

G. P. ABORN.
ENGINE VALVE.

APPLICATION FILED NOV. 10, 1911. RENEWED AUG. 1, 1912.

1,055,997.

Patented Mar. 18, 1913.

2 SHEETS-SHEET 1.

Fig. 1

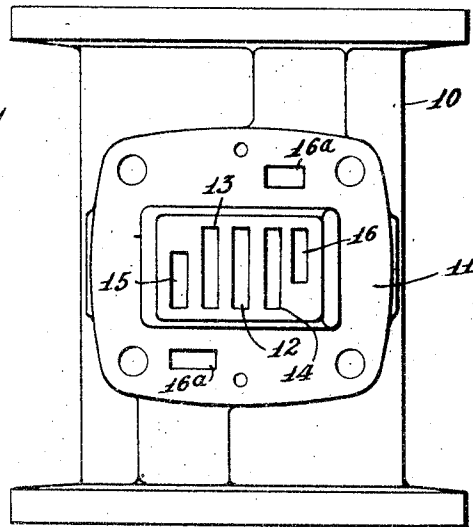
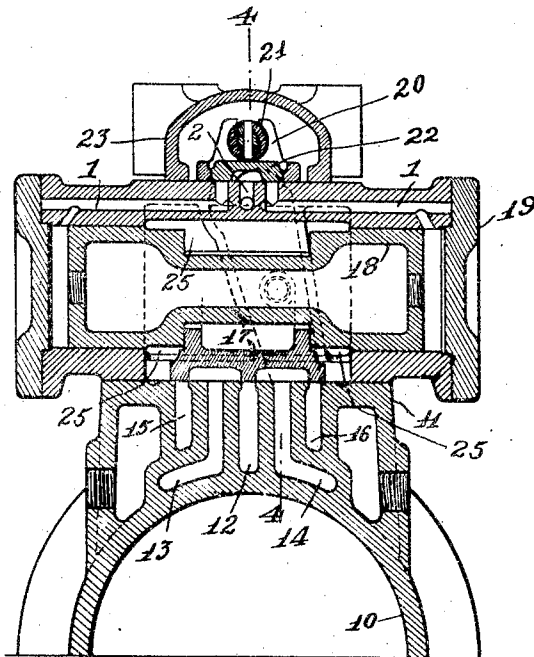


Fig. 2



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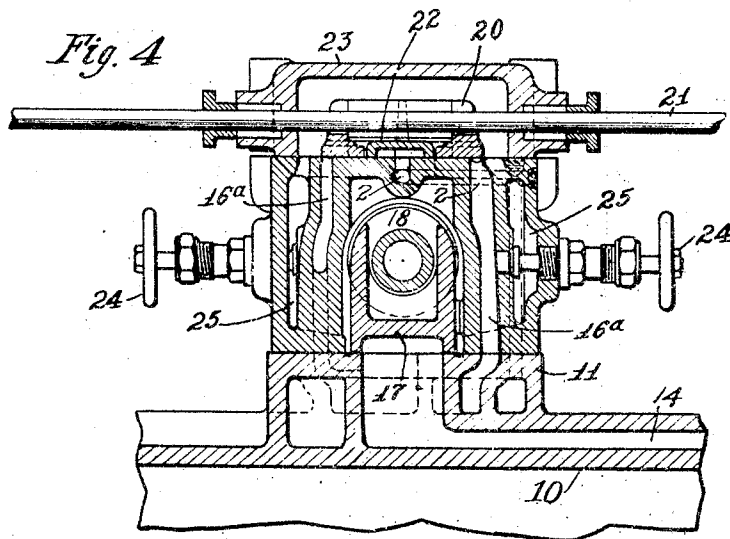
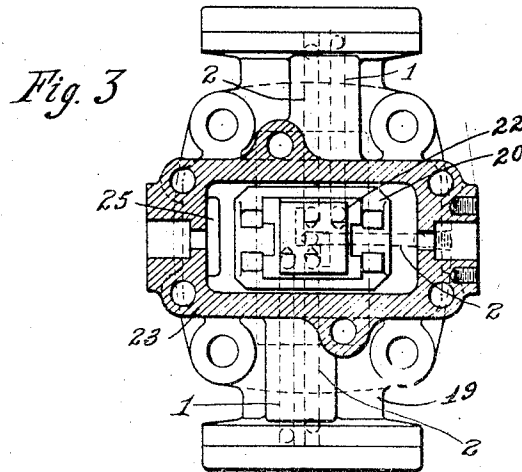
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UNITED STATES PATENT OFFICE.

