(No Model.) 2 Sheets—Sheet 1.

E. A. WILDT.

PISTON VALVE.

No. 265,727. Patented Oct. 10, 1882.

Fig. 1.

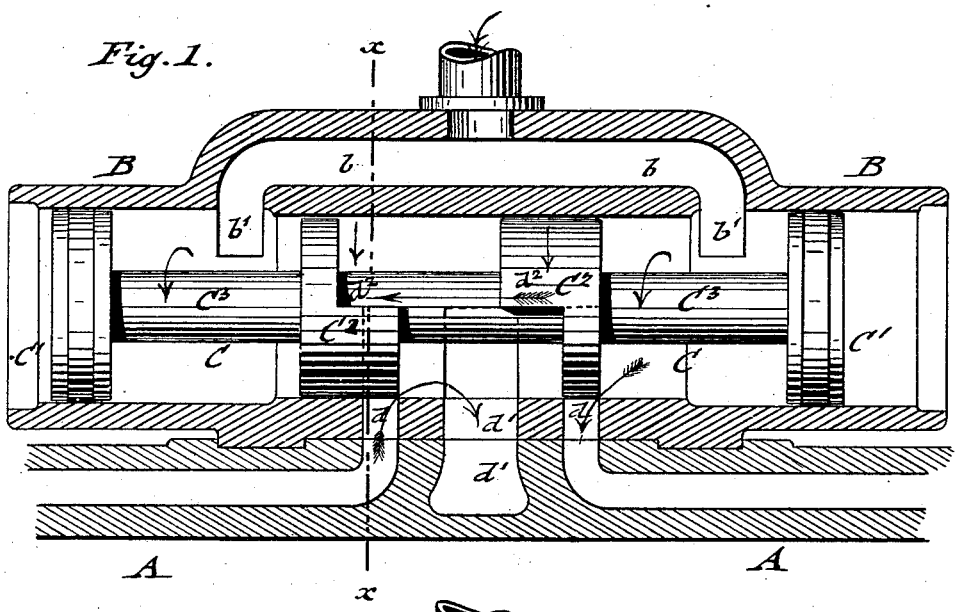


Fig. 2.

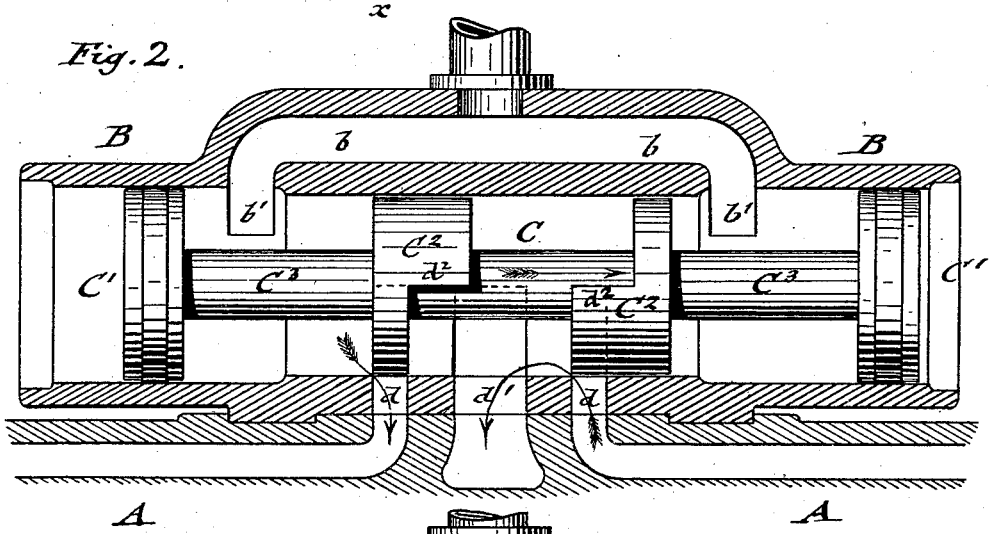
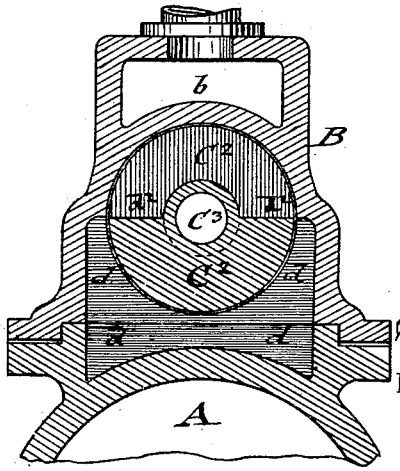


