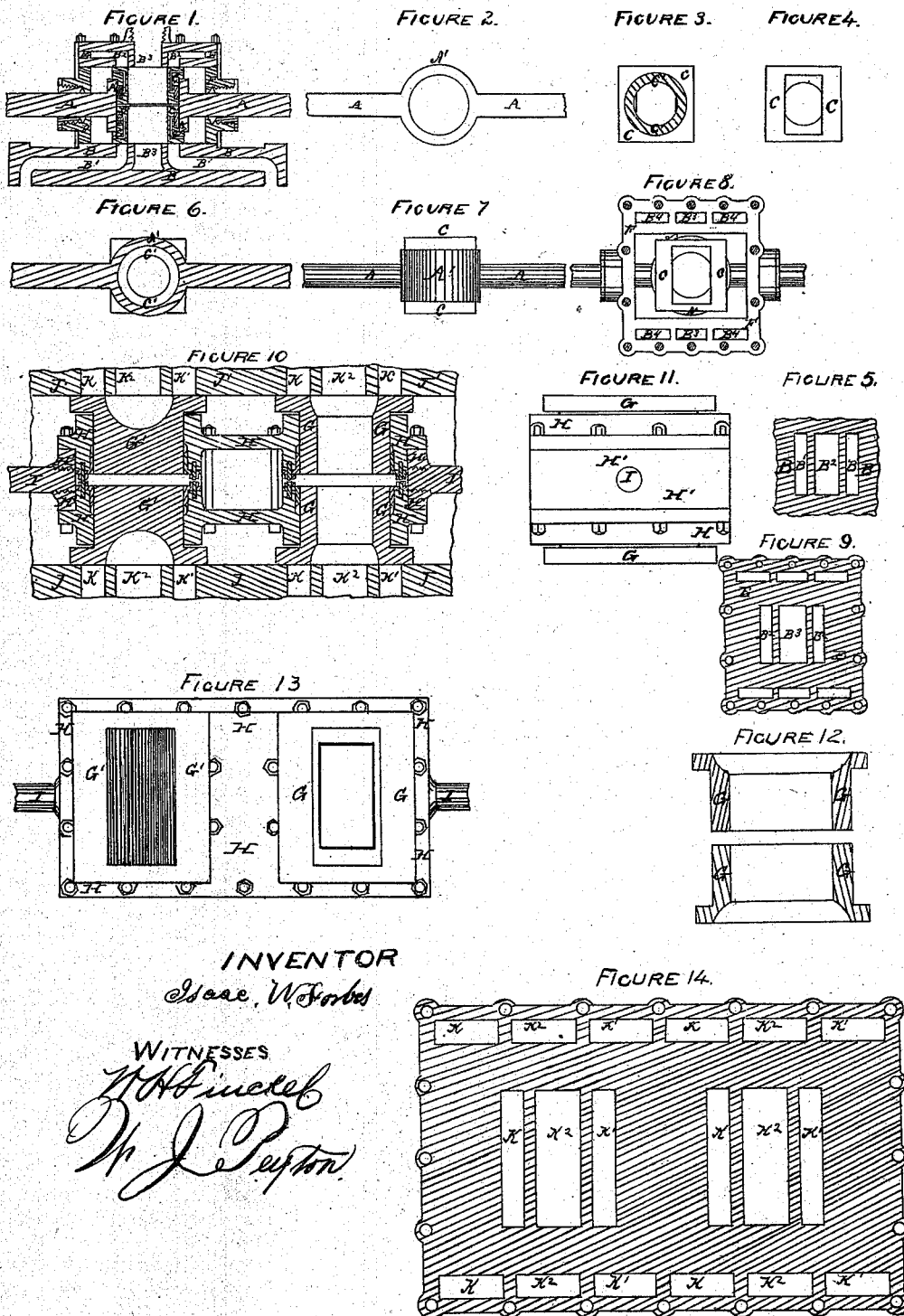


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Improvement in Slide-Valves for Steam-Engines.

No 115,299.

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IMPROVEMENT IN SLIDE-VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 115,299, dated May 30, 1871.

I, ISAAC WILLIAM FORBES, of La Porte, in the county of La Porte and State of Indiana, have invented certain Improvements in Slide-Valves for Steam or Air Engines, of which the following is a specification:

My invention consists of an equilibrium male slide-valve, the back of which is inserted in its frame or valve-stem, with steam-tight joint between the two to prevent the passage of steam, all constructed substantially as herein-after described. Steam is received in the steam-chest by the induction-pipe outside of the valve or valves which cover the ports.

