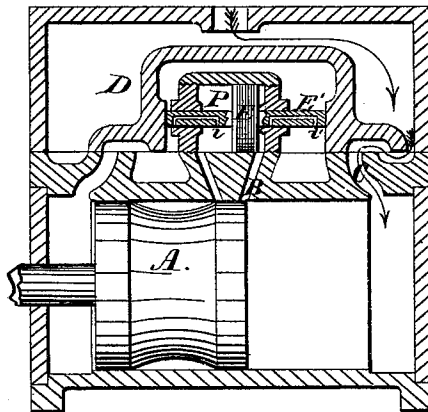


E. HILL, Jr.

VALVES FOR STEAM-ENGINES.

No. 174,956.

Patented March 21, 1876.



Witnesses:

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UNITED STATES PATENT OFFICE.

EBENEZER HILL, JR., OF SOUTH NORWALK, CONNECTICUT.

IMPROVEMENT IN VALVES FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **174,956**, dated March 21, 1876; application filed February 15, 1876.

To all whom it may concern:

Be it known that I, EBENEZER HILL, Jr., of South Norwalk, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Valves for Steam Pumps and Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in valves for steam-engines, especially such as are used for working steam-pumps, direct-acting engines, &c., whereby it is designed to provide a more simple, durable, compact, and improved means for working the said valves by the direct action of steam, admitted by means of cavities or ports, establishing communication from the main cylinder to an auxiliary cylinder located within the exhaust-channel of the main slide-valve, the main piston acting or performing the duty of a cut-off.

The especial improvements consist in the arrangement of an auxiliary cylinder within the exhaust-port of the main slide-valve, with its piston-valve, and of the ports of the valve relatively thereto, and the working of the main valve automatically, as will be hereinafter more fully described.

Referring to the accompanying drawings, Figure 1 represents a longitudinal vertical section of a steam-engine cylinder and valve-chest, with valves therein, in illustration of my improvements.

It will be seen that the main-valve chest is on top of the engine-cylinder. The main valve being moved in the direction of the arrow, the live-steam port C is opened to admit steam to the cylinder, and press the main piston forward, until the induction-port B, which admits steam to the auxiliary cylinder is uncovered to act on the piston-valve E, which throws the main valve in the opposite direction, where it is held by the expansive force of the steam by which it was moved until the main piston has performed its

corresponding or reciprocating movement. When, on its return stroke, a similarly-arranged port, B, is uncovered, the next flow of live steam from the main cylinder entering on the opposite side of the piston-valve, throwing the main valve in the opposite direction, and so on alternately. Thus it will be seen that the main piston performs the function of a cut-off, and reciprocates with the auxiliary piston and the main valve, whereby rapid motion or great velocity of speed may be acquired.

The exhaust from the cylindrical valve may be arranged in any well-known manner, but, as presented, it passes through two small ports, one on each end of the valve-stem communicating with a longitudinal port through the said stem to the exhaust-passage of the engine.

It is evident that the construction is simple, cheap, and easily operated, without being liable to get out of order, as is usual with so many self-operating valves of complicated construction, and thus secure a great saving not only in its manipulation and repairs, but also in first cost.

The main cylinder is cast in the usual manner, having the ordinary steam-ports therein, but it may be cast with the auxiliary cylinder, and its relative ports in the same casting which may be bored out in the usual manner common to machinists, and which method I prefer.

The auxiliary cylinder is supplied with steam through the ports B B', which will be hereinafter more fully described.

The main cylinder is supplied with the usual steam-chest, the main valve D being cast with the exhaust-port, considerably enlarged, so as to inclose the auxiliary cylinder within the exhaust-cavity. This cylinder D is rigidly fixed to the face of the main cylinder, as before stated, the exhaust steam on its eduction entirely surrounding it. A cylindrical or piston valve is inserted, the stems of which pass through the ends of said auxiliary cylinder, fitting snugly against the inner side of the walls of the exhaust-cavity of the main valve.

Any leakage around the main valve will not materially effect its operation, as such steam

may pass through the ports communicating with the auxiliary cylinder to the general exhaust or eduction passage.

The lap or lead of the valves may be provided for in any of the well-known methods.

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

1. The combination of the stationary auxiliary cylinder upon the valve-face of main cylinder and the valve, said cylinder being located within the exhaust-passage of the main valve, substantially as described.

2. The combination of fixed cylinder P, valve D having its enlarged exhaust-passage and

piston-valve E, substantially in the manner and for the purpose set forth.

3. The combination of the main piston A, ports B B', auxiliary cylinder P, valve E, with its stem E, having ports 1 2 3, with the main valve D, all arranged to operate said main valve in the manner and for the purpose set forth.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

EBENEZER HILL, JR.

Witnesses:

C. H. DISBROW,
O. T. EARL.