2 Sheets—Sheet 1.

H. M. HAMBLIN.

Balanced Slide Valve.

No. 202,025. Patented April 2, 1878.

Fig. 1.

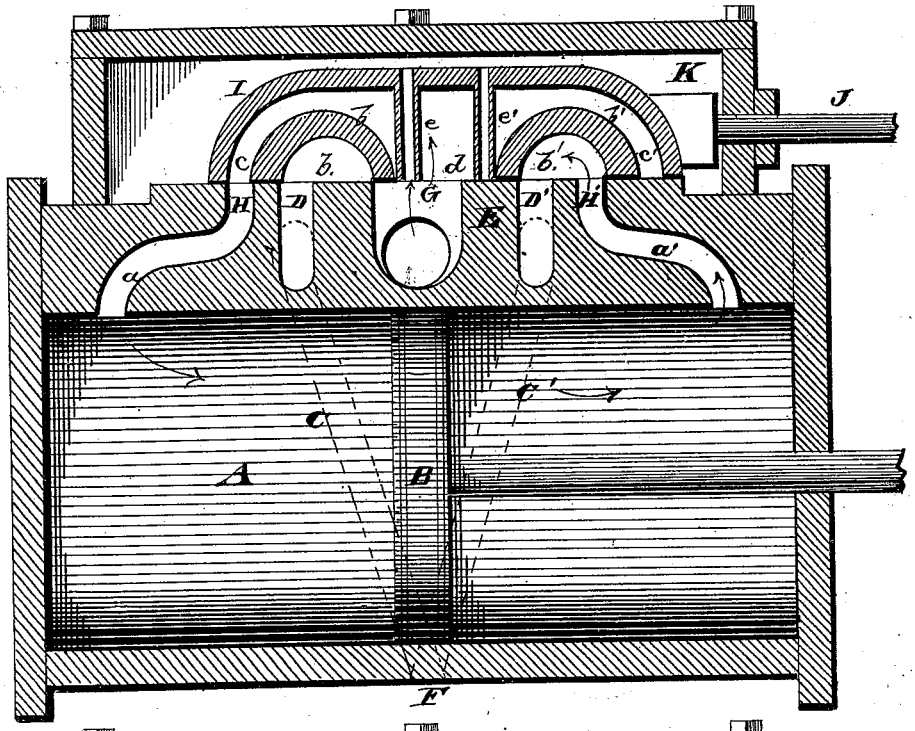
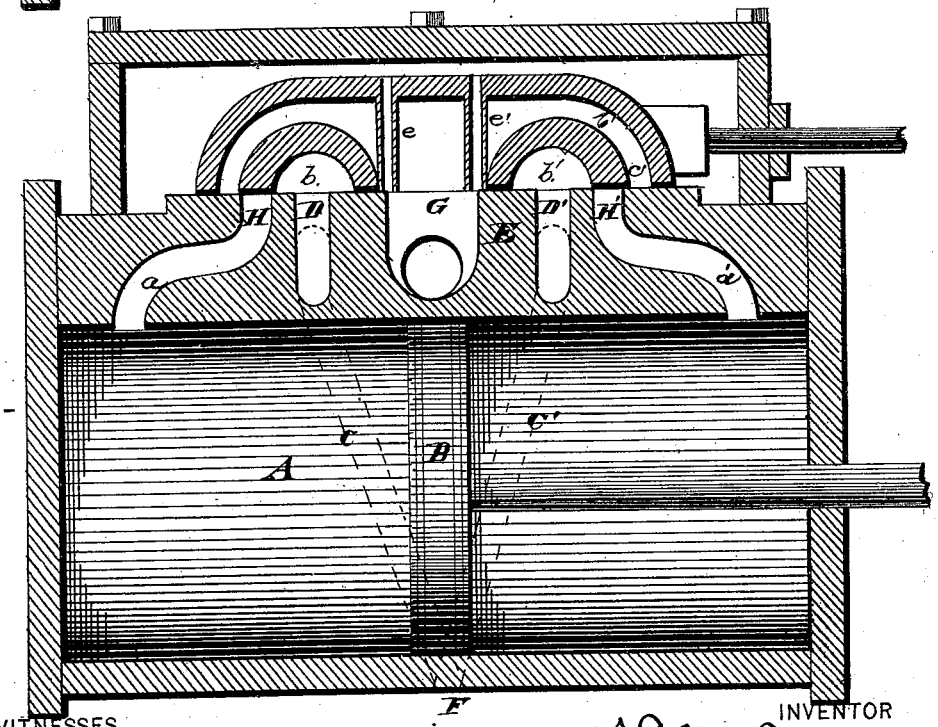


