United States Patent

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[54] **EXPANSIBLE PLUG VALVE HAVING A RECTILINEAR MOTION**
2 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **251/189,** 251/191, 251/325, 251/231, 251/63
[51] **Int. Cl.** **F16k 3/16**
[50] **Field of Search** 251/335, 325, 191, 190, 187, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 171

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ABSTRACT: A valve including a valve body with a chamber therein and a removable elastomeric valve member in the chamber including means for expanding the valve member under normal usage thereof whether open or closed, said valve body member having an open end with a removable closure therefor allowing removal of said valve member from the valve body.

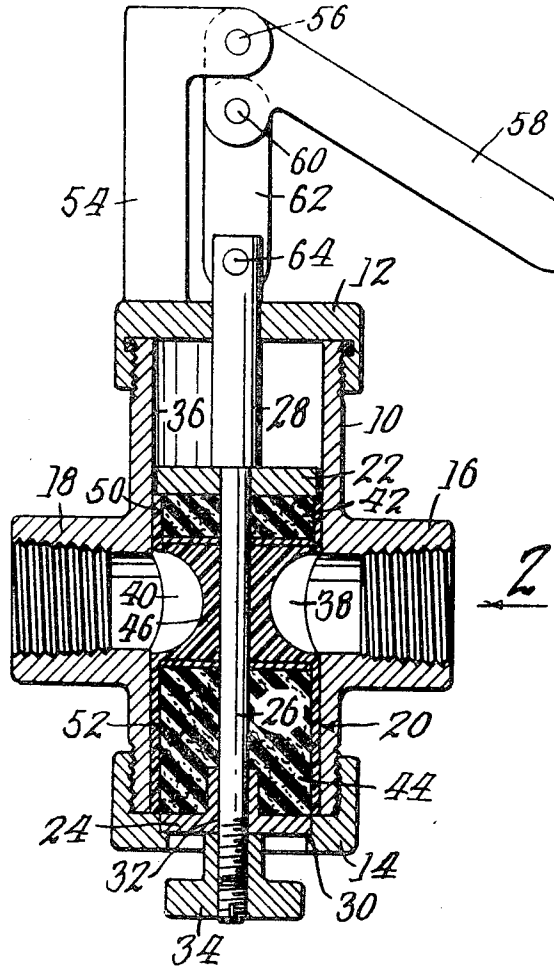


Fig. 1

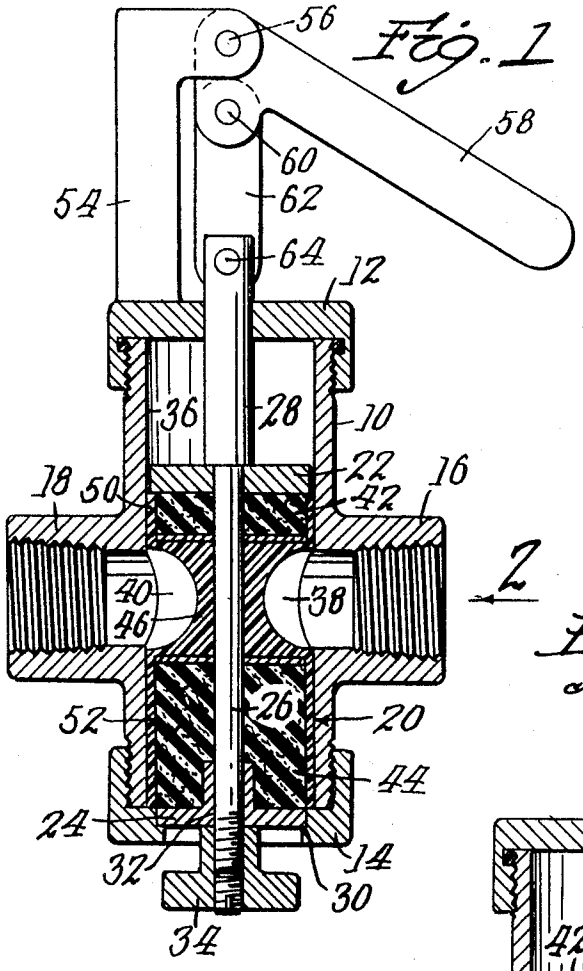


Fig. 2

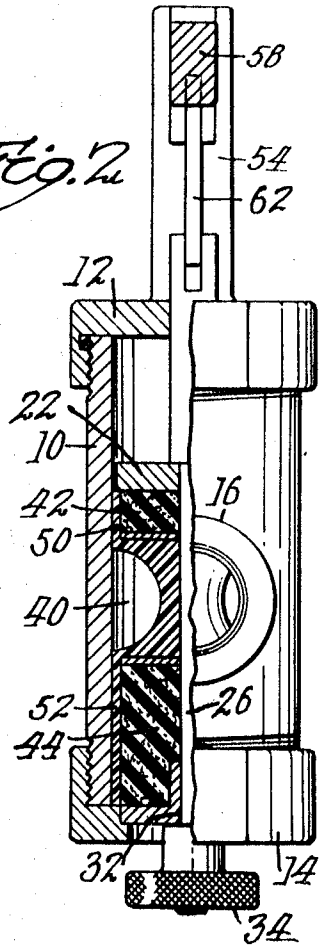
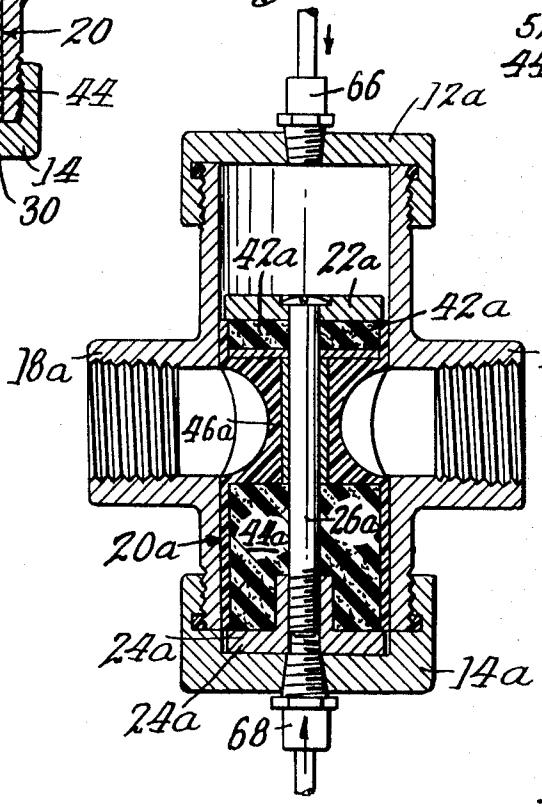


Fig. 3



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EXPANSIBLE PLUG VALVE HAVING A RECTILINEAR MOTION

BACKGROUND OF THE INVENTION

One of the problems in many kinds of valves is to provide against leakage particularly in completely removable valve members or actuators as for instance in sanitary valves. Many different kinds of seals, etc. have been suggested in the past but in one way or another such seals have usually been found to be unsatisfactory after ordinary usage and under high pressures, especially with viscous and partly solid fluids.

SUMMARY OF THE INVENTION

This invention provides a valve housing having a pair of oppositely directed pipe connections to the housing which has a central substantially cylindrical chamber open at both ends. An elastometric valve member is inserted through one of the openings in the valve housing and has a flow-through passage, there being means for moving the valve member rectilinearly between open and closed positions thereof.

