T. POORE.

BALANCED VALVES FOR STEAM-ENGINES.

No. 193,383. Patented July 24, 1877.

Fig 1.

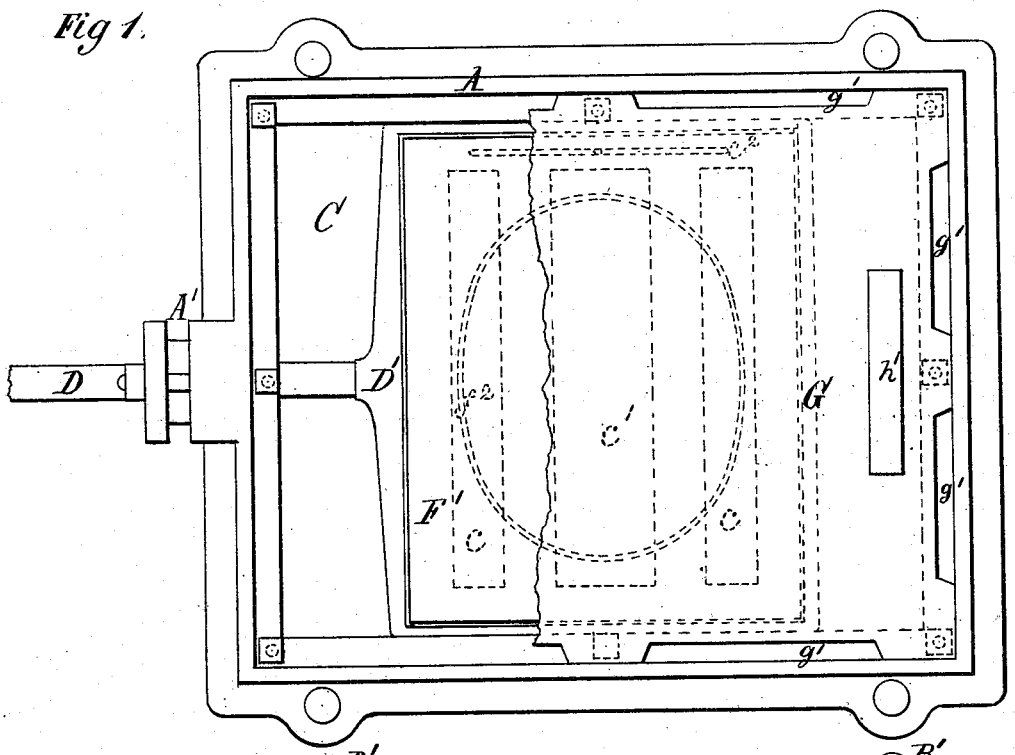


Fig 2.

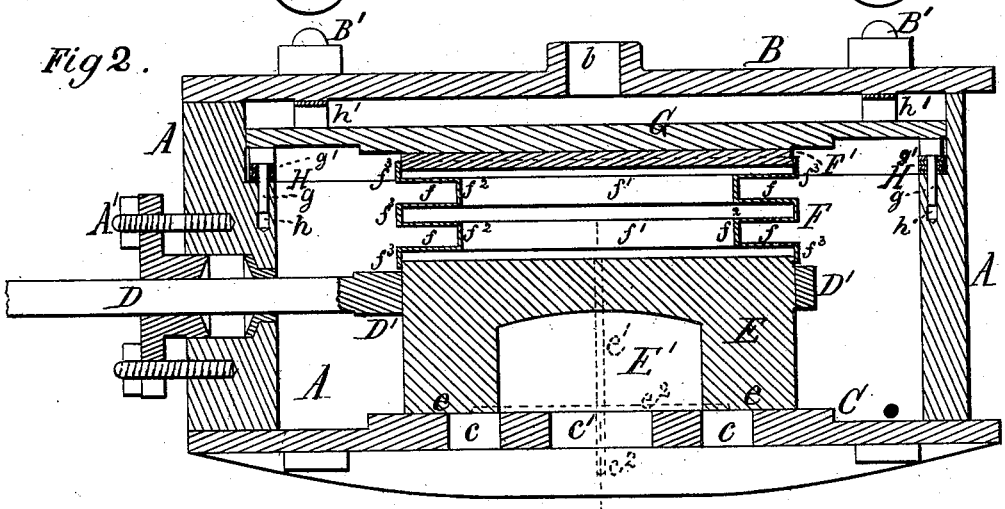


Fig 3.

