July 14, 1925.

1,545,490

R. H. GEORGE

OPERATING VALVE

Filed Aug. 4, 1924

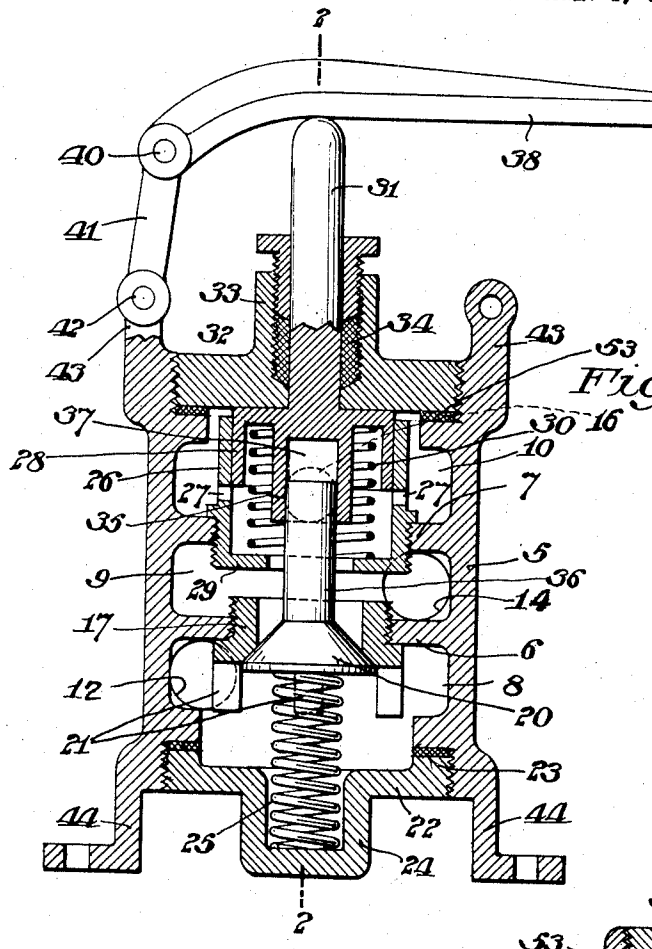


Fig. 1.

Fig. 2.

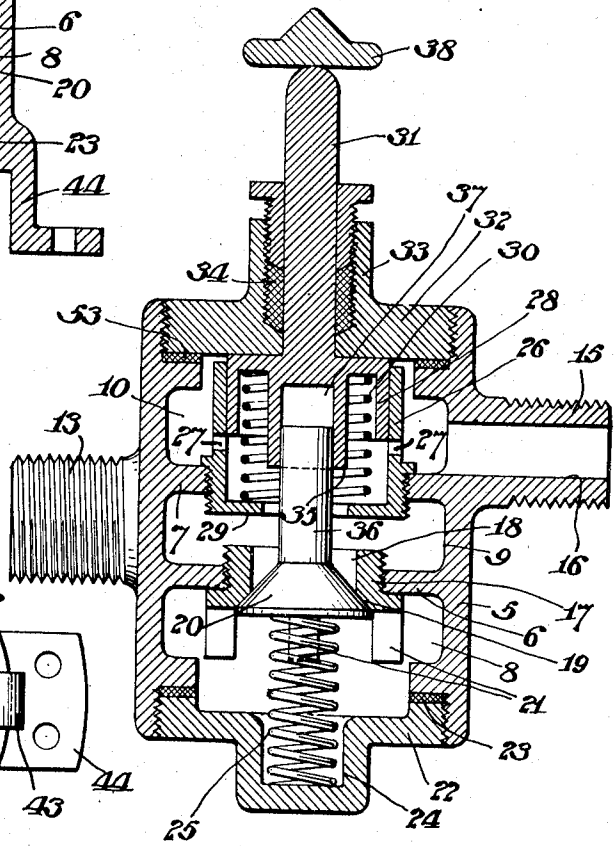
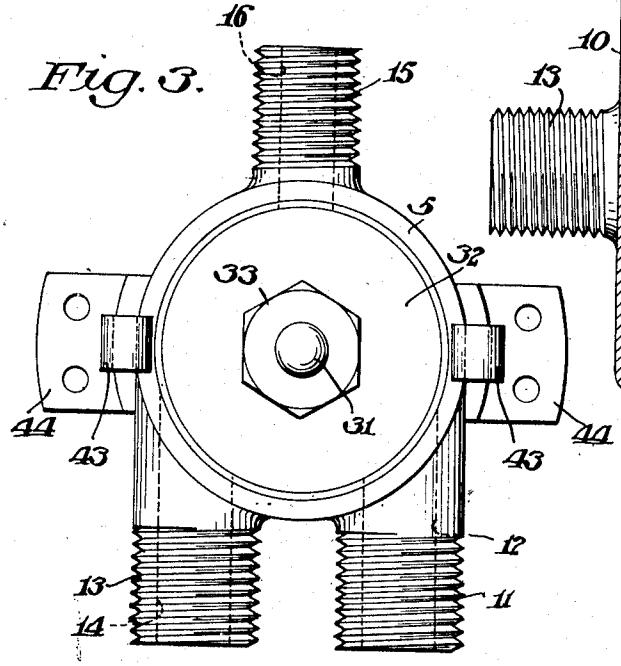


