Aug. 26, 1952 R. E. BLETCHER ET AL 2,608,412

ANTISIPHON SPOUT AND SPRAY FIXTURE

Filed Dec. 18, 1946

Fig. 3

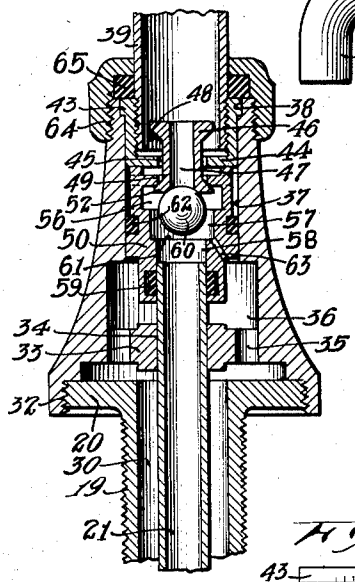


Fig. 2

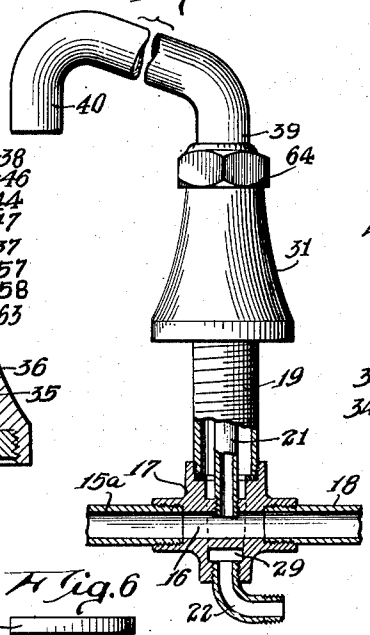


Fig. 5

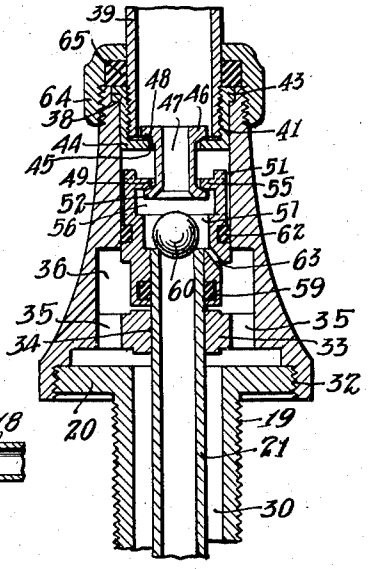


Fig. 6

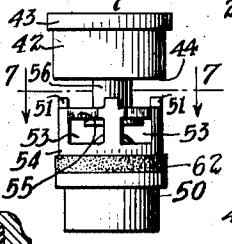


Fig. 4

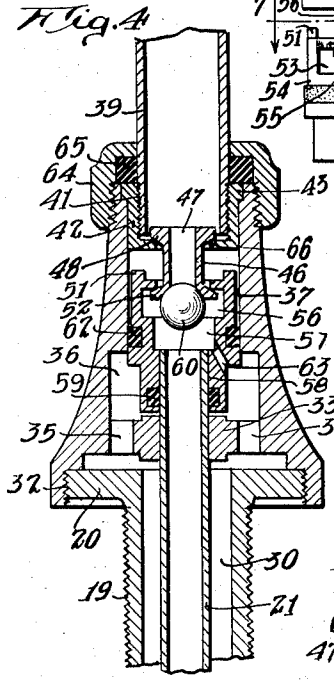


Fig. 1

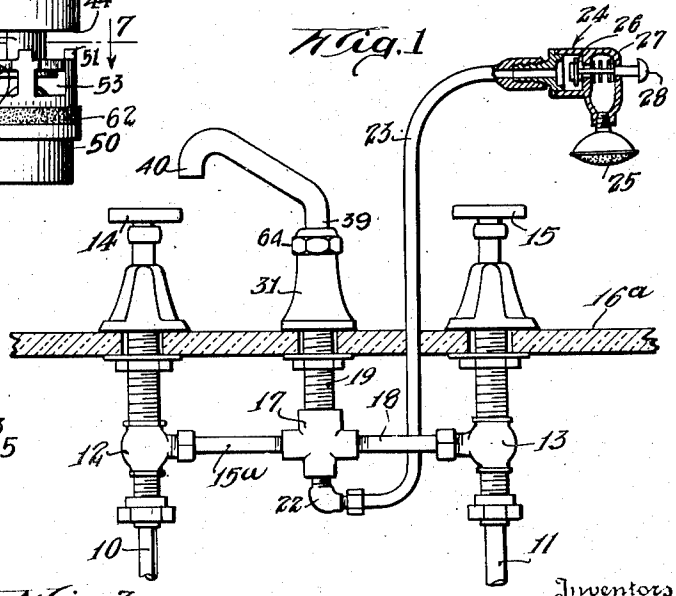
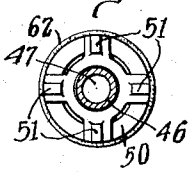


