June 7, 1955 C. J. MANVILLE 2,710,020

FLUID CONTROL VALVE

Filed March 29, 1952

FIG. 1

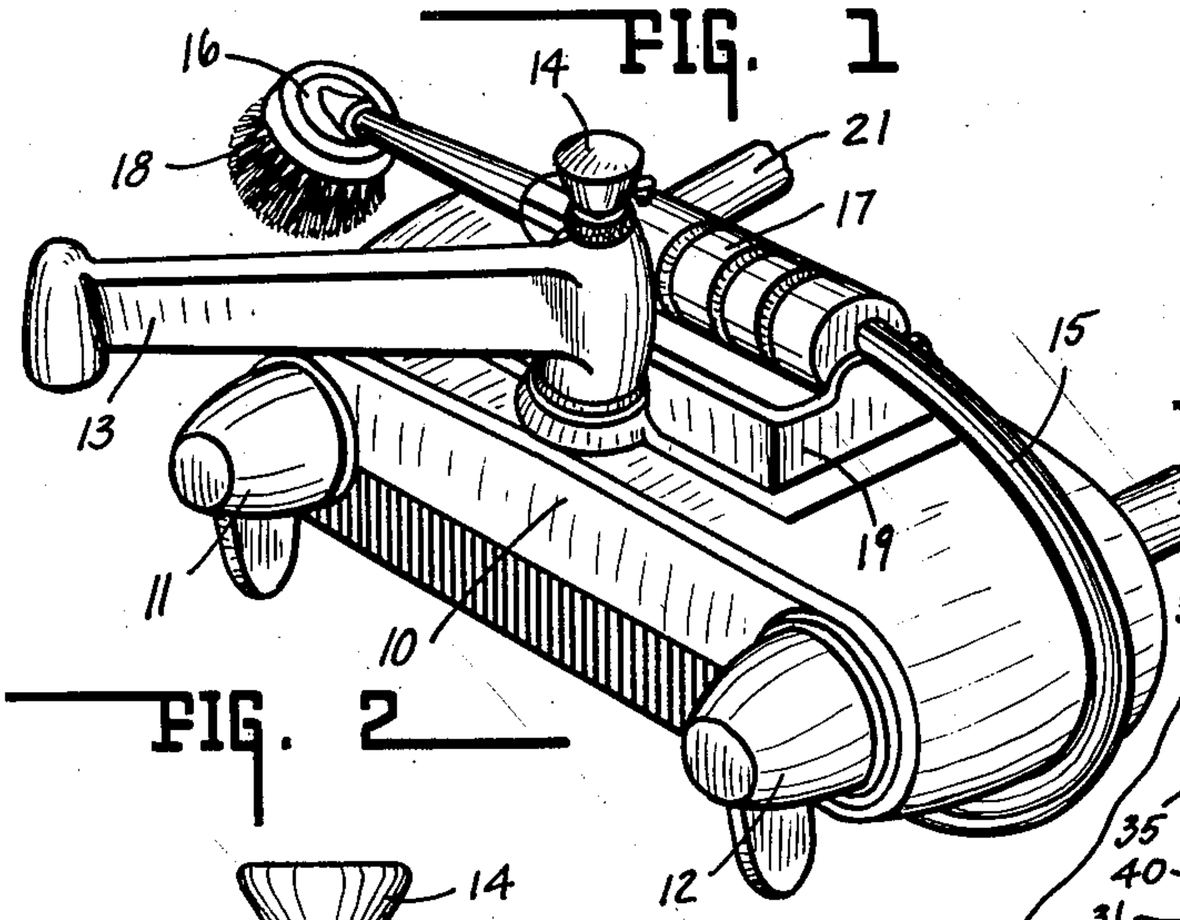


FIG. 2

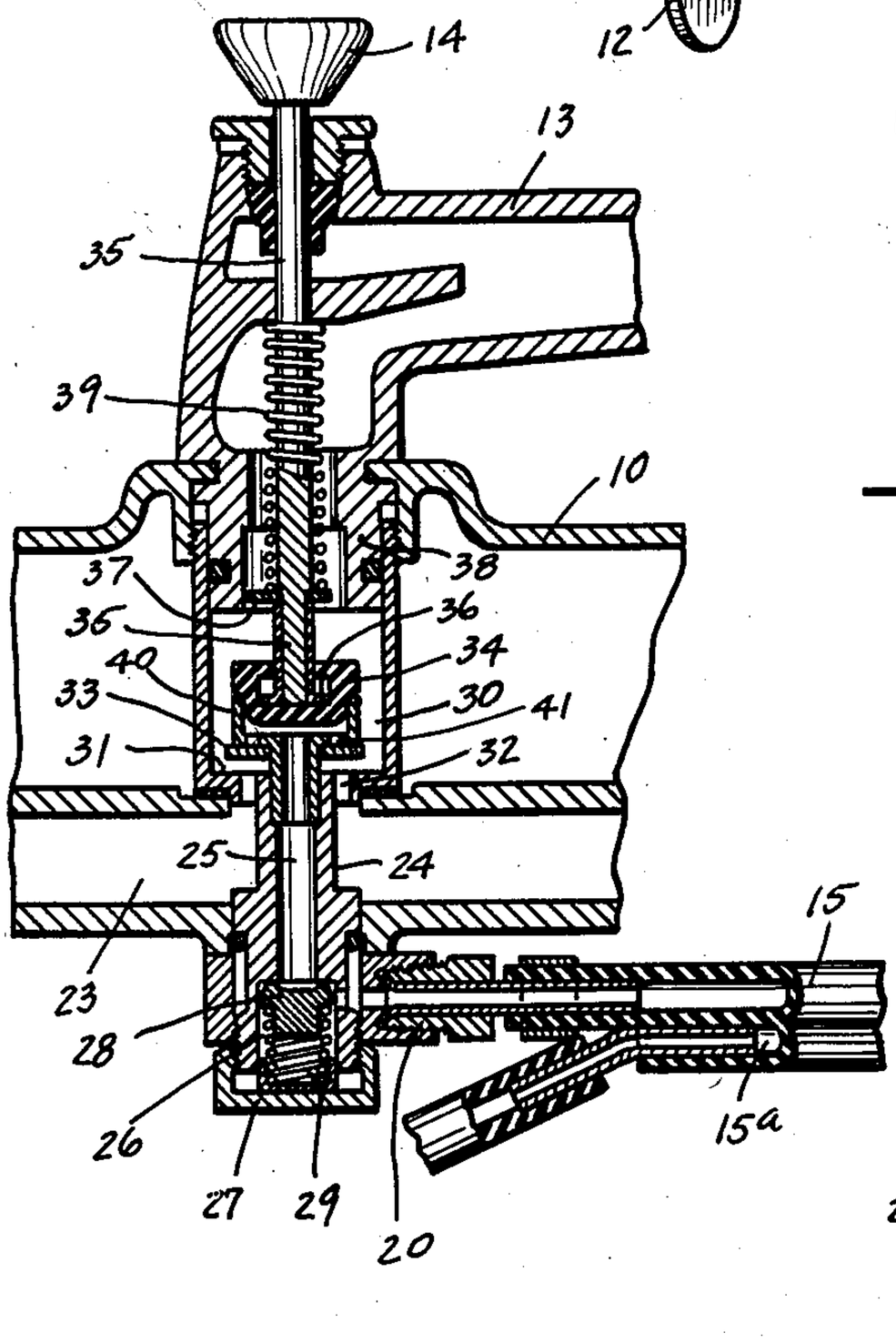


FIG. 3

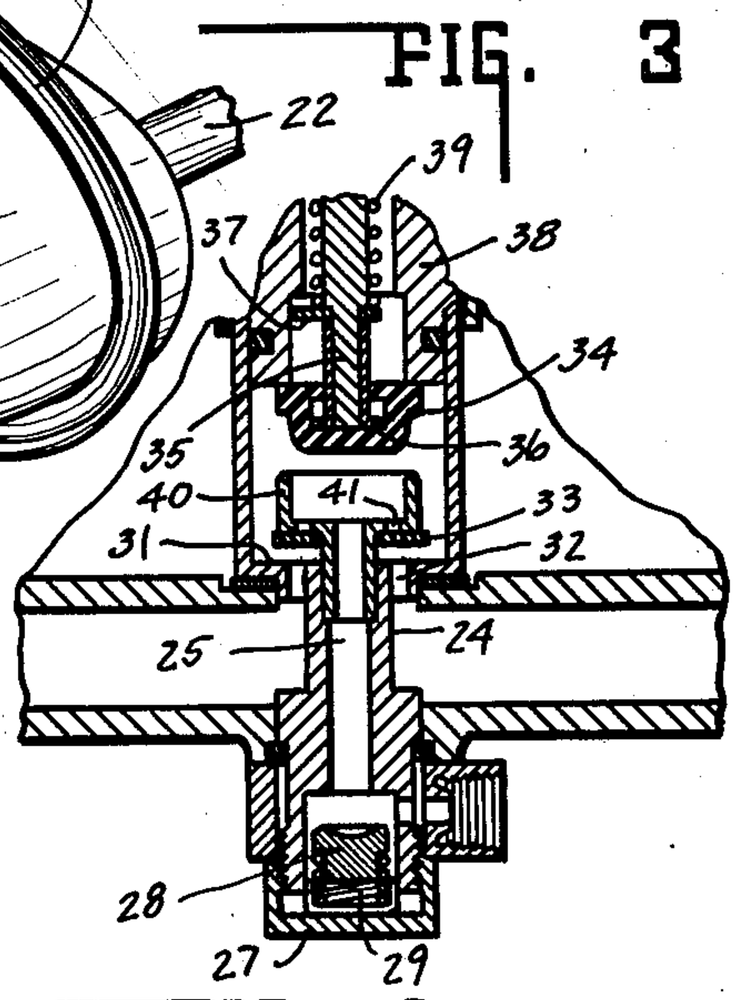
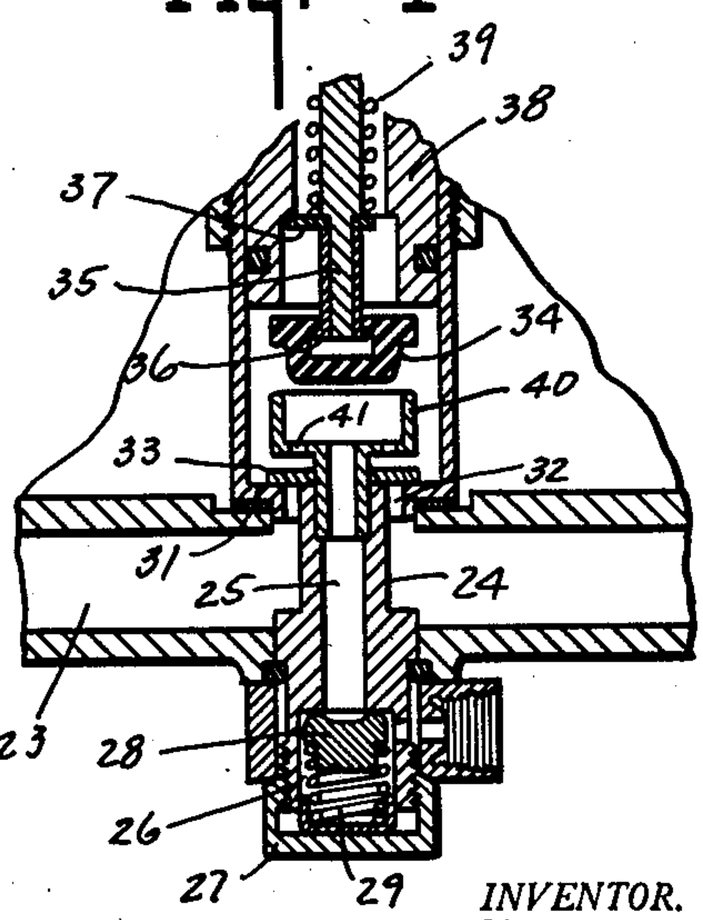


FIG. 4



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United States Patent Office

2,710,020

Patented June 7, 1955

2,710,020

FLUID CONTROL VALVE

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Application March 29, 1952, Serial No. 279,350

6 Claims. (Cl. 137—512)

This invention relates to a fluid control valve, and primarily to a manually operated valve capable of diverting fluid from a source under pressure from one outlet to another, and at the same time preventing the fluid from flowing in the reverse direction in event that the pressure at the source drops below the atmospheric pressure in either of the outlets.

More specifically the invention has to do with a combination water faucet and spray head wherein the fluid source comprises the usual city water main normally maintained under predetermined pressure, and one outlet is in the form of the usual swinging spout and the other outlet is in the form of a spray head having a hose connection, and in which hose connection there may be connected a source of liquid detergent. Such structure, therefore, comprises a dish washing apparatus wherein through a combined manual and pressure actuation of a diverter valve water may be caused to flow through the swinging spout in the normal manner or diverted so as to flow through a flexible tube having a spray head and associated scrubbing brush, the diverted flow of water through the spray head being selectively joined with a flow of detergent from a suitable reservoir for causing either clear rinsing water to issue from the spray head or a detergent solution.

