3 Sheets—Sheet 1.

G. M. WEINMAN.

STEAM PISTON-VALVE.

No. 192,550 Patented June 26, 1877.

Fig. 1.

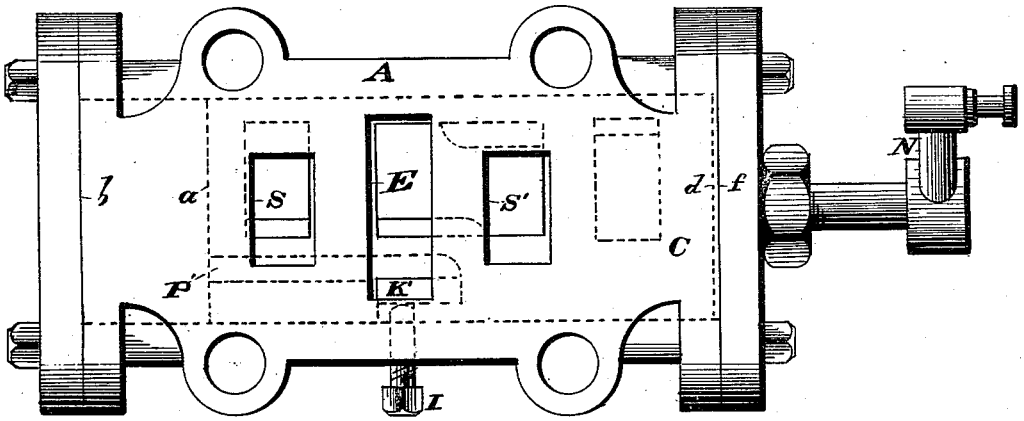
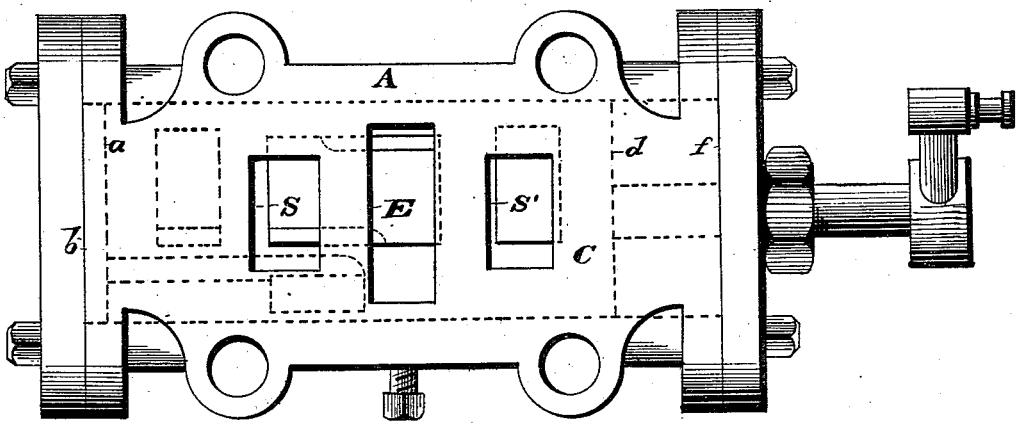


Fig. 2.



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3 Sheets—Sheet 2.

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Fig. 3.