Fig. 7



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ANTISIPHON SPOUT AND SPRAY FIXTURE

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Application December 18, 1946, Serial No. 717,036

13 Claims. (Cl. 277—21)

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This invention relates to pressure control fittings and flow diverter valves for controlling flow of liquid to either of two outlets from the same source of supply. This invention is directed to improvements over the valve assemblies shown in the Bucknell and Bletcher Patents Nos. 2,172,345, granted September 12, 1939; and 2,314,071, granted March 16, 1943.

The principal object of this invention is to provide an anti-siphon spout and spray fixture, including a double-acting valve, which is effective to direct flow alternately through the spout and the spray outlets under control of a valve on the spray outlet and also to provide anti-siphon means to prevent backflow from either of the outlets, in the event that suction should occur in the supply line.

Another object is to provide a unitary valve assembly of this type, employing a tubular valve element and a ball adapted to cooperate therewith for directing flow through either of two outlets from a common inlet.

Another object is to provide a valve assembly for diverting flow of liquid from a common inlet through either of two outlets, which assembly includes a tubular valve element and a ball check valve adapted to close the opening in the tubular check valve when the liquid is directed to either of the outlets and to function as a check valve to prevent backflow through the inlet, in the event of failure of pressure in the supply line.

Other objects and advantages will appear hereinafter.

In the drawings:

Figure 1 is a plan view, partly in section, showing the general arrangement of parts employed in connection with my invention;

Figure 2 is an elevation view, partly in section, on an enlarged scale, of a portion of the apparatus shown in Figure 1;

Figure 3 is a sectional view of a preferred form of valve assembly embodying my invention, the parts thereof being in position for a normal flow through the spout;

Figure 4 is a view similar to Figure 3 of the parts in position for normal flow through the spray nozzle;

Figure 5 is a view similar to Figures 3 and 4, showing the position of the parts, in the event that suction should occur in the supply line;

Figure 6 is an elevation, on an enlarged scale, showing details of construction of certain of the valve parts; and

Figure 7 is a sectional plan view, taken substantially on the line 7—7, as shown in Figure 6.

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In the drawings, the hot water supply line 10 and the cold water supply line 11 are each provided with a valve 12 and 13, respectively, controlled from the handles 14 and 15, extending upwardly through the wall of a supporting element 16a, which may be a sink or washbasin, or the like. Downstream from the valve 12 is a lateral pipe 15a, which is connected with the bore 16 in the cross-over fitting 17. Also connected to the bore 16 in the cross-over fitting 17 is a lateral pipe 18, which connects to the downstream side of the valve 13. The cross-over fitting 17 is carried at the lower end of the threaded tube 19 having a flange 20 at its upper end. A central tubular element in the form of pipe 21 is threaded into the fitting 17, in communication with the bore 16, and it stands upwardly through the threaded tube 19 in coaxial relationship.

An elbow 22, threaded into the lower end of the cross-over fitting 17 is connected to a flexible tube 23, leading to a spray fixture 24, provided with a spray nozzle 25 and a manually operable valve 26. The valve 26 is normally closed by the spring 27. The valve 26 may be opened by manually depressing the knob 28. A passageway 29, within the cross-over fitting 17, communicates with the elbow 22 and with the annulus 30 between the threaded pipe 19 and the tubular element 21. This passageway 29 does not communicate with the bore 16 within the cross-over fitting 17.

