W. Joslin,

Steam Balanced Valve.

No. 42,294. Patented Apr. 12, 1864.

Fig. 1.

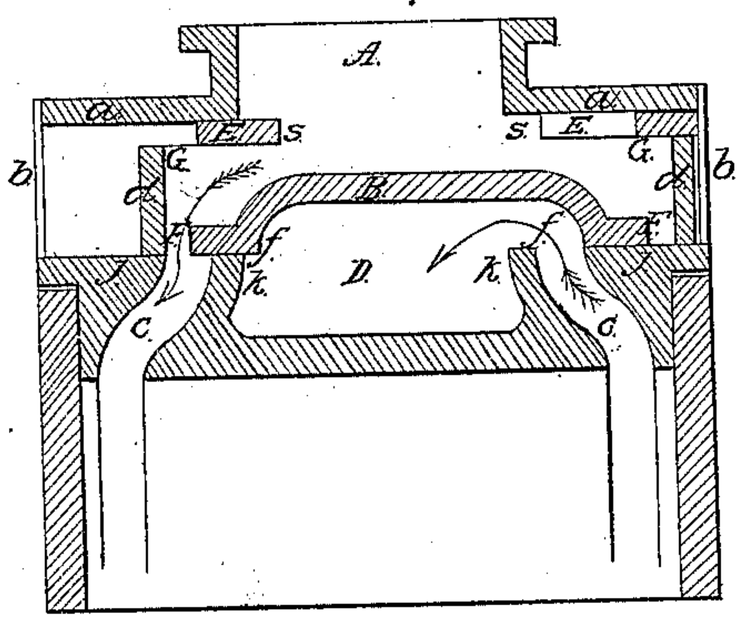


Fig. 2.

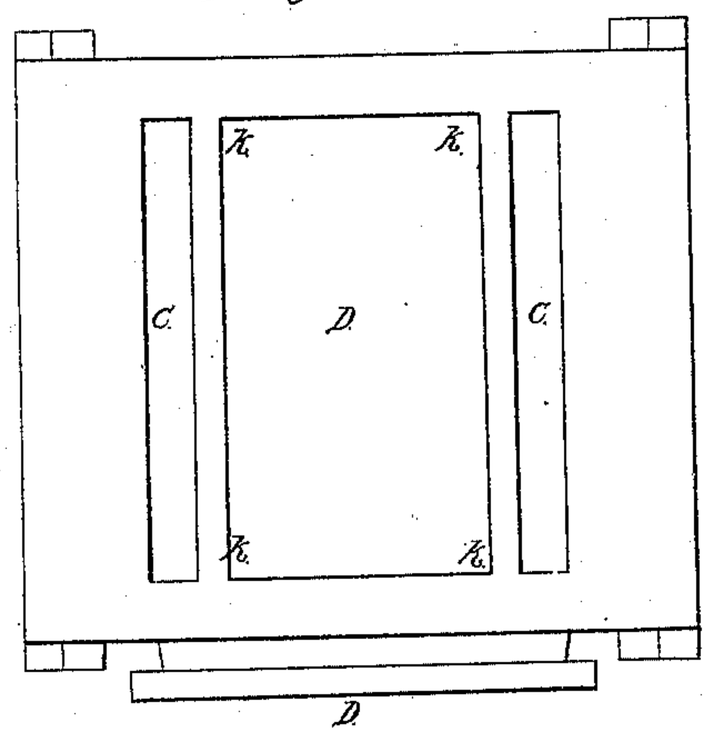


Fig. 3.

