

(No Model.)

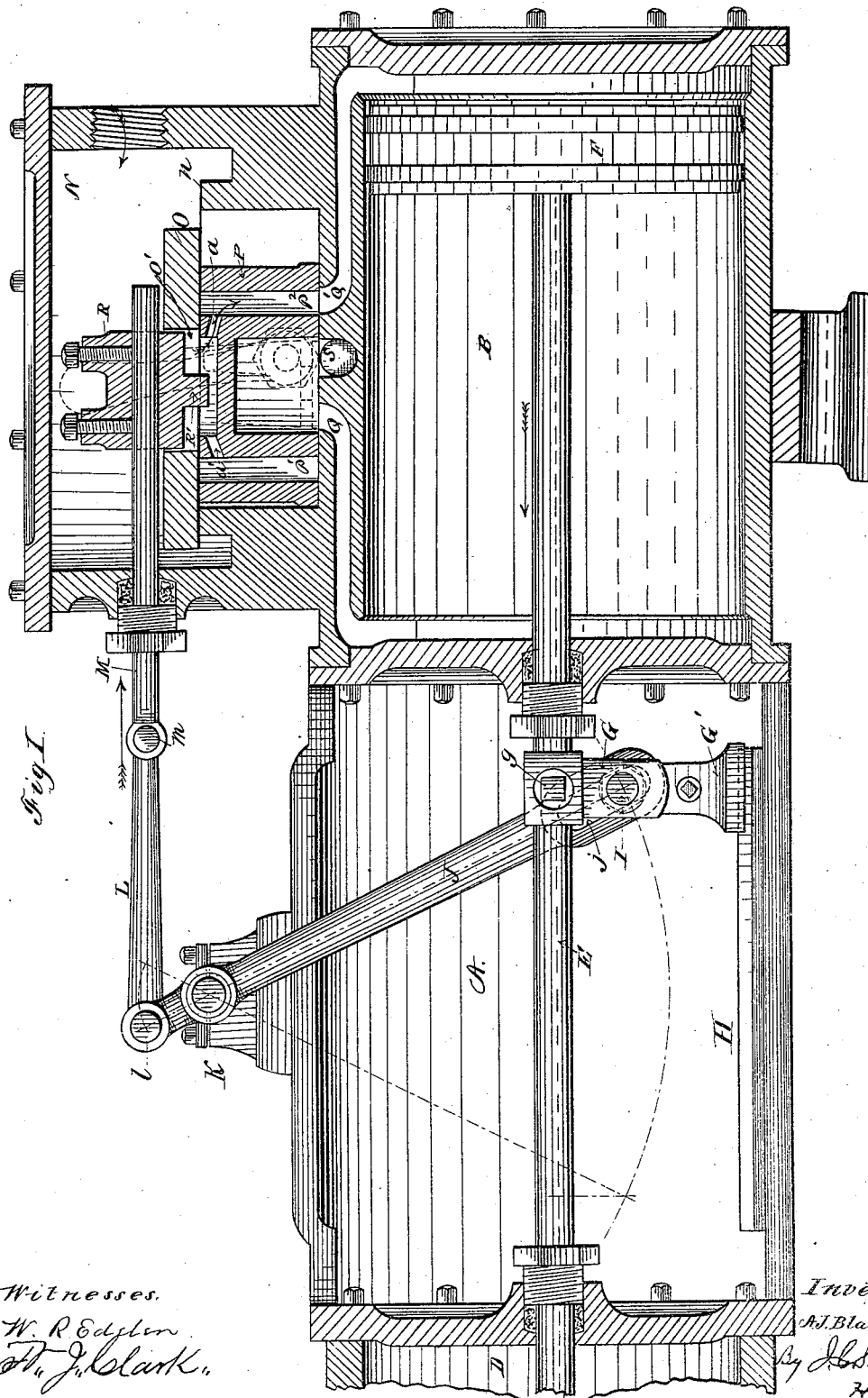
2 Sheets—Sheet 1.

A. J. BLAKESLEE.

STEAM ACTUATED VALVE FOR PUMPING ENGINES.

No. 307,006.

Patented Oct. 21, 1884.