A valve housing 31 is secured on the flange 20 by any convenient means, such as threads 32. A guide 33 is provided with a central aperture 34 for reception of the tubular element 21. Ports 35 are provided in the guide 33 to establish communication from the annulus 30 to the chamber 36, formed within the valve housing 31. A bore 37 within the valve housing 31 extends upwardly from the chamber 36 and terminates at a counterbore 38. Depending into the bore 37 is the lower end 39 of the housing spout 40. The lower end 39 of the spout 40 is axially threaded, as shown at 41, to receive corresponding internal threads in the cup 42, which slides into the upper end of the bore 37. An annular shoulder 43, encircling the upper end of the cup 42, is adapted to be received within the counter bore 38. The swing spout 40 and cup 42 are maintained in position by the threaded gland 64, and the gland may be provided with a compressible packing ring 65. The bottom 44 of the cup 42 is provided with a central opening 45. Extending through this central opening 45 is a tubular valve element 46, having a central passageway 47 and

a downwardly facing frusto-conical valve surface 48.

The tubular valve element 46 extends through the opening 45 and also through the central opening 49 in the upper end of the cage 50. A plurality of spaced lugs 51 are provided on the upper end of the cage 50 for contact with the bottom 44 of the cup 42. The lower end of the tubular valve 46 is flared, as shown at 52, to prevent disassembly of the cup 42 and cage 50. A plurality of windows 53 are provided in the wall 54 of the cage 50. It will be observed that the wall 54 is smaller in diameter than the bore 37 and that the windows 53 extend upwardly through the flange 55, within which the opening 49 is provided.

The cage 50 is provided with concentric bores 56, 57 and 58, which are progressively smaller, in the order named. The bore 58 forms a sliding fit with the upper end of the tubular element 21 and a packing ring 59 may be provided to seal the joint between the bore 58 and the external periphery of the tubular element 21. A non-metallic ball 60 is mounted within the bore 57 of the cage 50 and is moved into such position through the bore 58. The ball 60 passes inwardly through the bore 58, and is retained in place by the seal ring 59 which is placed in position after the ball 60 has been inserted. A packing ring 62 encircles the cage 50 to provide a sliding seal within the bore 37 in the housing 31.

In operation, liquid admitted through the laterals 15a or 18, or both, passes upwardly through the central tubular member 21 and into the interior of the cage 50. The pressure of the stream issuing from the tubular element 21 causes the ball 60 to seat within the flanged portion 52 at the lower end of the tubular valve 46, thereby closing the opening 47. As shown in Figure 3, the cage 50 is raised within the bore 37 and the lugs 51 contact the bottom 44 of the cup 42. Liquid then flows from the tube 21 around the ball 60 upwardly through the windows 53 and around the tubular valve 46, through the opening 45. The liquid then passes upwardly and is discharged through the open-ended swing spout 40. The above description of operation presumes that the spray valve 26 at the end of the flexible line 23 remains closed. The cage 50, under such conditions, is raised by the liquid pressure, because the total pressure of the liquid above the cage is less than the total pressure below it.

A metering discharge port 63 extends through the wall of the cage 50, one end terminating at the shoulder 61, adjacent the bore 57, and the other end communicating with the lower chamber 36 within the fitting 31. When the spray valve 26, at the end of the flexible line 23, is opened, a flow of liquid passes from the interior of the cage 50, through the metering discharge port 63, and into the chamber 36, and downwardly through the annulus 30 into the line 23. When the valve 26 is open, the parts take the position shown in Figure 4, the cage 50 being moved downwardly by pressure within the bore 37 above the cage. The ball 60 closes the lower end of the tubular valve 46 to prevent flow through the passageway 47. The metering effect of the orifice 63 in relation to the relatively free flow through hose 23 and valve 26 causes pressure above the cage to be greater than in chamber 36. The cage 50 applies a downward force on the flange 52, at the lower end of the element 46, and thus pulls the valve surface 48 into sealing contact with the valve seat 66, at the upper

end of the opening 45. The parts are proportioned so that the valve surface 48 engages the valve seat 66, before the lower end of the cage 50 strikes the guide 33. With the parts in the position shown in Figure 4, flow from the tubular member 21 passes into the bore 57 in the cage 50 and outwardly through the discharge passage 63, as stated. No flow of liquid occurs into the swing spout 40, because the opening 45 is closed by the ball 60. Upon closing of the valve 26 at the spray nozzle, the parts return to the position shown in Figure 3, so long as liquid is being supplied through one or both of the laterals 15a and 18.

