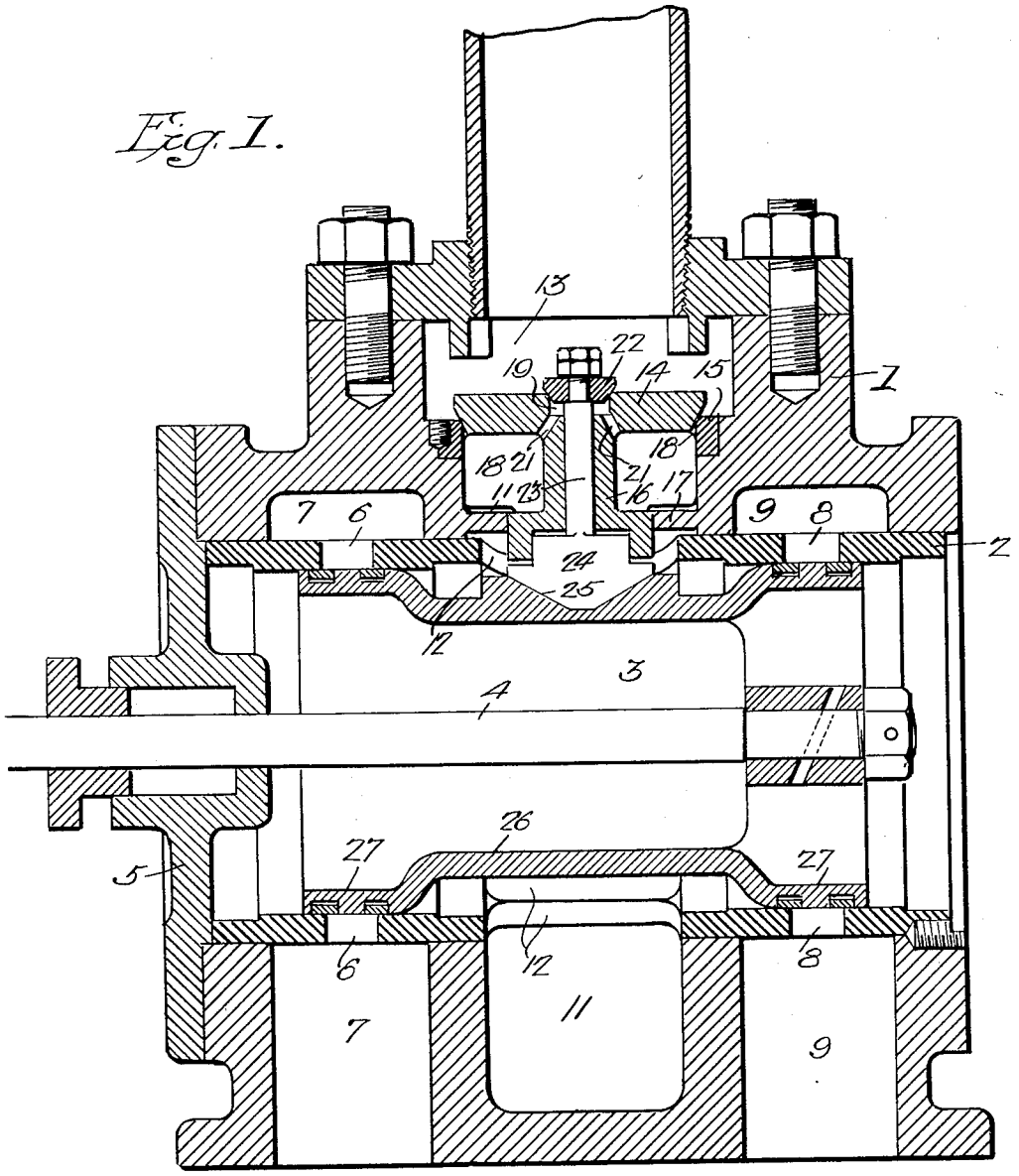
Feb. 20, 1934. R. C. LAMOND 1,947,527

VALVE

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Fig. 1.