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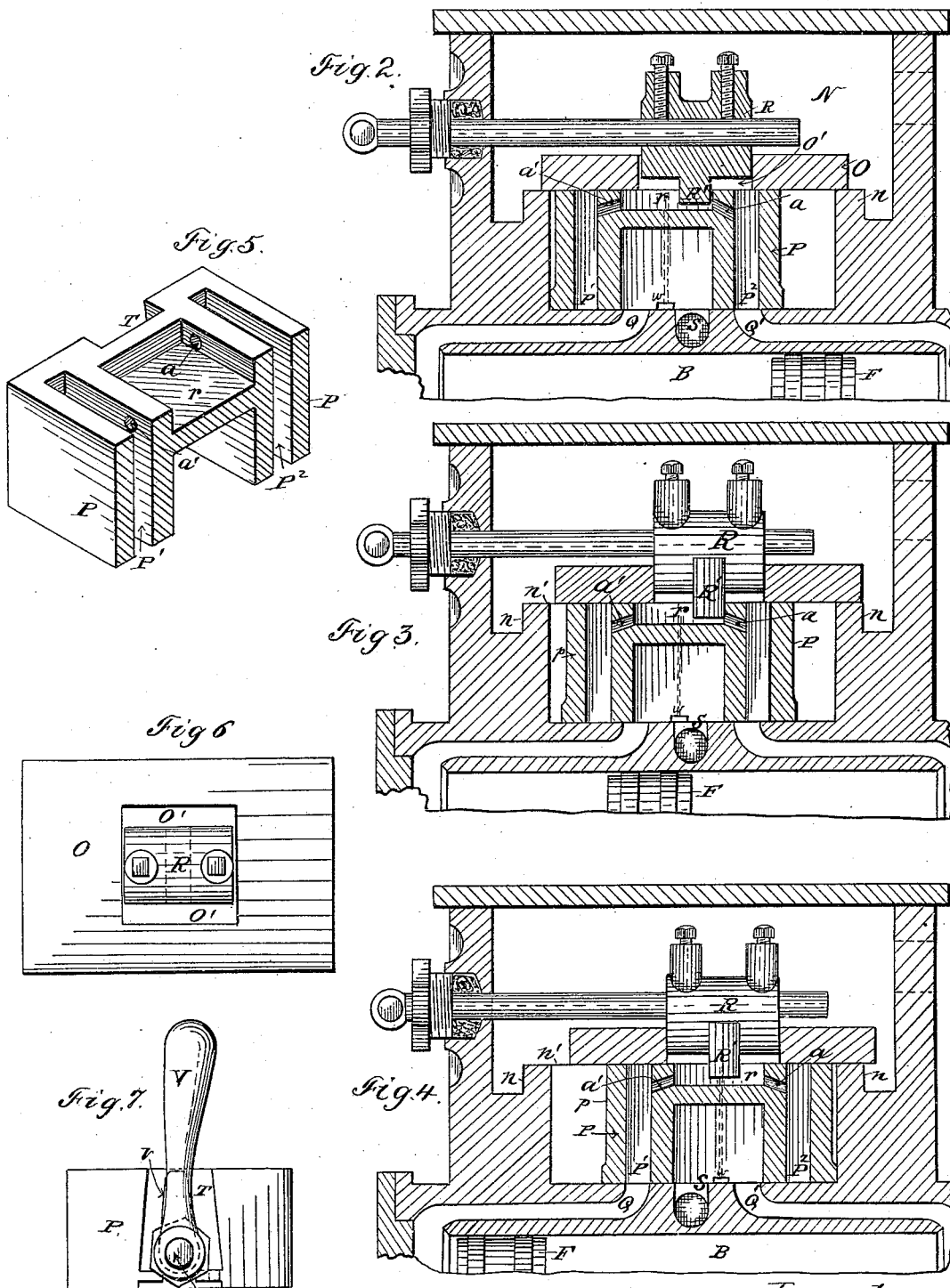
Inventor.
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UNITED STATES PATENT OFFICE.

ALBERT J. BLAKESLEE, OF DUQUOIN, ILLINOIS.

STEAM-ACTUATED VALVE FOR PUMPING-ENGINES.

SPECIFICATION forming part of Letters Patent No. 307,006, dated October 21, 1884.

Application filed January 17, 1884. (No model.)

To all whom it may concern:

Be it known that I, ALBERT J. BLAKESLEE, a citizen of the United States, residing at Duquoin, in the county of Perry and State of Illinois, have invented certain new and useful Improvements in Steam-Actuated Valves for Pumping-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, forming a part of this specification.

My invention relates to improvements in the steam-valves and valve-gear of direct-acting steam-pumps.

