H. E. MARCHAND.

Steam-Valve.

No. 165,350. Patented July 6, 1875.

Fig. 1.

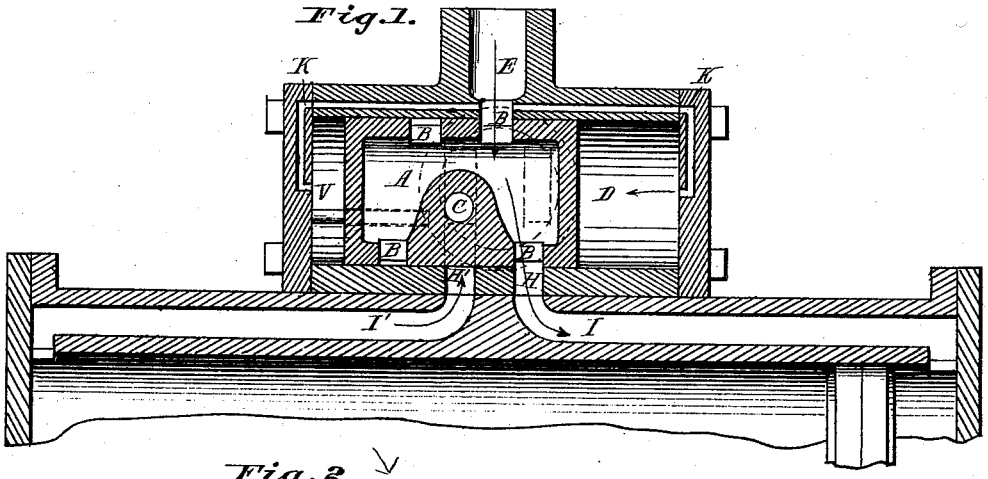


Fig. 2.

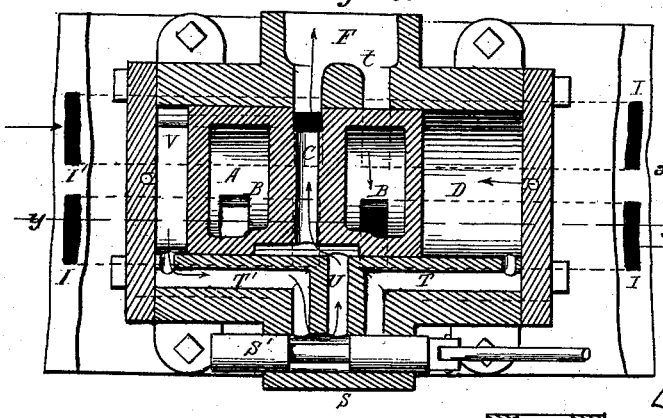


Fig. 3.

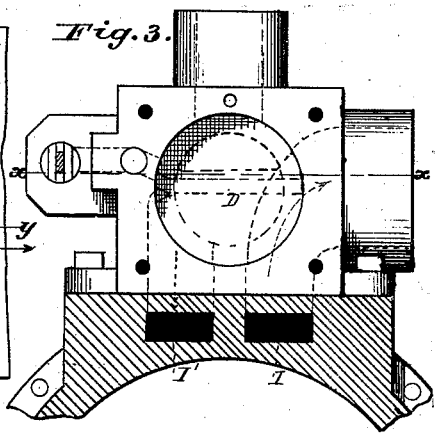


Fig. 4.

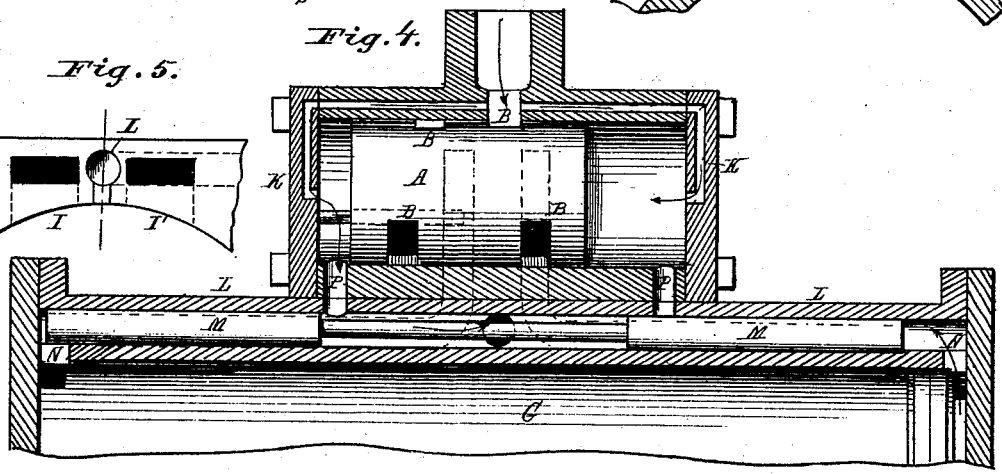
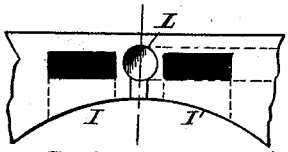


Fig. 5.



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HENRY E. MARCHAND, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN STEAM-VALVES.

Specification forming part of Letters Patent No. **165,350**, dated July 6, 1875; application filed April 26, 1875.

To all whom it may concern:

Be it known that I, HENRY E. MARCHAND, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Valves, of which the following is a specification:

This invention relates to a new and improved steam-valve for that class of engines in which the valves are shifted by the direct action of steam operating alternately on each side of the valve; and it consists, first, in the combination, with said reciprocating ported valve, of a cylinder constructed with four ports, two of which lead to each end of the same, serving in connection with the ports of said valve and valve-box as induction and eduction ports for the cylinder, in the manner hereinafter fully set forth; second, in the combination of the reciprocating ported valve, the valve-box and its four ports, and the cylinder provided with four ports, in the manner hereinafter fully set forth.