In such dish washing apparatus one of the major problems has been to meet the city water supply requirements by providing an unfailing means for preventing back flow of contaminated water through the spray head and flexible tube into the city water system in event of a drop in the water pressure due to any cause such as would result in a partial vacuum being created in the line. A further problem is to provide a diverter valve which will not only prevent such back flow but will react to the water pressure in a manner to normally direct flow from the source through the spout, but upon being manually positioned to direct flow through the spray head will be maintained in the latter position as long as it is under water pressure even to a minimum degree. Thus, when the water pressure is turned off by the usual faucets the diverter valve will be biased to a position to divert the water through the spout rather than the head, but upon a minimum of water pressure being admitted to the valve and the valve once manually moved to its other position it will be maintained in the latter position to divert the water to the spray head, returning to its normal first position upon the faucets closing off the water pressure.

The valve structure for effecting the above action and meeting the problems above mentioned will be more specifically set forth and described in the specification and drawings.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

Fig. 1 is a perspective view of a dish washing apparatus embodying the invention.

Fig. 2 is a central vertical section through the diverter

valve of the dish washing apparatus showing it in normal position for directing water through the usual spout.

Fig. 3 is the same as Fig. 2, showing the effective part of the valve positioned for directing water through the spray head.

Fig. 4 is the same as Fig. 1, showing the effective portion of the valve positioned to prevent back flow of water from spray head into the water system.

In the drawings there is shown a dish washing apparatus including a housing **10** and a pair of hand operated valve handles **11** and **12**, one for controlling the admission of hot water and the other the admission of cold water. Mounted on the housing there is a discharge spout or primary outlet **13** through which water may be diverted by a valve controlled by the exposed valve handle **14**. Also shown in Fig. 1 there is a flexible hose or secondary outlet **15** terminating in a spray head **16** through a detergent control handle **17**, said spray head carrying a scrubbing brush **18**. In the particular apparatus illustrated, but not shown herein, the housing contains a detergent reservoir under the cover lid **19** which is connected through a separate passage **15***a* and the hose **15** with the handle **17**, the hose **15** having two passages, the main passage being connected with the water system through a nipple **20**.

The source of city water pressure is introduced through the hot water line **21** and the cold water line **22**, both lines feeding into a manifold **23** and respectively controlled by the valve handles **11** and **12**. Thus the manifold **23**, so far as this invention is concerned, becomes a source of water pressure for diversion either to the spout **13** or the flexible hose **15**. Mounted in the housing **10** in association with the manifold **23** and extending diametrically therethrough there is a valve housing having a reduced depending portion **24** through which there is provided a passage **25**. The passage **25** leads to a valve chamber **26** below the manifold which chamber is in communication with the flexible hose and spray head through the nipple **20** and is closed at its lower end by cap **27**. Slidably mounted in the valve chamber **26** there is a valve head **28** spring biased by the spring **29** into valve closing position for preventing passage of fluid between the passage **25** and the nipple **20**. When the fluid is admitted to the passage **25** under pressure it forces the valve head **28** from its seat against the tension of spring **29** for passage into the hose and spray head. However, when the pressure in passage **25** drops below the pressure exerted by the spring **29** the valve head will move to closed position and prevent back flow from the spray head through the hose into said passage. Therefore, the valve head **28** acts as a check valve, normally preventing back flow in event of a pressure drop in the system.

The valve housing has an enlarged chamber portion **30** extending above the manifold **23**. Such enlarged chamber portion is formed with a valve seat **31** in which there is provided a plurality of ports **32** adapted to be controlled by a check valve disc **33**, said disc being moved to port open position to admit the fluid from the manifold **23** into the valve housing under pressure of the fluid in the manifold as shown in Figs. 2 and 3, but seating on the seat **31** for closing said ports when the pressure in the manifold **23** drops below the pressure in the housing, which is normally at atmospheric pressure. Thus the disc **33** serves as a second check valve to prevent back flow from the valve housing into the manifold and water system when for any reason a partial vacuum is created therein.

From the foregoing it will be observed that back flow is prevented by two separately and independently acting check valves, namely valve head **28** and check valve disc **33**. However, it may be observed that in order that

the check valve disc be rendered effective it must be subject to air pressure from the spout which is under control of the diverter valve.

