July 21, 1953 J. F. SEBALD 2,646,072

SELECTOR VALVE FOR WATER TREATING APPARATUS

Filed April 20, 1950 2 Sheets-Sheet 1

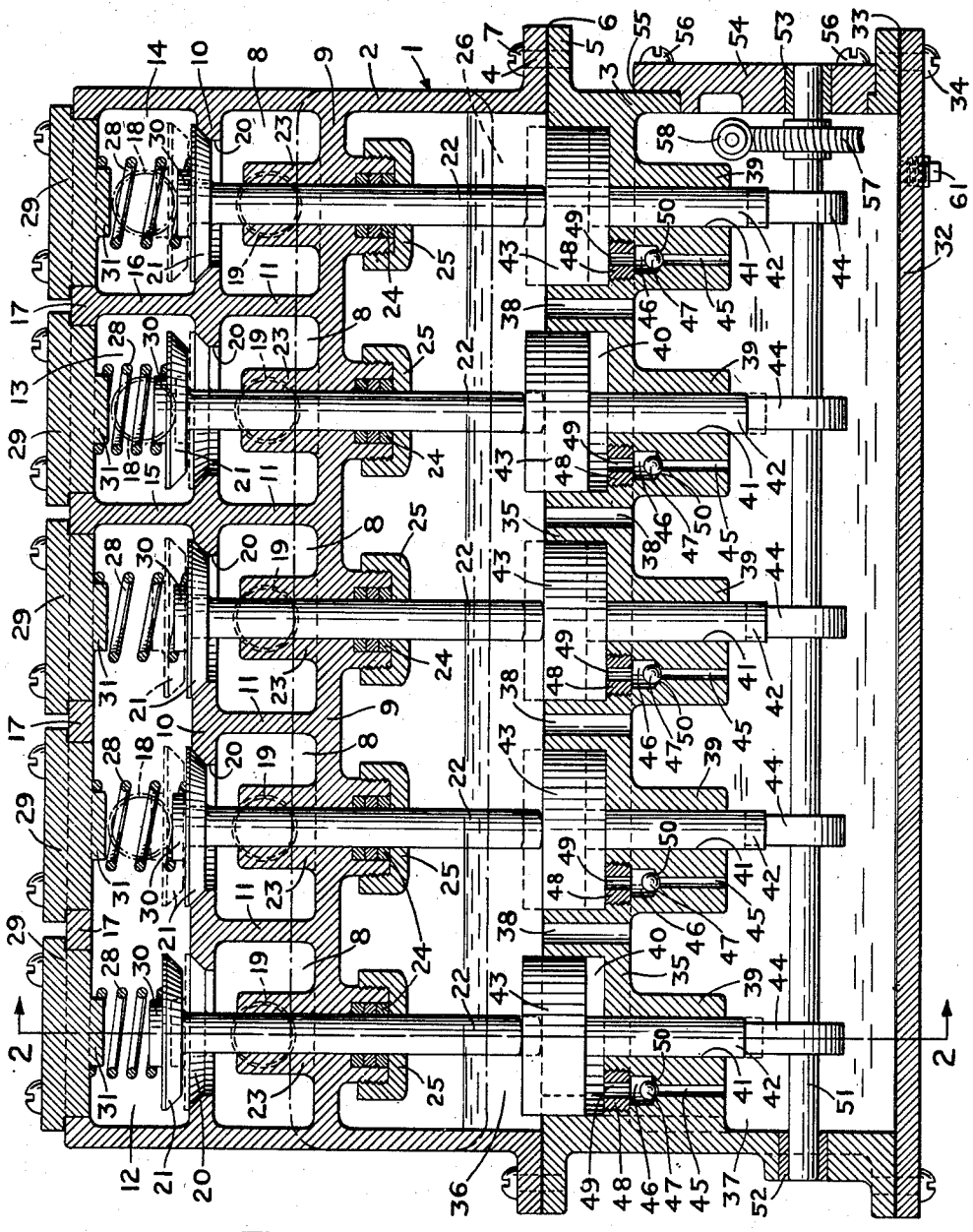


FIG. 1

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SELECTOR VALVE FOR WATER TREATING APPARATUS

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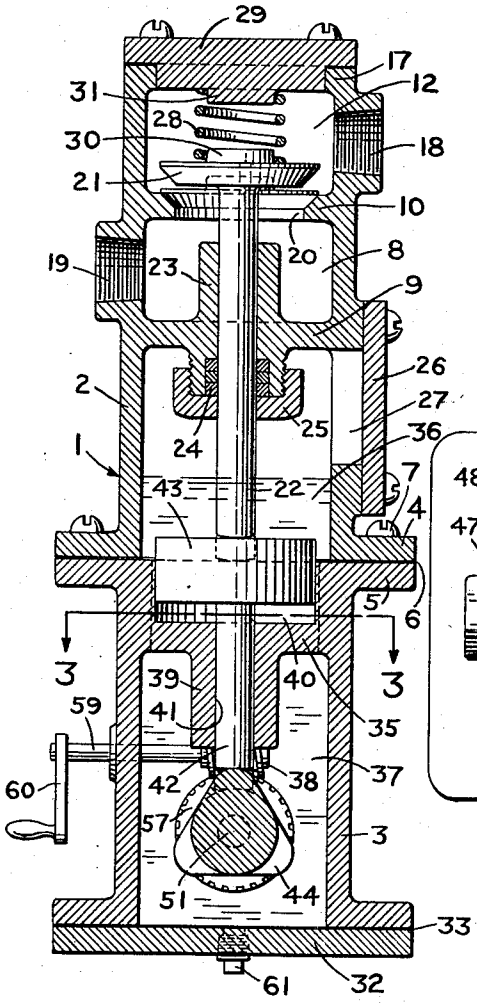


FIG. 2

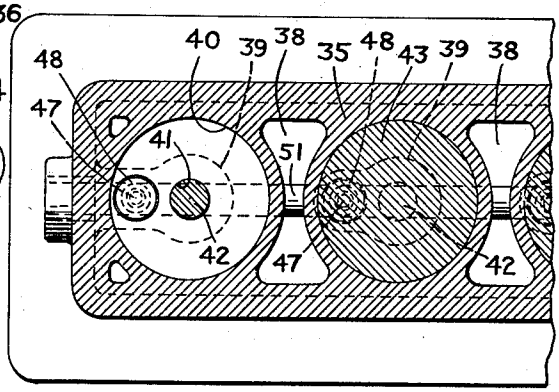


FIG. 3

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SELECTOR VALVE FOR WATER TREATING APPARATUS

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Application April 20, 1950, Serial No. 156,998

4 Claims. (Cl. 137—595)

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This invention relates generally to water treating equipment, and more particularly to a multi-port selector valve for controlling from a single point, the functional operations of water treating equipment through their service, back-wash, regeneration and rinse cycles.

There are a few multi-port selector valves now on the open market which employ liquid tight, unbalanced single seat valves. However, difficulties have developed in these multi-port selector valves where large pressure differentials exist due to the characteristic of slamming when closing which causes extreme water surging in the piping system.

Accordingly, it is an object of the present invention to provide a novel multi-port selector valve having a fluid dash pot cushion and tappet construction which prevents the valves from closing too quickly and thus prevents extreme water surging in the piping system of the water treating apparatus connected to and controlled by the selector valve.

It is another object of the present invention to provide a novel multi-port selector valve wherein easy access is provided for replacement of movable parts or packing which may become worn, or damaged at any time.