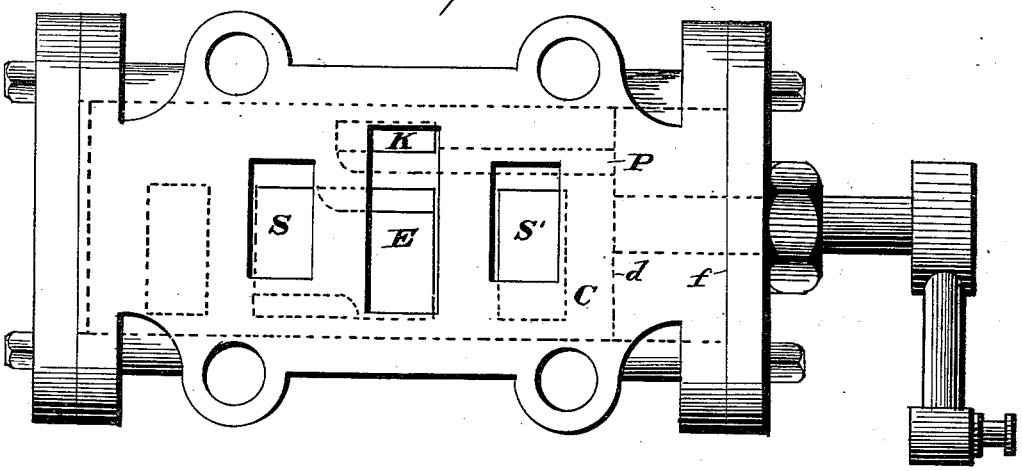

Fig. 4.

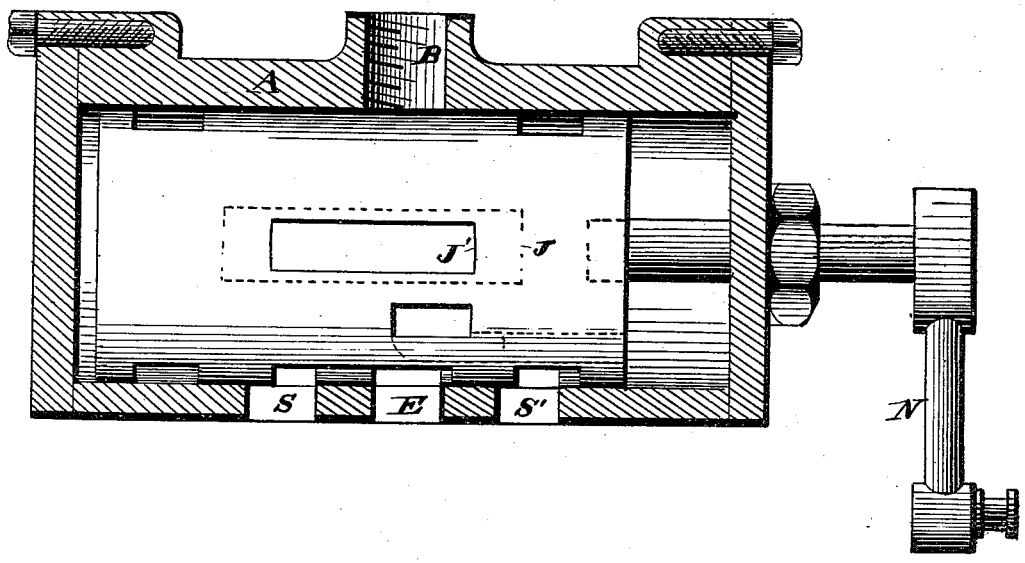

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Fig. 5.

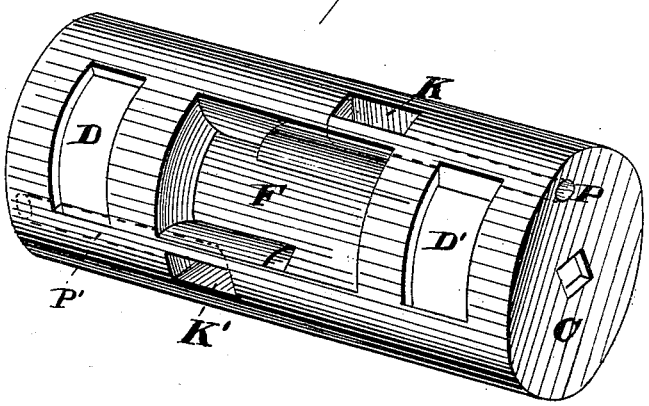
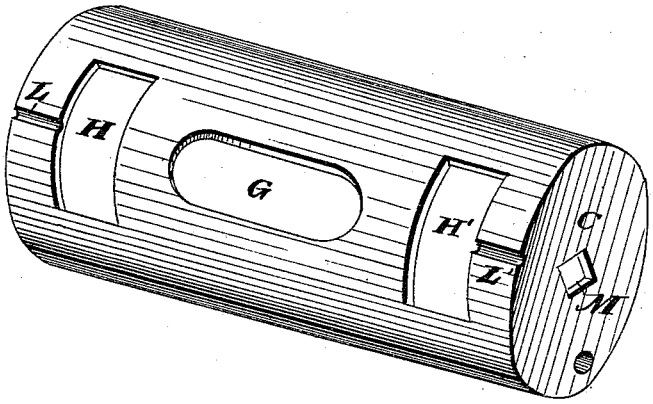


