F. H. BALL.
Balanced Slide-Valve.

No. 200,242. Patented Feb. 12, 1878.

Fig. 1.

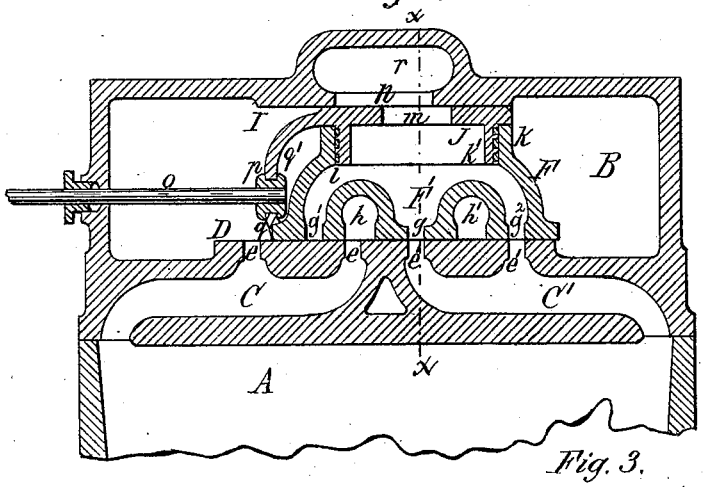


Fig. 3.

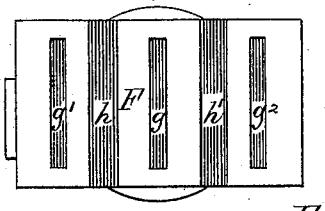


Fig. 2.

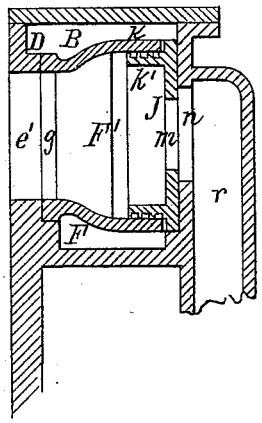


Fig. 4.

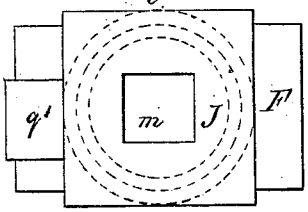


Fig. 5.

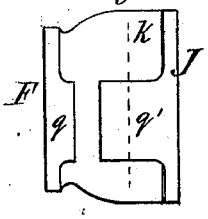
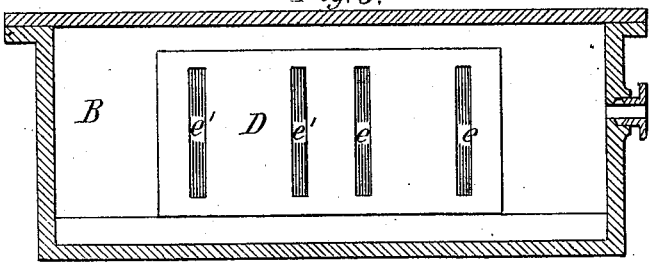


Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANK H. BALL, OF FOXBURG, PENNSYLVANIA.

IMPROVEMENT IN BALANCED SLIDE-VALVES.

Specification forming part of Letters Patent No. **200,242**, dated February 12, 1878; application filed December 18, 1877.

To all whom it may concern:

Be it known that I, FRANK H. BALL, of Foxburg, in the county of Clarion and State of Pennsylvania, have invented a new and useful Improvement in Slide-Valves for Steam-Engines, of which the following is a specification, reference being had to the accompanying drawing.

My invention relates more particularly to a hollow slide-valve which bears with its back against the wall or cover of the valve-chest, so as to be, to a greater or less extent, relieved from the steam-pressure, and in which the steam, in going to or coming from the cylinder, passes through the valve.

The object of my invention is to construct a valve of this kind which shall admit the steam to the cylinder in the most direct manner, so as to render the action of the valve very prompt and economical, while at the same time permitting the valve to be easily reversed.

The nature of my invention will be fully understood from the following description:

In the accompanying drawing, Figure 1 is a horizontal section of my improved valve arranged in the valve-chest. Fig. 2 is a vertical section in line *x x*, Fig. 1. Fig. 3 is a face view of the valve. Fig. 4 is a rear view, and Fig. 5 an end view thereof. Fig. 6 is a longitudinal section of the valve-chest, showing the valve-seat.

Like letters of reference refer to like parts in each of the figures.

A represents the steam-cylinder; B, the valve-chest; C C′, the main steam-passages of the cylinder, and D the face-plate or valve-seat thereof. *e e* and *e′ e′* represent four parallel openings or ports which are formed in the face-plate D, and by which the main steam-passages C C′ communicate with the valve-chest, each steam-passage being provided with two openings, as clearly shown in the drawing.

