(No Model.)

G. H. DUTHIE.

STEAM VALVE.

No. 346,435. Patented July 27, 1886.

Fig. 1.

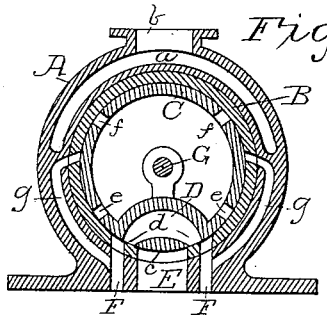


Fig. 2.

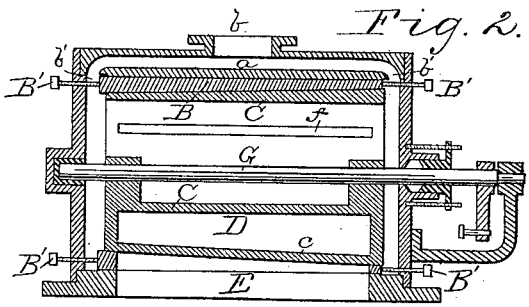


Fig. 3.

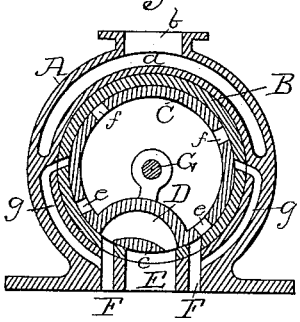
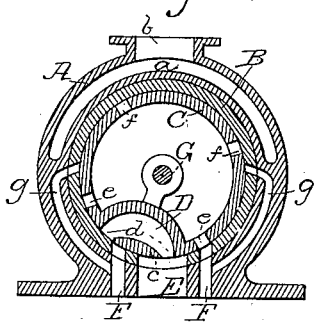


Fig. 4.



WITNESSES:

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GEORGE H. DUTHIE, OF MUSKEGON, MICHIGAN, ASSIGNOR OF ONE-HALF TO WILLIAM W. BARCUS, OF SAME PLACE.

STEAM-VALVE.

SPECIFICATION forming part of Letters Patent No. 346,435, dated July 27, 1886.

Application filed May 8, 1886. Serial No. 201,531. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. DUTHIE, of Muskegon, in the county of Muskegon and State of Michigan, have invented certain new and useful Improvements in Steam-Valves; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to an oscillating valve for steam-engines, and the improvements therein are of such a nature that, first, it is perfectly balanced in its action; second, supplies the steam to the cylinder so that its force upon the piston is gradual from the beginning to the end of the stroke thereof; third, exhausts so that a cushion is formed in front of said piston, the reactionary force of which greatly aids the return-stroke, and, fourth, when the valve becomes worn, it can be snugly fitted or adjusted in its seat.

In the drawings, Figures 1, 3, and 4 are transverse vertical sections showing the valve of my invention in different positions, and Fig. 2 is a longitudinal vertical section of the same.

Reference being had to the drawings and letters of reference marked thereon, A represents the valve having lateral basal flanges, by means of which it is bolted to the piston-cylinder. It has a cylindrical bore, and the upper half of the shell is made hollow, so as to form a chamber, *a*, for the fresh live steam, which is supplied thereto from a suitable source, through the opening *b*. This chamber *a* is provided with openings *b'* into the core or inner circumference of the valve-cylinder, near the ends thereof.

Fitting snugly within the core of the valve-cylinder is the sleeve B, which is of a length corresponding to the distance between the outlet-openings *b' b'*, and which is placed in position between said openings. The exterior of the sleeve is cylindrical; but the interior bore tapers from a less to a greater diameter as it approaches the actuating devices of the valve, as shown. This sleeve is adjustable longitudinally by means of set-screws B' B', passing through holes in the head of said valve-cylinder, suitably tapped and located with reference to the end edges of said sleeve B.

C represents the valve, having its exterior surface the obverse of the inner surface of the sleeve B—namely, tapering—and having a longitudinal sunken concave surface with a longitudinal central bridge, *c*, whose outer surface is on the peripheral line of said valve, which forms an exhaust-chamber, D, having two exhaust-openings, *d d*—that is, an opening on either side of said bridge, as shown. In the shell of the valve C, on either side of said exhaust-chamber D, at suitable and equal distance, are the steam-ports *e e*. Diametrically opposite these steam-openings *e e* are auxiliary ports *f f*.