The objects of my invention are, first, to construct the steam-valve of a direct-acting steam-pump in two parts, consisting of a lower or main valve and an upper or cut-off valve, the cut-off valve being actuated solely by the valve-gear, and the main valve partially by the valve-gear and partially by the action of the steam thereon; second, to construct and arrange the steam-valves and valve-gear of a direct-acting steam-pump so that the steam will be supplied to the piston in such manner that the piston will substantially come to a rest at the end of the stroke and start again without a jar or shock; third, to construct valve-gear which will operate the cut-off valve throughout its full traverse while the valve-gear actuates the main-valve part of its traverse, the balance of the traverse of the main valve being accomplished by steam-pressure. I attain these objects by the mechanism illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a longitudinal vertical section of the steam-cylinder, steam-chest, and valves of my improved direct-acting steam-pump, with the connecting-frame and valve-gear thereof in plain elevation. Figs. 2, 3, and 4 show like longitudinal vertical sections of the steam-chest, valves, and a portion of the steam-cylinder and piston of same, illustrating the relative positions of the valves and piston at different points of the stroke of the piston. Fig. 5 shows a perspective view of my improved main valve with one side broken away. Fig. 6 shows a plain top view of my improved cut-

off valve and the valve-stem collar. Fig. 7 is a view of the valve-starting lever with the walls of the steam-chest removed, and showing the side of the main valve opposite to that shown in previous figures.

Like letters of reference indicate like parts in all the figures.

There is nothing novel in the steam-pump to which my improvements are applied, as they may with equal facility be utilized in the construction of nearly or quite all styles of direct-acting steam-pumps, my improvements consisting in the construction, arrangement, and operation of the steam-valves and valve-gear, acting in conjunction with steam-pressure in operating said valves.

In the drawings, A is the connecting-frame of the pump; B, the steam-cylinder, and D the water-cylinder, (part only being shown;) E, the piston-rod, and F the steam-piston. All of these parts are of the usual and ordinary construction used in direct-acting steam-pumps.

G G' is an arm attached to the piston-rod E by a sleeve-like opening in G being slipped on the piston-rod E, and being secured in place by a set-screw, *g*. The lower end of G is fitted to receive the upper end of G', these parts being held in place by a set-screw, *g'*, so that the length of the arm G G' is adjustable, the lower end of the part G' forming a shoe which rests and slides upon a guide, H, attached to the lower edge of the frame A. The upper part of this arm G is also provided with a wrist-pin, I, upon which the lever J operates, passing through the slotted hole *j* therein. This lever J is mounted and oscillates on a bearing, K, attached to the upper edge of the frame A. The upper end of the lever J is provided with a bearing to receive a pintle, *l*, forming the connection between the lever J and the valve-rod L, which valve-rod L is attached to the valve-stem M by a joint, *m*, this valve-stem M passing through an ordinary stuffing-box into the steam-chest N, and is connected with and operates the valve, as hereinbefore described. The steam-chest N is attached to the steam-cylinder B in the usual manner, and is constructed with a ledge, *n*, which extends entirely around the inside of the steam-chest N, about midway between the valve-seat on the cylinder-ports and the steam-

chest cover, and forms a seat for a cut-off valve, O, the cut-off valve O being fitted thereto by a steam-tight joint. Under the cut-off valve O is placed the main valve P, which is seated on the cylinder-ports Q Q', and the upper side of the valve P is fitted to the bottom of the cut-off valve O by a ground joint. The main valve P is constructed with two ports, P' and P², which pass through it from top to bottom, through which ports P' and P² steam is alternately admitted to the cylinder-ports Q Q', steam being admitted to the ports P' and P² through an opening, O', in the cut-off valve O. (See Fig. 6.) This cut-off valve O is connected to the valve-stem M by an adjustable collar, R, which projects into the opening O' therein. The cut-off valve O is actuated by the valve-gear hereinbefore described, which valve-gear is propelled by the arm G G', attached to the piston-rod E, each stroke of the piston-rod producing a traverse of the cut-off valve O in the direction opposite to that traveled by the piston. The adjustable collar R is also provided with a lug, R', which projects downward below the bottom of the cut-off valve O into a recess, *r*, in the top of the valve P, so that in the traverse of the cut-off valve O the lug R' engages with the side of the recess *r*, and moves the main valve P a portion of its traverse in the same direction. This action of the lug R' is illustrated in Figs. 2 and 3. In Fig. 2 the lug R' is shown as just engaging with the side of the recess *r* the port P² being in full communication with the cylinder-port Q', and in Fig. 3 the valve P is shown as having been moved by the action of the lug R' thereon, so that the cylinder-port Q is half closed. At this first point in its traverse the lug R' ceases to move the valve P, this being the full extent to which the valve P is moved by the valve-gear. At this point in its traverse the cut-off valve O uncovers the ledge *n* at *n'*, and admits steam between the end *p* of the valve P and the side of the ledge *n*, the pressure of the steam thereon completing the traverse of the valve P at the same time or slightly before the steam is admitted at the end of the valve, as hereinbefore described. The cut-off valve O has covered the edge of the ledge *n* at the opposite end of the valve P, and inclosed the steam between that end of the valve P and the ledge *n*, and, retaining it therein, together with steam from the exhaust escaping through openings *w* (shown partially in dotted lines) on either side of the valve, forms a cushion to receive and sustain the impact of the valve P as it is driven the remainder of its traverse by the live-steam pressure exerted on its opposite end. The stroke being completed, the relative position of the valves P and O are shown at either end of the stroke in Figs. 1 and 4, ready for the return-stroke in either case. The recess *r* in the valve P is also provided with small holes *a* and *a'*, communicating with the valve-ports P' and P². These holes *a a'* serve to supply sufficient steam to the cylinder to start the piston on its return-stroke. (See Figs. 1

