(No Model.) 2 Sheets—Sheet 1.

A. HORSFIELD.

STEAM ACTUATED VALVE.

No. 321,605. Patented July 7, 1885.

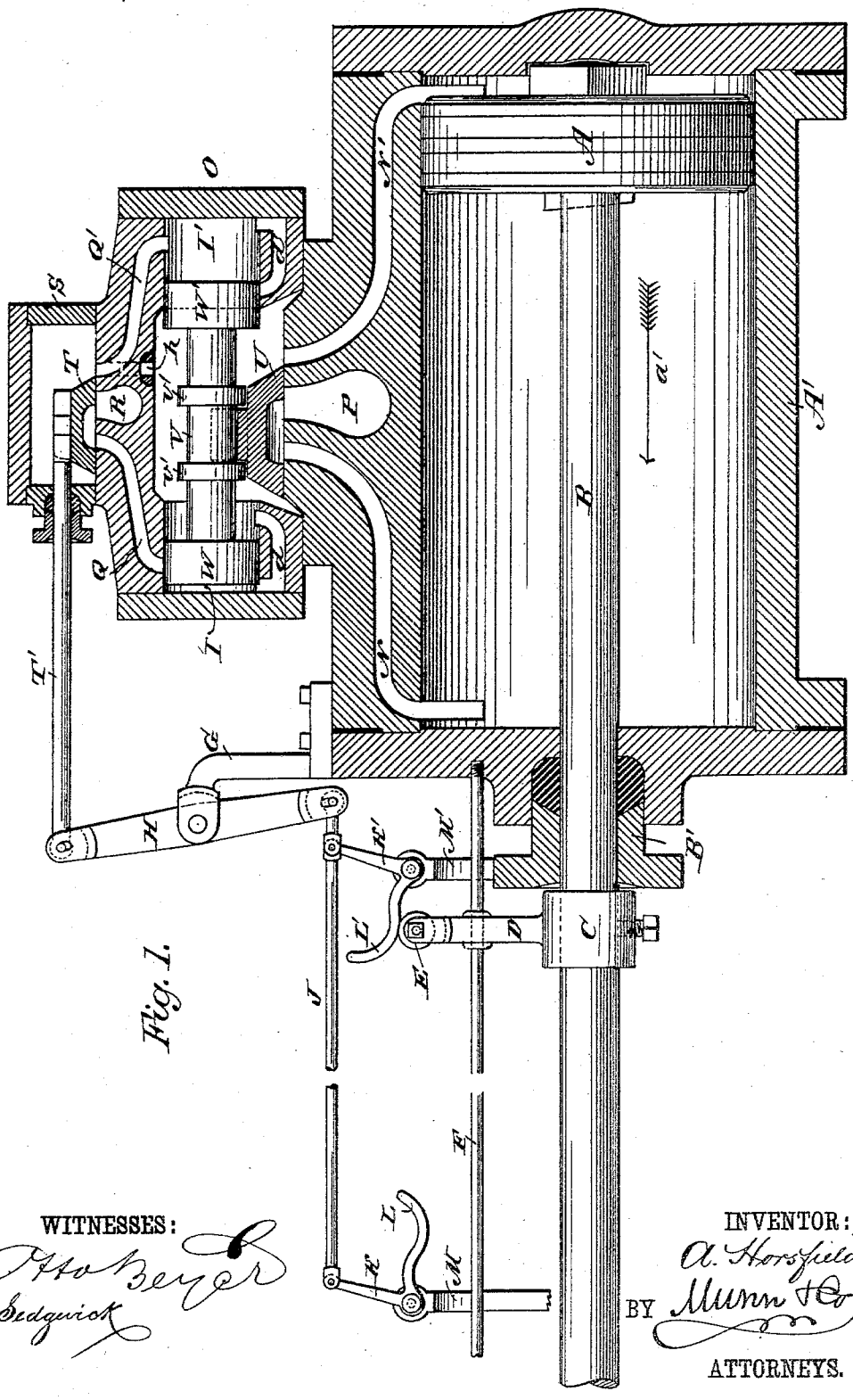


Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

A. HORSFIELD.

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Fig. 3.

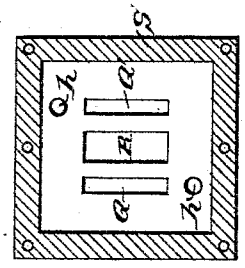


Fig. 4.

