G. P. ABORN.

VALVE.

APPLICATION FILED MAR. 27, 1912.

1,055,996.

Patented Mar. 18, 1913.

3 SHEETS—SHEET 1.

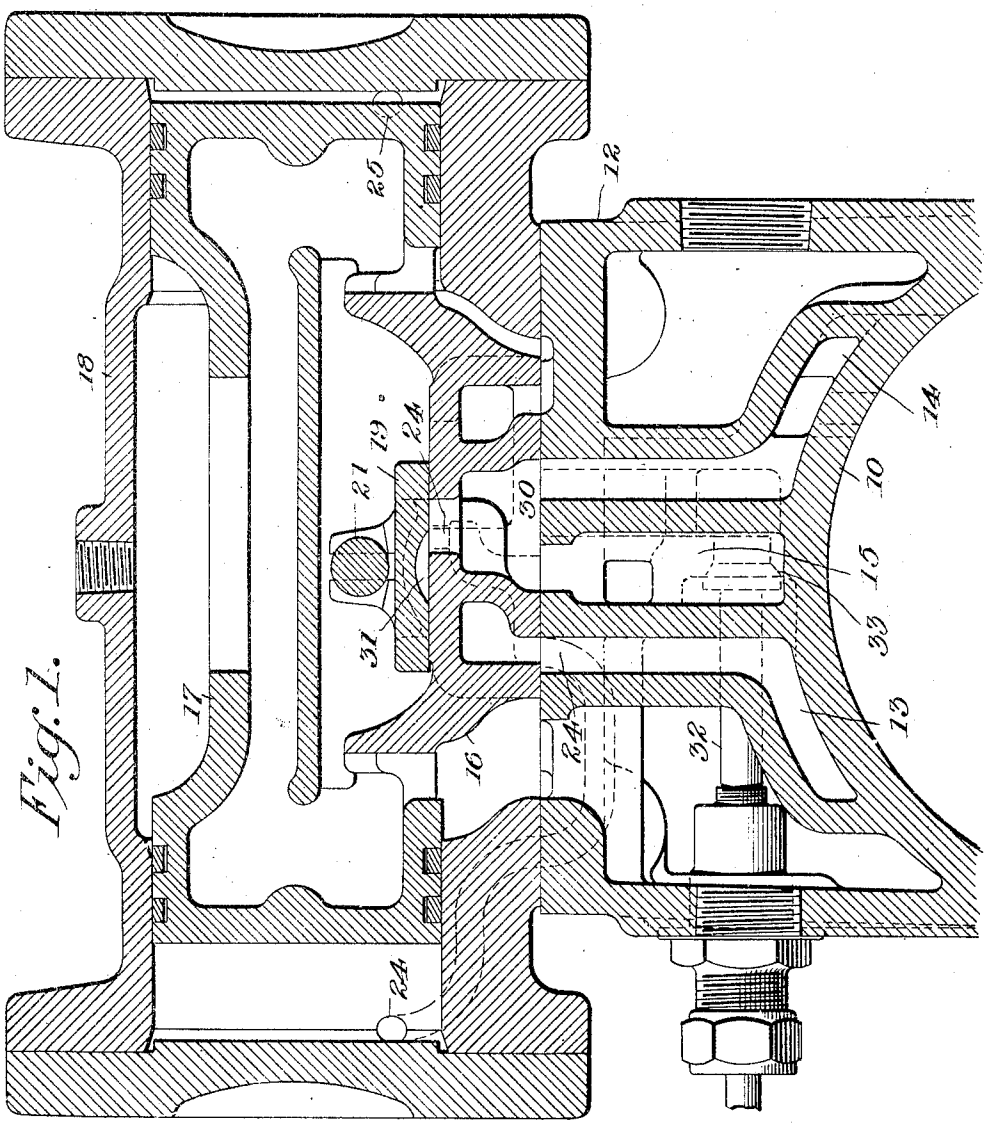

Fig. 1.