Fig. 3.



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UNITED STATES PATENT OFFICE.

ROBERT H. GEORGE, OF BROOKLAWN, NEW JERSEY.

OPERATING VALVE.

Application filed August 4, 1924. Serial No. 729,929.

To all whom it may concern:

Be it known that I, ROBERT H. GEORGE, a citizen of the United States, residing at Brooklawn, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Operating Valves, of which the following is a specification.

My invention relates to operating valves, that is to say, to valve devices adapted to control the supply and exhaust of fluid under pressure to and from some other apparatus for the purpose of actuating the same.

The object of my present invention is to provide a simple, efficient, and relatively inexpensive form of operating valve, in which likelihood of leakage of the fluid under pressure is reduced to a minimum, which will be certain in its action, which will be relatively easy to operate, in which the internal parts are readily accessible for inspection and repair, and which is susceptible of embodiment in a structure adapted for foot control, whereby the same will be particularly adapted for use in motive apparatus where the operator's hands and eyes are otherwise engaged.

My present invention finds a valuable application in connection with apparatus for draining engine cylinders of the general type shown and described in my previous application for Letters Patent filed May 24, 1924, Serial No. 715,572, although it will be readily understood that the same may be employed in connection with various other kinds of apparatus wherein it is desired to control the admission and exhaust of fluid under pressure to and from the same.

The nature and characteristic features of my present invention will be more readily understood from the following description, taken in connection with the accompanying drawings forming part hereof, in which:

Figure 1 is a vertical central sectional view of an operating valve embodying the main features of my present invention;

Fig. 2 is a transverse sectional view thereof, the section being taken approximately on the line 2—2 of Fig. 1; and

Fig. 3 is a top or plan view of the same, the foot control lever being removed.

Referring to the drawings, in the particular embodiment of my invention therein shown, 5 is a cylindrical housing, the interior of which is subdivided, by means of horizontal walls 6 and 7, into three chambers 8, 9 and 10. Extending from the side of the housing, in alinement with the lower chamber 8, is a connection nipple 11, having an internal passageway 12 which communicates with the lower chamber 8. The connection nipple 11 is intended to be connected by means of suitable piping (not shown) to a source of supply of fluid under pressure, such as a steam boiler where the device is adapted to be used for the control of steam actuated apparatus, or a compressed air tank where the device is adapted to be used for the control of pneumatically actuated apparatus.

Extending from the side of the housing 5, in alinement with the central chamber 9, is another connection nipple 13, having an internal passageway 14 extending to said central chamber 9. The connection nipple 13 is intended to be connected by means of suitable piping (not shown) to the apparatus the actuation of which is intended to be controlled by the device of the present invention.

Extending from the side of the housing 5, in alinement with the upper chamber 10, is another connection nipple 15, having an internal passageway 16 communicating with said upper chamber 10. This connection nipple 15 is intended to be connected by means of suitable piping (not shown) to the point at which it may be desired to deliver the exhaust. It will, however, be understood that where the exhaust is permitted to escape adjacent the valve structure, the connection nipple 15 may be omitted, and the passageway 16 may merely extend through the side wall of the housing. However, in the use of the device for the purpose of controlling steam actuated apparatus, it will usually be necessary to carry the exhaust to some other convenient point, where the same may be permitted to escape without objection.

Mounted in the wall 6, between the lower and central chambers, is a valve seat member 17, the same being preferably threaded in the wall 6 from the bottom, whereby said valve seat member may be readily inserted and removed when desired. The member 17 has a central passageway 18, at the lower end of which is provided a seat 19 for a valve disc 20. The seat face of the valve disc 20 is preferably frusto-conical in shape, and the seat 19 is shaped complemental

thereto. Extending downward from the valve member 17 are guide arms 21, which serve to prevent sidewise displacement of the valve disc 20 when the same is in the open position.

