No. 847,028. PATENTED MAR. 12, 1907.

D. C. SPRINGER.

STEAM ACTUATED VALVE FOR ENGINES.

APPLICATION FILED MAY 29, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

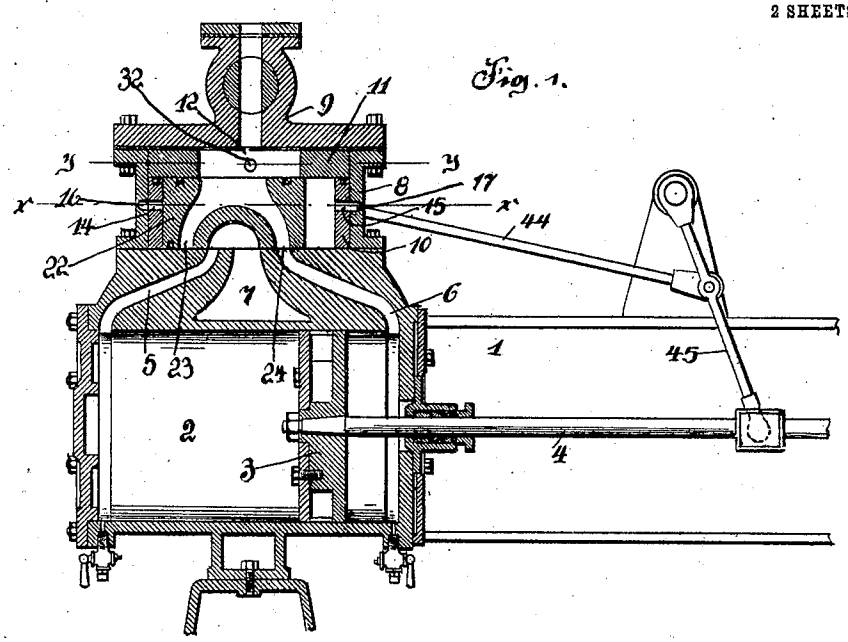


Fig. 2.

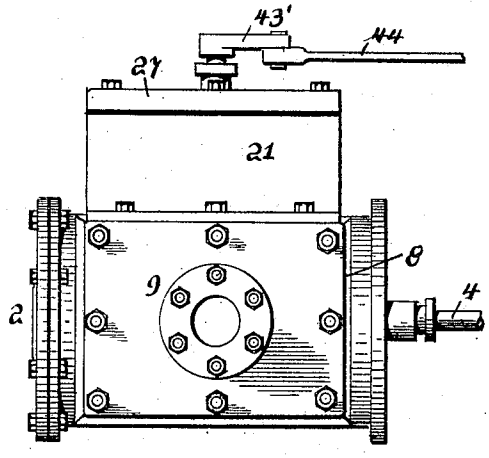
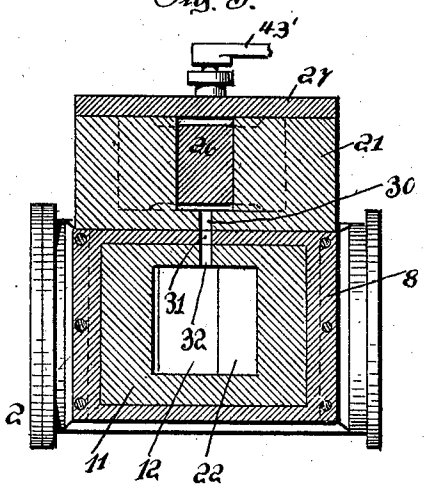


Fig. 3.



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STEAM ACTUATED VALVE FOR ENGINES.

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2 SHEETS—SHEET 2.

Fig. 4

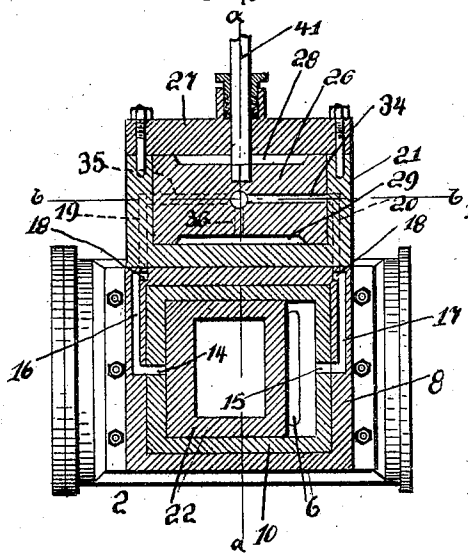
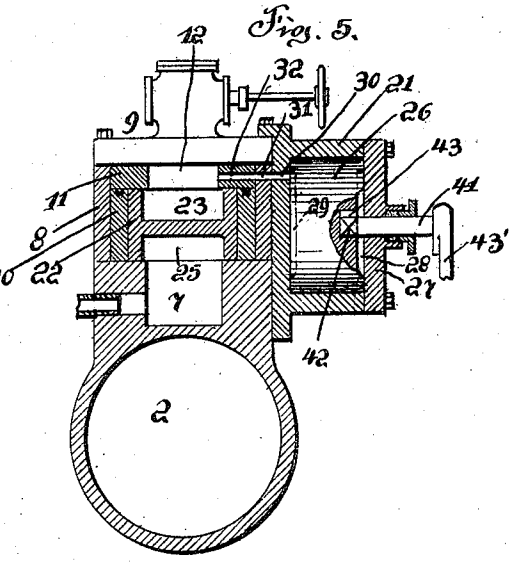


Fig. 5.