With these and other objects in view, as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing a selector valve for water treating apparatus of a preferred form embodying the invention, and the features forming the invention will be specifically pointed out in the claims.

In the drawings:

Figure 1 is a longitudinal section showing the invention.

Figure 2 is a vertical section taken on line 2—2 of Figure 1.

Figure 3 is a horizontal section taken on line 3—3 of Figure 2.

Referring to the drawings, Figure 1 shows a housing 1 having an upper portion 2 and a lower portion 3.

Upper portion 2 is substantially rectangular and inverted cup shape form in construction. It is provided with a flange 4 on its lower open end which is adapted to engage a corresponding flange 5 on the lower portion 3, in liquid tight relationship by suitable means such as gasket 6 and threaded member 7.

Substantially identical outlet chambers 8 are

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provided in the upper portion by two spaced horizontal partitions 9 and 10, and vertically spaced walls 11 therebetween. It is understood that while only 5 outlet chambers are shown that any number and size of outlet chambers may be established by increasing or decreasing the size of the housing or chambers accordingly. The partitions 9 and 10, are spaced in the upper portion 2 of the housing so that there is an area formed both above and below the outlet chambers 8. In the area above the spaced partitions 9 and 10 a main raw water inlet chamber 12, a service chamber 13 and a back-wash or rinse chamber 14 are formed by vertical walls 15 and 16, respectively between the upper partition 10 and the uppermost side 17 of the upper portion 2 of the housing 1, all of which is clearly shown in Figures 1 and 2 of the drawings.