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

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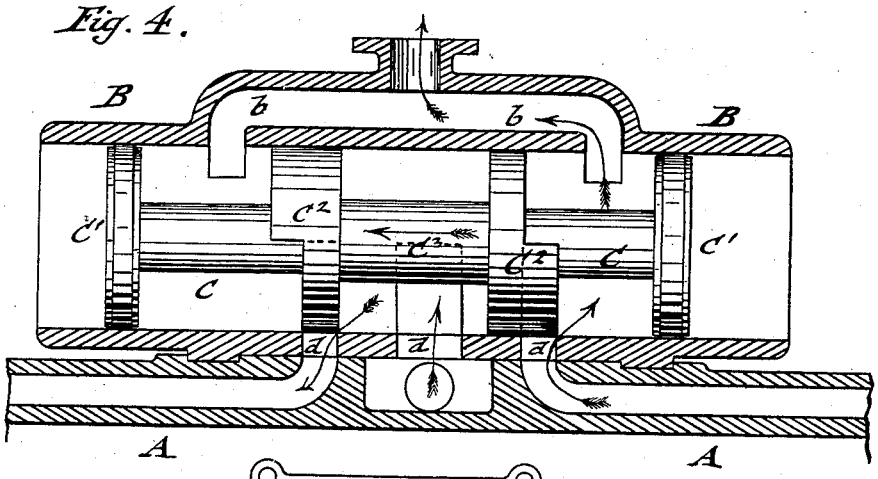
PISTON VALVE.

No. 265,727. Patented Oct. 10, 1882.

Fig. 4.



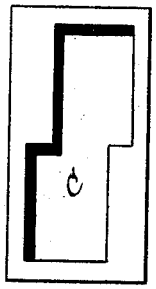


Fig. 7.

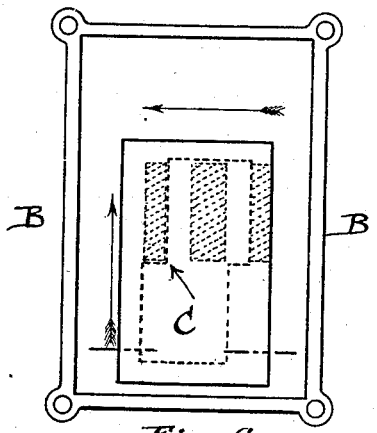


Fig. 6.

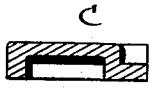


Fig. 8.

Fig. 5.

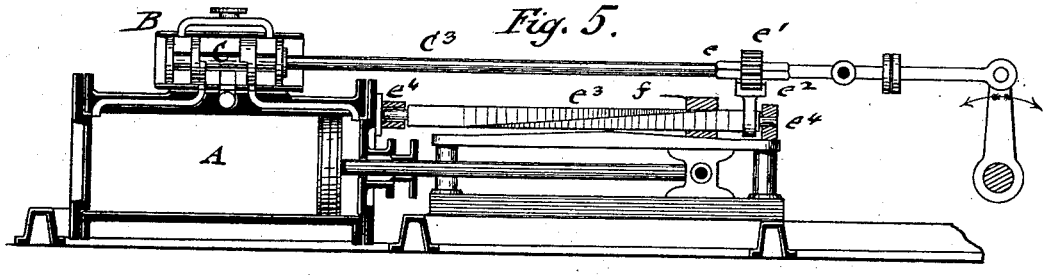


Fig. 9.

