(No Model.)

G. H. DUTHIE.

STEAM VALVE.

No. 346,434. Patented July 27, 1886.

Fig. 1.

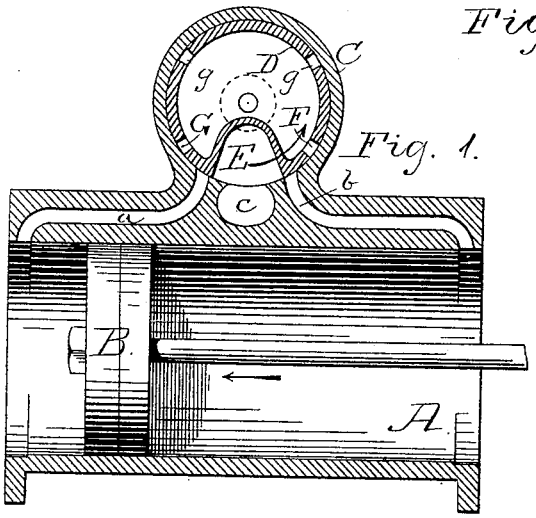


Fig. 2.

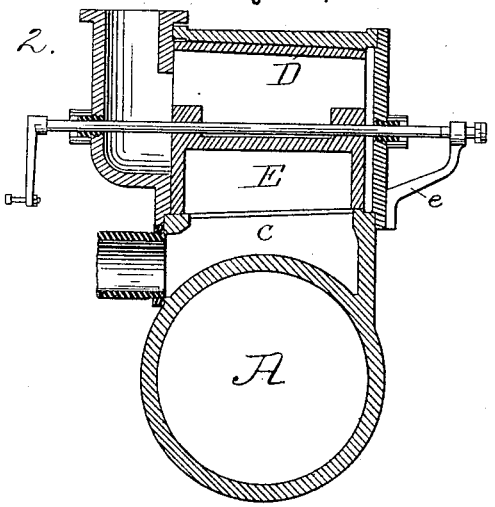


Fig. 3.

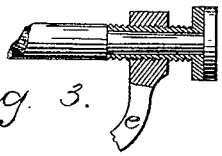


Fig. 4.

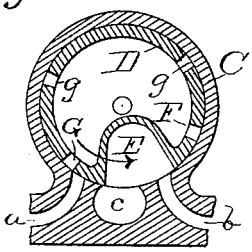
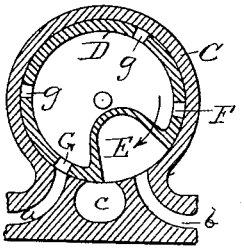


Fig. 5.



WITNESSES

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

STEAM-VALVE.

SPECIFICATION forming part of Letters Patent No. 346,434, dated July 27, 1886.

Application filed September 1, 1885. Serial No. 175,873. (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.

The object of my invention is to provide a new and improved oscillating valve for the cylinders of steam-engines, the action of which is balanced and equable by reason of the construction thereof, which equalizes the pressure of the live steam within the valve-chamber, substantially as hereinafter described, and as illustrated in the drawings, in which—

Figure 1 is a longitudinal vertical section of my invention. Fig. 2 is a transverse vertical section thereof. Fig. 3 is a detail view, and Figs. 4 and 5 are detail views illustrating the action of the valve.

Reference being had to the drawings, A represents a cylinder having a piston and a piston-head, B, therein, and having the steam-ports *a* and *b* leading from either end of the valve-chamber C, which is placed transversely on said cylinder at its center of length.

Running longitudinally and centrally under and open to chamber C midway between steam-ports *a* and *b* is the exhaust-port *c*. The width of the opening of this exhaust-port is just about twice that of either steam-port, and the exhaust-pipe leads from one end thereof laterally to the cylinder, as shown in Fig. 2.

The interior of the valve-chamber is cylindrical, and slightly tapers from the end thereof to which the steam-supply pipe is connected to the opposite end, and in it is placed the oscillating valve D, which is of a shape corresponding to the interior of the valve-chamber, but not of the same length, so that as the engaging surfaces of the valve and valve-chamber wear away the valve may be adjusted longitudinally (by means to be described further on) to take up the wear.

Valve D is fast or permanently secured to the valve-shaft, which, as will be observed, has its bearings in the outer wall of the steam-supply pipe and smaller end of the valve-chamber suitably packed to prevent the steam escaping, and has its ends extended beyond its bearings. The end of this shaft contiguous to the supply-pipe has a crank or other means attached thereto, through the medium of which the valve is given a positive oscillating motion. The other end is stepped to a smaller diameter, and said stepped portion passes through a sleeve and has a head or boss on its extremity. The sleeve referred to has its circumference screw-threaded, and has an annular flange on its end adjacent to the head of the shaft, the periphery of which is polygonal, so that a wrench could be made to obtain a purchase thereon, to move said sleeve longitudinally within the correspondingly-screw-threaded aperture in the extremity of an arm, *e*, which is secured to and projects from the adjacent end of the valve-chamber.

The valve D is hollow and open at both ends. It is provided with a longitudinal exhaust-chamber, E, made by depressing the periphery of the valve, the width of which corresponds to the distance from one edge of the exhaust-port to the farther edge of the steam-port farthest from said edge. Located on either side of this exhaust-chamber E, a distance removed therefrom equal to the distance from one edge of the exhaust-port to the farthest edge of the nearest steam-port, are the longitudinal openings G and F.

The operation of my invention is as follows: Say, the valve and piston-head are in the position shown in Fig. 1. This is the first position. As the valve oscillates in the direction of the arrow, the piston will travel toward the left-hand end of the cylinder. When the valve reaches the position shown in Fig. 4, the piston-head will have reached the left-hand end of the cylinder, and will reverse its motion and be forced by the expansion of the steam toward the other end as the opening G gradually assumes the position shown in Fig. 5. When in about the position shown in Fig. 5, the valve reverses its motion, and the return oscillation drives the piston-head back toward the other end of the

cylinder in the same way as the oscillation first indicated drove it in the other direction.

In the shell of the valve D, diametrically opposite openings G and F, are similar openings, *g g*. These openings, however, are not for the purpose of permitting the entrance to or exit from the interior of the valve of the steam, but for the purpose of equalizing the area of the inside of the valve—in other words, to offset the openings G and F, and thus make a balance-valve.

A very important feature of my invention is, that the valve may be fed with live steam from either end, or, if desired, from both ends. This latter construction would be especially desirable when the valve is used on locomotives.

What I claim as new is—

1. The combination, with a hollow oscillating valve having the longitudinal openings G and F and the balance openings *g g*, arranged diametrically opposite thereto, and the exhaust-chamber E, of the steam-cylinder A, having the steam-ports *a* and *b* and the exhaust-port *c*, opening into said valve-chamber and the piston and piston-head.

2. The combination, with hollow oscillating valve open at both ends, having openings G and F and exhaust-chamber E, cylinder A, having steam and exhaust ports *a*, *b*, and *c*, of the valve-chamber C, having its interior corresponding to the shape of said valve, and having a steam-supply pipe opening into one end thereof, substantially as and for the purpose set forth.

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.