In the event that suction should occur in the supply lines 10 or 11, when the valves 12 and 13 are open, means are provided for preventing a backflow into the tubular delivery pipe 21. As shown in Figure 5, suction within the pipe reduces pressure within the cage 50, causing the ball 60 to seat on the upper end of the tube 21, thereby closing off the supply passageway. It is immaterial, therefore, whether the remote valve 26 is open or closed, since the ball 60 prevents backflow from either the spout 40 or the spray line 23. The valve 60 drops away from the flanged receiving cup 52, at the lower end of the valve 46 and, hence, opens the chamber within the cage 50 to the spout 40 and to the atmosphere, through the opening 47. The spray line 23 is also in open communication with the chamber within the valve 50, by way of the annulus 30, chamber 36, and discharge port 63. The principal danger to be guarded against is backflow through the spray line 23, when the discharge nozzle 25 might be submerged in impure water. As illustrated in Figure 5, closing of the inlet pipe 21, by the resilient ball 60, prevents backflow into the supply pipe of such impure or contaminated water or other fluid. Should the seal between the ball 60 and the upper end of the pipe 21 be imperfect, any leakage would merely draw air through the open-ended spout 40.

An advantageous feature of our invention lies in the fact that upon unthreading the gland 64, the entire operative valve assembly, including the cup 42, valve 46, cage 50, ball 60, and the resilient sealing rings 59, 62, and 65 may be withdrawn upwardly through the bore 37, as a unit, for inspection, repair or replacement.

Having fully described our invention it is to be understood that we do not wish to be limited to the details herein set forth, but our invention is of the full scope of the appended claims.

We claim:

1. In a device for directing liquid from a single inlet through either one of two outlets, the combination of a floating valve element associated with one of the outlets and closing opposite to the direction of normal flow through said outlet, a passageway formed axially through said element, means to move said element to closed position including a movable member associated with said liquid inlet, valve means associated with the movable member and adapted to close the passageway in the valve element in response to pressure from the liquid inlet, and acting to seal off the inlet against backflow from the other outlet in the event of negative pressure occurring in the inlet.

2. In a device for directing liquid from a single inlet through either one of two outlets, the combination of a floating valve element associated with one of the outlets and closing opposite to the direction of normal flow through said outlet,

a passageway formed axially through said element, means to move said element to closed position including a cage associated with said liquid inlet, valve means in the cage adapted to close the passageway in the valve element in response to pressure from the liquid inlet, and acting to seal off the inlet against backflow from the other outlet in the event of negative pressure occurring in the inlet.

3. In a device for directing liquid from a single inlet through either one of two outlets, the combination of a valve housing, a floating valve element associated with the housing and one of the outlets, the valve element closing opposite to the direction of normal flow through said outlet, a passageway formed axially through said element, a bore in the housing, a cage slidably mounted in the bore and adapted to move said element to closed position, means establishing communication between the inlet and the interior of the cage, a ball in the cage adapted to close the passageway in the valve element in response to pressure from the liquid inlet, said ball acting to seal off the inlet against backflow from the other outlet in the event of negative pressure occurring in the inlet.

4. In a device for controlling flow of liquid from a single inlet to one of two outlets, the combination of a valve housing having a central bore, a cage slidably mounted in said bore, means establishing communication from the inlet to the interior of the cage, valve means including a movable valve element adapted when closed to prevent flow through one of said outlets, said valve element being operatively connected to the cage whereby movement of the cage in the bore in one direction may close the valve means, said valve element having a central passageway axially therethrough, and a ball in the cage adapted to close the passageway under pressure of liquid in the cage.

5. In a device for controlling flow of liquid from a single inlet to one of two outlets, the combination of a valve housing having a central bore, a cage slidably mounted in said bore, means establishing communication from the inlet to the interior of the cage, valve means including a movable valve element adapted when closed to prevent flow through one of said outlets, said valve element being operatively connected to the cage whereby movement of the cage in the bore in one direction may close the valve means, said valve element having a central passageway axially therethrough, a ball in the cage adapted to close the passageway under pressure of liquid in the cage, and a lateral discharge passage in the cage communicating from the interior thereof with the other outlet.

6. The sub-combination comprising a tubular cage, relatively small openings in opposed ends of the cage communicating with a relatively large chamber within the cage, a movable tubular valve element extending into one of said openings, the exposed end of said element having a valve head thereon provided with a sealing face adapted to seat in a direction toward said cage, and the other end of said element being larger than the cage opening to prevent disassembly of the valve element and cage, an axial passageway through said valve element, and a movable element insertable into the chamber through the other opening adapted to seal off the axial passageway in the tubular valve element.

