2 Sheets--Sheet 1.

J. HARE.

Steam-Valve.

No. 166,002. Patented July 27, 1875.

Fig. 1.

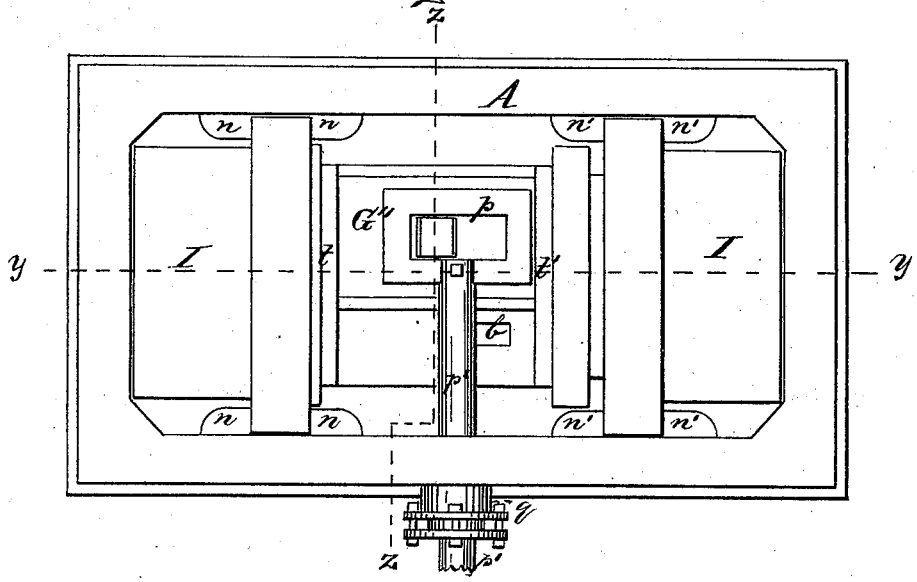
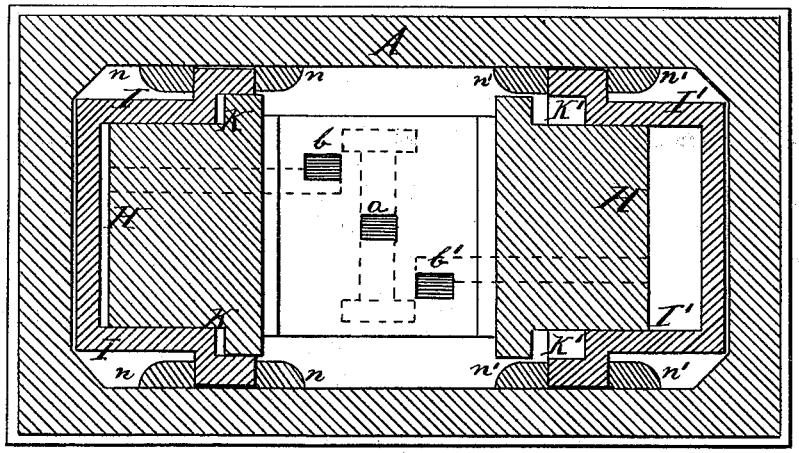


Fig. 2.



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2 Sheets--Sheet 2.

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Fig. 3.