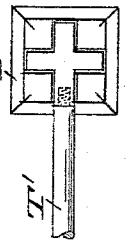
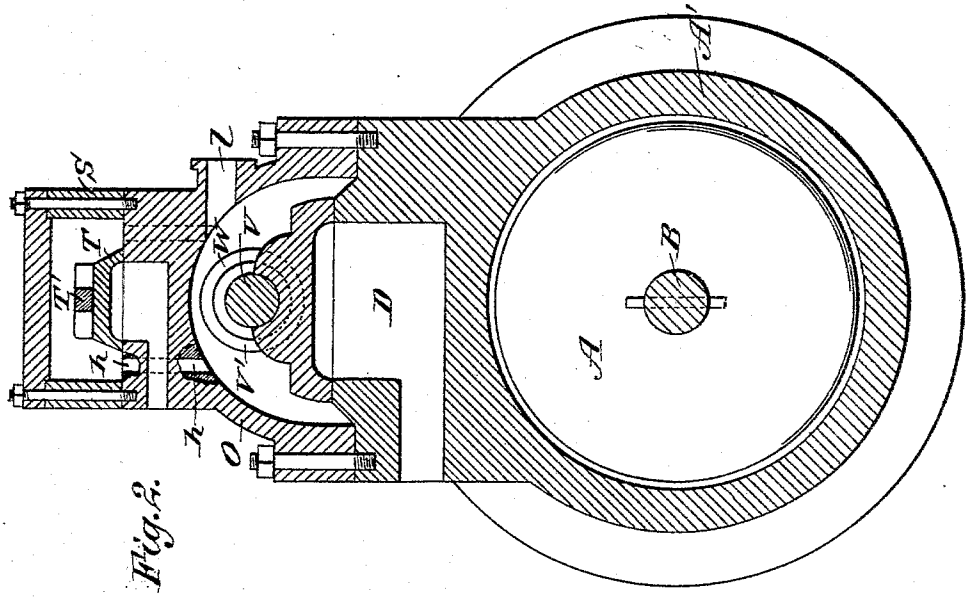


Fig. 2.



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UNITED STATES PATENT OFFICE.

ALFRED HORSFIELD, OF HAZLETON, PENNSYLVANIA.

STEAM-ACTUATED VALVE.

SPECIFICATION forming part of Letters Patent No. 321,605, dated July 7, 1885.

Application filed March 19, 1885. (No model.)

To all whom it may concern:

Be it known that I, ALFRED HORSFIELD, of Hazleton, in the county of Luzerne and State of Pennsylvania, have invented a new and Improved Steam-Actuated Valve, of which the following is a full, clear and exact description.

The object of my invention is to provide a new and improved steam-actuated valve for steam-engines, which is so constructed as to cushion the valve.

The invention consists in the arrangement and combination of various parts and details, as will be fully set forth and described hereinafter.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal sectional elevation of the cylinder, steam-chest, and supplementary steam-chest. Fig. 2 is a cross-sectional elevation of the same. Fig. 3 is a plan view of the bottom of the supplementary steam-chest. Fig. 4 is a plan view of the supplementary slide-valve.

The piston A, mounted on the piston-rod B, reciprocates in the cylinder A', the piston-rod B passing through a cylindrical stuffing-box, B', of the usual construction.

On the piston-rod B a collar, C, is held outside of the cylinder, and from the same an arm, D, projects upward, and on the upper end of the arm a roller, E, is pivoted. An eye is formed in the upwardly-projecting arm D, and through the same a guide-rod, F, passes, which has one end fixed in the head of the cylinder and the other end fixed in another suitable support, so as to prevent the piston-rod from turning and the arm D from swinging out of the vertical position. An upwardly-projecting arm, G, is secured on one end of the cylinder, and on the same a lever, H, is pivoted, which has its lower end connected by a rod, J, with two angle-tappets, K K', having curved arms L L', and pivoted at their angles on suitable uprights, M M'. The curved arms L L' of the tappet-levers project toward each other.

