J. A. PRINCE.

Valves and Gearing for Steam-Engines.

No. 165,687. Patented July 20, 1875.

Fig. 2

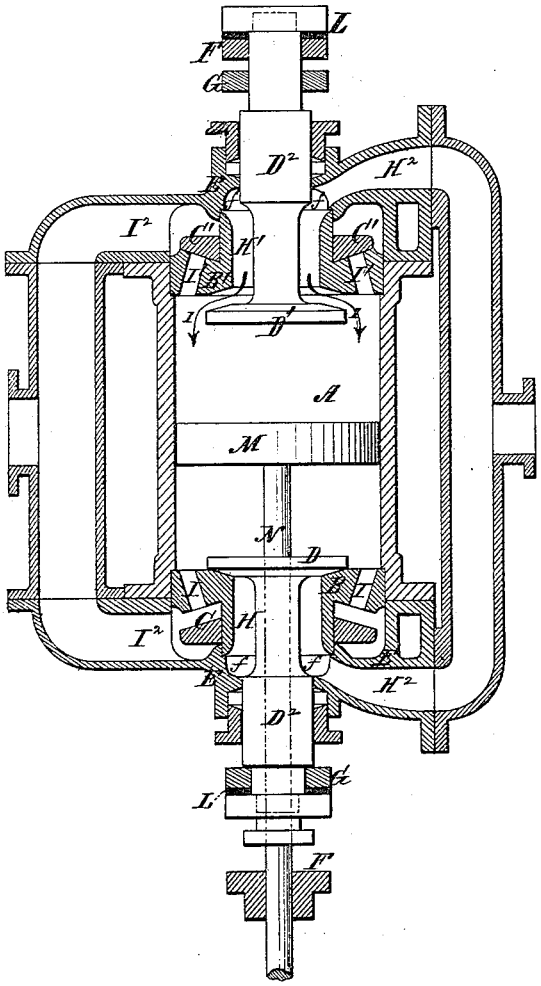


Fig. 1

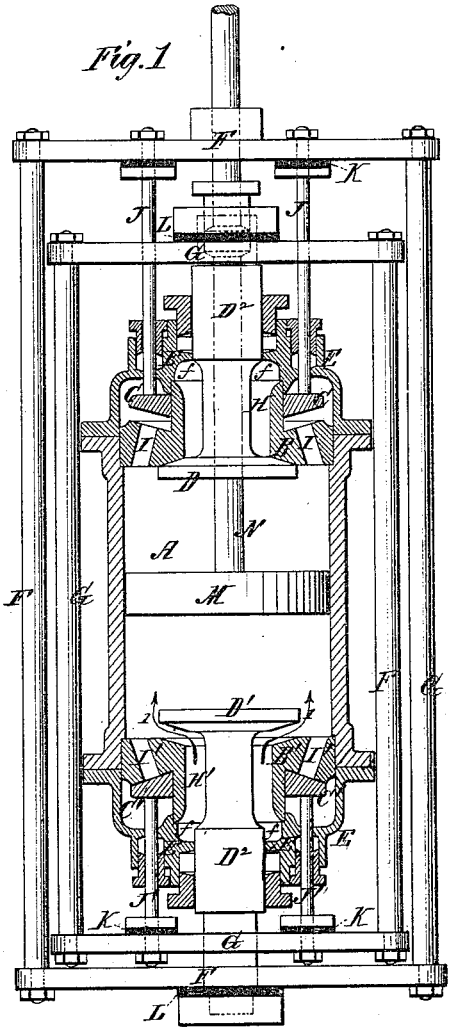


Fig. 3

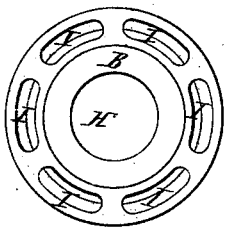
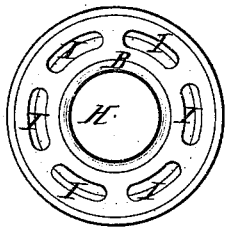


Fig. 4



Witnesses.
James Mastin Jr.
J. N. Campbell

Inventor:
John A. Prince,
by
Mason, Fenwick & Lawrence
attorneys.

