2 Sheets--Sheet 1.

J. HARE.

Steam-Valve.

No. 161,610. Patented April 6, 1875.

Fig. 1.

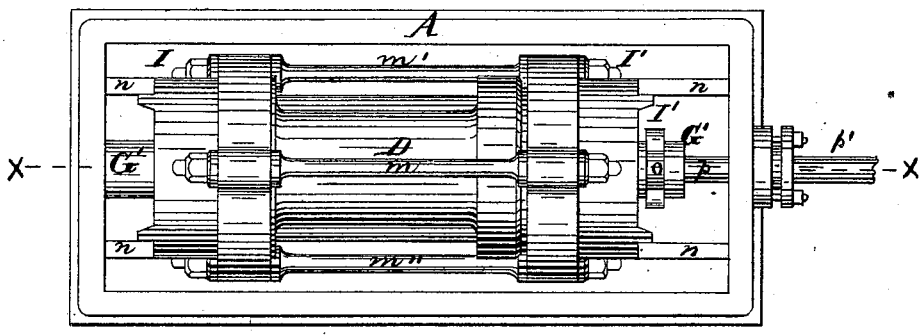
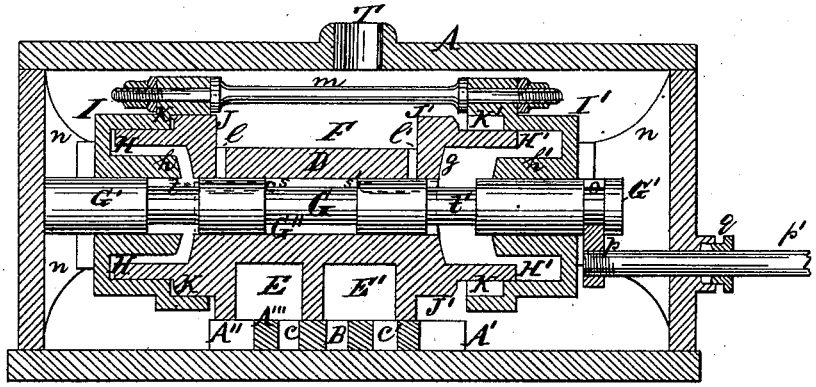


Fig. 2.



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2 Sheets--Sheet 2.

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Fig. 3.

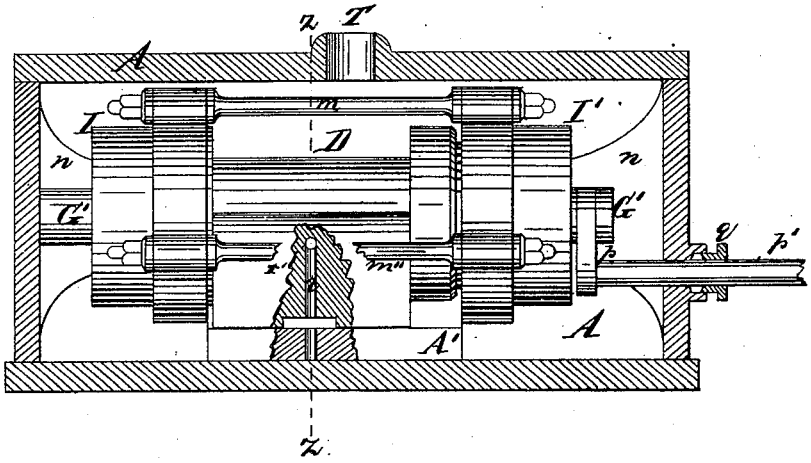
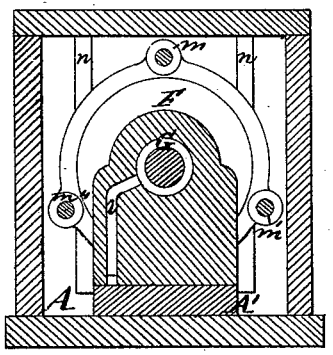


Fig. 4.



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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. **161,610**, dated April 6, 1875; application filed October 15, 1874.

To all whom it may concern:

Be it known that I, JAMES HARE, of the city of Brooklyn, county of Kings and State of New York, have invented a new and useful Improvement in Valve Movements; and I hereby declare that the following is a full, clear, and exact description and specification of the same, reference being had to the accompanying drawings making a part of the said specification.

My invention relates to that class of valve mechanism where the main valve, which is to directly control the movement of the main steam-piston of a steam engine or pump, is itself operated by steam or other fluid when another valve operated by some moving part of the exterior mechanism is shifted, 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; and to this end my invention consists in certain combinations of valves, pistons, shifting-rods, and other parts, which combinations are specifically set forth at the end of this schedule.