Inlet openings 18 are provided for the respective inlet chambers 12, 13, and 14, and discharge outlets 19 are provided for the respective outlet chambers 8, which are threadably connected to suitable piping whereby fluid may be directed into and out of the housing 1 to the water treating apparatus for the various abovementioned operations.

In order to channel the flow of liquid and direct the flow from the various inlet chambers 12, 13 and 14 to the various outlet chambers 8, valve ports 20 are provided for each of the outlet chambers 8, in the upper partition 10. Valve seats 20 are engaged by valve heads 21 formed integrally with elongated valve stems 22, which slidably engage vertically disposed valve stem guides 23 formed in the lower partition 9, in the upper portion 2 of the housing 1, as is clearly shown in Figures 1 and 2 of the drawings.

To prevent leakage along the valve stem during operation a suitable packing 24 is provided around the valve stem which is held in position at the lower portion of the valve stem guide 23, by means of a packing nut 25 having the valve stem 22 passing therethrough and adapted to abut and hold the packing 24 in position by threadably engaging the outer surface of the valve stem guide 23.

A suitable cover member 26, as is shown in Figure 2, is provided for an opening 27, whereby access to the packing nut 25 and packing 24 is easily available in case access thereto or to other portions of the selector valve hereinafter described is desired.

Valve heads 21, engaging valve seats 20 are normally held in a closed position. This is accomplished passively by the inlet water acting

against the top surface of the valve heads 21 and positively by a spring member 28 also acting against the top surface of the valve.

Spring members 28 lie in the axial line of each of the valve heads. Each spring member 28 also lies between its respective valve head 21 and a repair plug 29 in the uppermost side 17 of the upper portion 2 of the housing 1. An upwardly extending projection 30 on the top surface of the valve head 21 and a downwardly extending projection 31 formed on the lower surface of the respective repair plugs 29 also lie in the axial line of the valve head 21, the spring member 28 being held in position by their projections 30 and 31. Repair plugs 29 are provided to allow easy access to the movable valve heads or discs 21 for replacement thereof whenever necessary. All of the above being clearly shown in Figures 1 and 2 of the drawings.

In operation, the valves are normally held closed. They will be opened by suitable means as hereinafter described to allow fluid in the various main raw water, service and rinse, compartments to pass to the various outlet chambers whereby the operations of service, backwash and regeneration may be performed through this single multi-port selector control.

Fluid dash pot and tappet construction

Intermediate the control means for opening the valves and the valve stems 22 is a fluid dash pot cushion and tappet construction which is mounted and formed in the lower housing 3.

Thus lower housing 3 which is also substantially rectangular and cup shaped, and which as hereinbefore mentioned is in fluid tight relationship with the upper housing by means of flange 5, will form with that area in the upper portion 2 below the lower partition 9, a reservoir which contains hydraulic or other suitable type of lubricating fluid therein. The lower housing 3 may be integrally formed or provided with a removable base plate 32 connected thereto in liquid tight relationship by means of gasket 33 and threaded members 34, as is shown in Figures 1 and 2 of the drawings.

The bulkhead shown at 35 in Figures 1 and 2 of the drawings, is a substantially thick flat horizontally positioned member which may be formed integrally with the lower portion 3, in the plane of the flange 5, or may comprise a separately formed member adapted to be fixedly connected thereto by suitable means.

The upper surface of the bulkhead 35 is thus continuous with the flange, so that when the housing 1 is assembled the bulkhead 35 will lie in substantially the medial plane of the reservoir dividing it into an upper reservoir 36 and a lower reservoir 37. Equalizing passages 38 are formed in the bulkhead 35 to allow the free flow of liquid between the upper and lower reservoirs 36 and 37 respectively at all times to equalize the pressures therein.

Depending downwardly from the lower surface of the bulkhead 35 are projections 39, which are equal in number to the number of valve stems 22, all of the above being clearly shown in Figures 1 and 3 of the drawings.

