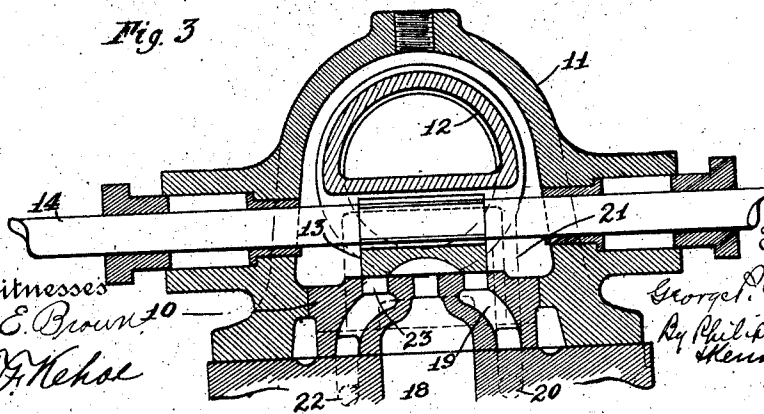
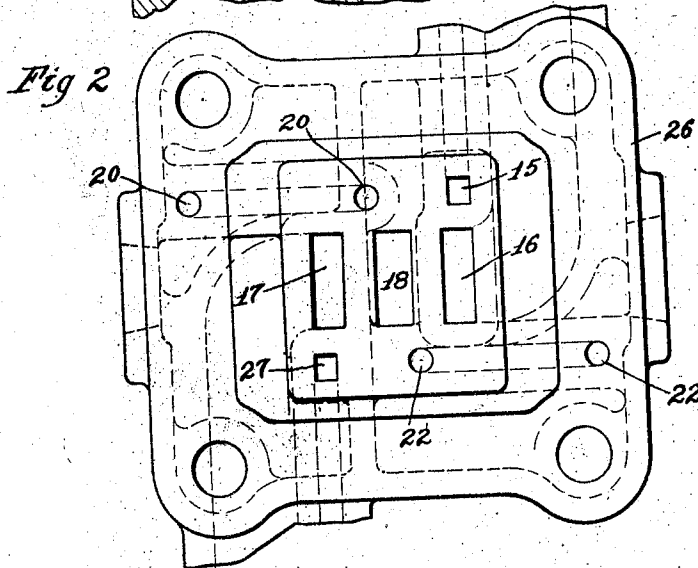
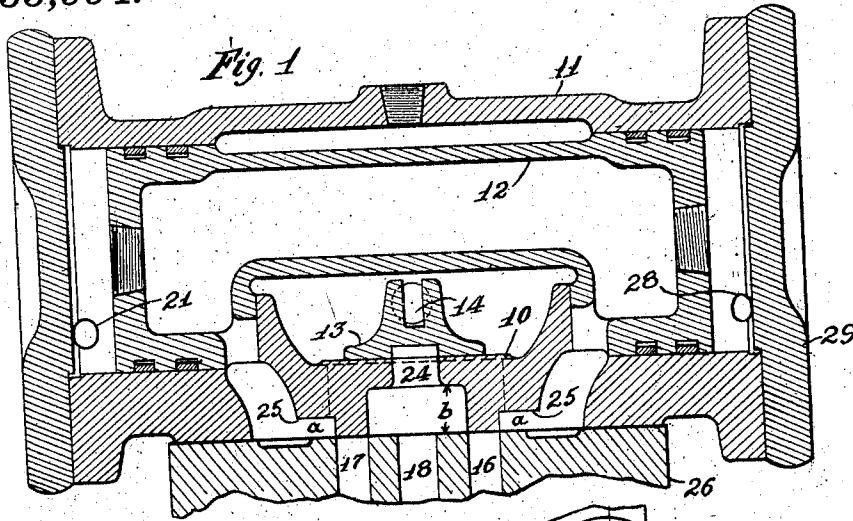


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ENGINE VALVE.
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1,055,994.

Patented Mar. 18, 1913.



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ENGINE-VALVE.

1,055,994.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed November 13, 1911. Serial No. 659,968.