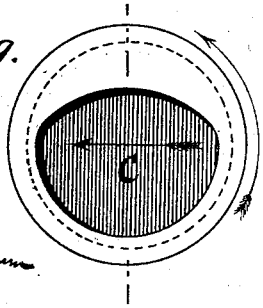


Fig. 10.

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UNITED STATES PATENT OFFICE.

EDWARD A. WILDT, OF LONG ISLAND CITY, NEW YORK.

PISTON-VALVE.

SPECIFICATION forming part of Letters Patent No. 265,727, dated October 10, 1882.

Application filed July 29, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWARD A. WILDT, of Long Island City, in the county of Queens and State of New York, have invented certain new and useful Improvements in Valves, of which the following is a specification.

This invention has reference to certain improvements in piston-valves, whereby steam may be admitted, cut off, and exhausted from the cylinder in such a manner that the exhaust begins directly at the beginning of the stroke, and does not close until the stroke is completed, so as to admit the free and unobstructed exhaust of the steam and the more effective working of the steam-engine; and the invention consists of a valve-chest, a reciprocating valve, and mechanism by which a shifting motion is simultaneously imparted to the valve, so as to give increased space to the exhaust by means of enlarged cavities in the valve; and the invention consists, secondly, of certain details of construction, which will hereinafter be more fully described.

In the accompanying drawings, Figures 1 and 2 represent vertical longitudinal sections of one form of my improved valve, to which, simultaneously with the reciprocating motion, a rotary shifting motion around its axis is imparted. Fig. 3 is a vertical transverse section of the same on line x x, Fig. 1. Fig. 4 is a vertical longitudinal section of a modified construction of the valve shown in Fig. 1, with a different arrangement of the steam admission and exhaust edges. Fig. 5 is a vertical longitudinal section of a steam-cylinder with my improved valve shown in connection with the mechanism by which rotary shifting motion is imparted to the slide-valve; and Figs. 6, 7, 8, 9, and 10 show the application of the same principle to common flat slide-valves to which simultaneously a reciprocating and a shifting motion is imparted.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents a steam-cylinder with suitable steam supply and exhaust ports, B the valve-chest, and C the slide-valve. The slide-valve C is preferably made in the shape of a piston-valve, the cage or chest B being cylindrical, open at both ends, and provided at the top with a steam-supply passage, b, having two openings, b' b', so as to supply steam to both ends of the piston-valve, and thereby balance the same. The bottom part of the valve-chest B has lateral ports d d, which communicate with the steam supply and exhaust ports of the cylinder A. The piston-valve C is provided with tightly-packed pistons C′ at both ends and intermediately between the pistons with collars C^2, one half of which is thicker than the other half of the collar C^2, the thicker half of each collar facing the thinner half of the other collar. A tubular valve-stem, C^3, passes centrally through the parts of the piston-valve and forms part of the connecting-rod, operated by the eccentric on the driving-shaft. Simultaneously with the reciprocating motion imparted by the eccentric, the piston-valve C receives either a rotary reciprocating or preferably a continuous rotary motion by a suitable mechanism, one complete revolution being made for every full revolution of the main shaft of the steam-engine.

The mechanism by which rotary motion is imparted to the piston-valve C is shown in Fig. 5, and consists of a square portion, e, of the connecting-rod, which square portion carries a loosely-sliding piston, e', that is engaged by a flanged and toothed segment, e^2, keyed to a spirally-bent rod, e^3, that turns in suitable bearings, e^4. The cross-head of the piston-rod of the steam-cylinder carries a fixed nut, f, the opening of which corresponds to the cross-section of the spirally-bent rod, so that with each reciprocation of the piston the spirally-bent rod is turned, the toothed segment oscillated, and the pinion e' rotated, while the connecting-rod C^3 moves in the hole of the pinion, as this is retained by the side flanges of the segment e^2. The piston-valve C receives thus a rotary motion simultaneously with its reciprocating motion. In place of the mechanism shown, any other mechanism by which the same object is accomplished may be used, as I do not confine myself to the specific construction shown. The thicker half of the collars C^2 of the slide-valve C has to be made equal in width to the width of the port plus the lap, while the thinner portion has to be equal to the width of the port. Whenever the thinner portion of one of the collars C^2 is placed by the rotary motion of the valve C over one port and the thicker portion of the other collar over

