

Maxwell & Cope.

Steam Engine.

No. 56,242.

Patented July 10-1866.

Fig. 1.

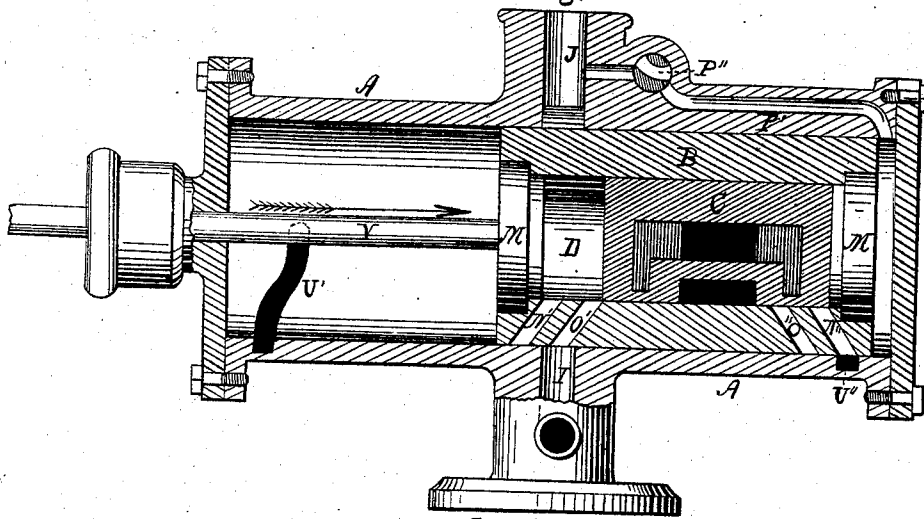


Fig. 2.

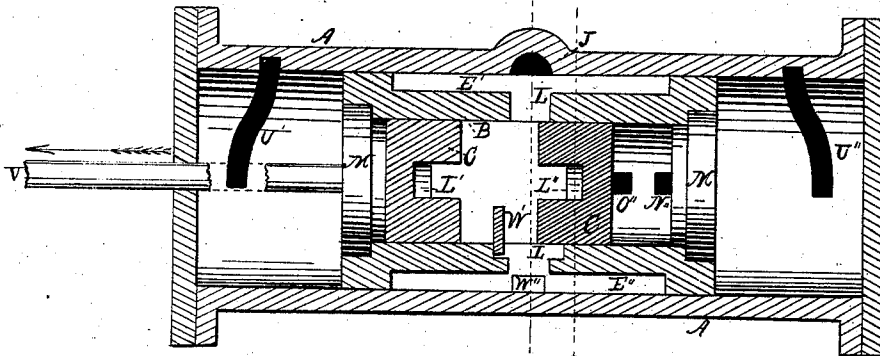


Fig. 3.

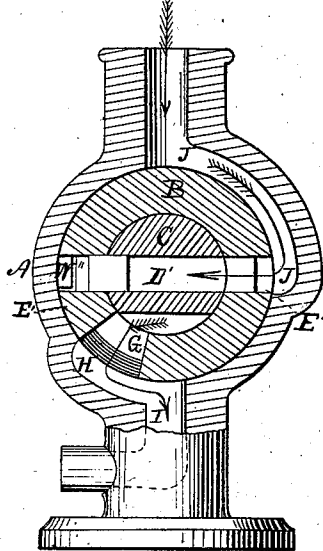


Fig. 4.

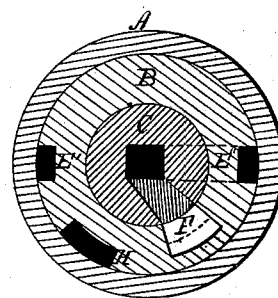
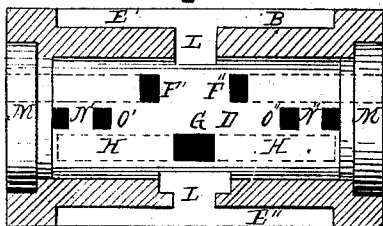


Fig. 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

JAMES R. MAXWELL AND EZRA COPE, OF CINCINNATI, OHIO.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. 56,242, dated July 10, 1866.

To all whom it may concern:

Be it known that we, JAMES R. MAXWELL and EZRA COPE, of Cincinnati, in the county of Hamilton, and in the State of Ohio, have invented a new and Improved Plan for Constructing Steam-Engines; and we hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section lengthwise through the steam-cylinder, piston, and valve, with the piston at the end of its stroke, and the valve in the act of moving for a return stroke. Fig. 2 is a horizontal section through the steam-cylinder and valve, with the piston in the middle of the cylinder and moving to the left, with the valve in the proper position for completing the stroke. Fig. 3 is a cross-section through the cylinder, piston, and valve in the line 1 1, Fig. 2, showing the main steam supply and exhaust ports. Fig. 4 is a cross-section through the cylinder, piston, and valve in the line 2 2, Fig. 2, showing the main steam supply and exhaust ports. Fig. 5 is a horizontal section of the main piston with the valve removed, showing the steam-ports for supply and exhaust for main and valve cylinders.