The cylinder is provided with steam-channels N N', leading from the chest O to the two ends of the cylinder, and with the usual exhaust-channel, P. In the top of the steam-chest O channels Q and Q' are arranged, which lead from the middle of the top of the steam-chest to the ends of the same, and the chest O is also provided with the exhaust-channel R. The top of the steam-chest O forms the bottom of a supplementary steam-chest, S, on the top of the chest O, and containing a slide or other suitable valve, T, of the usual construction, connected by a rod, T', with the upper end of the lever H. A slide-valve, U, rests on the bottom of the steam-chest O, and is provided in its top with a recess for receiving a shaft, V, having cams V' at the ends of the slide-valve U, which cams act on the projecting part of the slide-valve, thus causing the slide-valve to move with the shaft. On the ends of the shaft V the pistons W W' are formed to fit closely in cylindrical chambers I and I' in the ends of the chest O. Ports or channels *d d'*, formed in the bottoms of the chambers I and I', extend from a point at the bottom near the outer end to a point at the inner end, as shown. Ports or channels *h* extend from the bottom of the chest S down to the top of the chest O, and establish communication between the two chests. Live steam is conducted into the chest O through a pipe connected with the channel *l*, Fig. 2. The exhaust ports or channels are connected with the usual exhaust-pipes.

The operation is as follows: The steam which is admitted into the main chest O passes through the channels *h* into the upper or supplementary chest. When the parts are in the position shown in Fig. 1, live steam passes from the chest O through the channel N' to the right-hand end of the cylinder and forces the piston A in the direction of the arrow *a'*, the exhaust-steam passing out through the channel N and the exhaust-opening P, which are connected by the slide-valve U. When the parts are in this position, live steam is in the channel Q', the compartment or chamber I', and the channel *d'*, the outer end of which is closed. Live steam is also between the end of the compartment I and the piston W and in the channel *d*. The piston-rod B moves in the direction of the arrow *a'*, causing the roller E and the arm D to strike the arm L of the left-hand tappet-lever, K, thereby swinging up the arm L' and moving the lower end of the lever H in the direction of the arrow *a'*, and the rod T' and the slide-valve T in the in-

verse direction of the arrow *a'*, whereby the channel or port Q' is connected with the exhaust-port R, and live steam is admitted through the channel Q. The chamber I' is thus connected with the exhaust, and the live steam passes from the chest O through the channel *d* into the compartment or chamber I, and, acting on the piston W, moves the shaft V and the slide-valve U in the inverse direction of the arrow *a'*, thereby closing the outer end of the channel *d*, and at the same time opening the lower end of the channel Q, which channel conducts the live steam from the chest S. The said live steam acting on the piston W moves the same in the inverse direction of the arrow *a'*, thereby shifting the valve U sufficiently to connect the channel N' with the exhaust, and permitting the live steam to pass through the channel N into the cylinder, and so on alternately. When the piston W' is moved in the inverse direction of the arrow *a'* by the steam acting on the piston W, it uncovers the outer end of the channel *d'*, as is shown at the right-hand side of the chest O in Fig. 1. The steam can then pass from the steam-chest through the channel *d'*, and cushion the slide-valve by passing in between the end of the piston and the end of the chest.

It is evident that a reciprocating or rotary valve can be used in place of the slide-valve T with the same advantage.

The above-described improvement can also be used on steam-pumps.

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

1. The combination of the cylinder A', the steam-chest O, having channels Q, Q', and R, and provided with cylindrical chambers I I' and ports *d d'*, opening at one end at the outer ends of the chambers I I' and at their other ends into the said chambers near the inner ends thereof, and the valve U, having pistons W W', substantially as set forth.

2. The combination, with a cylinder having the channels N, N', and P, of the steam-chest O, having the channels Q, Q', and R, the compartments I I', the channels *d d'* at the bottoms of the said compartments, the slide-valve U, the shaft V, having pistons W W', the steam-chest S, connected with the steam-chest O by the channels *h*, the slide-valve T, and mechanism for operating the slide-valve from the main piston-rod, substantially as herein shown and described.

3. The combination, with the cylinder A', of the piston A and piston-rod B, the collar C on the piston-rod, the arm D projecting upward from the same, the roller E, the guide-rod F, the pivoted angle-tappets K, the rod J, the pivoted lever H, the slide-valve T, operated by a rod from the lever H, and a steam-actuated valve in a steam-chest below the slide-valve T, substantially as herein shown and described.

4. The combination, with the piston-rod having an arm, D, the pivoted lever H, the valve J, and connection between said valve and lever, of the tappets K K', arranged at the opposite ends of the path of the arm D, the arms L L', extended from tappets K K' toward each other and in position to be engaged by the arm D, and a rod extended between the tappets and connected with the lever H, substantially as set forth.

ALFRED HORSFIELD.

Witnesses:
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JOHN JOHNSTON.