The lower end of the housing 5 is closed by means of a member 22, which is preferably threaded therein, a sealing washer 23 being interposed to prevent escape of the fluid under pressure from the chamber 8. The closure member 22, at the bottom of the housing 5, is provided with a central recess 24, in which is seated the lower end of a coil spring 25, the upper end of which bears against the lower face of the valve disc 20 and assists in returning the same to its seat, as will be hereinafter more fully described.

Mounted in the upper wall 7, between the central chamber 9 and the upper chamber 10, is a barrel or cylinder 26, the same being preferably threaded in the wall 7 from the top, whereby the same may be readily inserted therein and removed therefrom. The barrel or cylinder 26 is provided with a series of apertures 27, forming a communication between the chamber 10 and the interior of the cylinder 26. Mounted within the cylinder 26 is a piston valve 28, which is adapted, when depressed, to shut off the communication through the apertures 27.

The lower end of the cylinder 26 is provided with an internally extending flange 29, upon which is seated the lower end of a coil spring 30, the upper end of which bears against the inner portion of the piston valve 28. The piston valve 28 is provided with an actuating stem 31, which extends through a bonnet or closure member 32, which is mounted in the top of the housing 5, being preferably threaded therein, a sealing washer 53 being interposed to prevent escape of the fluid in the chamber 10. The bonnet member 32 is provided with a stuffing box 33, through which the stem 31 extends, said stuffing box being provided with suitable packing 34, to prevent leakage of the fluid from the interior of the chamber 10.

The piston valve 28 is provided with a central sleeve 35, into which extends the stem 36 of the lower disc valve 20, and in the normal position of the parts, that is, when the apparatus to be controlled is in the non-operating condition, there is a space 37 between the upper end of the stem 36 and the surface at the inner end of the sleeve 35. The length of the space 37 is such that, when the piston valve 28 is depressed, the apertures 27 will be first shut off, after which the upper end of the stem 36 will be engaged by the surface of the inner end of the sleeve 35, whereby, as the piston 28 is further depressed, the valve disc 20 will be lowered from its seat and the pressure supply valve thereby opened.

The stem 31 of the piston valve 28 is adapted to be actuated by means of a lever 38, the outer end of which is preferably provided with a foot pedal 39 which is adapted to be depressed by the foot of the operator. The other end of the lever 38 is pivotally connected, as at 40, to a link 41, which in turn is pivotally connected, as at 42, to a bracket 43 which extends upward from the rim of the housing 5. There are preferably provided two or more of the bracket members 43 at different points in the periphery of the upper rim of the housing 5, whereby the lever 38 may be alternatively mounted at various positions, as desired, for convenient manipulation by the operator.

Extending downward from the bottom rim of the housing 5 are foot members 44, which are provided for the purpose of bolting the device at a fixed location with respect to the structure in connection with which the same is used.

The operation of the device may now be explained. As before pointed out, the connection nipple 11 is connected by means of suitable piping to a source of supply of fluid under pressure, and consequently said fluid under pressure will at all times be supplied to the lower chamber 8. Likewise, the connection nipple 13 is connected by means of suitable piping to the fluid pressure actuated apparatus, the operation of which is adapted to be controlled by the device, so that the chamber 9 will at all times be in communication with the cylinder or other operating portion of the apparatus the action of which is to be controlled, and likewise, the upper chamber 10 will at all times be in communication with the exhaust. The parts are shown in the drawings in the positions assumed when the supply of fluid under pressure is shut off from the apparatus to be controlled, and the same is open to the exhaust.

When it is desired to actuate the apparatus which is controlled by the valve device, the foot lever 38 is depressed, and, the same bearing against the upper end of the stem 31, the piston valve 28 will be depressed against the tension of the spring 30, and the apertures 27, which form the communication between the interior of the cylinder 26 and the exhaust chamber 10, will be closed. As the foot lever 38 is further depressed, and the piston valve 28 continues to descend, the surface at the inner end of the sleeve 35 will contact with the upper end of the stem 36, and the valve disc 20 will thereby be depressed and the fluid under pressure permitted to pass from the lower chamber 8 to the central chamber 9, and thence through the piping, which is connected to the connection nipple 13, to the apparatus to actuate the same. It will be noted that, so long as the valve disc 20 is maintained depressed, the apertures 27 in the cylinder 26 will con-

tinue to be closed, and none of the fluid under pressure will be permitted to escape through the exhaust.

When it is desired to hold the fluid under pressure in the apparatus, the operator partly releases the pressure upon the actuating lever 38, whereby the piston valve 28, as well as the valve disc 20, will rise until the valve disc 20 is seated, and the supply of fluid under pressure is thus shut off. If the foot lever be held in this intermediate position, the fluid supply and exhaust will both be closed, and the fluid which has been supplied to the apparatus which is being controlled will be entrapped, and the apparatus thereby maintained in what might be termed a "holding" position.