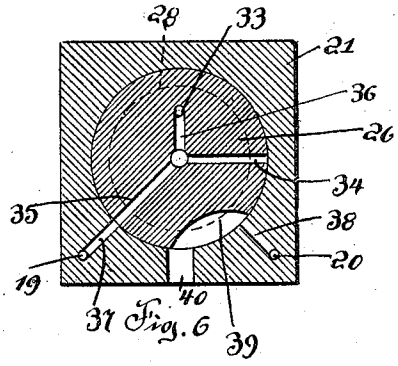


Fig. 6

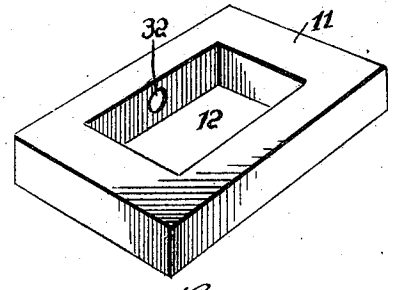


Fig. 7.

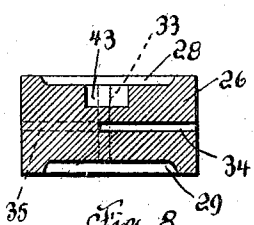


Fig. 8.

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UNITED STATES PATENT OFFICE.

DANIEL C. SPRINGER, OF CONNELLSVILLE, PENNSYLVANIA.

STEAM-ACTUATED VALVE FOR ENGINES.

No. 847,028. Specification of Letters Patent. Patented March 12, 1907.

Application filed May 29, 1906. Serial No. 319,308.

To all whom it may concern:

Be it known that I, DANIEL C. SPRINGER, a citizen of the United States of America, residing at Connellsville, in the county of Fayette and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Actuated Valves for Engines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to certain new and useful improvements in steam-actuated valves for engines; and the invention relates more particularly to the steam-chest and slide-valve mechanism of an engine.

The invention while applicable to simple and compound engines can be used in connection with marine engines and many other classes wherein a steam-chest and slide-valve are used.

The object of my invention is to provide a simple and effective slide-valve mechanism and positive and reliable means for insuring a perfect operation of the same. To this end I dispense with the ordinary reciprocating valve-stem heretofore actuated by an eccentric to reciprocate the slide-valve and employ steam for moving the slide-valve, the operation of said valve being controlled by a suitably-operated oscillatory valve.

The detail construction of my improved slide-valve and its actuating mechanism will be hereinafter more fully described, illustrated, and specifically claimed.

Referring to the drawing forming part of this specification, like numerals of reference designate corresponding parts throughout the several views, in which—

Figure 1 is a vertical sectional view of a portion of an engine constructed in accordance with my invention. Fig. 2 is a plan of the same partly broken away. Fig. 3 is a horizontal sectional view taken on the line *y y* of Fig. 1. Fig. 4 is a similar view taken on the line *x x* of Fig. 1. Fig, 5 is a cross-sectional view, partly in elevation, taken on the line *a a* of Fig. 4. Fig. 6 is a transverse sectional view of the oscillating valve, taken on the line *b b* of Fig. 4. Fig. 7 is a perspective view of a plate used in connection with the steam-chest, and Fig. 8 is a detail sectional view of the oscillating valve.

In the accompanying drawing I have illustrated a portion of a simple stationary engine 1, consisting of a cylinder 2, having piston 3, a piston-rod 4, inlet-ports 5 and 6, and an exhaust-port 7. Upon the cylinder 2 is secured a steam-chest 8, having a valve-head 9, through which steam passes into the chest 8.

To put my invention into practice, I mount a rectangular frame 10 within the chest 8, said frame being of a less depth than said chest to accommodate a plate 11, having a central opening 12, the object of which will presently appear. The frame 10 is provided with end ports 14 and 15, communicating with cross-ports 16 and 17, respectively, formed in the ends of the chest 8, said ports extending downwardly at one side of the chest, as at 18, to connect with end cross-ports 19 and 20, formed in a valve-casing 21, secured at the side of said chest.

In the frame 10 is slidably mounted a reciprocating valve-body 22, having communicating inlet-ports 23 and 24 formed therein, also a cup-shaped cavity 25, through which the exhaust-steam passes from the cylinder 2. The valve-body corresponds in height to the frame 10, but is of a less length than said frame, whereby the valve-body can be reciprocated upon the cylinder 2 by steam entering the clearance of the frame 10 through ports 14 and 15 of said frame.