Fig. 6.



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UNITED STATES PATENT OFFICE.

GEORGE M. WEINMAN, OF COLUMBUS, OHIO.

IMPROVEMENT IN STEAM-PISTON VALVES.

Specification forming part of Letters Patent No. **192,550**, dated June 26, 1877; application filed March 31, 1877.

To all whom it may concern:

Be it known that I, GEORGE M. WEINMAN, of Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Piston-Valves for Steam-Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to cylindrical valves for steam-pumps; and consists, first, in a valve provided with passages parallel with the length of the cylinder, which extend from the ends to the side thereof, and which form the shortest passage or route for the steam at the ends of the valve to the exhaust-port of the steam-cylinder; second, in so placing the openings of said passages on the side of the valve, relative to the exhaust-port of the steam-cylinder, that the said openings shall have passed beyond the exhaust-port before the valve reaches the head of the steam-chest, so that the valve shall be cushioned by the remaining steam thus prevented from escaping after said openings pass the said exhaust-port; third, in connecting with the valve a crank, or other suitable mechanism, whereby the valve is turned or oscillated on its axis, for the purpose of bringing the openings or supplemental exhaust-ports opposite the main exhaust-port alternately, according to the position of the valve relative to the steam-chest.

In the drawing, Figure 1 represents a steam-chest turned bottom upward, showing the two steam-ports and central exhaust-port, and in dotted lines the cylindrical valve with its steam-ports, bridge, and one supplemental exhaust-port. Fig. 2 is a similar view, showing the position of the valve after the supplemental exhaust-port thereof has passed beyond the exhaust-port of the steam-cylinder, so that the escape of steam from the end of the valve is cut off, and a cushion of steam remains to prevent the valve from striking the head of the steam-chest. Fig. 3 shows the valve turned on its axis, so as to bring the other supplemental exhaust-port opposite the main exhaust-port, and thus allow the steam at the other end of the valve to be exhausted as the valve moves in that direction. Fig. 4 represents a cross-section of the steam-chest with valve in position. Figs. 5 and 6 represent, respectively, the lower and upper sides of the cylindrical valve.

A represents the steam-chest, the under side of which is shown in Figs. 1, 2, and 3, and a cross-section thereof in Fig. 4. It is provided with the steam-inlet opening or port B, the steam-outlet ports S S′, and the exhaust-port E. It is preferably constructed of iron, and may be of any convenient and desired external form. C is the cylindrical valve, constructed hollow. It is provided with the steam-ports D D′ and bridge F, and is so placed that these steam-ports and bridge are opposite the steam and exhaust ports of the steam-cylinder. On the opposite or upper side of the valve is located the steam-inlet port G and the balance-openings H H′. I is a set-screw, the end of which projects into the slot J of the valve, and allows the latter to turn on its axis sufficiently to bring the two supplemental exhaust-ports K K′ alternately opposite the main exhaust-port of the steam-cylinder. Opposite the slot or opening J (represented in dotted lines in Fig. 4) is placed the balance-opening J′, for the purpose of properly balancing the valve. This opening J′, therefore, serves the same purpose as do the balance-openings H H′, located opposite the steam-ports D D′. L L′ are small grooves on the outside of the valve, extending from the ends thereof to the openings H H′, whereby steam may pass from within the cylindrical valve to and beyond the ends of the same. *m* is a square or other angular opening, into which loosely fits the shaft of the crank N, by means of which the valve is turned or moved on its axis. P P′ are two passages, which lie parallel with the axis of the valve, and extend from the ends of the same to the side, forming there the supplemental exhaust-ports K K′.