The means for so moving the valve member also includes means for compressing the plug in an axial direction so that it is under compressive action at all times to tend to expand in the chamber to render the valve substantially leakproof. The means for moving the plug may be constructed and arranged to provide for an additional expansion of the plug after it is installed, this means being releasable to move the valve between open and closed positions and remove the plug if it should require cleaning or replacement.

DESCRIPTION OF THE FIGURES

FIG. 1 is a sectional view illustrating a form of the invention;

FIG. 2 is an elevational view partly in section looking in the direction of arrow 2 in FIG. 1; and

FIG. 3 is a sectional view of a modification.

PREFERRED EMBODIMENTS OF THE INVENTION

Referring now to FIGS. 1 and 2, the valve housing comprises a generally cylindrical member 10 open at its top and bottom and having a closure cap 12 at the top and another closure cap 14 at the bottom, the latter being of slightly different construction from cap 12. The housing has pipe connection means 16 and 18.

The valve member 20 to open and close the valve in this case is axially or rectilinearly slidable and is elastometric and compressible. It is provided with a top plate 22 and a bottom plate 24, a rod 26 passing centrally through the same and through both the top and the bottom plates. The rod 26 is provided with an enlargement at 28 forming an abutment for top plate 22 and the cap 14 is provided with an annular shoulder 30 providing an abutment for bottom plate 24. Rod 26 is threaded at one end where it extends through an opening 32 in bottom plate 14, opening 32 being associated with the shoulder 30. A nut or other means 34 is applied thereto so that when the nut 34 is turned to a certain degree, it will exert a compressive action on the elastometric plug, causing it to expand laterally to tightly fit the walls of the chamber indicated at 36.

