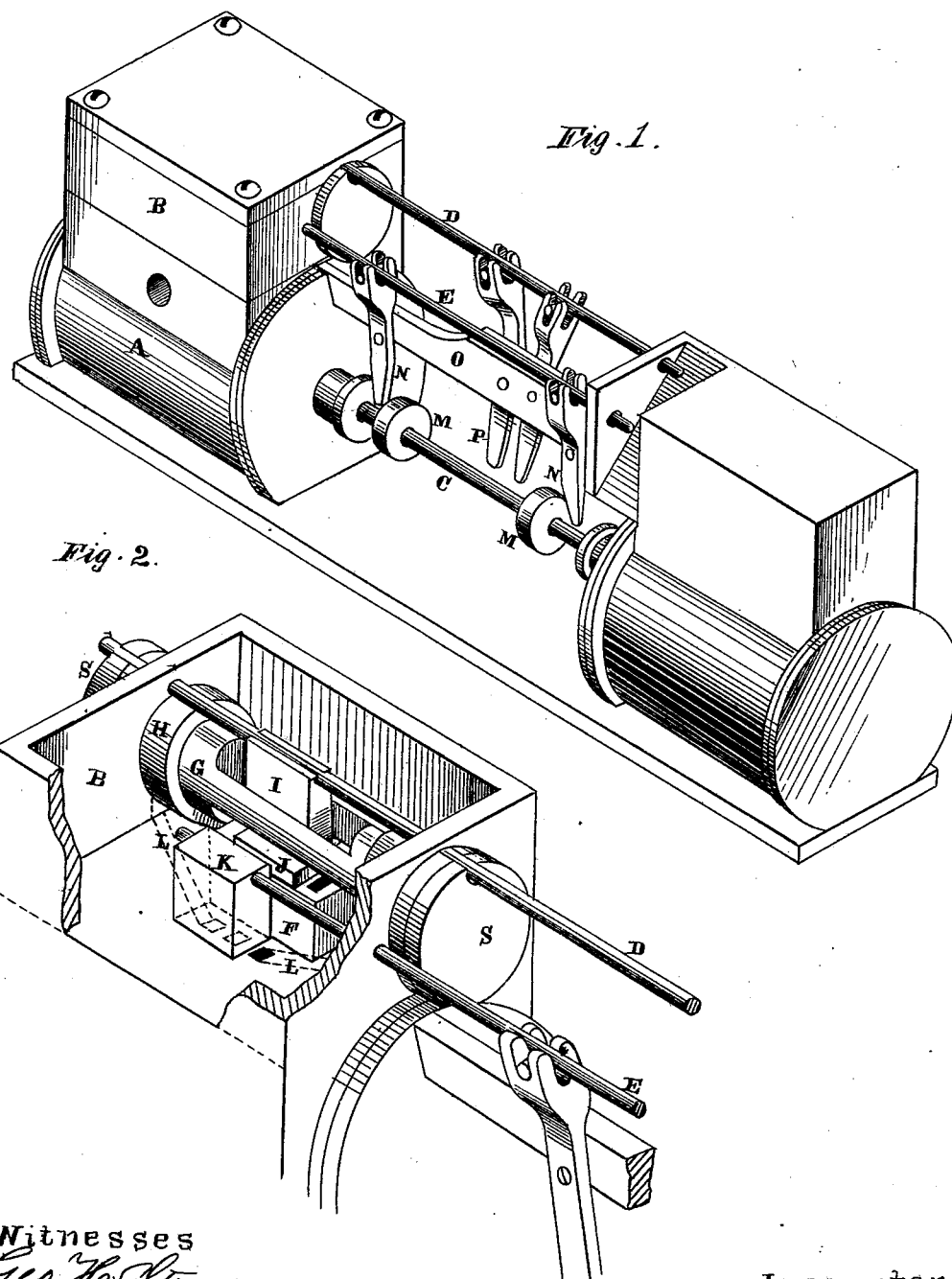


A. H. MATHESIUS.
Slide and Steam Valves.

2 Sheets—Sheet 1.

No. 215,064.

Patented May 6, 1879.



Witnesses
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Frank A. Brooke

Inventor
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Fig. 3.

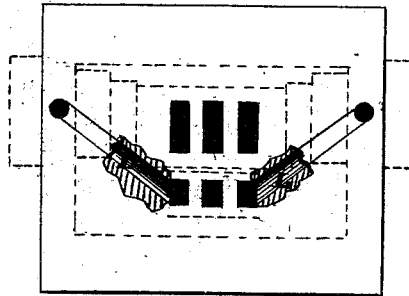


Fig. 4.

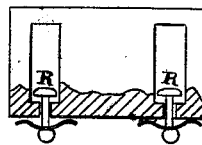
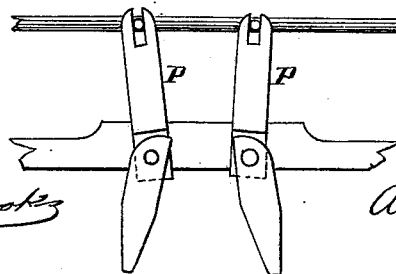


Fig. 5



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UNITED STATES PATENT OFFICE.

ALEXANDER H. MATHESIUS, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN SLIDE AND STEAM VALVES.

