W. HARDWICK.

OSCILLATING-VALVES FOR STEAM-ENGINES.

No. 194,238. Patented Aug. 14, 1877.

Fig. 1.

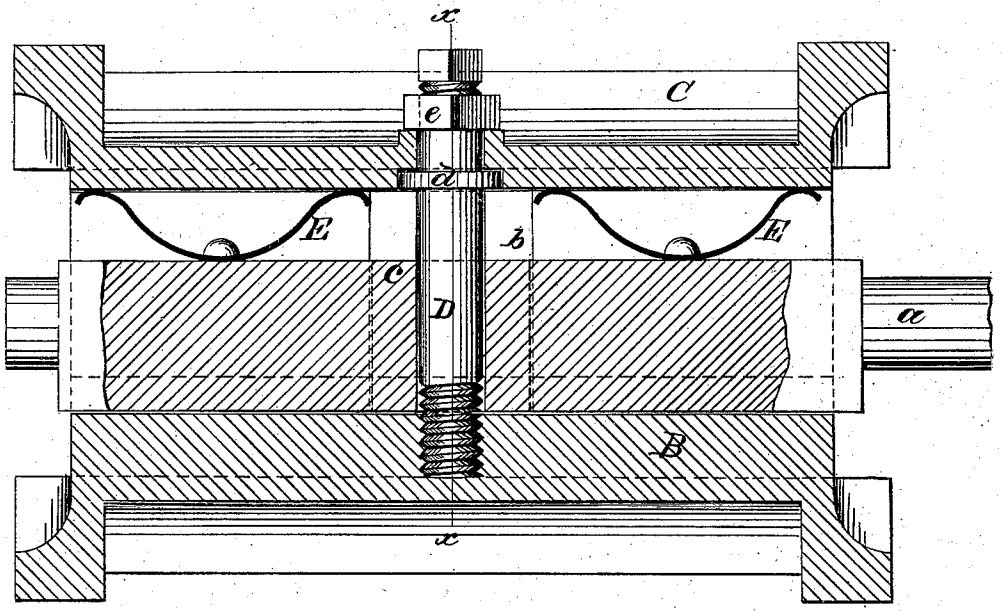
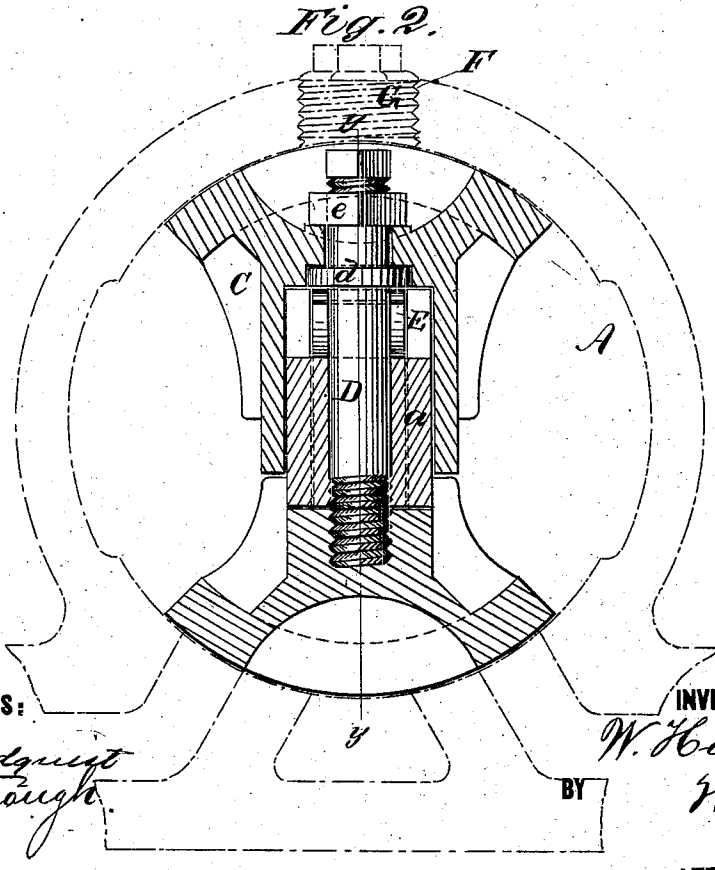


Fig. 2.



WITNESSES:

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WILLIAM HARDWICK, OF ERIE, PENNSYLVANIA.

IMPROVEMENT IN OSCILLATING VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **194,238**, dated August 14, 1877; application filed February 26, 1877.

To all whom it may concern:

Be it known that I, WILLIAM HARDWICK, of Erie, in the county of Erie and State of Pennsylvania, have invented a new and Improved Oscillating Valve, of which the following is a specification:

Figure 1 is a longitudinal section on line *y y* in Fig. 2. Fig. 2 is a transverse section on line *x x* in Fig. 1.

Similar letters of reference indicate corresponding parts.

My invention relates to oscillating valves for steam-engines; and it consists of two oscillating D-valves, placed in a cylindrical valve-chest with their backs together, and connected by a bolt.

The valves have equal areas, so that they exactly counterbalance each other. One of the valves moves on the ordinary valve-seat, while the other moves on a seat formed in the side of the chest opposite the steam-ports.

In the drawing, A is a cylindrical steam-chest, (shown in dotted lines,) and B is an ordinary oscillating valve, that is slotted to receive the squared portion of the rocking shaft *a*, and is cut away at *b* to receive the enlarged portion *c* of the said rocking shaft. C is a valve of the same area as the valve B, which is slotted to receive the back of valve B. A tap-bolt, D, passes through the valve C and shaft *a* into the back of the valve B, and is provided with a collar, *d*, which engages the back of the valve C, and holds the said valve out against its seat when the steam-pressure is off. The upper end of the bolt is threaded to receive a nut, *e*, by which the pressure of the valves upon their seats is limited, and is provided with a square head for receiving a wrench.

An aperture, F, stopped by a screw-plug, G, is provided for adjusting the valve without removing the head of the steam-chest.

The advantages claimed for my improvement are, that the valve is perfectly balanced, is easily adjusted, is durable, and consumes little power.

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

The combination of the valves B C and tap-bolt D, having the collar *d* and nut *e*, substantially as herein shown and described.

WM. HARDWICK.

Witnesses:

B. J. COATES,

CHAS. E. KIRK.