threads cut upon them, on which the double nut S fits. This nut has a right-hand thread cut in one end, and a left-hand thread cut in the other, and as it is turned in one direction, the followers are forced in upon the packing, and as it is turned in the other, they are drawn out away from the same.

The steam-piston is shown in the drawings attached to the plunger of a single-acting pump, as shown in the patent to Gardiner & Hyde, December 17, 1867, thus forming a very simple central direct-acting pump.

The advantages of the construction of a steam-pump, as a whole, are, simplicity, compactness, and consequent cheapness of construction, and durability.

And now, having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The arrangement of ports *g g′* on each end of the valve, and communicating with the exhaust, for the purpose of assisting in the movement of the valve, substantially as set forth.

2. The arrangement of the steam-chamber H and exhaust-chamber J upon the two sides of the steam-chest, substantially as set forth.

3. The arrangement of the screws *o o′*, wherewith to adjust the amount of steam let on and off the valve, as described.

4. The stuffing-box, constructed of the followers P P′ and nut S, in combination with the piston A and plunger B, substantially as described.

5. In combination with the central-acting valve, valve-rod C, and steam-piston, arranged and operating as described, the plunger B of a single-acting pump.

J. B. GARDINER.

Witnesses:

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