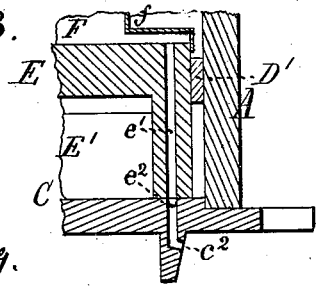
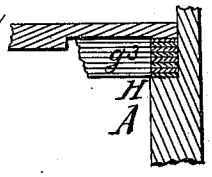


Fig 4.



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UNITED STATES PATENT OFFICE.

TOWNSEND POORE, OF SCRANTON, PENNSYLVANIA.

IMPROVEMENT IN BALANCED VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **193,383**, dated July 24, 1877; application filed June 26, 1877.

To all whom it may concern:

Be it known that I, TOWNSEND POORE, of Scranton, in the county of Luzerne and State of Pennsylvania, have invented a new and useful Improvement in Slide-Valves for Steam-Engines, which improvement is fully set forth in the following specification and accompanying drawings, in which latter—

Figure 1 is a plan view of a steam-chest furnished with one of my improved slide-valves, the lid of the steam-chest being removed, and part of the pressure or back plate broken away. Fig. 2 is a vertical central longitudinal section of the same, showing the top plate attached. Fig. 3 is a detail sectional view of a portion of the slide-valve which contains an exhaust-channel for the hood above the valve, and Fig. 4 shows a modification in the device for adjusting the back or pressure plate.

The nature of my invention consists in certain constructions, combinations, and arrangements of parts hereinafter fully described and specifically claimed, whereby a practically balanced slide-valve is produced, which is of very simple construction, very durable, and not liable to get out of order.

In the drawings, A represents an ordinary steam-chest, B the top plate, and C the valve-seat having steam-ports *c* and an exhaust, *c'*, as usual. D represents a valve-stem, properly packed at A', and having a yoke, D', whereby the valve E is embraced and operated; but, instead of the yoke, other means of connection may be used. The laps *e* of the valve E are made as high as the valve, so that the back of the valve has the same area as its face. The dimensions of the said laps *e* and the exhaust-chamber E' are the same as in ordinary slide-valves. The top or back of the valve is supplied with a vertically-yielding elastic metal hood, F F', the part F' serving as the top and bearing plate. The elastic body part F is composed of a number of horizontal yielding plates, *f*, with central openings f^1 through them, and united together so as to occupy different altitudes by a number of short vertical tubes, f^2 and f^3, whereby the plates are connected together alternately at their outer and inner edges, as shown. The tubes f^2 are of oblong form, like the valve E, and the lower one thereof is fitted and fastened upon the valve so as to receive the top of the valve into it, as shown. The tubes f^2 may be of circular, oval, or other suitable shape. The top bearing-plate F' is of the same area as the face of the valve E, and is attached to the body-part F in the same manner as the valve is attached thereto. Above the bearing-plate F' a back plate, G, is placed, and suitably supported by dowel-pins *g* in sockets *h* of a step, H, around the inner sides of the steam-chest A. For adjusting the dowel-pins *g* vertically higher or lower washers *g'* are used under the heads of the dowel-pins. The top plate B of the steam-chest has an opening, *b*, for the admission of steam, and is fastened to the steam-chest by means of through-bolts B', as indicated in Fig. 2. The back or pressure plate G has a number of spaces, *g'*, around its periphery, through which the supply steam flows freely from one part to the other. Steam might be brought in at the bottom of chest, as in a locomotive. Then it would pass up.

