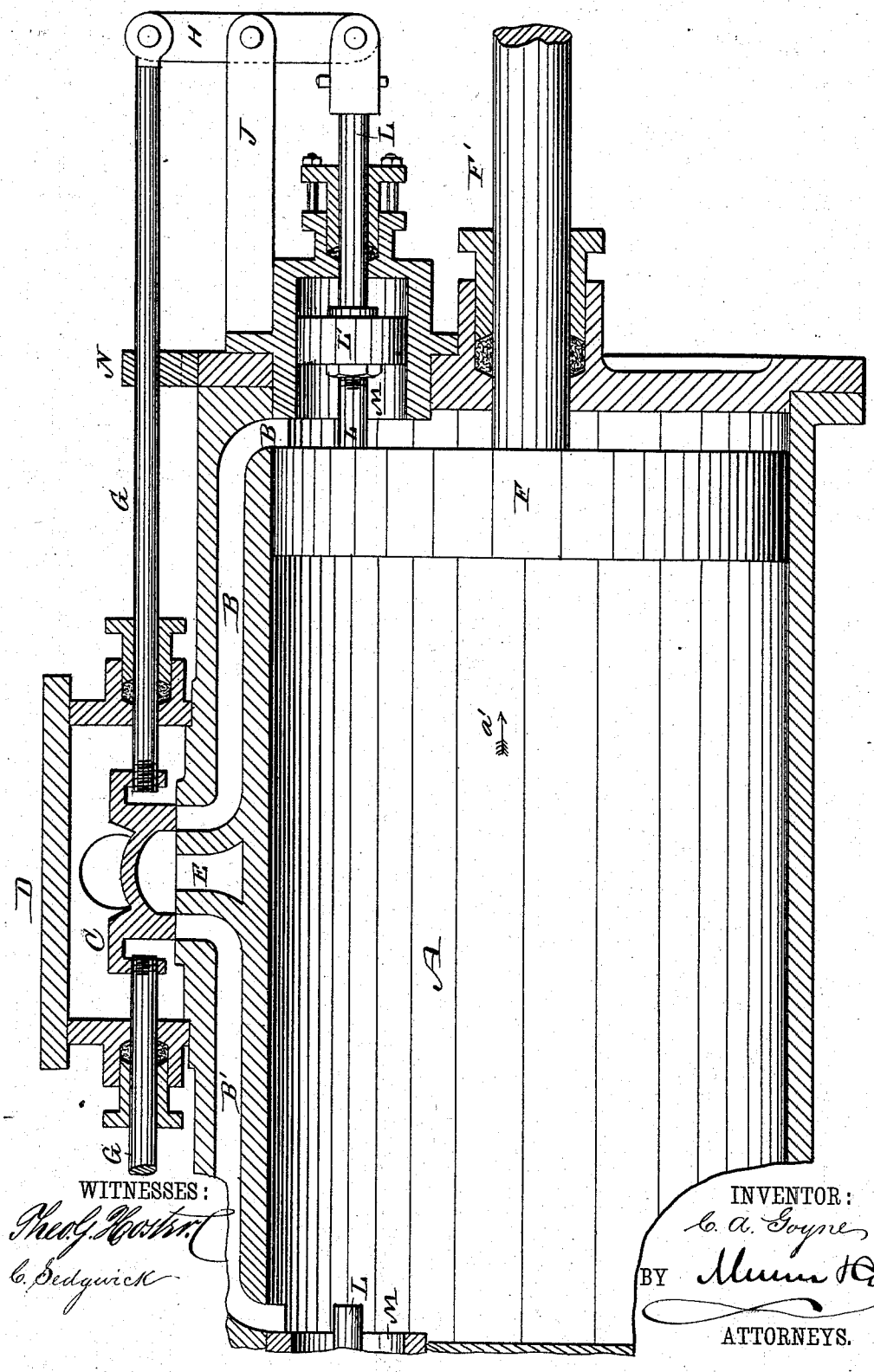
(No Model.)

C. A. GOYNE.

OPERATING VALVES OF STEAM PUMPS.

No. 289,250. Patented Nov. 27, 1883.



WITNESSES:

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UNITED STATES PATENT OFFICE.

CHARLES A. GOYNE, OF ASHLAND, PENNSYLVANIA, ASSIGNOR TO HIMSELF, FRANCIS H. GOYNE, THOMAS R. GOYNE, AND ARTHUR H. GOYNE, ALL OF SAME PLACE.

OPERATING VALVES OF STEAM-PUMPS.

SPECIFICATION forming part of Letters Patent No. 289,250, dated November 27, 1883.

Application filed March 10, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. GOYNE, of Ashland, in the county of Schuylkill and State of Pennsylvania, have invented certain new and useful Improvements in Operating Valves of Steam-Pumps, of which the following is a full, clear, and exact description.

The object of my invention is to produce certain new and useful improvements in operating the valves of steam-pumps, whereby the pump will be operated regularly and the pump-cylinder completely filled after each stroke.