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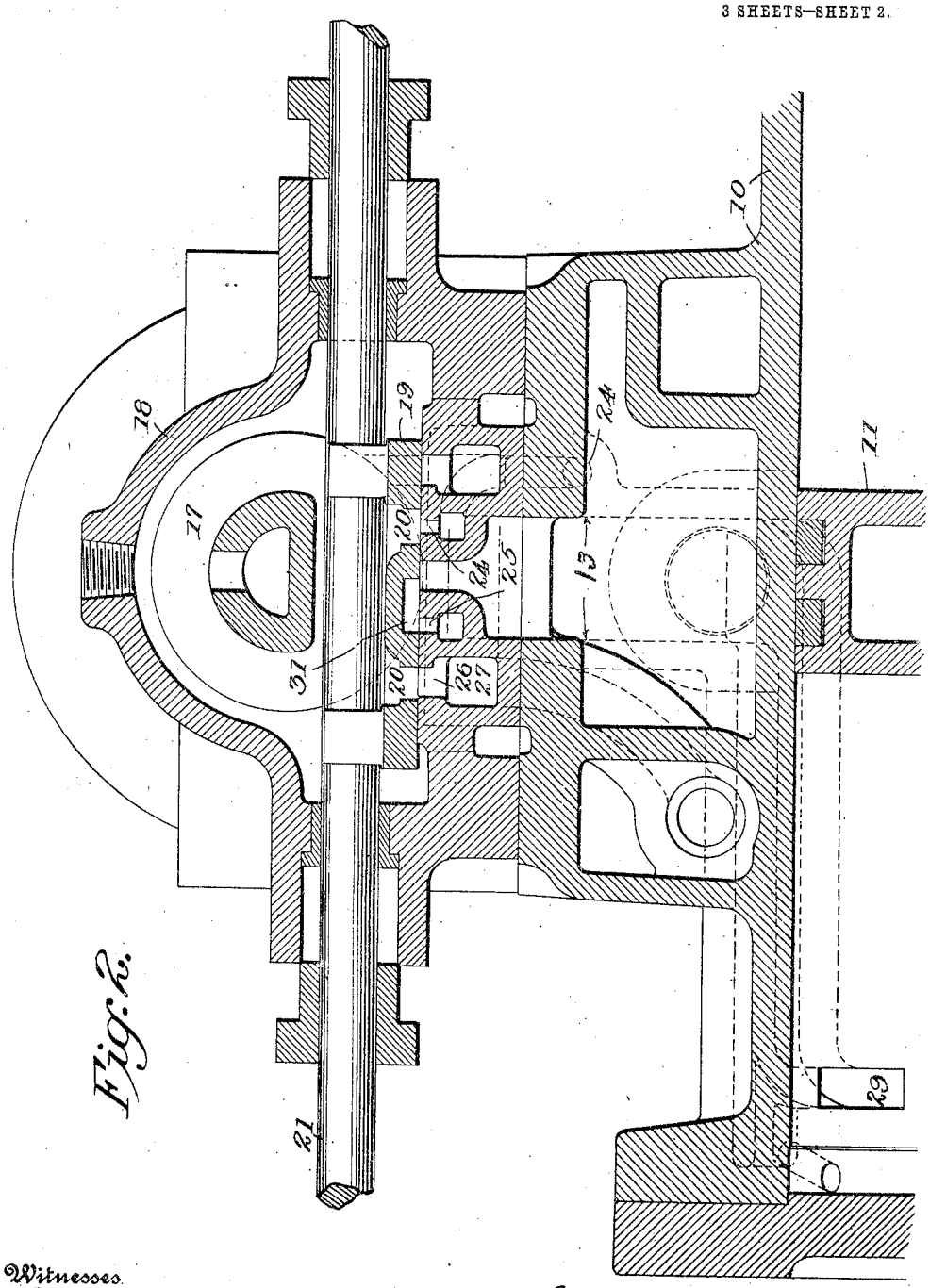

Fig. 2.

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3 SHEETS—SHEET 3.