the other steam-port, admission will take place at the former and exhaust at the other port. Supposing the valve to be moving in the direction of the arrows in Figs. 1, 3, and 5, the steam enters at one port, which is also about to be closed to the exhaust, and at the same time opens the other port to the exhaust-port d'. As the piston-valve C is simultaneously turned around its axis by the mechanism described, and as the ports d are extended upward, so as to terminate midway between the top and bottom of the cylindrical chest or cage B, as shown clearly in Figs. 1, 2, and 3, exhaust takes also place at one of the lateral edges d^2 of the thicker portion of the left-hand collar C^2, so that by the combined forward and rotary motion of the piston-valve C the area of the port through which steam escapes is gradually increased, and consequently the steam exhausted freely and without obstruction through the annular cavity between the collars C^2 to the exhaust-port d'. The large space furnished in this manner to the exhaust-steam dispenses entirely with the too early opening of the exhaust, and also with the too early closing of the same, and overcomes thereby in effective manner one of the main objections to the common slide-valves. The same operation takes place when the valve is traveling in opposite direction, as in Fig. 2, in which case the exhaust takes place at the lateral edge d^2 of the right-hand collar C^2, and at the inner edge of the thicker portion, the exhaust-opening increasing gradually as the piston-valve moves in the direction of the arrow.

In case the relative location of the steam-supply and exhaust ports is arranged as in Fig. 4 the thicker portions of the collars C^2 are arranged at the outside of the collars, while in the piston-valve shown in Figs. 1 and 2 they are placed at the inside of the collars. The same principle may also be applied to the common flat slide-valves, in which case the valve is made double the width of the valve-seat, so that a lateral shifting motion can be imparted thereto simultaneously with its reciprocating motion by any suitable mechanism, thus bringing one of the enlarged cavities over the port, and facilitate the exhaust at two edges of the valve, in an analogous manner as before described in the rotary piston-valve. As the valve receives the reciprocating and lateral motion at the same time, a diagonal motion is the result, as shown in Fig. 6, whereby the enlarged cavity is brought gradually over the steam-port, and thereby the area of exhaust gradually increased.

The valve may also be made of round or disk shape, and instead of being laterally moved it may be shifted around its axis, as in Figs. 9 and 10, by a suitable shifting mechanism. This valve has thicker and thinner lips, which, when presented to the steam-ports, facilitate thereby the exhaust, owing to the increasing area of the exhaust-passage.

The principle in all the different applications and modifications of my valves is the same—to wit, to facilitate the exhaust by permitting the admission of steam at one port and the exhaust at the other port to take place simultaneously, and then gradually enlarging the area of the exhaust-opening, so that the most favorable conditions of steam admission and exhaust relatively to the position of the engine-piston is the result.

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

1. The combination of a valve-chest having steam-passages, a reciprocating slide-valve having thicker and thinner portions opposite each other, and mechanism whereby simultaneously with the reciprocating motion a shifting motion is imparted to the valve, so as to gradually enlarge the exhaust-opening for the free exit of the exhaust-steam, substantially as set forth.

2. A piston-valve having recessed collars, the thick and thin portions arranged relatively to each other, as shown, at opposite sides of the steam and exhaust cavity, substantially as described.

3. The combination of a valve chest or cylinder, B, having steam-supply passages b and d, with a reciprocating piston-valve, C, having recessed collars C^2, the thicker halves of which are opposite the thinner halves, and an intermediate annular exhaust-cavity, substantially as specified.

4. The combination, with a valve-chest, B, having steam-passages b d, of a reciprocating piston-valve, C, having packed end pistons, C', and intermediate collars, C^2, with thicker halves opposite their thinner halves, and with mechanism whereby a rotary shifting motion is imparted to the piston-valve simultaneously with its reciprocating motion, so as to increase the area of the exhaust-passage, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

EDWARD A. WILDT.

Witnesses:
PAUL GOEPEL,
SIDNEY MANN.