and 4.) These holes *a a'*, being small, furnish steam to the cylinder slowly, so as to gradually start the piston on its stroke without jar or shock, and as soon as the piston is started a short distance on its traverse the port is opened, as shown in Fig. 2, by the movement of the cut-off valve O, when steam is supplied through the nearly fully-opened port, driving the piston on its traverse to past the middle of its traverse, as shown in Fig. 3, when the end *p* of the valve P, being exposed to the action of the steam by the movement of the cut-off valve O, closes the port, and all the balance of the traverse of the piston is accomplished by the expansion of the steam until it gradually comes to a rest at the end of its traverse, as shown in Fig. 4. This action of the valves O and P is repeated at each stroke of the piston forward or back. It will readily be seen that when the piston is at rest and steam is admitted to the upper part of steam-chest N it immediately passes through the opening O' in the cut-off valve O, and thence through one of the ports in valve P to the cylinder, and that there can be no point in the stroke where steam will not be admitted at one or the other of the ports, so that it is not possible to stop the pump on a center where it will not take steam. It is also obvious that the steam is by this mechanism supplied to the cylinder in such a manner that it will start and stop without any sudden jerk or jar, as is usual with single direct-acting steam-pumps. The steam, also acting as a cushion to receive the impact of the valve P, prevents any jar from its movement impelled by the force of steam in completing its traverse.

The mechanism shown in dotted lines in Fig. 1 and partially in elevation and partially in dotted lines in Fig. 7 is an auxiliary valve-lever, *v*, being a small lever attached to the end of the journal V', which journal passes through the wall of the steam-chest N, and to its outer end has attached a handle, V, by which the lever *v* is operated. The lever *v* operates in a recess, T, in the side of main valve P. (See Figs. 5 and 7.) This lever is used when necessary to start the valves P off of a center.

It is obvious to those skilled in the art to which this invention appertains that changes both in the form and arrangement of the parts can be made without departing from the spirit of my invention, which will operate well in practice.

Having thus described my invention so as to enable others skilled in the art to which my invention appertains to construct and operate the same, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A main steam-valve having ports through it to admit steam to cylinder-ports, and actuated partially by valve-gear and partially by the action of steam thereon, in combination with a cut-off valve actuated entirely by valve-gear connected therewith, operating on said main valve in the same steam-chest, and regulating

the supply of steam to said main valve, substantially as and for the purpose set forth.

2. In a steam-pump valve-gear, the combination of the adjustable arm $G G'$, attached to the piston-rod E, and the guide H on the frame A, with the oscillating lever J, the connecting-rod L, and valve-stem M, for actuating the cut-off valve O, operating over the main valve P, and for partially actuating said main valve P, substantially as and for the purpose set forth.

3. The steam-chest N, constructed with a ledge, n , in combination with the cut-off valve O, seated and operating on said ledge n , substantially as set forth.

4. The main valve P, having a recess, r , in the top thereof, ports $P' P^2$, for supplying

steam to the cylinder-ports, and holes $a a'$, forming communications between the recess r and ports P' and P^2 , constructed and operating substantially as and for the purpose set forth.

5. In combination with the valve-stem M, the adjustable collar R, fitting into the opening O' in cut-off valve O, and provided also with projection R, operating in recess r in main valve P, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ALBERT J. BLAKESLEE.

Witnesses:

J. T. MILLIGAN,

E. B. SIMONS.