Reference is to be had to the accompanying drawing, forming part of this specification, in which a longitudinal sectional elevation of the steam-cylinder of a steam-pump provided with my improved valve-gear is shown.

The steam-cylinder A is provided with the alternating inlet and outlet ports B B′, with the slide-valve C in the steam-chest D, and with the outlet E for the exhaust-steam, all in the usual manner. The steam-piston F fits closely in the cylinder, and is provided with the piston-rod F′, connected directly with the pump-cylinder piston.

To the slide-valve C two rods, G, are attached, which project from the opposite ends of the steam-chest, and are suitably packed. The outer end of each rod G is pivoted to the upper end of a vertical lever, H, pivoted in the end of an arm, J, projecting from the end of the cylinder.

To the lower end of the lever H a piston-rod, L, is pivoted, on which a small piston, L′, is mounted, which piston L′ fits closely in a small cylinder, M, formed in the cylinder-head and projecting from the same, which cylinder is closed at the outer end and open at the inner end. The piston-rod L is suitably packed in the outer end of the small cylinder M. The piston-rod L projects from the inner surface of the piston L′ into the cylinder A. The rods G are preferably guided in standards N on the ends of the cylinder A.

The above-described mechanism is provided on both ends of the cylinder. Instead of constructing the piston-rod L in such a manner that it projects into the cylinder, the piston L′ may be lengthened, or may be provided with a suitable projection extending into the cylinder A.

The operation is a follows: If the piston F moves in the direction of the arrow *a′*, it strikes against the inner end of the rod L at the right-hand end of the cylinder, and moves the same in the direction of the arrow *a′*, thereby moving the rods G and the slide-valve C in the inverse direction of the arrow *a′*, so that the valve closes both ports B B′, as shown, whereby the steam will be cut off. The steam in the cylinder expands and moves the piston F a short distance farther in the direction of the arrow *a′*, and the piston forces the rod L a corresponding distance in the direction of the arrow *a′*, and the rod G will be forced a like distance in the inverse direction of the arrow *a′*, whereby the port B will be opened slightly. Live steam passes through the said port into the right-hand end of the cylinder A, and, acting on the piston L′, forces the same in the direction of the arrow *a′*, whereby the valve C will be moved in the inverse direction of the arrow until the ports B and B′ are open. The live steam then enters the through the port B and forces the piston F in the inverse direction of the arrow *a′*, the exhaust-steam being forced through the port B′. When the piston F arrives at the left-hand end of the cylinder, it strikes against the left-hand rod L, causing the rods G to be moved in the direction of the arrow *a′*, whereby the ports B B′ will first be closed, and then the valve will be moved slightly to the right, to permit the live steam to pass through the port B′ and act on the piston L at the left-hand end of the cylinder, whereby the valve C will be moved to the right until the ports B B′ are entirely open, and so on. If desired, a buffer-spring of some suitable kind may be placed in the ends of the rods L or on the piston F, to prevent them from being damaged by striking against each other.

Small spigots can be provided at the outer ends of the small cylinders M, to leave the steam escape that leaks through the piston. If not removed, this steam would create a back-pressure on the pistons L′.

It will be observed that the back end of my valve-cylinder M is entirely open at the end

which enters the main cylinder, while the large piston takes the place of a back head to said cylinder M. At the junction of the open ends of the two cylinders the supply-port B enters the main cylinder, so that both cylinders are supplied by the use of a single slide-valve C of the usual kind. As the main piston approaches the end of its stroke and strikes the rod or tappet L, the slide-valve C is moved so as to open slightly. This causes the piston to stop, and then slowly to move in the opposite direction until the pressure of the column of water to be lifted exercises a counter-pressure. At this point my steam movement comes into play with great advantage. The slide-valve C being but slightly open, the steam admitted is insufficient to act upon the valve-piston L′, because the space formed by the slowly-receding piston F of the large cylinder makes room enough for it; hence the piston F now rests upon the weight to be lifted, and the pressure increases until the valve-piston L′ is moved and the valve C thrown wide open. The main piston F now moves on with increasing speed to the end of its stroke without the jar common to other movements. When used with two large pumps, it will stop the pump automatically as soon as the reservoir is emptied of water. This is the effect produced by the use of piston F as the head for valve-cylinder M. As soon as the pump begins to take on air, the main piston is moved so far before there is sufficient resistance to open the valve that thereafter sufficient speed is not obtained to move the main piston to the end of its stroke and act upon the rod L for reversing the valve; hence the pump will stop.

Pumps actuated by the usual movements move off rapidly as soon as the pump begins to take on air, and if there is no one present to shut off steam great damage ensues.

Having thus described all that is necessary to a full understanding of my invention, what I claim as new is—

The cylinders A and M, open at their junction, and the steam-supply ports B, arranged to supply steam at said junction, in combination with the pistons F L′, the rods L, levers H, rods G, and valve C, whereby the operation and effect will be substantially as described.

CHARLES A. GOYNE.

Witnesses:
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