To all whom it may concern:

Be it known that I, GEORGE P. ABORN, a citizen of the United States, residing at Brookline, county of Norfolk, and State of Massachusetts, have invented certain new and useful Improvements in Engine-Valves, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates generally to steam engines or pumps, and more particularly to such engines as are equipped with fluid actuated valves of the general class shown and described in Letters Patent to Hall Nos. 737,609 and 737,610. Its objects include the simplification of the valve mechanism, and means to insure a continuous and regular action of such moving parts of the engine or pump as are controlled by the valve or valves.

In the drawings, Figure 1 is a sectional side elevation of the valve arrangement, Fig. 2 is a plan of the valve seat upon the steam cylinder showing port connections, and Fig. 3 is a sectional end elevation along the line of the valve rod.

Referring to Fig. 1, the main slide valve seat forming a part of the main steam cylinder is indicated at 26, channels 16 and 17 being the inlet ports and 18 the exhaust port. The main slide valve 10 is of the D type and is moved by the steam actuated piston 12 inclosed in the auxiliary steam cylinder 11. The auxiliary steam cylinder is shown as positioned at right angles to the axial line of the main cylinder which it surmounts, and this is the preferred arrangement although not essential to the broader features of the invention.

The central portion of valve piston 12 is semi-cylindrical in cross-section, as shown in Figs. 1 and 3, and in the space thus formed between the valve piston and the main slide valve 10, the auxiliary valve 13 is located. This auxiliary valve controls the admission and exhaust to and from the valve piston and is moved by valve rod 14 which is actuated in turn by the usual tappet arrangement, not shown. The auxiliary valve has its seat upon the upper face of the main slide valve 10, and its movement in line with

the valve rod 14, is at right angles to the line of motion of the main slide valve 10 and the valve piston 12. The opening and closing of the steam ports leading to the auxiliary cylinder are determined by the combined movements of the two valves, as will presently be described.

Referring now to Fig. 2, the seat of the main slide valve is shown as being equipped with seven ports. These ports are the main exhaust at 18, the two main inlets at 16 and 17, the two pre-admission inlets at 15 and 27, and the two ports 20 and 22 communicating with the auxiliary cylinder. The main slide valve 10 controls the movement of steam through the main ports in the usual manner; it also controls in the usual manner the pre-admission of steam through the ports 15 and 27 to prevent shock upon the beginning of a piston stroke in the main cylinder, and it pockets the steam in the same ports to prevent shock upon the completion of the piston stroke. In addition to these functions, it coöperates with auxiliary valve 13 by means of ports 19, 20, 21, and 23, 22 and 28 to cushion the movement of auxiliary piston 12 by controlling the exhaust from the auxiliary cylinder.

The described mechanism operates as follows: Assuming the auxiliary piston 12, as viewed in Fig. 1, to be in its extreme left-hand position, the main slide valve 10 will be in a similar position with the main port 16 and the pre-admission port 15 open and admitting steam to one side of the main cylinder piston, and with the ports 17 and 18 in communication with each other and affording a passage for the exhaust steam from the other side of the main cylinder piston. Near the end of the stroke of the latter piston, the auxiliary slide valve, as viewed in Fig. 3, will be moved to the left by the valve rod 14 and steam will pass through ports 19, 20 and 21 to the left of the auxiliary piston 12, while steam is exhausting from the other end of the auxiliary cylinder through port 28 and thence through port 22 to port 23 to the cavity under the auxiliary slide valve 13 and out through exhaust ports 24 and 18. The auxiliary piston and main slide valve, as viewed in Fig. 1, will now

travel to the right and in so doing will close the auxiliary exhaust port 23 (Fig. 3) before the auxiliary piston and main slide valve have reached the end of their travel, and the auxiliary piston will cushion on the steam confined between its end and the auxiliary cylinder head 29. The main slide valve will come to rest with pre-admission port 27 and main port 17 open to steam, and main port 16 to exhaust; and the main cylinder piston will start on its return stroke. Further means are provided to control the admission of steam into the main cylinder in order to provide for a regular and smooth action of the engine. As shown in Fig. 1, the main slide valve 10 is provided with overhanging or beetling sides 25, 25, which restrict the cross-sectional area of the ports at the indicated points *a, a*, so as to effect a throttling of the steam at such points and to prevent any rush of steam into the cylinder when the ports are fully opened,—the amount of steam-flow through the ports being limited by the constricted passages *a, a* to any desired extent. At the same time, the exhaust passage formed in the center of the slide valve 10 is of such dimensions, as indicated at *b*, that no back pressure is caused; the effect of the valve conformation being such that only the inflowing steam is throttled.

