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J. HOFMANN

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VALVE

Filed Feb. 13, 1929

Fig. 1.

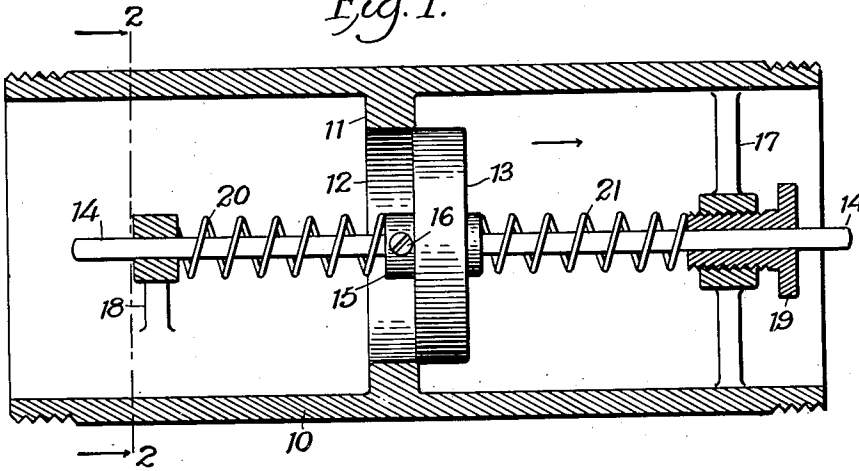


Fig. 2.

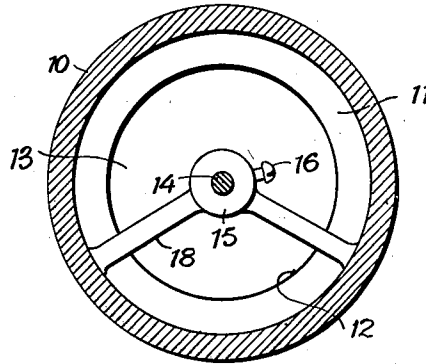
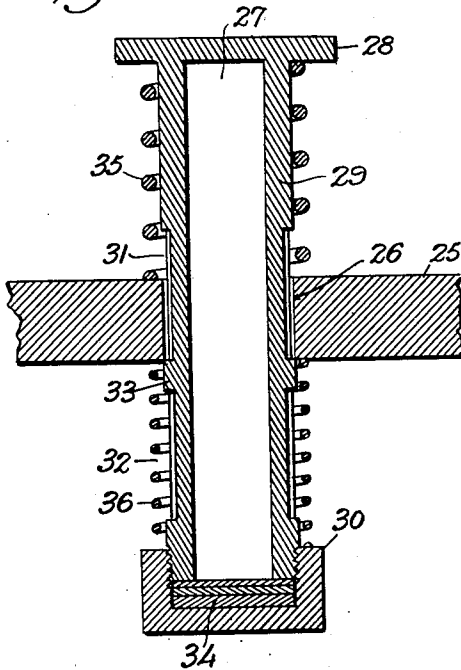


Fig. 3.



INVENTOR.
Josef Hofmann
BY *Henry Orth*
ATTORNEY.

UNITED STATES PATENT OFFICE

JOSEF HOFMANN, OF MERION, PENNSYLVANIA

VALVE

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My invention relates to valve structures of the type in which the valve is intended to pass entirely through the port in a ring seat in opposite directions, and the valve is balanced centrally on its seat between two springs.

My invention differs from known structures in that the valve is of appreciable thickness, and when in its normal position is held by spring pressure close to one end of a seat of appreciable length, or, as the case may be, nearer one end than the other, with the result that the valve will open the port in one direction with but little or no pressure or movement, as, for example, under a slight suction, but when moved in the other direction travels a greater distance to open the port at its opposite end, hence moves against a greater spring pressure, and strongly throttles the fluid passing through the port against an opposite or back pressure.

Means are provided, as in the known type, for adjusting the spring pressure on the valve to adjust its position relatively to the seat.

Referring to the drawings, in which like parts are similarly designated—

Figure 1 is a longitudinal section of a length of pipe having my improved valve construction therein.

Fig. 2 is a cross-section on line 2—2 of Fig. 1.

Fig. 3 is a vertical section of a modified form of valve.

Referring to Figure 1, 10 is a short length of pipe having a ring seat 11, either made in one piece with the length of pipe, or separately and fastened in the pipe length. This seat is provided with a port or opening 12 of appreciable length through which the valve 13 may pass in either direction.

The valve 13 preferably, but not necessarily, separate from its stem 14, has a boss 15 in which is a key, screw or other fastening 16 to hold the valve on its stem 14.

The stem is supported at each end in suitable supports, here shown as spiders 17 and 18. In one of the spiders, say 17, is screwed and adjusting sleeve 19, and a coil spring 20 is mounted on the spindle 14 between the spider

18 and the valve disc, and another spring 21 is between the valve disc and adjusting sleeve, so that the disc will be balanced between the pressures of the two springs and the position of the disc may be adjusted with respect to the ring 11.

