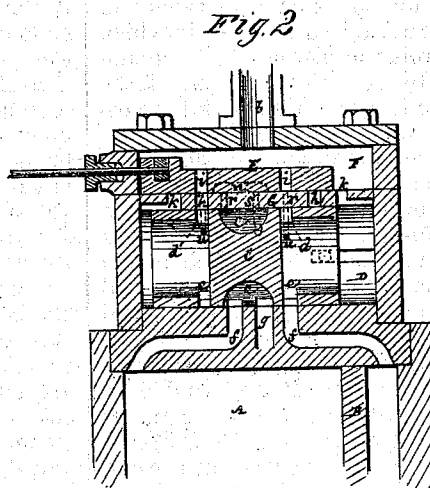
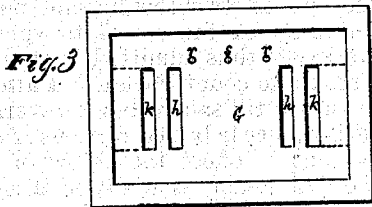
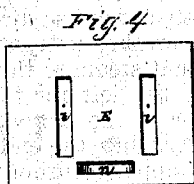
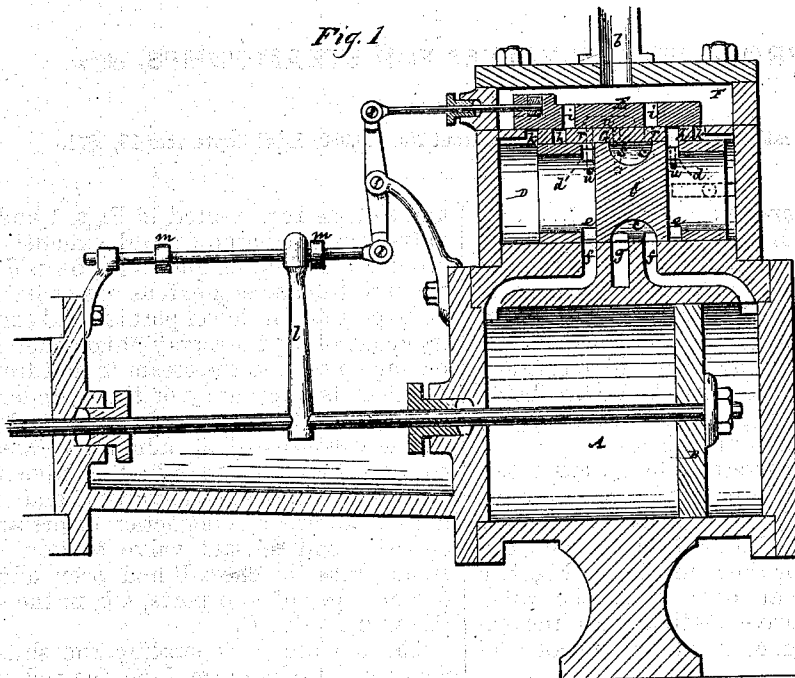


JOSEPH W. HOPKINS.

Improvement in Valves for Steam Pumps, &c.

119,030.

Patented Sep. 19, 1871.



WITNESSES

Fred Humes
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JOSEPH W. HOPKINS, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF, ALBERT G. BEARUP, AND PATRICK CARRAHER, JR., OF SAME PLACE.

IMPROVEMENT IN VALVES FOR STEAM-PUMPS, &c.

Specification forming part of Letters Patent No. 119,030, dated September 19, 1871.

To all whom it may concern:

Be it known that I, JOSEPH W. HOPKINS, of the city, county, and State of New York, have invented a new and useful Improvement in Valves for the Steam-Cylinders of Steam-Pumps and Direct-Acting Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a vertical longitudinal section of a steam-pump, in part, with my improvement applied to it; Fig. 2, a similar view of the valves of the steam-cylinder in a reverse position to that shown for them in Fig. 1; Fig. 3, a plan of the valve-seat, over which the valve that receives a positive motion from the engine travels; and Fig. 4, an under view of said valve.