Fluid dash pots 40 are formed in the upper surface of the bulkhead 35, comprising cylindrical chambers open to the upper reservoir 36, and spaced in the bulkhead 35, to provide a dash pot in the axial line of each of the valve stems 22. Tappet guides 41, extend from each of the dash pots 40 through each of the projections 39, whereby means are provided to slidably mount a tappet stem 42 therein. Connected to each tappet stem is a dash pot piston 43 which is slidable in the dash pot chamber 40. However, as clearly shown in Figures 1, 2 and 3, each of the dash pot pistons 43 is mounted in close fit with the walls of the dash pot chamber 40.

The dash pot pistons 43 will abut the ends of the valve stem 22, and the ends of the tappet stems 42 will extend downwardly past the lowermost portion of the tappet guides 41 into the lower reservoir 37 to contact their perspective cam members 44. The cam members 44 are connected in predetermined positions to means hereinafter described for imparting rotary movement thereto whereby predetermined tappet stems 42 and pistons 43 will be moved upwardly thus forcing their respective valve stems 22 upwardly whereby the valve head 21 connected thereto will open a given valve port 20 between at least one or more of the inlet and outlet chambers.

Adjacent each of the tappet guides 41 in the projections 39 are check valve ports or passages 45, which will receive fluid therein from the lower reservoir 37. The check valve ports 45 open into check valve chambers 46, which are larger in diameter than the check valve ports 45. A ball valve 47 is mounted for free movement in each of the check valve chambers 46 and will be held therein by threaded valve guards 48, which threadably engage the end of the check valve chambers 46 at the point which communicates with the dash pot 40 at its lowermost portion, as is clearly shown in Figure 3 of the drawings. Valve guards 48 are provided with communicating passages 49 which are of a lesser diameter than the ball valves 47, whereby means are provided to allow fluid to pass from the check valve chambers 46 to the dash pot chambers 40.

At the port where the check valve ports or passages 45 meet their respective check valve chambers 46, check valve seats 50 are provided for each of the ball valves 47 so that fluid will move upwardly through the port or passage 45 to pass the ball valve 47 into the valve chamber 46, through the communicating passage 49 to the dash pot chamber 40. However, fluid can not flow downwardly from the check valve chamber 46 as the ball valve 47 will seat itself to check the flow to the check valve port or passage 45.

Means for imparting rotary movement to the cam members

The cam members 44 are fixedly connected at various predetermined degrees about the circumference of the cam shaft 51 which is rotatably mounted in bearings 52 and 53. Bearing 52 is mounted in one side of the lower portions 3 in the wall thereof as shown in Figure 1 of the drawings. Bearing 53, which is identical in construction to bearing 52 is mounted, however, in a shaft repair plug 54 removably connected in liquid tight relationship to the lower portion 3 of the housing 1, by means of a gasket 55 and threaded member 56. The shaft repair plug 54 is provided to permit easy access to the lower reservoir 37 in the event that repairs are necessary or for some other reason.

Cam shaft 51 is rotated by worm gears 57 and 58 which may be any suitable type easily purchaseable on the open market. Worm gear 57 is fixedly connected to the cam shaft 51 and is driven or rotated by a second worm gear 58 which will be fixedly connected to a handle shaft 59 ex-

tending through the lower portion 3 of the housing 1 where on the outside thereof it is fixedly connected for manual operation to a handle member 60. All of which is clearly shown in Figures 1 and 3 of the drawings.

The casing formed of the upper and lower portions 1 and 3 is filled with oil to the level indicated at A in Figure 1, thus the dash pot mechanisms are submerged at all times.

In operation, the handle member 60 is turned manually to some desired position causing the worm gears 57 and 58 to rotate the cam shaft 51 and the cam members 44 thereon to their predetermined positions.

This will cause the desired tappet members to be moved upwardly, which movement will in turn be exerted against the various valve stems 22 to open one or more of the valves as desired.

In moving the tappet members upwardly because of the close fit relationship of the dash pot piston 43, a slight suction is created in the respective dash pot chamber 40, out of which it is being lifted. This will cause fluid to be drawn upwardly through the check valve port or passage 45 into the dash pot chamber 40 as above described, thus providing a cushion of fluid in the dash pot chamber 40 below the tappet head 43.