GEORGE P. ABORN, OF BROOKLINE, MASSACHUSETTS, ASSIGNOR TO THE BLAKE & KNOWLES STEAM PUMP WORKS, A CORPORATION OF NEW JERSEY.

ENGINE-VALVE.

1,055,997.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed November 10, 1911, Serial No. 659,501. Renewed August 1, 1912. Serial No. 712,770.

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 to valve gear for steam pumps or other fluid engines, more particularly to those equipped with a fluid actuated valve gear, such as shown, for instance, in United States Letters Patent to Hall, No. 737,610.

The objects of the invention include a more simplified mechanism together with the addition of a cut-off gear whereby greater economy in the use of steam or other motive fluid is made possible.

In the drawings, Figure 1 is a plan view of the valve seat of the main steam cylinder, Fig. 2 is a sectional elevation taken longitudinally through the transverse auxiliary cylinder, Fig. 3 is a plan view, partly in section, of the valve chamber and valves of the auxiliary cylinder, and Fig. 4 is a section taken longitudinally through the main steam cylinder on line 4-4 of Fig. 2.

The main steam cylinder is indicated at 10, and is provided with the integral valve seat 11. The ports in the valve seat are best shown in Figs. 1 and 2. The exhaust port is shown at 12, the main inlet ports at 13 and 14. Ports 15 and 16 communicate with openings 16', 16' located outside of the valve seat proper and forming sections of channels to be later described.

The main slide valve 17 is of the B type as shown in Fig. 2. It is connected to and moves with the piston 18 inclosed in the auxiliary cylinder 19. The auxiliary piston 18 is controlled by the auxiliary slide valve 22 which is positioned within a cut-off valve 20. The latter derives its movement from the valve rod 21, which in turn is operated by the usual tappet arrangement, not shown.

As best shown in Figs. 3 and 4, the cut-off valve 20 straddles the auxiliary valve 22, and the dimensions of these valves is such that there is a certain amount of lost motion between them. A casing 23 surrounds these valves and forms a steam chest.

As shown in Fig. 4, the steam after entering the chest 23 may pass through either of

the two channels 16^a, 16^a to the ports 15 and 16 located in the main slide valve seat, as shown in Fig. 1. From these ports, see Fig. 2, it may flow into the main inlet ports 13 and 14, later to be exhausted through port 12. 60

The valves operate as follows: Assuming the auxiliary piston 18, as viewed in Fig. 2, to be in its extreme left-hand position, the main slide valve will then have placed ports 13 and 15 into communication, and also ports 12 and 14. At the same time the cut-off valve 20, as viewed in Fig. 4, will be in its right-hand position. Steam will then flow from chest 23, through the left-hand channel 16^a into port 15 and thence into inlet port 13 70 into the main cylinder, where it will move the main piston (not shown). The cylinder space on the other side of the moving piston is open to the exhaust through ports 14 and 12. When the piston has completed its 75 stroke to the point of cut-off, the valve rod 21 (Fig. 4) moves to the left, carrying with it the cut-off valve 20 which closes the left-hand port 16^a thereby cutting off the supply of steam to the main cylinder, although the 80 main slide valve 17 still remains open. As the movement of the cut-off valve 20 continues, the lost motion between it and the auxiliary valve 22 is taken up, whereupon the auxiliary valve moves with the cut-off 85 valve. This movement of the auxiliary valve, through the ports which it controls as shown in Figs. 2 and 3, will open the left-hand end of the auxiliary cylinder to steam pressure and the right hand end to exhaust, 90 whereupon the auxiliary piston will be driven to the right, carrying with it the main slide valve 17, and thereby reversing the piston stroke. These auxiliary ports are inlet ports 1, and exhaust ports 2, operating as 95 described in Letters Patent No. 737,610 above referred to, to which reference is made for a more detailed description of the general operation of the auxiliary and main valves. 100