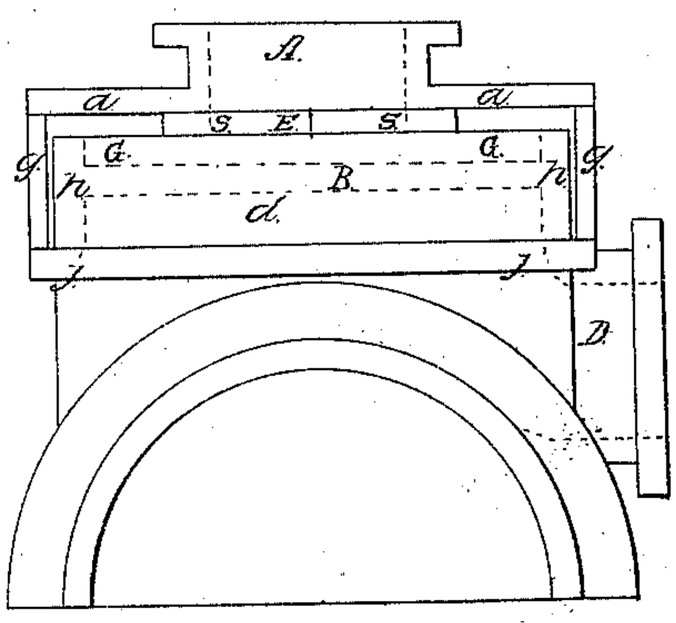
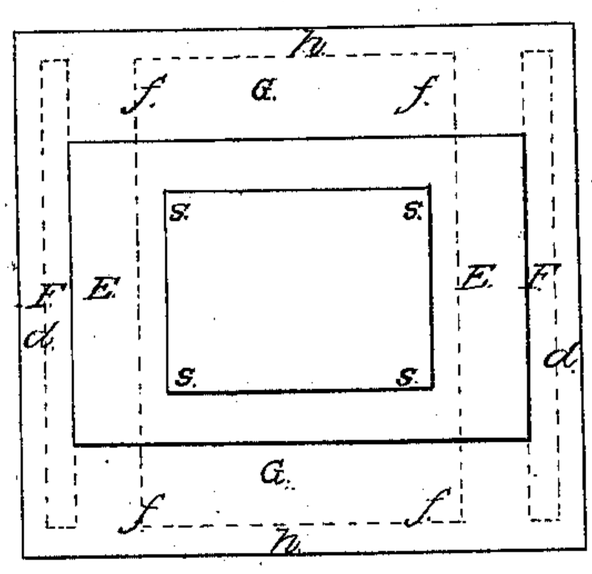


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM JOSLIN, OF CLEVELAND, OHIO.

IMPROVEMENT IN SLIDE-VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **42,294**, dated April 12, 1864.

To all whom it may concern:

Be it known that I, WILLIAM JOSLIN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in the Slide-Valve for Steam-Engines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in so constructing the slide-valve in steam-engines as to relieve it of the steam-pressure which the common slide-valves are subject to.

Figure 1 is a sectional side elevation taken through the center of the cylinder and slide-valve. Fig. 2 is a top view with the valve and valve-box removed, showing valve-seat, steamways, and exhaust or escape port. Fig. 3 is an end view with the end of valve-box removed, showing end of slide-valve. Fig. 4 is a top view of the slide-valve.

The construction of valve-motion, piston, &c., in my engine is the same as common engines. It is therefore not necessary to describe those parts, as they are understood by engine-makers.

A in Fig. 1 is the steam-entrance.

B is the common slide-valve, very much elongated, and boxed on the sides and ends similar to the common valve when a cut-off valve is made to work on the top of the slide-valve, with this exception that I provide my valve with a flexible diaphragm or cover, which will be explained hereinafter.

C and C^2 are steamways leading from the slide-valve into the cylinder.

D is the exhaust or escape port, elongated to correspond with the elongation of the slide-valve.

a and a^2 is the top or cover of slide-valve box. *b* and b^2 are the ends of the same.

g and g^2 in Fig. 3 are the sides of the slide-valve box, all being fastened to the valve-seat *j j*, Fig. 1.

E and E^2 in Figs. 1, 3, and 4 is a sliding-plate, with an opening through which the steam passes from the steam-entrance A in Fig. 1 to the cylinder.

The opening *s s* in Fig. 1, *s s* in Fig. 3, shown by dotted lines, and *s s s s* in Fig. 4, is for the passage of steam, with an area equal to the steamways C and C^2 in Fig. 1 and C and C^2 in Fig. 2—that is if the areas of C and C^2 in Fig. 2 contains ten square inches each, then the area of the steam-passage in the sliding-plate E and E^2 will contain twenty square inches, which is equal to the two steamways C and C^2, the object of which will be hereinafter explained.

The sliding plate E and E^2 in Fig. 1 is made to work steam-tight under the slide-valve box-cover *a* and a^2.

h h in Fig. 3 and *h h* in Fig. 4 are sides fastened firmly to the sides of the slide-valve B, as shown by dotted lines in Figs. 3 and 4, projecting some above the slide-valve B.

d d in Fig. 1 and *d d* in Fig. 4 are the ends of the boxing fastened to the slide-valve B.

F and F^2 in Fig. 1 and F and F^2, shown by dotted lines in Fig. 4, are steamways between the slide-valve B and ends of boxing *d d* in Fig. 1 and *d d* in Fig. 4.