In order that persons skilled in the art may fully understand, make, and use my invention, I will proceed to describe it as constructed by me, referring to the accompanying drawings, in which—

Figure 1 represents a top or bird's-eye view of a steam-chest, with the main valve and the small cylinders and pistons, and the rod which operates the secondary valve reaching through the steam-chest. Fig. 2 is a vertical longitudinal section through the line *x x*, Fig. 1, showing the interior construction of the parts. Fig. 3 is a side view and longitudinal section of a portion exhibiting the connection of the small exhaust-port with main valve-seat. Fig. 4 is a cross-section of the main valve in the line *z z*, Fig. 3.

A′, Fig. 2, 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 portion of the main valve is curved, as is shown in section Fig. 4, at F, and is bored entirely through, forming a small cylinder, G. 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 parts 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′. Two small openings, *e e′*, are made in the valve for steam to pass from the main chest to the small cylinder G. The pistons H H′ are also cupped out, as shown at *g*, in order that they may pass over the hubs *h h′* on the interior of the cylinders I I′. The cylinders I I′ are connected by the rods *m m′ m″*, 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 flanges *n n′*, which confine them, 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 hubs *h h′* are also bored out on a line with said cylinder G, and of the same interior diameter, and the valve G′ is fitted steam-tight entirely through the hubs *h h′*, and in the cylinder G, projecting at both ends, and furnished with a groove, *o*, by means of which it is operated by an arm, *p*, and rod *p′*, which passes through the packing-box *q* in the side of the steam-chest, and is operated by a dog on the main piston-rod, causing

the valve G′ to reciprocate in the hubs *h h′* and cylinder G. As the pressure of the steam in the steam-chest presses on both ends of the valve G′, it is balanced, and will be readily moved by the rod *p′* when it is tapped by the stops on the piston-rod or other moving part. *r* is a small exhaust-passage leading from the cylinder G to the valve-seat A′, the lower portion being elongated near said seat, to provide for the motion of the main valve, so that it is always in connection with the air or exhaust-passage B. The entrance of said passage *r* into cylinder G is central between the ends of the main valve. At equal distances from the entrance of the exhaust-passage *r* in the cylinder G are two other exhaust-passages, *s s′*, leading from the interior surface of said cylinder to either end of the pistons H H′. The piston-valve G′ is cut out centrally, as shown at G″, so that when moved to the right the recessed portion will connect the passage *s* with the exhaust-passage *r*, and when moved to the left it will connect the passage *s′* with the passage *r*. In the valve G′ are also two other recesses, *t t′*, made at such a distance each side of the central recess that when moved to the right the steam-passage J is connected with interior of cylinder I, and when moved to the left the passage J′ is connected with the interior of cylinder I′, so that steam may flow from the chest to the said cylinders, 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 hub 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 the cylinder, a projection connected with valve-rod *p′* is struck by a stop connected with said piston, and the valve G′ is moved toward the right until the passage J is open, when steam from the chest flows into the cylinder I, and against the piston H, through the passage J and recess *t*. By the movement of the valve G′, the passages *s* and *r* are brought in connection by means of the recess G″, and the cylinder I is open to the exhaust-passage B and the air. The main valve is now moved 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 valve is then arrested by the cushioning of the steam shut up in the pocket K, as the piston projection J has closed it, so that there is no escape. If no steam should be in the chest, the main valve would stand in the position shown in the section, Fig. 2, when starting; but when steam is in the chest the valve cannot go so far to the right or left as is shown, and the cushioning referred to prevents the pistons from striking the cylinder 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′ to the left by means like that before described, while the main piston moved to the right, and brings the recess *t* in connection with the passage J, and the recess G″ in connection with the exhaust-passages *s* and *r*. Thus pressure is thrown on the head of piston H′, the main valve is moved to the left to a position a little short of the position shown in the drawing, Fig. 2, 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, arranged to reciprocate in steam-chest on a valve-seat, over suitable ports, its ends being fitted to cylinders sustained by said valve, but prevented from moving endwise by stops on the chest, as described, with a central piston-valve, recessed, so as to act in connection with suitable ports and passages in said main valve, to admit and release steam or other fluid to and from said cylinders, for giving motion to said main sliding valve, for the purposes set forth.

Witness my hand this 6th day of October, A. D. 1874.

JAMES HARE.

Witnesses:
E. F. HARTE,
W. H. ISAACS.