When it is desired to permit the fluid under pressure to exhaust from the apparatus which is being controlled, the lever 36 is entirely released by the operator, whereupon the piston valve 28 will continue to rise until the apertures 27 are exposed, and the fluid will be permitted to pass from the central chamber 9 to the upper chamber 10, and thence through the passageway 16 to the exhaust.

It will be seen that, by the foregoing arrangement, whenever the pressure supply is open, the exhaust will be closed, and consequently there will be no loss of the fluid under pressure, and furthermore, by the employment of the disc valve for controlling the pressure supply, and the piston valve for controlling the exhaust, likelihood of leakage of the fluid under pressure will be reduced to a minimum, and this without unduly complicating the construction, arrangement and operation of the parts. Furthermore, the action of the valve will be relatively easy, and the construction and arrangement are such as to render the device particularly adaptable for foot control. Also, it will be noted that the various parts are readily accessible for inspection and repair, as it will be seen that the pressure supply valve may be dismantled without disturbing the arrangement of the exhaust valve, and vice versa.

Having thus described the nature and characteristic features of my invention, what I claim as new and desire to secure by Letters Patent, is:

1. An operating valve comprising a housing, internal walls subdividing said housing into three chambers, to wit, a central chamber adapted to be connected to the apparatus to be controlled by the device, a fluid pressure supply chamber at one end of the housing, and an exhaust chamber at the other end thereof, a disc valve interposed in the wall between the central chamber and the pressure chamber, and a piston valve structure interposed in the wall between the central chamber and the exhaust chamber.

2. An operating valve comprising a housing, walls subdividing said housing into three chambers, to wit, a central chamber adapted to be connected to the apparatus to be controlled by the device, a fluid pressure supply chamber at one end of the housing, and an exhaust chamber at the other end thereof, a disc valve interposed in the wall between the central chamber and the pressure chamber, a piston valve structure interposed in the wall between the central chamber and the exhaust chamber, and coacting means between said piston valve and said disc valve whereby when said piston valve is actuated said piston valve will first be closed and thereafter the disc valve will be opened.

3. An operating valve comprising a housing, walls subdividing said housing into three chambers, to wit, a central chamber adapted to be connected to the apparatus to be controlled by the device, a fluid pressure supply chamber at one end of the housing, and an exhaust chamber at the other end thereof, a disc valve interposed in the wall between the central chamber and the pressure chamber, a piston valve structure interposed in the wall between the central chamber and the exhaust chamber, the piston valve having a greater range of movement than the disc valve whereby when said piston valve is actuated the same will first be closed and the disc valve will thereafter be opened.

4. An operating valve comprising a housing, walls subdividing said housing into three chambers, to wit, a central chamber adapted to be connected to the apparatus to be controlled by the device, a fluid pressure supply chamber at one end of the housing, and an exhaust chamber at the other end thereof, a valve seat member carried by the wall between the central chamber and the pressure chamber, a disc valve adapted to be seated therein, a cylinder carried by the wall between the central chamber and the exhaust chamber, a piston valve mounted in said cylinder, said cylinder having apertures forming a communication between the interior thereof and said exhaust chamber, the piston valve being adapted to close said apertures, and coacting means between said piston valve and said disc valve whereby when said piston valve is actuated the same will first close the apertures in the cylinder and thereafter open the disc valve.

5. An operating valve comprising a housing, walls subdividing said housing into three chambers, to wit, a central chamber adapted to be connected to the apparatus to be controlled by the device, a fluid pressure supply chamber at one end of the housing, and an exhaust chamber at the other end thereof, a valve seat member carried by the wall between the central chamber and the

pressure chamber, a disc valve adapted to be seated therein, a spring adapted to impel said valve toward its seat, a cylinder carried by the wall between the central chamber and the exhaust chamber, a piston valve mounted in said cylinder, said cylinder having apertures forming a communication between the interior thereof and said exhaust chamber, the piston valve being adapted to close said apertures, a spring tending to impel said piston to the open position, and coacting means between said piston valve and said disc valve whereby when said piston valve is actuated the same will first close the apertures in the cylinder and thereafter open the disc valve.