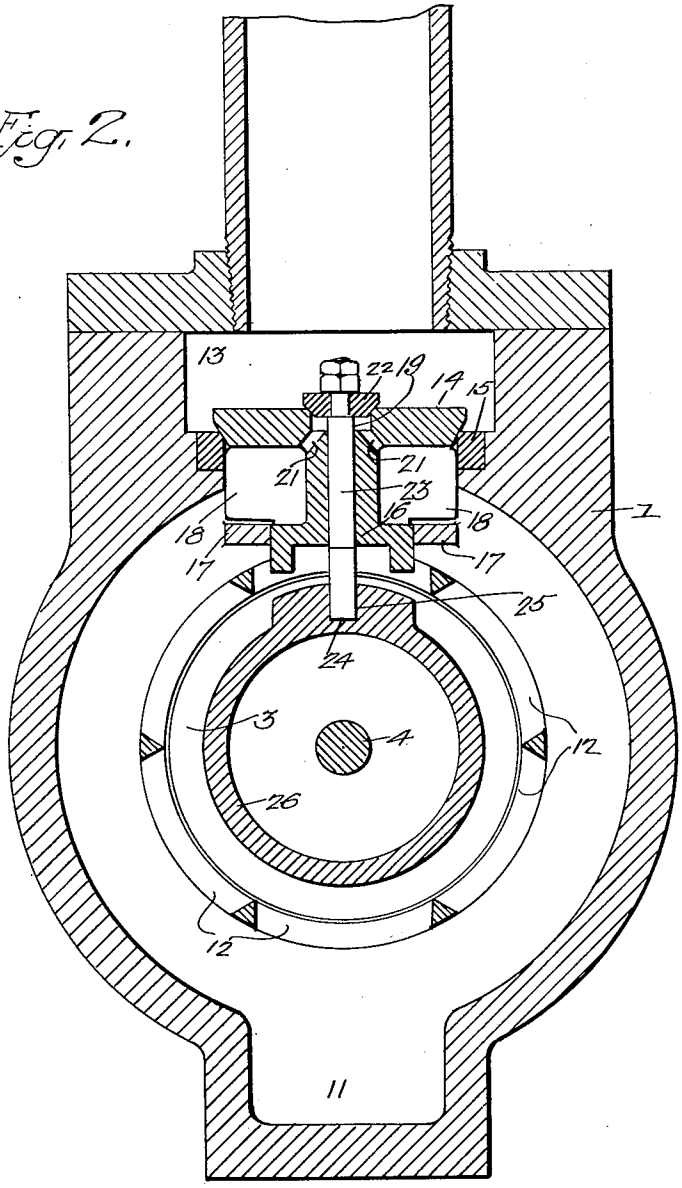
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Fig. 2.



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UNITED STATES PATENT OFFICE

1,947,527

VALVE

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Application February 25, 1930. Serial No. 431,252

1 Claim. (Cl. 277—7)

This invention relates to improvements in valves, and has a particular application to reversing valves of the type used in connection with fluid actuated reciprocating engines.

One of the objects of the invention is to provide means for substantially eliminating fluid losses through a reversing valve, and to this end a specific object of the invention is to provide in conjunction with a reversing valve, which in essential respects may be of standard type, a second valve which excludes the actuating fluid from the reversing valve chamber except when the latter valve is in one of its operating positions.

A further object of the invention is to provide means for equalizing the pressure on opposite sides of said second valve when the latter is to be unseated so that the force required to open the said valve is materially reduced.

The invention further resides in the novel arrangement of parts and mechanical details hereinafter set forth and illustrated in the attached drawings, in which:

Figure 1 is a view in section of a reversing valve made in accordance with my invention, and

Fig. 2 is a section on the line 2—2, Fig. 1.

With reference to the drawings, the valve therein illustrated comprises a main casing 1 having therein a cylindrical opening for reception of a sleeve 2 which constitutes a working cylinder for a valve 3. The valve 3 is actuated in the sleeve through the medium of a rod 4 which extends through a cylinder head 5 secured to the casing 1 and closing one end of the sleeve 2. The sleeve 2 has adjacent one end a plurality of circumferentially arranged ports 6 which communicate with a passage 7 in the casing 1; and at the opposite end the sleeve is provided with a second set of ports 8 which communicate with a passage 9 in the said casing 1. The valve 3 is shown in Fig. 1 in a centered position in the cylinder in which both sets of ports 6 and 8 are closed. Between the passages 7 and 9, the casing 1 is provided with a chamber 11 which is in communication with the interior of the sleeve 2 through ports 12, and this chamber 11 is normally separated from an intake port 13 in the top of the casing by a valve 14, this valve finding a cylindrical seat 15 in the casing, as illustrated in both figures of the drawings. The valve 14 has a depending part 16 the lower cylindrical end of which is guided by a guide 17 in the casing 1, and the valve is further guided through the medium of a series of radially projecting wings 18 which project into proximity to the casing immediately below the seat 15.