The valve E, hood body part F, and top bearing-plate F' are fitted together steam-tight; but a channel, e^1, is drilled vertically through the side of the valve E, and a horizontal groove, e^2, of the length of the stroke of the said valve is made on its face, and a port, c^2, is made through the bottom of the steam-chest, so as to preserve an equilibrium, whether against expanding or contracting air, and thus avoid the injurious consequences of the expansion or contraction by heat or cold of the air in the said hood when hermetically closed up therein. The channel groove and port will also serve to permit leakage of steam into the hood in the event of any defect in the construction existing, and thus give notice of such defect to the engineer.

When the valve is in motion the channel e^1 moves alternately to the right and left of the port c^2, and would alone be of very little or no use, but for the groove e^2 formed in the direction of the stroke of the valve, and thereby makes the communication between the channel e^1 and the port c^2 permanent.

The hood F F^1 when operating is slightly compressed to prevent the entering of steam

between the bearing-plate F′ and the back plate G. The area of the bearing-plate F′ being the same as that of the valve-face, the valve is perfectly balanced, with the exception of the slight upward pressure of the plate F′ against the plate G, necessary for making a steam-tight joint between these parts.

In Fig. 4 the dowel-pins *g* are left off, and a number of thin large contiguous washers g^3 placed upon the step H, whereby the back plate G is adjusted as desired, and kept in the right position during the operation of the valve E.

To prevent disarrangement of the back plate when the valve-chest stands vertical, a couple of springs *h′* are provided between the said back plate and the top plate B of the valve-chest.

By constructing the body part F of the hood of vertical and horizontal parts, as described, I obtain a very yielding contrivance, inasmuch as a horizontal plate supported at its periphery is more sensitive, and yields more readily to vertical pressure, than an inclined or conical plate or a corrugated one; in consequence whereof, the adjustment of the back plate G is easier, and the wear of the valve is less, and also more uniform.

Another advantage of my improved hood is that I can multiply the horizontal plates *f* very considerably, so as to have great volume of spring in a small compass by shortening the tubes f^2 f^3, and thereby gain greatly in elasticity without making the said parts more liable to wear by change of form in yielding; while the corrugated and other forms cannot be made with very small vertical and very large horizontal dimensions, except with great expense and liability to become cracked when operated, as the metal must either undergo severe processes of shaping, or must be put together in sections, and united in places where solid homogeneous metal would be more proper, unless cast whole of brass or flexible malleable metal.

By making the inner tubes f^2 of the body part of the hood round or oval, I obtain a more uniform action of the plates *f*, inasmuch as I avoid by means of greater leverage the greater stiffness of the plate opposite their outer corners. The more the openings f^1 are contracted, the more the sensitiveness of the hood is increased, and the better it is adapted for use in low-pressure engines, where a stiff corrugated or zigzag plate hood is almost uncontrollable.

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

1. In a steam-chest, the combination of a slide-valve, E, adjustable back plate G, step H, and adjusting washers g^1, and a yielding hood, F F′, substantially as set forth.

2. The combination of the hood F F′, channel e^1, groove e^2, and port c^2, whereby constant communication between the air inside the hood F F′ and the outer atmosphere is maintained, substantially as set forth.

3. The yielding portion F of the hood formed of yielding horizontal plates *f*, and vertical tubular connections f^2 f^3 of alternately larger and smaller diameters, whereby a suitable degree of elasticity in a vertical direction is secured from the horizontal plates *f* between the said connections, for keeping the slide-valve steam-tight at its face and back, substantially as set forth.

Witness my hand in the matter of my application for a patent for slide-valves for steam-engines.

TOWNSEND POORE.

Witnesses:
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