6. An operating valve comprising a housing, walls subdividing said housing into three chambers, to wit, a central chamber adapted to be connected to the apparatus to be controlled by the device, a fluid pressure supply chamber at one end of the housing, and an exhaust chamber at the other end thereof, a valve seat member threaded in the wall between the central chamber and the pressure chamber, a disc valve adapted to be seated therein, a spring adapted to impel said valve toward its seat, a cylinder threaded in the wall between the central chamber and the exhaust chamber, a piston valve mounted in said cylinder, said cylinder having apertures forming a communication between the interior thereof and said exhaust chamber, the piston valve being adapted to close said apertures, a spring tending to impel said piston to the open position, and coacting means between said piston valve and said disc valve whereby when said piston valve is actuated the same will first close the apertures in the cylinder and thereafter open the disc valve.

7. An operating valve comprising a housing, walls subdividing said housing into three chambers, to wit, a central chamber adapted to be connected to the apparatus to be controlled by the device, a fluid pressure supply chamber at one end of the housing, and an exhaust chamber at the other end thereof, removable closure members at each end of the housing, a valve seat member threaded in the wall between the central chamber and the pressure chamber, a disc valve adapted to be seated therein, a spring adapted to impel said valve toward its seat, a cylinder threaded in the wall between the central chamber and the exhaust chamber, a piston valve mounted in said cylinder, said cylinder having apertures forming a communication between the interior thereof and said exhaust chamber, the piston valve being adapted to close said apertures, a spring tending to impel said piston to the open position, and coacting means between said piston valve and said disc valve whereby when said piston valve is actuated the same will first close the apertures in the cylinder and thereafter open the disc valve.

8. An operating valve comprising a housing, walls subdividing said housing into three chambers, to wit, a central chamber adapted to be connected to the apparatus to be controlled by the device, a fluid pressure supply chamber at one end of the housing, and an exhaust chamber at the other end thereof, removable closure members at each end of the housing, a valve seat member threaded in the wall between the central chamber and the pressure chamber, a disc valve adapted to be seated therein, a spring adapted to impel said valve toward its seat, a cylinder threaded in the wall between the central chamber and the exhaust chamber, a piston valve mounted in said cylinder, said cylinder having apertures forming a communication between the interior thereof and said exhaust chamber, the piston valve being adapted to close said apertures, a spring tending to impel said piston to the open position, and coacting means between said piston valve and said disc valve whereby when said piston valve is actuated the same will first close the apertures in the cylinder and thereafter open the disc valve, said means comprising a stem extending from the disc valve, and a central sleeve carried by the piston valve, the inner end surface of which is adapted to engage the upper end of said stem after the aforesaid passageways are closed.

9. An operating valve comprising a housing, walls subdividing said housing into three chambers, to wit, a central chamber adapted to be connected to the apparatus to be controlled by the device, a fluid pressure supply chamber at one end of the housing, and an exhaust chamber at the other end thereof, removable closure members at each end of the housing, a valve seat member threaded in the wall between the central chamber and the pressure chamber, a disc valve adapted to be seated therein, a spring adapted to impel said valve toward its seat, a cylinder threaded in the wall between the central chamber and the exhaust chamber, a piston valve mounted in said cylinder, said cylinder having apertures forming a communication between the interior thereof and said exhaust chamber, the piston valve being adapted to close said apertures, a spring tending to impel said piston to the open position, coacting means between said piston valve and said disc valve whereby when said piston valve is actuated the same will first close the apertures in the cylinder and thereafter open the disc valve, said means comprising a stem extending from the disc valve, and a central sleeve carried by the piston valve, the inner end surface of which is adapted to engage the upper end of said stem after the aforesaid passageways are

closed, and means for actuating said piston valve.

10. An operating valve comprising a housing, walls subdividing said housing into three chambers, to wit, a central chamber adapted to be connected to the apparatus to be controlled by the device, a fluid pressure supply chamber at one end of the housing, and an exhaust chamber at the other end thereof, removable closure members at each end of the housing, a valve seat member threaded in the wall between the central chamber and the pressure chamber, a disc valve adapted to be seated therein, a spring adapted to impel said valve toward its seat, a cylinder threaded in the wall between the central chamber and the exhaust chamber, a piston valve mounted in said cylinder, said cylinder having apertures forming a communication between the interior thereof and said exhaust chamber, the piston valve being adapted to close said apertures, a spring tending to impel said piston to the open position, coacting means between said piston valve and said disc valve whereby when said piston valve is actuated the same will first close the apertures in the cylinder and thereafter open the disc valve, said means comprising a stem extending from the disc valve, and a central sleeve carried by the piston valve, the inner end surface of which is adapted to engage the upper end of said stem after the aforesaid passageways are closed, the piston valve having a stem extending through one end of the end closure members, and a lever engaging said stem and adapted to actuate the same.

In testimony whereof, I have hereunto signed my name.

ROBERT H. GEORGE.