

W. D. ANDREWS.
BALANCED VALVE.

No. 175,894.

Patented April 11, 1876.

Fig. 1

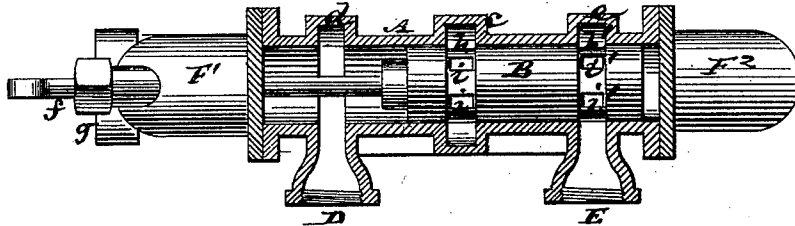


Fig. 2

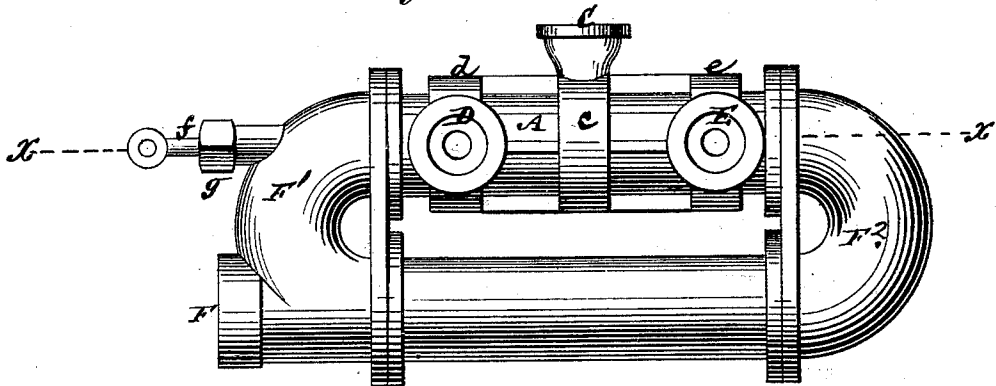
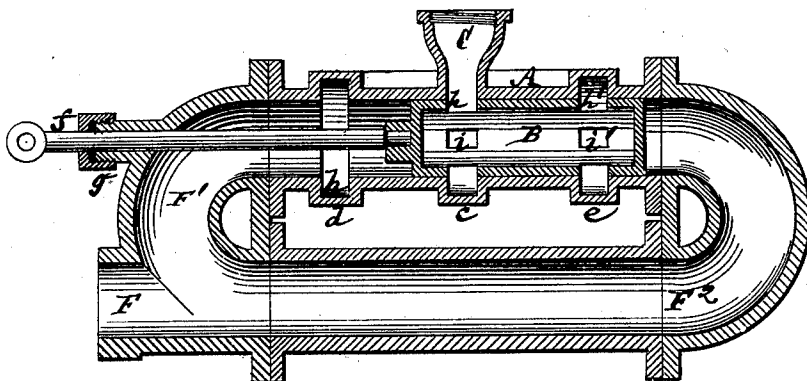


Fig. 3



Witnesses:
Benjamin W. Hoffman
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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN BALANCED VALVES.

Specification forming part of Letters Patent No. **175,894**, dated April 11, 1876; application filed July 1, 1875.

To all whom it may concern:

Be it known that I, WILLIAM D. ANDREWS, of Brook Haven, in the county of Suffolk and State of New York, have invented certain new and useful Improvements in Reversing Balance Slide-Valves of Steam and other Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms a part of this specification.

The invention is more particularly designed to be used as a reversing-valve, in connection with the main valve of an engine. A valve constructed in accordance with it is balanced in its action, and is nearly, if not wholly, free from leakage; also works with the most perfect freedom. Such valve will be found of great advantage in engines for working hoisting apparatus.

The invention consists in a novel construction of a hollow valve, the cylinder or case in which the valve works, and the ports and passages pertaining to said valve, the whole being combined as hereinafter described.

In the accompanying drawing, Figure 1 is a longitudinal, partly sectional, view of the valve, taken mainly as indicated by the line *xx*; Fig. 2, an exterior longitudinal view of the same; and Fig. 3 a longitudinal section thereof in a plane at right angles to Fig. 1.

A is the case of the valve. This valve-case is of cylindrical form internally. B is the valve, which is composed of a hollow cylinder having closed ends, and which is accurately fitted to have a longitudinal movement within the case A. Disposed around the inner circumference of the case A are three channels *c*, *d*, and *e*, which connect, respectively, through the case with main openings C D E. The opening C will here be described as the steam-inlet to the valve-case, and the openings D and E, as connecting, respectively, with the induction and eduction pipes or passages of the engine.

The valve B, which may be worked by a rod, *f*, arranged to pass out through a stuffing box, *g*, at the one end of the valve-case, has recesses *h h'* around its outer perimeter, and any number of ports *i i'* through it at such recessed portions, and of an area in the

aggregate corresponding with said recesses. The distances between these recesses *h h'* is the same as between the channels *c* and *d*, and *c* and *e*, respectively.

F is a general exhaust passage or outlet, in communication by end or branch passages F¹ F² with opposite ends of the valve-case A. These passages F¹ F² are alternately or respectively put in communication by the adjustment of the valve with the openings D and E, according to the direction in which it is required to run the engine.

When the valve B is in the position shown in the drawing, the steam entering at C passes around the channel *c* and recess *h*, and through the ports *i* into the interior of the valve, and from thence through the ports *i'*, recess *h'*, and channel *e* into the opening E leading to the engine, from which latter, when exhausting, it enters the valve-case A at the opening D, and from thence through the branch passage F¹ to the general outlet F. So long as the valve B remains in this position, the engine will continue to run in the same or forward direction.

To stop the engine, the valve B is moved so as to bring it in closed position at its longitudinal center over the channel *c* or steam-inlet C connected therewith. The steam then is entirely shut off from the valve and both openings D and E to the engine are closed, which causes the steam to cushion on one side of the engine-piston, and a vacuum to form on the opposite side thereof, thereby rapidly arresting the motion of the engine without shock or jar. This makes the valve peculiarly applicable to engines used for elevating purposes.

To reverse the engine, the valve B is moved to bring the ports *i'* in communication with the steam-inlet C and the ports *i* in communication with the opening D, so that steam will pass from the valve through the ports *i* into the channel *d*, and from thence through the opening D to the engine. In this position of the valve B, the opening E is in free communication through the end or branch passage F² with the outlet F for escape of the exhaust steam from the engine.

By the extension of the channel *c* entirely around the valve B, the pressure of the steam upon the valve is perfectly balanced, both

when said valve is open and closed. The same balancing result is effected by the channels *d* and *e* as they alternately or respectively become steam-passages.

It is desirable to construct the valve B of a uniform thickness throughout, so that steam passing through it will insure an equal expansion, thereby rendering the working of the valve easy, and avoiding all cutting and springing. It is preferred to construct the valve case of cast-iron, and the valve of brass, whereby there is very little wear, and the valve remains tight and will act as a perfect stop after an exceedingly-prolonged use, in-

volving many thousand movements, but at the same time will be perfectly free and easy in its movement.

I claim—

The combination of the openings C, D, and E, the valve-case A, and its channels or passages *c d e*, the passages F¹ F², the outlet F, and the single cylindrical hollow valve B, with its lateral ports *i i'*, essentially as shown and described.

WM. D. ANDREWS.

Witnesses:

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