7. The sub-combination comprising a tubular cage, relatively small openings in opposed ends of the cage communicating with a relatively large chamber within the cage, a stationary member having a central aperture defining an upwardly facing valve seat, a movable tubular valve element extending through said aperture and one of said openings, one end of said element having a valve head with a downwardly facing sealing surface adapted to cooperate with said seat, an axial passageway through said valve element, and a movable element insertable into the chamber through the other opening and movable upwardly to seal off the axial passageway in the tubular valve element.

8. The sub-combination comprising a tubular cage, relatively small openings in opposed ends of the cage communicating with a relatively large chamber within the cage, a movable tubular valve element extending into one of said openings, the exposed end of said element having a valve head thereon provided with a sealing surface facing the cage, and the other end of said element being larger than the opening to prevent disassembly of the valve element and cage, an axial passageway through said valve element, and a check valve insertable into the chamber through the other opening adapted to seal off the axial passageway.

9. In a device for controlling the direction of liquid flow in a combination fixture having a liquid inlet and two liquid outlets, the combination of a bore in the fixture, a cage slidably received within the bore, a tubular valve element extending into one end of the cage and having a passageway axially therethrough, a valve seat associated with the fixture adapted to cooperate with a valve face on said element to prevent flow around the valve element to the first of the outlets, the liquid inlet including a stationary pipe extending into the other end of the cage in telescopic relation, a ball in the cage adapted to close off the passageway under pressure of liquid delivered through said inlet pipe, a chamber in the fixture operatively connected to the second of said outlets, and a discharge port leading from the interior of the cage.

10. An anti-siphon valve assembly for directing a liquid through one of two outlets from a single inlet, having in combination a movable valve member for controlling flow to the first outlet, a cage adapted to move the valve member to closed position, an inlet pipe telescopically received within the cage and extending into and with the interior of the cage, a discharge passage in the cage communicating with the interior thereof and with the second outlet, and a ball in the cage adapted to close the inlet pipe against reverse flow from said outlets.

11. In a device for diverting liquid through one of two outlets from a single inlet, the combination of a valve housing having an axial bore, a stationary inlet pipe projecting axially into said bore, one of the outlets being in communication with one end of the bore and the other outlet being in communication with the annulus between the bore and the inlet pipe, a valve assembly within the housing including a member slidably mounted within said bore, said member having an opening receiving the inlet pipe in telescopic relation.

12. In a device for diverting liquid through one of two outlets from a single inlet, the combination of a valve housing having an axial bore, a stationary inlet pipe projecting axially into said bore, one of the outlets being in communication with one end of the bore and the other

outlet being in communication with the annulus between the bore and the inlet pipe, a cage slidably mounted in said bore and having an axial opening receiving the inlet pipe in telescopic relation, a stationary valve seat associated with said housing and positioned in the path of flow to one of said outlets, a tubular valve element extending through and adapted to close on said seat in a direction opposed to the direction of flow to said outlet, an axial opening through said valve element, interengaging means on the cage and valve element whereby axial movement of the cage within the bore may close the valve, said means including a valve seat, a movable valve element in the cage adapted to contact said seat to close said axial passageway under pressure of fluid from said inlet pipe, a lateral discharge passage communicating with the interior of the cage and with the said annulus, said element being adapted to prevent backflow through the inlet pipe in the event suction should occur at the inlet.

13. In a device for diverting liquid through one of two outlets from a single inlet, the combination of a valve housing having an axial bore, a stationary inlet pipe projecting axially into said bore, one of the outlets being in communication with one end of the bore and the other outlet being in communication with the annulus between the bore and the inlet pipe, a cage slidably mounted in said bore and having an axial opening receiving the inlet pipe in telescopic relation, the cage having a lateral opening establishing communication from the interior of the cage to

said annulus, said lateral opening being sufficiently small so that flow from the inlet pipe to said second outlet causes a pressure drop from the interior of the cage to said annulus, packing means on the cage engaging the axial bore in sealing relation, the cage having ports extending through the wall thereof on the opposite side of said packing means from said annulus whereby a pressure differential is established across said packing means for moving the cage within said bore, and cooperating valve elements on the cage and housing for interrupting communication between the inlet pipe and the first of said outlets upon movement of the cage under said pressure differential.

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