It will be seen that at whatever point the cut-off becomes operative, it will not cause any reversal of the piston stroke because of the lost motion between the cut-off valve and the auxiliary valve, the parts being so 105 proportioned that only at the extreme limits of motion of the cut-off valve 20 is any effective movement transmitted to the auxiliary valve 22.

Should it be desired to suspend the action 110

of the cut-off valve and have the main cylinder take steam for its full piston stroke, this may be done by opening the valves 24, 24 shown in Fig. 4, which put the channels 5 16^a, 16^b into communication with the chambers 25, 25 which communicate by ports passing around the auxiliary piston 18, one of these chambers opening directly into the steam chest 23, as shown in Figs. 3 and 4. 10 By opening either one of these valves alone, it is obvious that the steam may be expanded on one side of the piston and not on the other, an arrangement that is at times desirable.

15 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 20 broader features of the invention, as defined by the claims, may be embodied in other constructions.

What is claimed:

1. In combination, a main slide valve, 25 fluid-actuated means to move said valve, an auxiliary valve controlling the fluid-actuated means, and a cut-off valve controlling both the movement of the auxiliary valve and the supply of fluid to the main slide 30 valve.

2. In combination, a main slide valve, fluid-actuated means to move said valve, an auxiliary valve controlling the fluid-actuated means, a cut-off valve controlling the 35 movement of the auxiliary valve and adapted to limit the supply of fluid to the main slide valve, and means to supply fluid to the main slide valve independently of the said cut-off valve.

40 3. In combination, a cylinder, a main slide valve controlling the movement of fluid to and from the cylinder, fluid-actuated means to move the main slide valve, a cut-off valve controlling the passage of fluid 45 to the main slide valve, an auxiliary valve controlling the fluid-actuated means, the

said auxiliary valve being controlled by the movement of the cut-off valve.

4. In combination, a main cylinder, a main slide valve, an auxiliary cylinder, an 50 auxiliary piston located within the auxiliary cylinder and controlling the main slide valve, a cut-off valve controlling the movement of fluid to the main slide valve, an auxiliary valve controlling the movement of 55 fluid to the auxiliary cylinder, the said auxiliary valve being controlled by the movement of the cut-off valve.

5. In combination, a main cylinder, a main slide valve, an auxiliary cylinder, an 60 auxiliary piston located within the auxiliary cylinder and controlling the main slide valve, a cut-off valve adapted to control the movement of fluid to the main slide valve, and means to pass the fluid to the main slide 65 valve independently of the said cut-off valve.

6. In combination, a main slide valve, fluid-actuated means to move said valve, an auxiliary valve controlling the fluid-actuated means, a cut-off valve, and a valve rod 70 moving both the auxiliary valve and cut-off valve.

7. In combination, a main slide valve, fluid-actuated means to move said valve, an auxiliary valve controlling the fluid-actuated 75 means, a cut-off valve, and a single valve seat having ports for said auxiliary valve and cut-off valve.

8. In combination, the auxiliary cylinder 80 19, the auxiliary piston and main valve, cut-off valve 20 in tandem relation to the main valve, an auxiliary valve 22 controlling the movement of the main valve and moving with cut-off valve 20, substantially as shown and described. 85

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

GEORGE P. ABORN.

Witnesses:

E. H. HIGGS,

JOHN J. FINLEY.