UNITED STATES PATENT OFFICE.

JOHN A. PRINCE, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN VALVES AND GEARINGS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. **165,687**, dated July 20, 1875; application filed May 19, 1875.

To all whom it may concern:

Be it known that I, JOHN A. PRINCE, of Pittsburg, county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Valves and Valve-Gearing of Steam, Pneumatic, and Hydraulic Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a vertical section of an engine-cylinder, having two of my improved valves applied to it, said valves being arranged to be operated by my improved gearing, and the piston shown arranged to be guided from above. Fig. 2 is a vertical section, taken at right angles to the section shown by Fig. 1. In this view the piston is shown as arranged to be guided from below the cylinder. Figs. 3 and 4 are views of the upper and under faces of the valve-seat.

The nature of my invention consists in certain constructions and combinations of parts, as hereinafter described and specifically claimed, whereby the valve-seats and valves of an engine can be constructed within the cylinder, against the cylinder-heads, and each end of the cylinder be provided with receiving and exhausting passages, and the receiving-valves of said passages be opened at the proper times by the pressure of the steam upon the receiving-valves at the respective ends of the cylinder, and the simultaneous acting of sliding frames upon said valves; and whereby, also, the exhaust-valve at one end of the cylinder can be closed and the exhaust-valve at the other end opened simultaneously with the opening of a receiving-valve at one end of the cylinder, and the closing of a similar valve at the other end thereof.

In Fig. 1 of the drawings, A is the cylinder of the engine; E E, its heads, and B B′ receiving and exhaust valve-seats, arranged within the cylinder against the heads. Each seat has a central receiving-passage, H or H^1, and a series of exhaust-passages, I, and the inner faces of the cylinder-heads are made with channels or chambers *f f*, so as to allow the steam to flow into and out of the passages I. The receiving-passages H H^1 are in communication with the receiving sides or channels H^2, and the exhaust-passages I I^1 are in communication with the exhaust sides or channels I^2. D D^1 are the receiving-valves, which are very similar to puppet-valves, and are connected respectively to sliding frames G and F by means of stems D^2. C C′ are the exhaust-valves, and J J′ rods for connecting these valves to the frames G and F. K and L are gum springs or cushions on the stems D^2 and rods J J′ of the valves C C′ and D D^1, for compensating for any imperfection in construction and adjustment of one part with respect to another, and for difference in expansion of the frames and cylinder while the engine is in operation. M is the piston and N its rod.

Having reference to Fig. 1 of the drawing, the steam, air, or water is received through the passage H^1 of the seat B′, and enters the cylinder, as indicated by the arrow No. 1 in Fig. 1. The entrance of the steam through this passage gradually moves the valve D^1 from its seat, and the piston M toward the upper end of the cylinder, and thereby causes the frame F to slide upward and gradually open the exhaust-valve C. The frame F then moves downward, closing valve D^1 and exhaust-valve C. The steam, next entering the upper passage H of seat B, opens the valve D and thereby causes the frame G to open valve C′, and thus the operation continues.

Having reference to Fig. 2, the operation is precisely the same as just described, except that the steam, air, or water first enters the passage H^1, at the top of the cylinder, and causes the frame F, valves D^1 and C, and piston M to move downward.

It should be understood that the frames F and G hold the respective sets of valves to their seats at the different ends of the cylinder by means of suitable external mechanisms. One proper arrangement is a rock-arm worked by an eccentric or a cam, and another a direct connection of the frames with cams on the engine-shaft by cam-rods.

What I claim is—

1. The combination of the double tubular valve-seat B′, having direct passages H and I leading respectively to and from the interior of the cylinder, with the valve D and annular valve C, substantially as and for the purpose set forth.

2. The combination of the frames F and G and valves C and D, substantially as and for the purpose described.

JOHN A. PRINCE.

Witnesses:

ARCHIE SHORE,

JAS. MCFETRICK.