Description of the Accompanying Drawing.

Figure 1 is a longitudinal central section of a double valve, valve-stem, steam-chest, and valve-seat, with portions of the cylinder and ports complete. Fig. 2 is a longitudinal central section of a valve-stem and frame bored out for the purpose of receiving the valves. Fig. 3 is the inside portion of one of the valves with the boss or back extending up, which forms a shank or piston designed to fit in the frame or boss of the valve-stem. Fig. 4 is an outside view of the valve and of that part which fits on the seat. Fig. 5 is a top view of valve-seat. Fig. 6 is a longitudinal central section of a valve-stem, which also forms the frame into which the valve is fitted, with one of the valves in. Fig. 7 is a full side view of the valve-stem and valves in the frame as they belong, viewed laterally, as compared with Figs. 2 and 6. Fig. 8 is a top view of valves with their frame, stem, and steam-chest, with the cover removed, showing their passages. Fig. 9 is the steam-chest cover of Figs. 1 and 8, with induction-ports and exhaust-port, with passages which convey the live and exhaust steam to and through the cylinder, said ports corresponding with the ports in the cylinder. Fig. 10 is a central longitudinal section of a quadruple equilibrium male slide-valve, with ports in their proper positions in relation to the valves from those described in previous figures. Two of these valves have holes through them to prevent the exhaust steam from having any effect to lift them from their face, while the other two have only recesses in the center, like that of a common D. Fig. 11 is an end view of

Fig. 10 with the valve-seat removed. Fig. 12 is a central longitudinal section of valves removed from the frames, with holes through them, as viewed laterally. Fig. 13 is a top view of Fig. 10 with the valve-seats removed. Fig. 14 is a top view of the seat upon which the valves shown in Figs. 10, 11, 12, and 13 fit. Figs. 10, 11, 12, 13, and 14 all belong to the same cylinders and valves.

In the drawing, A A is the valve-stem, the center of which forms the frame or ring in which the valves fit. This is bored out true to receive the backs or pistons of the valves. A' is the boss or ring on the valve-stem which forms the frame for the valve. B B is that part of the steam-cylinder in which the ports and steam-passages are. B¹ B¹ are steam-passages in the cylinder which convey steam from the ports. B² B² are steam-ports and passages in the steam-chest cover which pass round and through the steam-passages B⁴ B⁴, Fig. 8, through the sides of the steam-chests to the steam-ports B¹ B¹ in the cylinder. B³ B³ are exhaust-ports in cylinder and steam-chest cover, and steam-passages through the sides of steam-chest, for exhausting. C C are the valves; C', shanks; D, pistons upon the backs of valves, which fit its frame. E E is the lid of steam-chest. F F is the steam-chest. G G, seen in Figs. 10, 11, 12, and 13, are valves with exhaust recesses or holes through the same, which holes prevent the exhaust from having any material effect toward lifting the valves from their seats, while G' G' are valves of the same class with exhaust recesses only, which do not pass through, and must, necessarily, have a greater downward, upward, or lift steam pressure on the same to overcome the lift produced by exhaust. These valves fit the mortises in their frames. This frame and valve differ from those in previous figures. H H are sides of frames in which these valves belong. When the quadruple valve, as shown in Fig. 10, is used for a single engine, J J would represent the valve-seat of the cylinder; J' J' would represent the valve-seat in the steam-chest cover; in which case K K would extend to one end of the cylinder, while K' K' would extend to the opposite end of the other cylinder. In this case the ports in the steam-chest must

connect with their mates in the cylinder through the sides of the steam-chest, or pipes for that purpose. $K K$ and $K^1 K^1$ are induction ports and passages. $K^2 K^2$ are exhaust ports and passages.

This valve is moved by an eccentric, or any other valve-gear found necessary or useful, in the same way as the common **D**. It is applicable for the classes of engines for which the ordinary **D**-valve is used.

Claims.

1. The valves $G G$ and $G' G'$, in combina-

tion, substantially as and for the purpose described.

2. The frame $H H$ and frame $H' H'$, substantially as and for the purpose described.

3. The valves $G G G' G'$ in combination with frame, substantially as and for the purpose described.

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Witnesses:

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