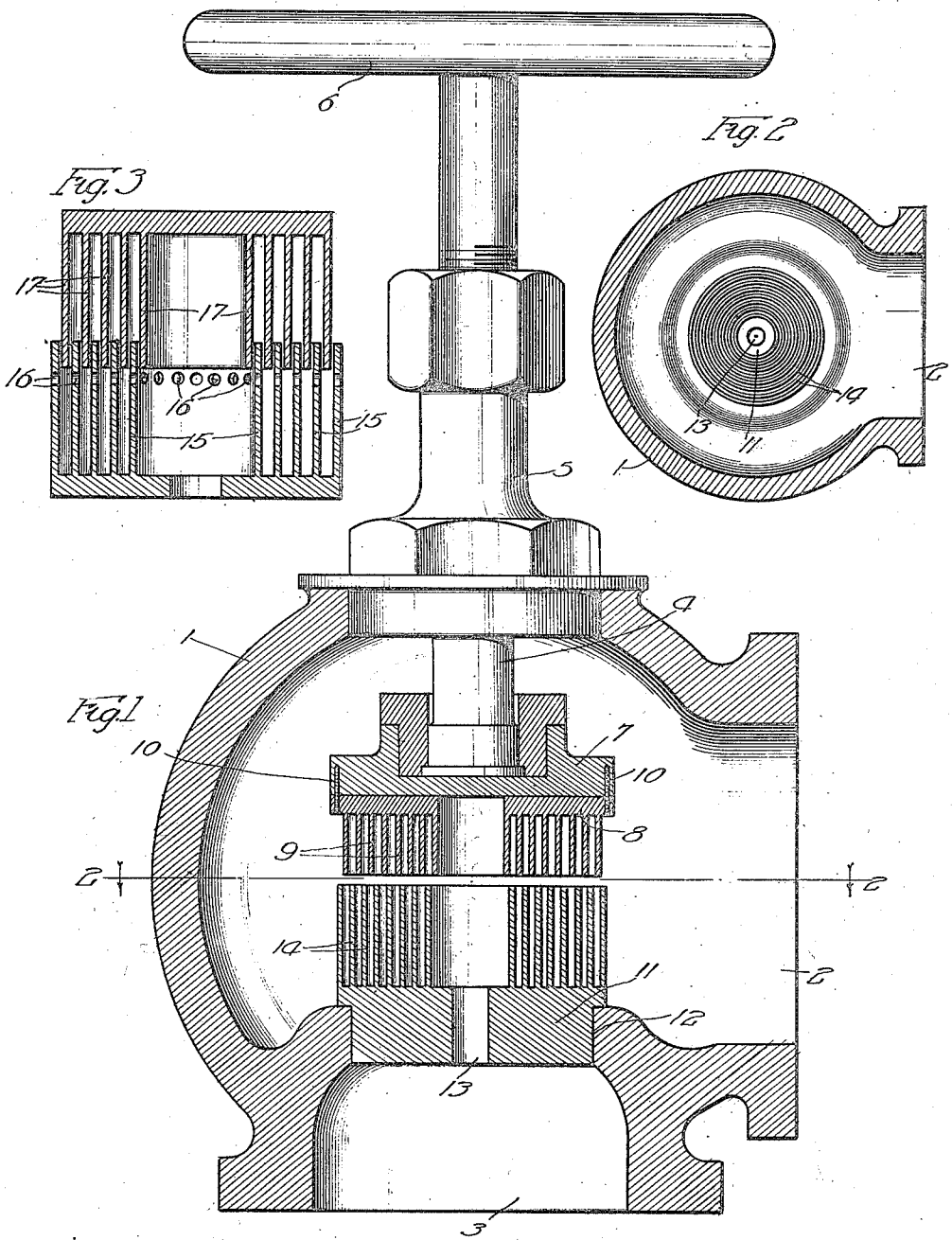
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VALVE.

APPLICATION FILED APR. 19, 1918.

1,342,955. Patented June 8, 1920.



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VALVE.

1,342,955. Specification of Letters Patent. Patented June 8, 1920.

Application filed April 19, 1918. Serial No. 229,496.