In the drawings, Figure 1 represents a longitudinal sectional view of my improved valve and valve-box, showing a portion of the same of the steam-cylinder to which it is attached. Fig. 2 represents a horizontal section through the valve-box. Fig. 3 represents a transverse section through the valve-box and a portion of the steam-cylinder; Fig. 4, a longitudinal vertical section through the cylinder and valve-box; and Fig. 5, a transverse vertical section through the upper part of the steam-cylinder.

The letter A indicates the cylindrical, semi-cylindrical, or polygonal valve, having ports B, B, and C extending through the same. D represents the valve-box, with a suitable bore or chamber extending through the same, and provided with induction and eduction ports E F. The lower face of said valve is planed and adapted to fit upon and be secured to the top of the cylinder G of the engine. Through the bottom of the valve-box are formed four ports, H H H′ H′, which set over similar ports I I I′ I′ in the upper portion of the steam-cylinder, two of said ports extending to each end of said cylinder and communicating with the interior of the same. The ports B B in the valve extend through the same, connecting the induction-port of the valve-box alternately with the ports H H in the valve-box and I I in the cylinder, which serve as induction-ports for admitting steam alternately to each end of the cylinder. The port C extends through the valve and serves to connect the ports H′ H′ and I′ I′ with the induction or discharge port of the valve alternately at proper intervals, serving as an induction-port to the cylinder. K K represent two small ports in the upper wall of the valve-box, leading to each end of the interior of the same from the induction-port, and serving to admit steam to both sides of the cylindrical valve, for the purpose to be hereinafter explained. L represents a cylindrical chamber extending longitudinally through the upper part of the cylinder G, and provided with a shifting-valve, M. Said chamber communicates at its ends with the interior of the cylinder G, through ports N, with each end of the valve-box D, through ports P P, and with the exhaust-port of the valve-box by means of the port R. Said valve M is shifted as the steam is alternately admitted at each end of the cylinder by the action of the steam alternately opening and closing the ports P P, and throwing the steam-spaces in the valve-box at each end of the valve A, alternately, into communication with the exhaust-port of the said valve-box. The valve-chest is provided with the usual induction and exhaust ports, indicated by the letters E and F, the exhaust-port having a bridge, *t*, extending across the same, which closes the circumferential exhaust-port in the main valve when feeding or exhausting through the lower ports. The letter S represents an auxiliary valve-box, formed on one side of the valve-box D, and communicating with the interior of the same at each end by means of the ports T T, and at the center by a port, U. Said auxiliary valve-box is provided with a cylindrical valve, S′, adapted to work therein in such manner as to alternately establish communication between the ends of the valve-box and the port U. This last-mentioned auxiliary valve is intended to be used in connection with the tappet-arm or eccentric of the engine to alternately establish communication with the ends of the valve-box and eduction-port of the same, in place of the valve M, before

described. To prevent the valve A from shifting around in the bore of the valve-box, a guide-pin, V, setting in a recess bored in the end of the valve A, is extended from either head of the valve-box D.

The operation of my invention is as follows: The various parts of the engine being in the position shown in Fig. 1, upon admitting steam into the eduction-port of the valve-box it takes the course through the port B into the port I, as shown by the arrows, entering at one end of the cylinder. The port I′, leading from the opposite end of the cylinder, being connected with the exhaust-port of the valve-box by means of the port C, through the valve A, allows the steam behind the piston to drive it toward the opposite end of the cylinder. The valve M in the chamber L will be in position to close the port P, leading into the right-hand end of the valve-box, and opening the port P at the left-hand end, establishing communication between the latter end and the exhaust-port of the valve-box. The difference in the pressure by this means created keeps the valve A in position until the piston reaches the opposite end of the cylinder and shifts the valve M, which immediately changes the ports P P, opening communication between the opposite end of the valve-box and the exhaust-port, relieving the pressure on the right-hand side of the valve and allowing the steam to shift it, so as to change the induction and eduction-ports of the cylinder so as to admit the steam on the left-hand side to make the return stroke of the piston.

The operation of the auxiliary valve will be readily understood from the above without further explanation.

It will be evident from the above description that, as the live steam is admitted at all times equally to both sides of the valve, all back-pressure of steam already used will be avoided, and a steam-cushion will be formed at each end of the valve, as the ends of said valve never close the ports. The valve, by reason of the live steam being admitted on both sides alike, will be perfectly balanced, and will act instantaneously at each stroke of the piston of the engine, owing to the large amount of steam held at each end of the valve-chest, which serves as a reservoir, retaining the steam in readiness for action as soon as either end may be connected with the exhaust, and the equilibrium between the two sides destroyed.

The engine may be used by connecting the auxiliary-valve to the cam or eccentric-rod, or in connection with the piston of the engine. In the first case, the auxiliary valve at the side of the valve-box is employed; in the latter, the reciprocating valve in the upper part of the cylinder.

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

1. The combination of the reciprocating ported valve and the cylinder, constructed with four ports, I I and I′ I′, two of which lead to each end of said cylinder, serving in connection with the ports of the valve and valve-chest, as induction and eduction ports to said cylinder, substantially as described.

2. The combination of the reciprocating ported valve, the valve-box and its four cylinder-ports, and the cylinder provided with four ports, substantially as described.

In testimony that I claim the foregoing, I have hereunto set my hand.

HENRY E. MARCHAND.

Witnesses:

JAMES L. NORRIS,

JOS. L. COOMBS.