The operation of the valve is as follows: When the valve is in the right-hand end of the steam-chest, and occupies the position shown in Fig. 1, the steam that passes into the valve through the inlet-port G passes out of the same

through steam-port S to the cylinder in which the piston of the engine is located, and steam is exhausted from the said piston-cylinder at its other end through the steam-port S′ and exhaust-port E. At the same time the steam present between the end *a* of the valve and the head *b* of the steam-chest is being exhausted through the passage P′ and supplemental exhaust-port K′, now opposite the exhaust-port E. As the steam escapes through the port K′ the pressure at the end *a* of the valve is relieved, and the pressure of steam at the other end *d* of the valve pushes the same toward the head *b*. (See Fig. 2.) When the supplemental exhaust-port K′ has just passed beyond the main exhaust-port E the escape of steam from the end *a* of the valve is cut off, and the remaining steam forms a cushion, which prevents the end *a* of the valve from striking the head *b* of the steam-chest. As soon as the valve reaches the end of its stroke it is turned on its axis, by means of the crank N, (which is suitably connected with the piston of the pump or other part of the machinery,) sufficiently to bring the opposite supplemental exhaust-port K opposite the main exhaust-port E. The steam now passes through steam-port S′ to the piston-cylinder, and is exhausted therefrom through port S and exhaust-port E. At the same time the steam at the end *d* of the valve is exhausted through the port K. (See Fig. 3.) As the pressure at the end *d* is relieved by the escape of the steam, the steam at the other end of the valve, which has passed there from within the valve by means of the groove L, forces the valve toward the head *f* of the steam-chest, but as soon as the port K passes beyond the exhaust-port E a cushion of steam is formed, as before described, and the valve is prevented from striking the said head *f*. The crank then receives another turn in the opposite direction from before, and the first-described motion of the valve is repeated. The grooves L and L′ are constructed only sufficiently large to permit the requisite quantity of steam to pass to each end of the valve. And the supplemental exhaust-ports K and K′, and the passages P and P′ are of sufficient capacity to quickly exhaust the steam.

It is evident from the foregoing description that the steam is exhausted from each end of the valve by the most direct route to the main exhaust, and that the valve is effectually cushioned after the supplemental exhaust-port has passed a short distance, say one-eighth of an inch, beyond the main exhaust-port.

Instead of the grooves L and L′, small openings may be made in the ends of the valve, communicating with the interior, which will serve the same purpose as the grooves.

What I claim is—

1. A hollow valve provided with steam-passage leading to opposite ends of the valve, and independent exhaust-passages leading from opposite ends of the valve to independent supplemental exhaust-openings, the latter located on opposite sides and ends of the main exhaust-opening, whereby the partial rotation of the valve serves to exhaust steam directly to the main exhaust, and cut off the exit of steam before the valve has reached the limit of its stroke, thereby cushioning the valve, substantially as and for the purpose set forth.

2. A hollow valve constructed with openings H H′, steam-passages L L′, supplemental exhaust-passages P P′ leading to opposite ends of the valve, and independent ports K K′, the latter located on opposite sides and ends of the main exhaust-opening F, substantially as and for the purpose set forth.

3. A cylindrical valve provided with steam-ports D D′, bridge F, inlet-port G, balance-openings H H′, passages P P′, supplemental exhaust-ports K K′, and grooves L L′, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE M. WEINMAN.

Witnesses:
JAS. G. BULL,
G. F. WHEELER.