To all whom it may concern:

Be it known that I, HENRY J. GEBHARDT, a citizen of the United States of America, and resident of Chicago, Illinois, have invented a certain new and useful Improvement in Valves, of which the following is a specification.

The invention relates to valves for controlling fluid pressure, such as steam or water or gases under pressure, and more particularly to valves for this purpose in which the operation thereof, in order to open or close the passage controlled by the valve, is brought about by relative movement, as for example, by reciprocation of the movable valve member relatively to the stationary valve seat, or by relative movement of any suitable character between the members of the valve.

Generally stated, the object of the invention is to provide a novel and improved construction which will obviate the necessity of frictional engagement between the members of the valve and which will also obviate the necessity of direct pressure of one member against the other, in order to close the valve, and whereby, in one sense, there will be no valve seat, or no positive seating of the valve member, and hence no friction and no wearing action at the point or points where the fluid pressure is controlled.

It is also an object to provide certain details and features of construction and combinations tending to increase the general efficiency and desirability of a valve of this particular construction.

To these and other useful ends the invention consists in matters, hereafter set forth and claimed and shown in the accompanying drawings, in which—

Figure 1 is a vertical section of a valve embodying the principles of the invention.

Fig. 2 is a horizontal section on line 2—2 in Fig. 1, on a smaller scale.

Fig. 3 is a sectional view showing a different form of the invention.

As thus illustrated, the invention takes the form of an ordinary hand-operated steam valve having a casing 1 provided at its side with an opening 2 and at its bottom with an opening 3, either of which may be the inlet, and either of which may be the outlet for the steam or other fluid under pressure. The rotary valve stem 4 is of any suitable or known character, and is carried in the stuffing-box 5 usually provided in a valve construction of this kind, the upper end of said stem being provided with a handle or hand-wheel 6 of the usual or any suitable form. The lower end of the valve stem is provided with a head 7 of any suitable character, which may be rigid, or which may, if desirable, turn freely about a vertical axis on the lower end of the valve stem, in a manner that will be readily understood. A movable valve member 8, having downwardly extending concentric walls 9, is removably secured by screws 10, or by any other suitable means, to the bottom of the movable valve member 7, and a stationary valve member 11 is tightly fitted and secured in the reduced portion 12 of the opening 3, being provided with a central passage 13 for the fluid under pressure. This stationary valve member 11 is provided with upwardly extending concentrically arranged and cylindric walls 14, which are opposite the concentrically arranged spaces between the walls 9, so that the walls 9 will enter the spaces between the walls 14, when the valve member 7 is moved downward, thus closing the valve. The walls 9 are slightly thinner than the spaces between the walls 14, so that the two sets of walls do not engage each other, but come so close together that the thin film of steam or water or other fluid under pressure is subjected to so much friction that it cannot flow from one space to the next, the zigzag or back and forth path which the pressure would have to take in escaping being so extensive or of such length that the fluid is effectually impeded by its frictional contact with the surfaces of the walls. To open the valve the valve-stem is rotated in the opposite direction so that the member 8 is lifted a sufficient distance to bring its walls 9 above the upper edges of the walls 14, thereby permitting the fluid under pressure to pass between the members.

In Fig. 3 the construction is similar, except that in this case the lower cylindric, concentrically arranged walls 15 are provided near their upper edges with holes or openings 16, and with this arrangement the cylindric and concentrically arranged walls of the upper valve member do not need to be completely withdrawn from the spaces between the walls 15. In other words, it is only necessary that the walls 17 be moved upward a distance sufficient to bring their

lower edges above the openings 16, as this will provide a plurality of passages through which the fluid under pressure can flow from one side of the valve to the other, depending upon which is the inlet side and which is the outlet side.