Fig. 2.



WITNESSES

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By Leggett and Leggett.

ATTORNEY

2 Sheets—Sheet 2.

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Fig. 3.

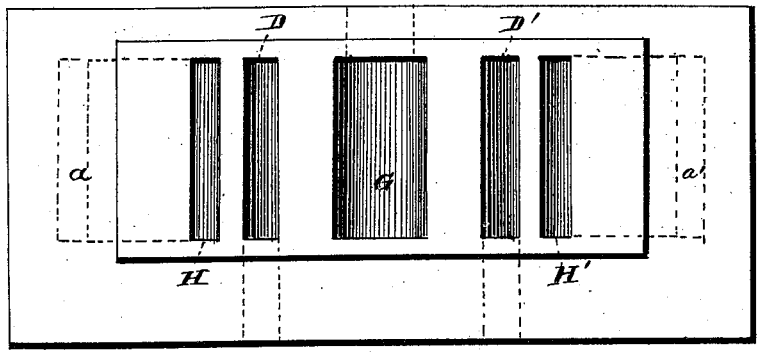
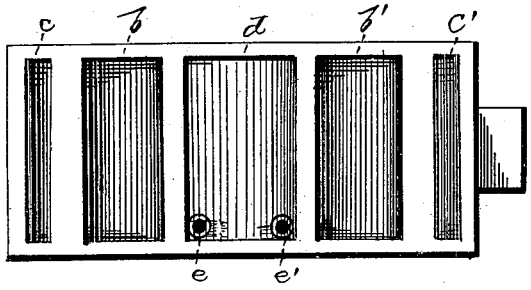


Fig. 4.



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UNITED STATES PATENT OFFICE.

HENRY M. HAMBLIN, OF GREENVILLE, PENNSYLVANIA.

IMPROVEMENT IN BALANCED SLIDE-VALVES.

Specification forming part of Letters Patent No. **202,025**, dated April 2, 1878; application filed March 11, 1878.

To all whom it may concern:

Be it known that I, HENRY M. HAMBLIN, of Greenville, in the county of Mercer and State of Pennsylvania, have invented certain new and useful Improvements in Balanced Slide-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improved balance slide-valve for steam-engines; the object being to provide a slide-valve of such construction that live steam may be admitted, and caused to exert an upward pressure on the entire lower surface of the back of the valve, and also introduced through the valve into the steam-chest, and exert a pressure on the upper surface of the valve, so that the downward pressure will be slightly in excess of the upward pressure on the valve and practically balance the same.

In the accompanying drawings, Figure 1 represents a vertical section of my improved balanced valve as applied to a steam-cylinder, the valve being shown in proper position for conducting steam to one end, and exhausting from the other end, of the cylinder. Fig. 2 represents a similar view, showing the steam-ports cut off and the exhaust-ports open. Fig. 3 is a plan view of the valve-seat, and Fig. 4 a plan view of the face of the valve.