In the sleeve and cylinder, on a vertical line intersecting the center of the valve, and of a width a little less than that of the bridge *c*, is the exhaust-port E, and on either side of the exhaust-port, about a distance corresponding to the width of the exhaust-openings *d*, are the steam-passages F. Opening into and leading from the valve-seat—*i. e.*, the inner circumference of the sleeve—at a point in the sides of said valve-seat a distance from the steam-ports corresponding to that between steam-port openings *f* and *e*, are the auxiliary steam-passages *g g*, as shown in the drawings.

The valve is mounted on a suitable shaft, G, which is journaled in suitable bearings and packed in the ends or heads of the valve-cylinder, and has a crank or arm secured to or near its outer end, through medium of which it is oscillated.

The valve itself is of a length corresponding to about that of the sleeve B—viz, of a length corresponding to the distance between steam-openings *b' b'* from chamber *a*—and is secured in such position on the shaft as to come between said openings *b'*, so that the steam issuing from the latter can freely enter the open ends and circulate in the interior of the valve.

The operation of my invention is substantially as follows: When the valve is in the position shown in Fig. 1, the piston would be near the right-hand end of the piston-cylinder. The exhaust in the first instance is very slight. Then, as the valve assumes the position shown

in Fig. 3, it gradually increases, and as gradually decreases as the position of the valve shown in Fig. 4 is attained.

It will be observed that, because the initial exhaust is not complete and open, a cushion is formed for the piston, the elasticity of which will assist in the reverse stroke of said piston. When the valve reaches the position shown in Fig. 4, it reverses its motion, and substantially what has been described as the action of the valve and its influence upon the piston as it moves forward takes place upon the opposite side of the piston as it reverses its motion.

Bridge *c* greatly adds to the completeness of my invention; but it can be dipensed with, if desired. Again, instead of using the steam-chamber *a* with the openings *b' b'*, the steam could enter said cylinder from the end.

The sleeve with the tapering interior, and adjustable by means of set-screws, can be applied to a number of oscillating and rotary valves; but while I deem its use preferable, yet it could be dispensed with.

What I claim is—

1. The combination, in an oscillating valve, with the cylinder A, having a cylindrical bore, exhaust-port E, and steam-passages F, of a sleeve, B, having its bore tapering from one end to the other and adjustable longitudinally, and valve C, having steam-ports *e e* and exhaust-chamber D, as set forth.

2. The combination, in an oscillating valve, with the cylinder A, having a cylindrical bore, exhaust-port E, and steam-passages F and auxiliary passages *g g*, of sleeve B, having its cone tapering and adjusted longitudinally, and valve C, having ports *e e* and *f f* and exhaust-chamber D.

3. The combination, in an oscillating valve, with the cylinder A, having an exhaust-port, E, steam-passages F F, and auxiliary passages *g g*, of valve C, having steam-ports *e e* and *f f* and exhaust-chamber D.

4. The combination, in an oscillating valve, with the cylinder A, having a steam-chamber, *a*, supplied from a suitable source, outlet-openings *b' b'*, exhaust-port E, and steam-passages *g g*, of a valve, C, having steam-ports *e e* and *f f* and exhaust-chamber D.

5. The combination, in an oscillating valve, with the cylinder having exhaust-port E and steam-passages F, of a valve, C, having steam-ports *e e*, exhaust-chamber D, and longitudinal central bridge, *c*.

6. In an oscillating steam-valve, the combination, with a cylinder, A, having an exhaust-port, E, and steam-passages F and *g*, of valve C, having steam-ports *e e* and *f f*, exhaust-chamber D, and longitudinal central bridge, *c*.

7. In an oscillating steam-valve, the combination, with a cylinder, A, having a steam-chamber, *a*, supplied from suitable source, outlet-openings *b' b'*, and exhaust-port E, steam-passages F, and auxiliary steam-passages *g g*, of valve C, having steam-ports *e e* and *f f*, exhaust-chamber D, and longitudinal central bridge, *c*.

In testimony that I claim the foregoing as my own I hereunto affix my signature in presence of two witnesses.

GEORGE H. DUTHIE.

Witnesses:
JAMES H. COYNE,
FRANK D. THOMASON.