F represents the slide-valve, and F′ the cavity thereof. *g* is a central opening or port, and g^1 g^2 two similar openings, arranged on opposite sides thereof in the face of the valve F. The openings *g* g^1 g^2 correspond in form with the openings *e e* and *e′ e′* in the face-plate, and are so arranged in the valve that the central opening *g* and one or the other of the openings g^1 g^2 can be made to coincide with the two ports of one of the steam-passages C C′. The openings *g* g^1 g^2 communicate with the cavity F′ of the valve, so as to enable the steam to pass from the cavity of the valve into the steam-ports of the cylinder, and vice versa. *h h′* are two recesses or cavities arranged in the face of the valve between the openings *g* g^1 and *g* g^2, respectively, and parallel therewith. The recesses *h h′* extend from one side of the valve to the other, as clearly shown in Fig. 3.

I is a face-plate formed on the wall of the steam-chest opposite the back of the valve, and J is an adjustable plate sliding on the face-plate I. The valve F and plate J are each provided, respectively, with a cylindrical sleeve, *k k′*, fitting one into the other, and capable of telescopic adjustment with reference to each other, so that both the valve F and the plate J are enabled to adjust themselves to and run in steam-tight contact with their respective face-plates. *l* represents packing-rings of any suitable construction, arranged in one of the sleeves *k k′*, for forming a steam-tight joint. *m* is an opening formed centrally in the plate J, and communicating with the interior of the sleeve *k′*, and *n* an opening formed in the face-plate I of the valve-chest, and made of such size and form as to be in communication with the opening *m* of the plate J in every position of the valve. *o* is the valve-stem, and *p* a grooved block or bearing secured to the inner end thereof, and engaging with two ribs or feathers, *q q′*, formed respectively on the valve F and plate J, for imparting motion to those parts. *r* is a steam-pipe connecting with the valve-chest, for admitting the steam thereto or exhausting it therefrom, as the case may be. The valve slides upon its edge, as well as the plate J, both being held away from the bottom of the valve-chest, so as to permit an unobstructed passage of the steam through the recesses *h h′* from one end to the other.

Steam being admitted to the opening *m* in the face-plate I, the steam enters the cavity F′ of the valve. When the valve is in the position shown in Fig. 1, the steam passes from the cavity F′, through the openings *g* g^2,

into the ports e' e' of the face-plate D, and thence into the steam-passage C'. The exhaust-steam from the other end of the cylinder escapes, through the openings e e and recess h, into the valve-chest, from where it is discharged by a suitable pipe. As the valve is reversed the ports g g^1 of the valve are placed in coincidence with the ports e e, thereby admitting the live steam to the passage C, while the steam from the other end of the cylinder is exhausted through the passage C', ports e' e', and cavity h' into the valve-chest. When the live steam is taken into the valve-chest it is admitted alternately to the steam-passages C C' by passing by the end of the valve and through one or the other of the cavities h h', and the steam is exhausted from the cylinder into the cavity F' of the valve, and escapes through the pipe r.

The central steam-port g of the valve coincides alternately with the nearest port e and e' of the valve-seat, thereby reducing the number of steam-ports of the valve to three; but, if desired, four may be employed.

By providing each steam-passage C C' with only one port, e e', with which the central port g of the valve alternately coincides, the outer ports g^1 g^2 of the valve may be dispensed with; but in that case the stroke of the valve and the width of the ports, or the length of the ports, must be doubled, in order to get the same area of opening as in the arrangement shown in the drawing.

My improved valve, when arranged as shown in the drawing, admits the steam to the cylinder in a quicker and more direct manner than balanced valves taking steam on both sides; it saves the steam which in these valves is employed to fill the long steam-passages leading to the cylinder, and it simplifies the construction of the valve-chest, while the principal advantages of balanced valves taking steam on both sides, viz.—small steam-ports and ease of movement—are fully attained in my improved valve.

I claim as my invention—

1. The combination, with the valve-chest B, provided with face-plate D, having steam-ports e e e' e', and face-plate I, having exhaust-opening n, of the hollow slide-valve F, constructed with three steam-ports, g g^1 g^2, and two intermediate cavities, h h', substantially as and for the purpose hereinbefore set forth.

2. The combination, with the valve-chest B, provided with face-plate D, having steam-ports e e e' e', and face-plate I, having exhaust-opening n, of the hollow slide-valve F, provided with steam-ports g g^1 g^2, recesses h h', and sleeve k, and the adjustable plate J, provided with sleeve k' and opening m, substantially as and for the purpose set forth.

FRANK H. BALL.

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