The nature of our invention consists in the construction of a steam-engine with a cylinder and piston suited to each other, so as to have the piston perform the function of a valve in opening and closing the ports of steam-passages, when accomplished by making the piston as much longer than the stroke as is required to cover the ports at each end of the cylinder alternately when in operation; also, in the arrangement of steam-passages to the interior of such a piston as described, wherein a main piston-valve is so arranged with its passages and cavities as to properly communicate with the passages in the piston to change and direct the flow of steam in order to effect the reciprocating motion of the piston without external valve-gear.

To enable others skilled in the art to make and use our invention, we will proceed to describe its construction and operation.

The main cylinder A is provided with a steam-connection, J, on top and exhaust-pipe I at the bottom, near the center, between the ends, and has a channel, U' U'', near each end

in its inner surface, which, when covered by the piston B, forms steamways for operating the valve C, as hereinafter described. There is a small side pipe and valve, P' P'', leading from the high steam-pipe J to one end of the cylinder A, used for starting the engine should the valve C cover the ports F' F''. For pumping-engines this cylinder has a foot in the middle, serving for the exhaust; also supports the cylinder. The piston B is a long cylinder turned to fit the bore of the cylinder A accurately, and has heads M M screwed into its ends, to one of which the piston-rod V is attached.

In each side of the piston is a channel, E' E'', longer than the stroke of the engine, one of which communicates with the high steam-pipe J. In the center of each channel is a port, L, through which steam passes into and through the valve C to the opposite one, by which one port balances the other. Near the bottom of the piston is a channel, H, longer than the stroke, with a port, G, in the middle for the escape-steam. Near each end of the piston are two small ports, N' N'' O' O''. The ones nearest the ends pass over the recesses U' U'' alternately for supplying steam to the interior of the piston B for moving the cylindrical valve C. The ports O' O'' are for exhausting the steam from the valve, the recesses U' U'' in the inner surface of the main steam-cylinder, reaching from the high steam-channel E in the side of the piston B to convey steam to the valve-chamber. The guides W' W'' in the piston and valve are to keep them from turning round, so that the ports may always be in proper position when the piston and valve move back and forth.

To operate, steam is admitted from the source of supply and passes into J on top the cylinder A', Fig. 1, and around channel J, Fig. 3, into channels E' E'' in the piston B, Figs. 2, 3, 4, 5, through openings L L to steam-passage L' L'', Fig. 2. The main piston B', Fig. 1, is represented as having completed its stroke to the right, and the valve C is receiving steam for the return stroke, Fig. 1, from port N'', through recess U'' and channel E, which will move the valve C to the left, as shown in Fig. 2, thereby bringing port L'', Fig. 2, in communication with F' for supply, and port G with channel H for exhaust, Figs. 3, 5; thence

to opening I, Figs. 1, 3, and to the atmosphere, as indicated by the black arrow, Fig. 3, at the same time that the piston B has come into position to admit steam to the valve-chamber D'' by bringing port N'' over recess U'' for supply. The steam is exhausted from the opposite end of D' by port O' coming over I, which leaves the valve free to move to the exhausted end until it passes over the exhaust-port O'', when it begins to cushion on the steam or air contained therein, and gradually stops the valve. The main piston B will move in the direction of the arrow, Fig. 2, by virtue of the supply-steam, until it reaches the end of its stroke, when the reverse motion takes place in the same manner as before described.

Should the valve C stop in a position to close the ports F' F'', steam is admitted by valve P' and side pipe, P'', Fig. 1, into the main cylinder A, moving the piston B to the opposite end, when the valve C will be set aright, and the piston will move back and forth continuously as long as steam is supplied.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The piston-head of a steam-engine longer than its stroke, in the manner and for the purpose herein described.

2. The piston-head of a steam-engine longer than its stroke, with channels and ports in its sides, in combination with a cylinder having corresponding added length and ports leading to and from the main steam-valve, in the manner and for the purpose substantially as described.

3. The cylindrical piston-valve C, with closed ends, and steam-openings through its sides and bottom, whereby to operate within the main piston, substantially as described.

4. The independent steam pipe and valve P P, for admitting steam to the main piston B in cylinder A, in the manner and for the purpose herein described.

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Witnesses:

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