When the valve head 21 is moved upwardly, the spring member 28 will be compressed and thus when the handle member 60 is turned to a new position, instead of the valve heads 21 slamming closed on the valve ports 20, by reason of the expansion of the spring members 28, they will close relatively slowly as fluid cannot be forced past the ball valve 47 of the respective dash pot 20 involved, and accordingly the pressure is dissipated on the fluid cushion which forces the fluid slowly outward past the close fit between the piston 43 and the dash pot chamber 40 to commingle with the fluid in the upper reservoir 36. Equalizing ports 38 provide immediate means for equalizing the pressure or excess fluid between the upper and lower reservoirs.

In the event that it is desired to drain the fluid from the upper reservoir 36 and the lower reservoir 37, a discharge plug 61 is provided in the base member 32 therefor.

While one form of the invention has been illustrated and described, it will be understood that the invention is not to be limited to the specific construction or arrangements of parts shown but that they may be widely modified within the invention defined by the claims.

What is claimed is:

1. In a multi-port selector valve for water treating systems, a housing, a plurality of outlet chambers in said housing, inlet chambers in said housing, a plurality of valves between said inlet and said outlet chambers including, valve ports between said chambers, valve heads for opening and closing said valve ports, and valve stems connected to said valve heads, resilient spring members for normally maintaining said valves in a closed position, a cam shaft rotatably mounted in said housing and provided with angularly disposed cams fixedly mounted thereon in the axial line of each of said valve stems, a support member in said housing intermediate the ends of said valve stems and said cam shaft and having dash pot chambers thereon disposed in the axial line of said valve stems, a fluid reservoir formed in said housing to coact with said dashpot chambers, an actuating member for each of said valves slidably mounted in said dashpot chamber and adapted to open predetermined valves when operated by said cam, inlet valves in each of said dash pot chambers to allow fluid from said reservoir to flow therein on movement of the member therein, and said actuating members and said dash pot chambers so constructed and arranged that the rate of return flow of fluid from said dash pot controls the speed of closing of said valves.

2. In a multi-port selector valve for water treating systems as claimed in claim 1 wherein said actuating members are mounted in close fit relationship in said dash pot chamber to limit the rate of fluid return to the reservoir to control the speed of seating of the valve actuated by said actuating means.

3. In a multi-port selector valve for water treating systems, a housing, a plurality of outlet chambers in said housing, inlet chambers in said housing, a plurality of valves between said inlet and said outlet chambers including, valve ports between said chambers, valve heads for opening and closing said valve ports, and valve stems connected to said valve heads, resilient spring members for normally maintaining said valves in a closed position, a cam shaft rotatably mounted in said housing and provided with angularly disposed cams fixedly mounted thereon in the axial line of each of said valve stems, a support member in said housing intermediate the ends of said valve stems and said cam shaft and having dash pot chambers thereon disposed in the axial line of said valve stems, an actuating member for each of said valves slidably mounted on said support member including, a piston member slidably mounted in said dash pot chamber each having tappets fixedly connected thereto and extending downwardly for contact by its respective cam whereby movement of said cam shaft will open predetermined valves, a fluid reservoir formed in said housing, an inlet valve for each of said dash pot chambers to allow fluid from said reservoir to flow therein on movement of the piston, and return flow of said fluid from said dash pot chamber to said chamber about said piston member to control the seating of the valves when the cam actuating the piston is moved.

4. In a multi-port selector valve for water treating systems, a housing, a plurality of outlet chambers in said housing, inlet chambers in said housing, a plurality of valves between said inlet and said outlet chambers including, valve ports between said chambers, valve heads for opening and closing said valve ports, and valve stems connected to said valve heads, resilient spring members for normally maintaining said valves in a closed position, a cam shaft movably mounted in said housing and provided with angularly disposed cams fixedly mounted thereon in the axial line of said valve stems, a support member mounted in said housing intermediate the end of each of said valve stems and said cam shaft, actuating means slidably mounted on said support member in the axial line of its respective valve stem each including, a piston abutting each valve stem, a tappet stem fixedly connected to each piston and contacted by said cam to operate said actuating means, and a dash pot chamber formed on said support means in the axial line of said valve stem to slidably receive said piston in close fit relation therein, a fluid reservoir formed in said housing, inlet valves for said dash pot chambers to allow fluid to flow from said reservoir into said dash pot chambers when said piston members move upwardly on actuation of said actuating means, and return flow of said

fluid from said dash pot chamber to regulate the speed of seating of said valves.

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