It is preferred that for long wear and better action, the elastometric plug instead of being merely a single cylindrical body of elastometric material having the flow-through openings 38, 40, should comprise a pair of elastometric members which are indicated at 42 at the top and 44 in spaced relation therewith at the bottom. These two members engage the top and bottom plates respectively as shown and are separated by a central structural member 46 which may or may not be elastometric and is preferably made of a plastic material having long wear characteristics and slidability as for instance Teflon.

In this case the Teflon material is provided in the form of a pair of thin walled cups or coatings indicated at 50 and 52, these embracing the elastometric elements 42 and 44 but not interfering to any great extent with the expansion pressure caused by tightening member 34.

With this construction the elastometric plug is easily slidable between a closed uppermost position, not shown, and a lowermost position shown where the valve is open, but at the same time pressure can be applied to the rod 26 to expand parts 42 and 44 so as to cause the sidewalls of the cups for instance at 50 and 52 to very closely engage the interior sidewall 36 of the valve housing 10 and render the valve completely leakproof.

The top plate 12 is provided with an upright standard 54 having a pivot pin 56 on which is mounted a pivotable handle 58. The handle 58 has an offset pivot pin 60 connected to a link 62 which is in turn pivoted at 64 with respect to enlargement 28 of rod 26. The action is than when the handle 58 is in the position shown in FIG. 1, the link 62 pushes the valve down to the open position shown in FIG. 1. When the handle 58 is moved in a counterclockwise direction, the rod 26 is moved upwardly and the valve is closed when the plate 22 approaches the closed position against the under side of cap 12.

The parts may be adjusted so that when the handle 58 is moved to its fullest extent downwardly as shown in FIG. 1, the shoulder of the enlargement 28 bearing against top plate 22 may be made to provide an extra compressive pressure against the entire body of the elastometric valve member because the bottom plate 24 is seated on the shoulder 30, so that therefore with the parts in the position shown, the valve is additionally expanded and further sealed. When the handle is turned in the opposite direction, handle 58 will cause the reverse action because the rod 26 will pull on the fastener 34 reacting against bottom plate 24 to additionally compress the elastometric valve member.

Either cap 12 or cap 14 may be removed and the valve member can be removed by removing pin 64. On the other hand, if cap 12 is removed, the valve assembly can be moved in the opposite direction because threaded member 34 has a diameter less than the diameter of the opening at 32 and bottom cap 14.

FIG. 3 shows a modified arrangement. Like numbers indicate like parts with the addition of a small "*a*." Cap 12*a* is varied by having a fluid pressure fitting applied thereto as at 66 and the same is true of the bottom cap 14*a* which has the fluid pressure fitting 68 and an opening therein. However the valve member itself is of similar construction having the elastometric members 44*a* and 42*a*, top plate 22*a*, and bottom plate 24*a*. The bottom plate however is directly threaded to the central rod 26*a*, thus being preset as to the amount of expansion provided on the plug which has the structural member 46*a* similar to that at 46.

It is to be understood that both rod 26 and 26*a* are easily tightened after insertion of the respective plug in the respective chambers. However in some situations the plug may be expanded and then forced into the chamber if this should be found desirable.

In the present case the valve is opened and closed by means of air pressure operating in the respective direction as shown by the arrows and this pressure may be made great enough to further compress the elastometric plug valve member in either fully open or fully closed condition.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. A valve comprising a housing having a chamber, said chamber having an open end, a valve member comprising an elastometric plug adapted to be positioned in the chamber and to be removed therefrom, said plug having a flow-through opening,

means applying compressive pressure to said elastometric plug to expand the same so that it is sealed against leakage in the chamber, said means comprising a top plate and a bottom plate for the plug and connecting

means extending between the same, said connecting means being actuatable to cause said plates to tend to move toward each other for compressive action on the plug,

means for moving said plug rectilinearly between open and closed positions in said chamber, said last named means being constructed and arranged to apply additional compressive stress to said plug in at least one position of the latter, when said means is moved rectilinearly past both fully closed and open positions of the plug,

said plug comprising an elastometric member and a structural member, said structural member including means substantially encasing said elastometric member and slidingly engaging the walls of the chamber.

2. The valve of claim 1 wherein said structural member is relatively rigid and includes a thin-walled open cup at one end, the elastometric member being located in said cup and encompassed thereby, the outer surface of the cup conforming to and engaging the inner wall of the cylindrical chamber.