In the top of the valve 14 is a central recess 19, from the bottom of which passages 21 extend into the space below the valve or into the chamber 11. The top of the recess 19, however, is normally closed by a valve 22 which seats upon the upper edge of the recess. This valve has a stem 23 which extends downwardly through a central passage in the valve 14 and the depending portion 16 thereof, and carries at its lower projecting end a cam 24 which fits into a radial groove 25 in the valve 3. The cam 24 is adapted to be moved vertically by longitudinal movement of the valve 3 in its cylinder, and sufficient play or clearance is provided between the cam and the depending portion 16 of the valve 14 to provide for an initial elevation of the valve 22 from its seat before the valve 14 is elevated by a continuous movement of the said valve 3. It will be apparent, therefore, that the arrangement is such that actuation of the valve 3 in either direction from the normal mid position in which it is shown in Fig. 1 will result first in an elevation of the valve 22 from its seat, and thereafter elevation of the valve 14 from its seat whereby the chamber 11 is thrown into communication with the intake port 13 at the top of the casing. Return of the valve 3 to the normal mid position permits a return of both of the valves 14 and 22 to their normal seated positions.

The valve 3 is formed with an intermediate section 26 of lesser diameter than the end sections 27, which latter sections as shown in Fig. 1 normally cover the ports 6 and 8. When, therefore, the valve 3 is moved to the left, see Fig. 1, the chamber 11 is brought into communication with the ports 6, elevation of the valve 14 as previously described permitting actuating fluid to flow from the inlet 13 to and through the passage 7. At the same time, the ports 8 are thrown open to exhaust through the open end of the casing 1. A movement of the valve 3 in the opposite direction from the mid position results in connecting the ports 8 with the chamber 11 and the intake 13, while the ports 6 are thrown open to exhaust through the interior of the cylindrical valve 3 and the open end of the casing.

In one application of this valve, the passages 7 and 9 are connected to the opposite ends of a main engine cylinder, and the valve illustrated accordingly constitutes a reversing valve through which an actuating fluid may be admitted to

either end of the said main cylinder at the will of the operator.

It will be noted that by reason of the initial elevation of the relatively small valve 22 as described above in advance of the opening of the valve 14, the actuating fluid is admitted from the intake port 13 and through the ports 21 into the space below the valve 14. Pressure is thereby substantially equalized on both sides of the valve 14, which materially facilitates elevation of the valve 14 from its seat and requires less force in moving the valve 26 from the mid position.

It will be apparent that during the periods of inoperation of the valve 3 in which it occupies the mid position as illustrated, the actuating fluid is excluded from the valve chamber 11 by the valves 14 and 22 whereby all losses due to leakage around or past the sleeve valve 3 is prevented. Only when the valve 3 is moved from the mid position towards either end is the valve 14 opened to admit steam or other actuating fluid to the valve cylinder.

I claim:

In a valve, a casing having intermediate and terminal chambers, and ports respectively communicating with said chambers, a sleeve in said casing having ports communicating respectively with said chambers, a slide valve in said sleeve movable into positions respectively preventing communication between the said chambers and connecting the terminal chambers individually with the intermediate chamber, a valve in said casing controlling the casing port communicating with the intermediate chamber, a supplemental valve carried by the casing valve and also controlling communication between the said casing port and the intermediate chamber, a stem for said supplemental valve extending through the carrier valve and terminating adjacent the sleeve valve in a head portion the terminal surface of which is substantially V-shape, means for guiding said head portion in the carrier valve, and said sleeve valve having therein a cam slot corresponding substantially in form to the V-shaped terminal end of said head portion and adapted to receive the latter, said parts being so constructed and arranged that predetermined movements of the sleeve valve in either direction from a neutral position, wherein communication between the said terminal and intermediate chambers is prevented, result in successive unseating of the supplemental valve and, through the said supplemental valve head portion, of the carrier valve.

ROBERT C. LAMOND.