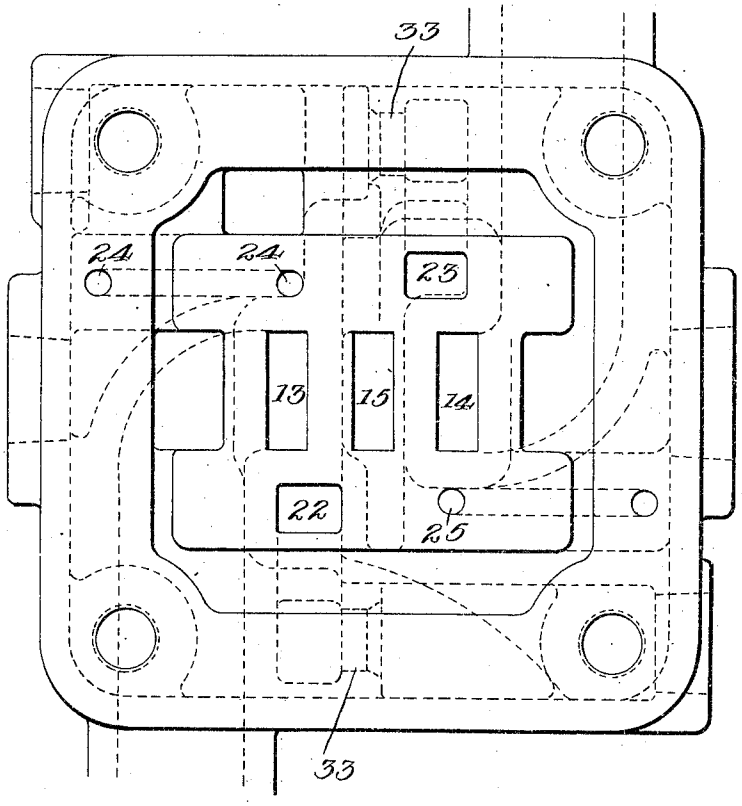

Fig. 3.

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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.

VALVE.

1,055,996. Specification of Letters Patent. Patented Mar. 18, 1913.

Application filed March 27, 1912. Serial No. 686,563.

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 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 and pumps, and more particularly to engines equipped with fluid-actuated valves of the general class shown and described in Letters Patent to Hall, Nos. 737,609 and 737,610.

The object of the invention is to secure economy in steam consumption by working the steam expansively; and, when used in steam pumps, to slow down the piston stroke near its end to allow the valves in the pump cylinder to seat quietly and with little shock, and to secure an easier reversal of the piston stroke.

The invention aims particularly to provide a simpler and more durable form of mechanism to effect these results than has hitherto been used, and reduce to a minimum the clearance spaces in the cut-off ports and the expansion of steam therein.

In the drawings, Figure 1 is a section transverse to the steam cylinder. Fig. 2 is a section longitudinally of the cylinder and on the line of the valve rod, and Fig. 3 is a plan of the valve seat on the steam cylinder showing port connections.

In Fig. 1, the main cylinder is indicated at 10, and the main piston is partly shown at 11 in Fig. 2. The valve seat 12 of the main cylinder is equipped with three main ports, 13 and 14 being the inlet channels and 15 the exhaust. The main slide valve 16 is moved by an auxiliary piston 17 inclosed in the auxiliary steam cylinder 18. The cylinder 18 is shown 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 the valve piston 17 is of a reduced semi-cylindrical cross-section as shown in Figs. 1 and 2, and in the space thus formed between the valve piston and the main slide valve 16 the combined auxiliary and cut-off valve 19 is located. The auxiliary valve 19 includes ports that control the admission and exhaust to and from the valve piston, and also cut-off ports that control the supply of steam passing through the main slide valve. The auxiliary valve is moved by valve rod 21, 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 16, and its movement, in line with the valve rod 21, is at right angles to the line of motion of the main slide valve 16 and the valve piston 17. The opening and closing of the ports of the auxiliary cylinder are determined by the combined movements of the auxiliary and the main slide valves, as will presently be described.