In the valve-casing 21 is mounted an oscillating cylindrical valve 26, retained in said casing by a head 27 secured thereto. The faces of the valve are recessed, as at 28 and 29, and communicating with the recess 29 is a port 30, formed in the casing 21, and through the medium of this port a port 31, formed in the side of the chest 8, and a port 32, formed in the frame 11, establish communication between the valve 26 and the cylinder 2.

The valve 26 a short distance from its axis is provided with a transverse port 33, establishing communication between the recesses 28 and 29 of said valve, thereby providing an equal-balanced valve. The port 33 connects with two radially-disposed ports 34 and 35 by virtue of a port 36.

The ports 34 and 35 are adapted to communicate with angularly-disposed ports 37 and 38, which in turn communicate with the ports 19 and 20 of the valve-casing 21. The valve 26 has its periphery cut away to provide an exhaust-passage 39, adapted to establish communication between the exhaust-port 40, formed in the casing 21, and the ports 37 and 38 of said casing.

To oscillate the valve 26, I provide the head 27 with a shaft 41, having an inner rectangu-

lar end 42, which engages in an oblong socket or recess 43, formed in the face of the valve 26. The oblong socket or recess allows the valve-body to settle as it is worn and maintain tight connection between the under side of said valve and its casing. The outer end of the shaft 41 carries a crank-arm 43′, which is connected by a rod 44 to a pendulum 45, oscillated by the piston-rod 4 of the engine or its equivalent.

In operation I will assume that steam is entering the opening 12 of the plate 11 through the valve-head 9 and is passing through the port 24 of the valve 22 into the port 6 of the cylinder 2 and is forcing the piston 3 forwardly. The steam of the cylinder is exhausting through port 5 and exhaust-cavity 25 to the port 7. When the piston 3 has nearly completed its stroke, the valve 26 is oscillated through the medium of the shaft 41, rod 44, and pendulum 45 to move the reciprocating valve 22 and allow the cylinder 2 to take steam through the port 5. Since steam can enter the cylindrical valve 26 through ports 32 31 30 33 36 and ports 34 and 35, the steam entering the port 35 will pass into ports 37 and 19 of the valve-casing, ports 18 and 16 of the steam-chest 8, and port 14 of the frame 10, forcing the valve 22 to the opposite end of the frame 10, thereby establishing communication between the ports 6 and 7 and allowing the cylinder 2 to take steam through the ports 23 and 5. The oscillation of the valve 26 just described places the ports 15, 17, 18, 20, and 38 in communication with the exhaust-passage 39 of the valve 26 and the exhaust-port 40 of the valve-casing 21.

It will thus be observed that the ports in the ends of the steam-chest 8 and valve-casing 21 alternately serve as inlet and exhaust ports for the steam-chest alone, while the port 7 serves functionally as an exhaust for the cylinder 2 independently of the ports of the steam-chest or valve-casing.

From the foregoing it is thought that the construction, arrangement of parts, and operation of my improved steam-chest, together with the valve-actuating mechanism thereof, will be understood without further description, and it is obvious that such changes in the size, proportion, and minor details of construction are permissible by the appended claims.

What I claim, and desire to secure by Letters Patent, is—

1. In a steam-actuated valve for engines, the combination with a cylinder having inlet and exhaust ports, and a piston working in said cylinder, of a steam-chest mounted on the cylinder and provided with a valve-head, a frame fitting the said walls of said steam-chest and being of less height than the said steam-chest, ports in the side walls of said frame, and communicating ports in the side walls of the steam-chest, a reciprocating valve mounted in said frame having inlet-ports and an exhaust-port, a second steam-chest connected to the first-mentioned steam-chest, a cylindrical valve mounted in said second-named steam-chest, having recessed faces, and having ports communicating with the aforesaid ports in the walls of the first-mentioned steam-chest, a stem connected to said cylindrical valve, and connections between said stem and the piston-rod of the engine whereby said cylindrical valve is operated as the piston in the cylinder is reciprocated.

2. In a steam-actuated valve for engines, the combination with a cylinder having inlet and exhaust ports, and a piston working therein, of a steam-chest secured to said cylinder, a frame fitted within said steam-chest and of less height than the said chest, ports in said frame, and registering ports in the walls of the steam-chest, a plate fitted on top of said frame and having a central opening, a valve fitted within the frame to reciprocate beneath said plate, and having inlet and exhaust ports, a second steam-chest secured to the first-mentioned steam-chest, ports for establishing communication between the second-named steam-chest and the ports in the walls of the first-mentioned steam-chest, a balanced valve in said second-named steam-chest, a stem connected to said valve, and connections between said stem and the piston-rod of the cylinder whereby the valve is actuated as said piston is reciprocated, substantially as described.

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

DANIEL C. SPRINGER.

Witnesses:
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JOHN W. NELSON.