Similar letters of reference indicate corresponding parts throughout the several figures.

My invention relates to that system of combination of valves for the steam-cylinders of steam-pumps and direct-acting engines, in which the valve that controls the piston of the steam-cylinder is moved by the direct action of the steam as admitted to it by a valve having a positive motion from the piston or mechanism connected therewith; and the invention consists in a novel construction and arrangement of said valves, their ports and passages, whereby a most efficient action is obtained, and, among other advantages, the valve that controls the piston of the steam-cylinder is both shut and stopped by the live steam, and counterbalanced by said pressure when at rest.

A in the accompanying drawing represents the steam-cylinder of a steam-pump, and B its piston. C is the valve that directly controls the motion of said piston, and D its cylinder or case. E is the valve that is operated at the end of the piston's stroke by a positive motion from the piston through a tappet motion or other suitable mechanism. F is the valve-chest, to which the live steam is admitted as by a pipe, b. Both valves are slide ones, but the valve C, preferably made cylindrical, in which case it may be restrained from turning by a guide-pin

and slot, as represented in Figs. 1 and 2. Said valve has an outer central exhaust-cavity, *c*, around it, and upper and lower parts *d d* and *ee*, through tubular end-extensions of its central or body portion, the lower ports *ee* and exhaust-cavity *c* controlling the ways *f f* and general exhaust-passage *g* to pass the steam to and from the opposite ends alternately of the cylinder A. The upper ports *d d* in the valve C control ports *h h*, in the valve-seat G, to admit live steam alternately through ports *i i* in the valve E for the purpose of stopping the valve C and of producing a counterbalancing action or pressure on the opposite end of said valve to that on which steam from the chest F had been admitted by one or other of two ports, *k k*, in the seat G, to throw the valve C.

The devices for operating the slide-valve E may consist of an arm, *l*, on the rod of the piston B, arranged to strike alternately stops *m m* upon a rod which is connected with a lever that actuates said valve. The valve E, thus suddenly thrown alternately in reverse directions at the ends of the piston's stroke, alternately uncovers the ports *k k* to admit steam to throw the valve C to the right or to the left for the purpose of reversing the motion of the piston, and shortly before the valve C reaches the end of its throw brings either port *i* opposite either port *h* to admit live steam through either port *d* to stop the valve C at the end of its throw by said port *d* then coming in line with the port *h*, to which it pertains. The steam thus admitted to stop the valve C also serves to counterbalance it after it has been thrown and till said valve is reversed, such action taking place in both directions of said valve's travel; but to effect the throw of the valve C by the live steam, as admitted through either port *k*, it is necessary to get rid of the live steam admitted by either one set of ports, *i*, *h*, and *d*, to stop said valve C, and counterbalance it when at rest. To accomplish this the valve E is provided with an exhaust cavity, *n*, which, when said valve is uncovering a port, *k*, comes over the one of a pair of ports, *r r*, in the cylinder D and valve-seat G, and over a further port, *s*, in said cylinder and valve-seat to pass the live steam from the reverse end of the valve C by the

one of a pair of ports, *u u*, in the valve *C*, to the exhaust-cavity *c* and general exhaust-passage *g*, thus providing for the throw of the valve *C* by the live steam, either one set of ports *u r* being alternately brought in line to relieve the valve *C* as or shortly before it is thrown first to the one side and then to the other.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination of the ports *i i* in the valve *E* and ports *d d* in the valve *C* with the station-

ary ports *h h* and *k k*, when arranged substantially as and for the purposes herein set forth.

2. The combination, with the elements recited in the preceding claim, of the ports *u u r r s* and exhaust-cavities *n* and *c*, arranged in relation with each other, essentially as shown and described.

JOSEPH W. HOPKINS.

Witnesses:

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