G and G^2 in Fig. 1, G and G^2 in Fig. 3, and G and G^2 in Fig. 4 is a flexible diaphragm or cover (above mentioned) fastened steam-tight upon the top of the slide-valve boxing *d d* and *h h* in Fig. 4. It is also fastened steam-tight to the under side of the sliding plate E and E^2, as shown in Figs. 1, 3, and 4. The flexible diaphragm or cover has an opening the same as the sliding plate E and E^2, through which the steam passes.

The object of the opening being equal, as above mentioned, is to relieve the slide-valve of the steam-pressure which the common slide-valve is subject to. If the common slide-valve has steam and escape openings equal to forty square inches area, and steam-pressure equal to one hundred pounds to the square inch, the pressure will be equal to forty hundred pounds upon the common slide-valve during that portion of its travel in which the outside lap of the slide-valve exceeds the steamways, and thirty hundred pounds during the remainder of its travel—that is, if the escape port is equal to both steamways, which is often the case, and if a cut-off valve is used upon the top of the common slide-valve, (which is quite common,) it then has forty hundred pounds steam-pressure during that portion of the stroke which the steam is cut off. With this common arrangement a large portion of the steam-power is used in moving the slide-

valve. With my invention I save this power lost by pressing the common slide-valve upon its seat.

My new slide-valve being constructed, as above described, with the opening of the steam-entrance through the sliding plate and valve-openings being equal, it relieves the slide-valve of the steam-pressure. It will be readily seen if the steam-openings *s s*, Fig. 1, are stopped steam-tight, and the openings F and F², Fig. 1, in the bottom of the slide-valve are also stopped steam-tight, and steam allowed to enter through a small pipe, it would press down upon the valve B and on the sides *h h* and ends *d d*, and upon the diaphragm and sliding plate, (the openings in the sliding plate being sloped,) the valve thus arranged would have no pressure upon anything it might be placed, except its own weight, while the pressure inside might be very great. Now, if the valve is placed between two surfaces, and working steam-tight, one under the valve and the other on the top of the sliding plate, the two surfaces so fastened together as not to be pressed away from each other; now if the steamways F and F² are opened, the pressure would then come upon the bottom surface and press the valve up against the upper surface. If the area E and E² is equal to twenty square inches, and the pressure of steam is equal to one hundred pounds to the square inch, the pressure up against the upper surface will be equal to twenty hundred pounds, which would cause the slide-valve to move very hard. Now, if the stoppage is taken from the steam-openings *s s*, area being equal to the areas of the steamways F and F², the pressure of twenty hundred pounds will then come against the upper surface, and the valve will move quite free. If an opening is made in the upper surface equal to the opening in the sliding plate, the pressure will then be transferred from the upper surface to the boiler, the slide-valve would continue to move with the same freedom as before. If openings are made in the lower surface equal to those in the bottom of the slide-valve, the pressure upon the lower surface would then be transferred to the cylinder, the slide-valve would still continue to move with the same freedom, because the steam has no tendency to press the slide-valve down upon the lower surface or up against the upper surface. If the openings in the upper and lower surfaces are not as large as those in the valve, then only a portion of the steam-pressure is transferred to the boiler and cylinders. If the openings in the surfaces are made one-half those of the valve, then only one-half of the steam-pressure is transferred to the boiler and cylinder, and so on in proportion. This in no wise affects the working of the valve unless the openings in the upper or lower surface exceed the openings in the valve. If the opening in the upper surface exceeds the opening in the valve and lower surface, then the pressure down will be equal to the excess of opening in the upper surface, and the reverse will take place if the opening in the lower surface exceeds those in the valve and upper surface, less the weight of the valve; thus the steam-pressure may be changed. This is the principle upon which my new slide-valve works. The diaphragm G and G′, Figs. 1, 3, and 4, being flexible, causes the sliding plate E and E² to move steam-tight against the cover *a* and *a*². The tendency of the steam to work through between the sliding plate E and E² and the valve-box cover *a* and *a*² is nearly equal to the pressure of the sliding plate E and E² against the cover *a* and *a*². This allows the valve to move quite free and steam-tight at the same time. The same effect would take place if the flexible diaphragm was attached to the valve-box cover *a* and *a*², and an inflexible cover attached to the slide-valve boxing *d d* and *h h*, Fig. 4, with the same sized steam-openings as the sliding plate E and E², Fig. 4. By relieving the slide-valve of the steam-pressure I am enabled to make the steamways leading from the slide-valve to the cylinder near the ends of the cylinder, thereby allowing me to extend the exhaust-way through the entire space between the steamway-bridges, thus allowing an exhaust more free than common engines.

What I claim as my invention, and wish to secure by Letters Patent, is—

The diaphragm G G² and plate E E², in combination with the valve B, as above described.

WM. JOSLIN.

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