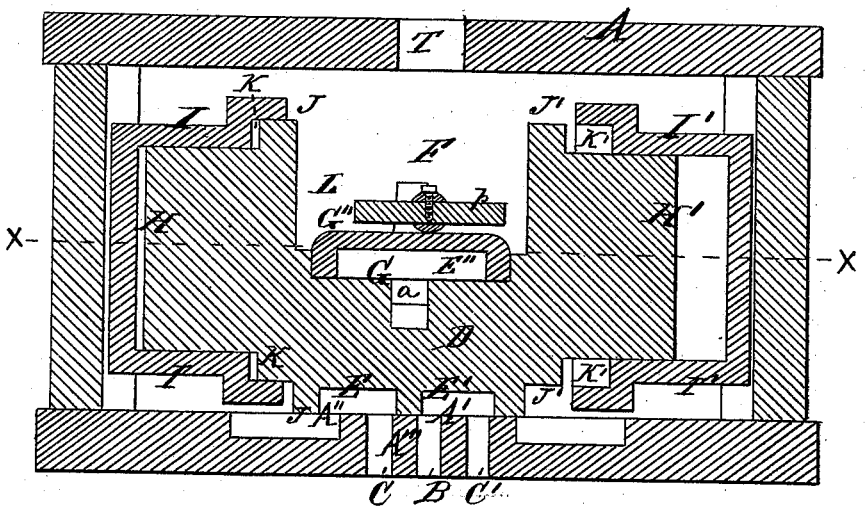
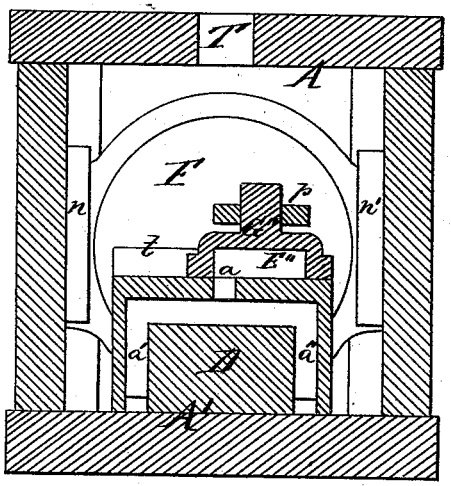


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES HARE, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN STEAM-VALVES.

Specification forming part of Letters Patent No. **166,002**, dated July 27, 1875; application filed May 6, 1875.

To all whom it may concern:

Be it known that I, JAMES HARE, of Brooklyn, in the county of Kings and State of New York, have made an invention of new and useful Improvements in Valve-Movements; and that the following is a full, clear, and exact description and specification of the same.

The invention has reference to that class of valve-movements in which the main valve, which controls the movements of the main steam-piston of a steam engine or pump, is itself operated by steam or other fluid, when a second valve, operated by some moving part of the exterior mechanism, moves said second valve, and directs the steam against the main valve, or a piston connected with it, at the proper times.

The object of my invention is to simplify and condense the parts of said combined valve apparatus, and to render it more effectual and reliable. To this end the invention consists in the combination of valves, pistons, and other parts, which combinations are specified at the close of this schedule.

In order that my invention may be fully understood I have represented it in the accompanying drawings, and will proceed to describe it as constructed by me.

Figure 1 represents a top view of a steam-chest, with the main valve, the secondary valve, the small cylinders and pistons, and the yoke and rod, the latter of which operates the secondary valve, reaching through the steam-chest. Fig. 2 represents a horizontal central section through the line *x x* of Fig. 3, showing the secondary valve removed. Fig. 3 represents a vertical longitudinal central section through the line *y y* of Fig. 1, showing the interior construction of the parts. Fig. 4 represents a transverse section of the main valve, exhibiting the connection of the small exhaust-ports with the main valve-seat at line *z z* of Fig. 1.