A represents a steam-cylinder, provided with an ordinary piston, B. C C′ are exhaust-passages leading from the exhaust-ports D D′ in the valve-seat E to the lower side of the cylinder, where they converge and unite in the single exhaust-outlet F. The valve-seat E is provided with the main steam-induction port G and end ports H H′, which connect with steam-passages *a a′*, leading to opposite ends of steam-cylinder A. I is a steam-valve of the class termed as the "B" slide-valve. It is provided with two arched bridges, *b b′*, which serve as exhaust-passages. The opposite ends of the valves are formed with steam-passages *c c′*, while the central portion of the valve between the bridges *b b′* constitutes the main steam-inlet passage *d*. Within the central passage *d*, I secure or form in the process of casting the valve two small steam-passages, *e e′*, which form an open passage through the back of the valve. J is the valve-rod, and is attached to the valve by means of a nut or slide, K, which fits within guides on the end of the valve, whereby the latter is allowed free vertical movement when in operation.

The operation of my improved balanced valve is as follows: When the valve is in the position illustrated in Fig. 1, live steam flows from the main induction-port G into the interior portion of the valve through the central and main steam-passage *d*, over the arched bridge *b*, through the end passage *c* in the valve, and into the steam-port H, and from thence to the end of the cylinder through the steam-passage *a*, and operates to drive the piston to the right hand of the cylinder, as indicated by the arrow. The confined steam on the opposite side of the piston flows through the steam-passage *a′*, through the steam-port H′ into the recess in the arched bridge *b′*, and from thence through the exhaust-port D′ to the outlet F through the exhaust-passage C′.

It will be observed that the effect of the upward pressure of steam on the under side of the valve is to raise the valve from its seat. To counterbalance the upward pressure the small vertical ports *e e′* are employed, which have the following effect: When the valve is in the position above described, the tendency is not only to raise the valve from its seat, but also to raise one end of the valve higher than the other, and hence my object is to admit steam to the valve in such a manner as will not only equalize the pressure on the valve, but distribute the pressure in such a manner that all tendency to unequal pressure on the ends of the valve will be obviated.

When the steam is flowing through one end of the valve and exhausting through the opposite end thereof, it is obvious that the combined force and momentum of the inflowing steam flowing upward against one end of the valve has a tendency to raise that end of the valve to a greater extent than has the confined steam in the opposite end of the valve, which latter is held to its seat by the fact that it is open to the exhaust, and hence, by allowing the steam to enter through the steam-passage

e, located nearest that end of the valve through which steam is being supplied to the cylinder, that end of the valve will be held to its seat by the pressure of steam acting on the upper surface of the valve. When the valve is in the position represented in Fig. 2, the steam-passages *e e'* overlap the main steam-inlet sufficiently to allow free passage of steam to the back of the valve and balance of the same.

The initial cost of applying my improved valve to new or old engines is slight, and but a slight and comparatively inexpensive change in the construction of the valve is necessary to effect the desired result.

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

1. In a balanced valve, the combination, with a hollow valve provided with independent exhaust-steam passages, of independent steam-passages *e e'*, extending from the face of the valve upward through the back of the valve, substantially as set forth.

2. The combination, with a valve-seat provided with steam-ports G H H' and exhaust-ports D D', of a hollow valve formed with steam-ports *d c c'*, independent exhaust-passages *b b'*, and steam-passages *e e'*, substantially as set forth.

3. A hollow balanced valve provided with two independent exhaust-passages, and with steam-passages located in the main steam-induction passage of the valve, said steam-passages arranged and adapted to supply steam intermittingly to the back of the valve, substantially as set forth.

4. A balanced hollow valve having one main central inlet-port and two discharge-ports leading therefrom, and having two independent exhaust-passages located on either side of the main inlet-port, and between said inlet-port and the said discharge-passages, and having independent live-steam passages in the back of the valve, said passages located in the live-steam passages, and constructed so as to admit live steam intermittingly to the back of the valve, said valve adapted to have free vertical movement in the valve-chest, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand.

HENRY M. HAMBLIN.

Witnesses:
J. K. HAMBLIN,
J. C. HAMBLIN.