Specification forming part of Letters Patent No. **215,064**, dated May 6, 1879; application filed October 28, 1878.

To all whom it may concern:

Be it known that I, ALEXANDER HUGO MATHESIUS, of the city and county of San Francisco, and State of California, have invented a Cut-Off Attachment for Direct-Acting Steam-Engines; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention relates to certain improvements in direct-acting engines, such as are principally intended to drive steam-pumps, hammers, rock-drills, and similar machines; and it consists in the employment of a cut-off attachment to the steam-cylinder, by the use of which the action is rendered much smoother, and in certain details of construction, which will be more fully described by referring to the accompanying drawings, in which—

Figure 1 is an exterior view of my engine, showing the operating-levers. Fig. 2 is a view, showing the arrangement of the valves. Fig. 3 is a view of the ports. Fig. 4 is a separate view of the main valve with its attachment. Fig. 5 is a view of the jointed levers.

I have shown my improved engine connected with a pump in the present case, so as to conveniently show the operation of the piston-rod, valve-stems, and their attachments.

A is the steam-cylinder, and B is the valve-chamber, of my engine. C is the main piston-rod, and D the cut-off-valve stem. E is the auxiliary-valve stem. In the present case the main piston-rod extends into the pump-cylinder, as usual in such cases, so that the pump-plunger is actuated directly from the engine-piston.

The main valve F is actuated by a supplemental piston, G, which works within the steam-chest, its ends extending into the supplemental cylinder H, which extends into each end of the valve-chamber or forms a part of it, as shown. The central connecting portion of this supplemental piston may be slotted, or otherwise so constructed as to allow an extension, I, from the cut-off valve J to pass through or beyond it, and this valve is thus driven by the rod D, with which it is directly connected. The auxiliary valve K is actuated by the stem E, and supplies steam to move the supple-

mental piston and the main valve through the ports L.

The cut-off valve is situated upon the back or top of the main valve, and the action will be as follows: A collar, M, is secured to the main piston-rod, and two levers or arms, N, are pivoted to a bar, O, which extends from the steam-cylinder head to that of the water-cylinder. By suitable pins or connections these levers are united to the auxiliary-valve stem, so that as the main piston completes its stroke in one direction the collar M will strike the lever at that end, and thus move the auxiliary valve through its stem, so as to admit steam to the supplemental cylinder and piston at the end where the piston has arrived. This moves the main valve F so as to admit steam to return the main piston to the opposite end of its cylinder. In doing this the collar M will strike the lower end of the nearest of two levers, P, which are also pivoted to the bar O. These levers are connected with the cut-off-valve stem, so that when the lever is struck by the collar it moves the stem and cut-off valve, and thus shuts off all further admission of steam to the main cylinder. Each of these levers P has its lower end jointed, so that when moving in one direction the collar M will move the lever nearest to it from the position of the joint; but it will simply bend the joint of the second lever so as to pass it, without any action upon the lever or the valve-stem. In this manner it will be seen that one of these levers serves to actuate the cut-off valve in each direction alternately, while the other is inoperative during that movement. This construction is proper when the steam is to be cut off at less than half the stroke; but when it is to follow the piston more than half the stroke the action upon the levers would be reversed—that is, the joint in the first lever would be made to yield, while that of the second would remain rigid, so as to actuate the valve.

By this means, and a suitable adjustment of the levers, it will be seen that steam may be cut off at any point in the stroke.

In order to prevent the steam within the cylinder from being reduced too much below that of the steam-chest, which might sometimes happen from too great expansion, I have

employed small tension-valves R, which are secured to the main valve, opening into the ports or at other suitable point, and are provided with springs, so that when the difference in pressure exceeds a certain amount the springs will yield and allow steam from the chest to enter the cylinder.

The cut-off valve is relieved from any undue end pressure upon its valve-rod by extending the rod through stuffing-boxes S at each end, as shown.

By this construction I am enabled to give a softness to the stroke, making it without noise or jerk, and with considerable economy of steam.

The valves R may be balanced instead of having springs, or constructed in any other suitable manner.

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

1. The improvement in direct-acting engines, consisting in the main valve F, with its supplemental actuating-piston G, and the auxiliary valve K, with its stem E, in combination with the cut-off valve J, mounted upon the back of the main valve, and actuated by the rod or stem D and levers P, substantially as and for the purpose herein described.

2. The cut-off-valve stem D, said stem extending through stuffing-boxes S at each end to balance the pressure, and provided with the exterior actuating-levers P, said levers so jointed at their lower ends that the collar M upon the piston-rod may actuate the stem by means of one lever alternately and pass the other as it reciprocates, substantially as herein described.

3. The supplemental piston G, having ends fitted to move in the partial supplemental cylinder H at each end of the open steam-chest, while the center drives the main valve, and is slotted to admit an extension, I, of the cut-off valve to pass and be united with the independent stem D, substantially as and for the purpose herein described.

4. In combination with the main piston, main valve F, and cut-off valve J, the independent pressure-valves R, substantially as and for the purpose herein described.

In witness whereof I have hereunto set my hand.

ALEXANDER H. MATHESIUS.

Witnesses:

GEO. H. STRONG,

FRANK A. BROOKS.