Referring now to Fig. 3, the seat of the main slide valve is shown as being equipped with seven ports. These ports are the main exhaust at 15, the two main inlets at 13 and 14, two supplementary steam supply ports 22 and 23 through which steam is supplied to the main slide valve independently of the cut-off when steam is used for the full stroke, and the two ports 24 and 25 communicating with the auxiliary cylinder. As is obvious, the arrangement of these ports is such also as to secure in the usual way the preadmission of steam to prevent shock upon the beginning of a piston stroke in the main cylinder, the pocketing of steam at the end of the stroke for the same reason, and also by means of the related ports to cushion the movements of the auxiliary piston 17.

The described mechanism operates as follows: Assuming the auxiliary piston 17, as viewed in Fig. 1, to be in its extreme right-hand position, as shown, it will be held in this position by steam admitted to the left of the auxiliary piston through ports 24, 24 as shown in Figs. 1 and 2. The main valve 16 will also be in a similar position and will allow steam to pass through ports 20, 26, 27, 13 and 29 (Fig. 2) into the main cylinder causing the piston 11 to move to the right. At the same time steam will exhaust through port 14 (Fig. 1) to the cavity 30 in main slide valve 16 to the central exhaust port 15. At a predetermined point in the travel of the main piston 11, the usual tappet gear (not shown) will move the valve rod 21 to the right as viewed in Fig. 2. The auxiliary valve 19 attached thereto will thereupon close port 26 cutting off the supply of steam to the main piston thus

causing the steam to work expansively during the remainder of the piston stroke. After the valve 19 closes port 26, its continued movement causes port 25 in main valve 16 to open to steam and port 24 to open to the exhaust cavity 31 in the valve 19. Steam is now exhausted from the left of the auxiliary piston 17 through the channel indicated generally by 24, 24, while at the same time steam is admitted through the opposed ports indicated at 25. This causes the auxiliary piston and main slide valve to move to the left until the port 24 in the main slide valve is closed to exhaust by the edge of the cavity 31 in the auxiliary valve 19. The port 24 being closed the auxiliary piston cushions on the steam confined between its end and the auxiliary cylinder head, and comes to rest with the main slide valve in the proper position for the return stroke of the main piston. When it is desired to have the steam follow full stroke in the main cylinder, as in warming up, either one or both of the bleeder valves 32, 32 covering ports 33, 33 may be opened. These valves admit steam through ports 22 and 23 to the main slide valve through which it may pass into the main cylinder independently of the cut-off arrangement.

The construction as thus shown and 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.

The construction shown and described herein includes certain features claimed broadly in my prior applications, Serial No. 659,501, filed November 10th, 1911, and No. 659,968, filed November 13th, 1911.

What is claimed:—

1. In combination, a main slide valve, fluid actuated means to move said valve, and a second valve adapted to control the admission of fluid to the said fluid actuated means and to the said main slide valve through independent passages.

2. In combination, a main slide valve, fluid actuated means to move said valve, and a single valve coöperating with a single valve seat, to control the admission of fluid to the said fluid actuated means and to the said main slide valve through independent passages.

3. In combination, a main slide valve, fluid actuated means to move said valve, and a single valve provided with auxiliary ports to control the admission of fluid to the said fluid actuated means, and with cut-off ports to control the admission of fluid to the said main slide valve.

4. In combination, a main slide valve, fluid actuated means to move said valve, a second valve equipped with ports to control the said fluid actuated means and with ports to limit the supply of fluid to the main slide valve, the said second valve being located between the said main slide valve and the fluid actuated means

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, and a combined auxiliary and cut-off valve mounted upon the main slide valve and nested in said piston but having its movement independent of the piston.

6. In combination, a main slide valve, fluid actuated means to move said valve, a second valve equipped with ports to control the said fluid actuated means and with ports 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 limiting ports.

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

GEORGE P. ABORN.

Witnesses:
C. U. Stearns,
C. G. Chapman.