This new and peculiar type of valve, with its overhanging parts is herein designated as a beetle valve, and by this term is meant a valve having projecting or overhanging parts which may in any way perform the function of throttling the steam between the valve and the valve seat independently of the extent to which the port in the valve seat may be covered or uncovered by any movement of the valve. This type of main valve may be used not only in fluid actuated valve mechanisms, but generally in steam pumps and other engines, in which it is desired to thus throttle the motor fluid between the valve and valve seat, and the valve may be actuated by any common, or suitable means.

The construction shown and above described is the preferred embodiment of the invention, but it will be understood that the invention is not limited to the specific arrangement of parts illustrated, but that the broader features of the invention, as defined by the claims, may be embodied in other constructions.

What is claimed is:

1. A valve seat for an engine cylinder provided with inlet and exhaust ports, a valve movable to admit and exhaust motor fluid through said ports, the said valve having a beetling conformation adapted to throttle the inflowing fluid at a point im-

mediately in advance of its passage into the port of the valve seat.

2. A valve seat for an engine cylinder provided with inlet and exhaust ports, in combination with a beetle valve, movable to admit and exhaust motor fluid through said ports, the said valve being adapted to throttle the fluid between the valve and the valve seat prior to its passage into the inlet ports of the valve seat.

3. In a fluid actuated engine, the valve seat 26, in combination with the slide valve 10 inclosed within a valve chest and equipped with throttling overhang 25, 25, substantially as shown and described.

4. In combination, a fluid actuated valve gear including an auxiliary cylinder, an auxiliary piston, a main slide valve attached to and moved by said piston, an auxiliary slide valve mounted upon the main slide valve between the main slide valve and auxiliary piston, the said auxiliary slide valve being nested in said piston, but having its movement independent thereof.

5. In combination, a fluid actuated valve gear including an auxiliary cylinder, an auxiliary piston, a main slide valve attached to and moved by said piston, an auxiliary slide valve seated upon and controlling ports in the main slide valve, the said auxiliary valve being located between the main slide valve and the auxiliary piston, substantially as shown and described.

6. In combination, the valve seat of a main cylinder, the main slide valve working upon said seat, an auxiliary cylinder, a piston located within the auxiliary cylinder, the said valve and piston being coupled together to move as a unit, the valve being moved by the piston, an auxiliary valve seated upon the main slide valve and movable thereupon in a direction at right angles to the line of movement of the main slide valve, ports in the main slide valve cooperating with the auxiliary valve, ports in the valve seat of the main cylinder connected with the auxiliary cylinder and cooperating with the said ports in the main slide valve and with the auxiliary valve, the arrangement being such that the said piston is primarily controlled by the movement of the auxiliary valve upon the main slide valve, and is secondarily controlled by the movement of the main slide valve under the auxiliary slide valve.

7. In combination, the valve seat of a main cylinder, the main slide valve working upon said seat, an auxiliary cylinder, a piston located within the auxiliary cylinder and adapted to move the said slide valve, an auxiliary valve seated upon the main slide valve and movable thereupon, passages in

the auxiliary valve, in the main slide valve,
and in the valve seat of the main cylinder
whereby the said piston is primarily con-
trolled by the movement of the auxiliary
5 valve upon the main slide valve, and is
secondarily controlled by the movement of
the main slide valve under the auxiliary
slide valve.

In testimony whereof, I have hereunto
set my hand, in the presence of two sub- 10
scribing witnesses.

GEORGE P. ABORN.

Witnesses:

JOHN J. FINLEY,
E. H. HIGGS.