In either case, however, the opening of the valve is produced by relative movement between the two sets of cylindric and concentrically arranged walls, in one direction, and closing of the valve is produced by a similar relative movement in the opposite direction. In Fig. 3, the portions of the walls 15 above the openings 16 serve merely as guides to retain the walls 17 in correct position, and the openings 16 merely constitute the terminating edges of the walls 15, so far as the valve action is concerned, for it will be seen that the portions of the walls 15 above the openings 16 can be omitted without altering the mode of operation of the valve, or without rendering it inoperative as a valve to control fluid under pressure. It will be seen, however, that the cylindric and concentrically arranged walls may be made quite thin, and that in such case they might warp or get out of shape, and in that even the walls of one valve member might not accurately enter the spaces between the walls of the other member, and the valve would jam or fail to close. Therefore, with the construction shown in Fig. 3, the walls of one member are always retained in place, relatively to the walls of the other member, inasmuch as the two members are never completely disengaged, the one from the other, and with this construction the cylindric walls can be made of as thin metal as will stand the strain and pressure of the steam or other fluid.

In either form of the invention, however, it will be seen that the cylindric walls of each set are disposed opposite the cylindric cavities of the other set. Thus two groups of parallel surfaces are provided, which surfaces have relative movement to open and close the valve without frictional engagement between the opposing surfaces, and with the surfaces sufficiently close together to resist by surface friction the passage of the fluid between the walls when the valve is closed. If the walls are slightly distorted or made of very thin sheet material, it is possible, of course, that some of them will engage each other, and will have sliding contact when the valve is opened and closed. Such contact, however, is not intentional, is not necessary, and does not depart from the principle of the invention, which involves the arrangement of the opposing surfaces so close together that no contact between them is necessary, the mere surface friction being sufficient to check the flow of the fluid. Obviously, therefore, the invention is not limited to the exact construction shown and described.

As shown and described, the invention is employed in a valve, but it may be used for other purposes, in other structures for containing fluid under pressure, to prevent leakage where necessary, if desired.

What I claim as my invention is:—

1. In a valve to control fluid pressure, means forming one set of walls with successive cavities between them, another set of walls forming successive cavities between them with the walls of each set alternating with those of the other set, and means for causing relative movement between the two sets of walls, to open and close the valve, and a casing to inclose said walls, having inlet and outlet openings for the passage of the fluid to and from said cavities.

2. A valve as specified in claim 1, said walls being cylindric, whereby said cavities are concentric, and so arranged that the walls of each set are exactly opposite the cavities of the other set.

3. A valve as specified in claim 1, said cavities being slightly thicker than the walls, whereby the walls of one set do not engage the walls of the other set, and move without friction, being close enough to resist by surface friction the passage of the fluid between the walls when the valve is closed.

4. A valve as specified in claim 1, said walls being cylindric, and one set of walls being stationary and having an opening in the center thereof for the passage of the fluid when the valve is open.

5. A structure as specified in claim 1, a portion of said walls having apertures to permit the escape of the fluid, when the valve is opened, and each set of walls being retained in guiding relation to the other when the valve is open.

6. In a valve to control fluid pressure, the combination of means to provide a plurality of surfaces disposed in position to frictionally resist the passage of the fluid when the valve is closed, and means to cause relative movement between said surfaces to open and close the valve without friction between said surfaces, the opposing surfaces being close enough to resist by surface friction the passage of the fluid between them when the valve is closed.

7. A structure as specified in claim 6, said surfaces being cylindric and concentrically arranged.

8. A structure as specified in claim 6, said surfaces being parallel and arranged in two groups, the members of each group alternating with those of the other group.

9. The improved non-seating valve to control fluid pressure, without friction between the parts thereof having opposed and relatively movable surfaces of sufficient area to

frictionally prevent the escape of the pressure fluid between them, substantially as shown and described.

10. In a structure for containing fluid under pressure, the combination of means to provide a plurality of smooth opposing surfaces, mechanism whereby said surfaces have relative parallel movement, and an inlet and an outlet for the pressure, said surfaces being close enough together and of sufficient area to obviate the necessity of contact with each other to frictionally prevent the passage of the fluid between them.

11. A structure as specified in claim 10, said means comprising a plurality of concentric cylinders spaced apart and rigidly connected together, and other cylinders rigidly connected together and arranged to operate in unison in the spaces between said first mentioned cylinders.

12. A structure as specified in claims 10 and 11, in which said cylinders form a fluid pressure chamber within the cylinder of least diameter.

Signed by me at Chicago, Illinois, this 17th day of April, 1918.

HENRY J. GEBHARDT.