A′, Fig. 3, is the main valve-seat, having three ports, the center one, B, being the exhaust-passage leading to the air or condenser, the end ones, C C′, being, as usual, the ports leading to the ends of the main cylinder for the admission and release of the steam alternately as the main piston moves back and forth in the main cylinder. On this valve-seat A′ is a sliding valve, D, its face making a close steam joint with its seat, as usual. It is furnished with two pockets, E E′, by means of which the live steam from the steam-chest A is passed over to the ports C C′, and the exhaust is passed over from said ports from the main cylinder to the central port B alternately. The upper central portion of the main valve is constructed in such manner as to allow of the placement of a secondary slide-valve, as is shown in Figs. 1, 3, and 4, at F. The ends of the main valve are made circular, as shown at H H′, and extend beyond the valve-face A′ into the cylinders I I′, and reciprocate in said cylinders after the manner of plunger-pistons. They are enlarged, as shown at J J′, where they are of greater diameter than at the ends H H′, and when the valve is reciprocated the said ports J J′ enter the pockets or cylinders K K′, and confine the steam contained in them, and compress it, so as to cushion on it and prevent any jar or blow being communicated from valve D to the cylinders I I′. G, Fig. 3, is the secondary valve-seat, having three ports, the center one, *a*, being the exhaust-passage leading to the air or condenser. The end ones, *b b′*, are the ports leading to the ends of the cylinders I I′, for the admission and release of the steam alternately as the pistons move back and forth in their cylinders. On this valve-seat G is a slide-valve, G″, its face making a close steam-joint with its seat, as usual. It is furnished with a pocket, E″, by means of which the exhaust steam is passed over from the ports *b b′* from the cylinders to the central port *a* alternately. The cylinders I I′ are held in relative position with each other by means of flanges *n n′*, or by any other suitable means, so that they may act as one, and they are also prevented from moving endwise in the steam-chest by the same flanges *n n′*, but do not hinder them from rising or falling with the valve D, upon which they are hung. The interior of these cylinders is made smooth and round, so that the pistons and the enlargements J J′ may fit steam-tight, yet can move when under pressure of steam from the chest.

The valve G′ is operated by means of a yoke,

p, and rod p', the latter of which passes through the packing-box q in the side of the steam-chest, and is operated by means of a dog on the main piston-rod, causing the valve G′ to reciprocate on its valve-seat. The main valve in its operation carries with it the valve G′, and gives to said valve a movement that is at right angles to the reciprocating movement given to the valve by the main piston. This valve is guided in its movements by slides t t' and yoke p. The valve G′ will be readily moved by the rod p' when it is tapped by the stops on the piston-rod or other moving part. The exhaust-passages a' a'', leading from the valve G′ to the valve-seat A′, are elongated at their lower portions near said seat, to provide for the motion of the main valve, so that they are always in connection with the air or exhaust-passage B. At equal distances from the entrance of the exhaust-passages a at valve G′ are two steam-passages, b b', leading from the steam-chest at L to either end of the pistons, so that steam may flow from the chest to the cylinders I I′, to act on the pistons H and H′ alternately.

The operation is as follows: Steam is conducted from a boiler through suitable pipes to the steam-chest A through the opening T, and, filling the chest, passes into the pocket E, thence through port C to the left end of the main cylinder, forcing the main piston toward the right, the exhaust-port C′ being open to allow free communication between the right side of the main piston with the air through port C′, pocket E′, and port B. When the main piston arrives near the end of its cylinder a projection, connected with valve-rod p', is struck by a stop connected with said piston, and the valve G′ is moved forward until the passage b is open, when steam from the chest flows into the cylinder I and against the piston H, and the cylinder I′ is open to the exhaust-passage B and the air. The main valve now moves toward the right by the pressure of the steam on the head of piston H, and moves until the port C′ is open to the pressure from the steam-chest, the port B connected with the port C, and the steam shut off from said port by the lip A″ coming in line with the bar A‴. The motion of said lip is then arrested by the cushion of the steam shut up in the pocket K′, as the piston projection J′ has closed it, so that there is no escape. The cushioning referred to prevents the pistons from striking together when the valve is in use. When the main valve opens port C′ the main piston moves toward the left. As it approaches the end of its stroke it causes the valve-rod p' to move the valve G′ backward, by means like that before described, until the passage b' is opened, when steam from the chest flows into the cylinder I′, and thus pressure is thrown on the head of piston H′. The passage from the cylinder I is now open to the exhaust-passage B and the air, the main valve is moved to the left, as shown in the drawing, Fig. 3, and the main piston is reversed.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

The combination, substantially as hereinbefore set forth, of a main sliding valve, having piston-formed ends, which support the cylinders, in which they are to be reciprocated by steam or other fluid, and a secondary valve, which admits and releases the steam into and from said cylinders, also supported by the main valve, and mounted at right angles to the axis of the cylinders, arranged to operate in the manner and for the purpose set forth.

Witness my hand this 1st day of May, A. D. 1875.

JAMES HARE.

Witnesses:
JAS. S. WIGHTMAN,
THOS. J. TINDALL.