The ring seat is not intended to be a thin edge but has substantial thickness, i. e., is tubular, and this longitudinal dimension may be varied in accordance with the strength of the throttling action desired to be obtained. The springs may be of the same strength, or of different strengths, and preferably the spring 21 in the direction of least resistance shall be the lighter spring, but in any event the disc 13 will be held balanced between the two springs.

In Figure 3, however, the resistance of the lighter spring 36 is considerably less than that of spring 35, and during the upward flow of the liquid through port 26 the upper flange 28 of the tubular valve member 27 may leave spring 35, so that the resistance to the passage of liquid 33 through the port 26 offered by the spring 36 is less than that offered by the very much heavier spring 35 to the downward movement of the valve.

The rate of progressive resistance to movement by a heavy spring is very much greater than with a light spring.

The fluid flows in the direction of the arrow, the valve disc 13, being preferably partly open when in normal position and to the right of the ring 11, will offer but little resistance to the flow, and especially if the spring 21 is of smaller wire, so as to more readily yield and permit the disc to move to the right a greater distance for a given pressure.

On the other hand, when back pressure is applied the disc must move a much greater distance to open the port, and this distance is dependent upon the thickness of the ring, or rather, upon the length of the tubular port plus the thickness of the disc, hence the spring 20 is compressed to a much greater extent, exerting a pressure on the disc increasing with the extent to which this spring is compressed toward the left, thus strongly throttling the liquid returning through the port.

The edges of the ring valve may be rounded,

but this is not absolutely necessary. Such rounding prevents the hissing noise of the fluid when passing between the ring and disc.

In Fig. 3 I show a modification operating on exactly the same principle, but of different form. 25 is the member having a hole or port 26 of appreciable length through which the fluid is to pass, and may be a stationary diaphragm, a piston, a cylinder head, or any other element requiring such a valve.

Movable through the port is a tubular valve member 27 comprising a flange 28 at one end, the body or tube portion 29 threaded at its lower end for the reception of an adjustable spring seat in the form of a cap 30. The body is provided with longitudinal grooves 31 and 32 between the ends of which is an uncut portion or peripheral land 33 that has the equivalent function of the disc 13 in Fig. 1.

Between the threaded end of the body and the cap are washers 34, preferably of different thicknesses, that may be removed or inserted in the cap to act as a gauge to determine the take up or compression of the springs 35 and 36, which I have shown of different sizes of wire, as referred to with respect to Figure 1. The upper end of spring 35 seats against the flange 28, and its lower end against the member 25, and the upper end of spring 36 seats against the member 25 and its lower end against the seat or cap 30, as shown.

The cap 30 and washer 34 may be omitted and the cap replaced by an interiorly threaded washer of sufficient width to form the lower seat of spring 36. The longitudinal grooves 31 and 32 should be longer than the axial length of the port 26.

The operation is similar to that of the structure shown in Figure 1.

In both of the constructions shown the throttling action is dependent on the axial length of the port or the axial thickness of the valve, or both, so a variation of either of these variables affects the throttling action.

I claim—

1. The combination with a member having a port therein of appreciable length; of a valve mounted to pass entirely through the port in opposite directions, said valve being of a substantially greater length than the part, and spring means to hold the valve normally to one side of the middle of the length of the port, the path of movement of the valve from its normal position to open the port in one direction being greater than its path of movement to open the port in the opposite direction, said spring means cooperating with the valve and opposite sides of the port member and in combination with the port member forming sole means for supporting and guiding the valve in its movement.

2. The combination with a member having a port therethrough of appreciable length; of an element having two grooves divided by

a land, said grooves having a length greater than the length of the port, and spring means to yieldingly support the element with its land at one side of the middle of the port length, and means to adjust the tension of the spring means to position the land with respect to the port middle.

3. The combination with a member having a port therethrough of appreciable length; of a tubular element movable in the port and having longitudinal grooves of greater length than the length of the port with a land between them, said land operating as a valve to pass through the port in opposite directions, a flange at one end of the element, a coil spring surrounding the element seated at one end against the flange and at its other end on the member, a second spring surrounding the element and seated at its one end against the opposite side of said member, and the other end of the latter spring resting on a spring seat adjustable on the other end of said element whereby the position of the land is adjusted with respect to the port.

4. The combination with a member having a port therethrough of appreciable length; of a tubular element movable in the port and having longitudinal grooves of greater length than the length of the port with a land between them, the land operating as a valve to pass through the port in opposite directions, a flange at one end of the element, a coil spring surrounding the element seated at one end against the flange and at its other end on the member, a second spring of different strength from the first spring surrounding the element and seated at its one end against the opposite side of said member, and the other end of the latter spring resting on a spring seat adjustable on the other end of said element, whereby the position of the land is adjusted with respect to the port.

In testimony that I claim the foregoing as my invention, I have signed my name hereto.

JOSEF HOFMANN.