The diverter valve includes a floating valve head 34 slidably mounted upon a valve stem 35. The lower end of the valve stem is provided with a sleeve having a head 36 for sustaining the valve head while permitting vertical relative movement therebetween. The valve head 34 is in its uppermost position on the valve stem when under normal water pressure as shown in Figs. 2 and 3, but is forced downwardly to its lowermost position as shown in Fig. 4 when the water pressure drops below atmospheric pressure. Thus through the floating action of the valve head 34 admission of atmospheric pressure to the check valve disc 33 is assured upon a partial vacuum developing in the manifold 23. For maintaining the valve head 34 in its open position even though the valve stem is raised by the handle 14, in event of such pressure drop, there is a stop disc 37 secured upon the valve stem between the sleeve 36 and a shoulder portion of the stem so positioned that it abuts a shoulder in the downwardly projecting portion 38 of the spout 13. Thus the stop disc 37 limits the upward movement of the valve stem, arresting it in a position so that the valve head 34 will be removed from its valve seat while sustained by the stem when atmospheric pressure is sufficient to force it to its lower position as shown in Fig. 4. The stop disc 37 also provides a fixed seat for the compression spring 39 which surrounds the valve stem for biasing it to its normal lowered position.

The valve head 34 is formed to seat in a cup 40 and seal the open end of the cup when the valve stem 35 is biased to its normal valve closing position. The passage 25 is in communication with the cup 40, said cup providing a second valve seat for the check valve disc 33, which seat is provided with a plurality of ports 41. Thus the check valve disc 33 when in its upper position shown in Figs. 2 and 3 will open the ports 32 and close the ports 41, but when in its lower position as shown in Fig. 4 will close the ports 32 and open the ports 41.

The operation of the control valve may be described as follows: When the valve handles 11 are closed there will be no water pressure in the manifold 23. The check valve disc 33 will rest upon the valve seat 31, the valve head 28 will seat and close the lower end of passage 25 and the valve stem 35 will be spring pressed to seat the valve head 34 upon the cup 40. Upon opening a valve handle 11 or 12 water under pressure will be admitted to the manifold 23, pass upwardly through the ports 32, lifting the disc 33 upwardly and seating it to close the ports 41. Thus no water is permitted to pass through the passage 25 to the hose 15, but will flow through the upstanding portion of the valve housing 30, past the stop disc 37 and out through the spout 13.

When it is desired to divert the water from the spout to the hose and spray head the handle 14 is raised against the tension of spring 39 which will lift the valve head 34 sufficiently close to its seat to be forced into seating position against the portion 38 of the spout under pressure of the water in the manifold. Thus water is prevented from flowing through the spout but is free to flow into the cup 40 and through the passage 25, depressing the valve head 28 for permitting the flow to the hose and spray head. During this action, as shown in Fig. 3, the upward surge of the water will still maintain the check valve 33 in its closing position with respect to the ports 41 and the cup 40. In this operation there will be a snap action since the raising of the valve head 34 from the cup will be resisted so that the head will hang on the valve stem in its lowered position as shown in Fig. 4. The valve stem can be raised no further because of the stop disc 37, but the water pressure and velocity of flow through the valve housing will snap the valve head 34 upwardly relative to the valve stem into its closed position as shown in Fig. 3.

If a drop in water pressure occurs, such as to create a partial vacuum in the manifold 23 and the valve stem 35 is in the position shown in Fig. 2, atmospheric pressure through the hose 15 will tend to assist the spring 29 to close valve head 28, already in its closed position, which will prevent any back flow through the hose. At the same time atmospheric pressure through the spout 13 will force the disc 33 from its upper to its lower position, closing off ports 32 whereby no flow will be permitted into the water system from either the spout or the hose through said ports 32. Thus when the diverter valve is in the position shown in Fig. 3 with water flowing through the hose when the partial vacuum develops the spring 29 will immediately close the valve head 28 due to release of water pressure thereon which will prevent back flow through the hose, and atmospheric pressure through the spout will force the valve head 34 to its lower position on the valve stem as shown in Fig. 4 to admit air pressure into the valve housing which will in turn force the disc 33 from its upper position shown in Fig. 3 to its lower position shown in Fig. 4 for closing the ports 32.

If for any reason the check valve disc 33 fails to function or is defective, the operator will immediately be made aware of such difficulty because there will then be a flow through both the spout and the hose. Viewing Fig. 2 and eliminating the disc 33, water will flow through the ports 32 up through the spout, and will simultaneously flow through ports 41 into the passage 25, opening the valve head 28 to the hose. Since the device cannot be operated with water flowing through both the spout and the spray head, steps will immediately be taken to correct the condition and replace or repair the valve disc 33. From the foregoing it will be observed that the structure provides a double check against back flow in event of a pressure drop in the water system which double check is made effective by the diverter valve which not only controls the diversion of water selectively as between the spout and the hose, but under any condition admits atmospheric pressure to actuate the check valve 33 in event of pressure drop.

The invention claimed is:

1. In a valve structure, the combination with a manifold connected with a source of water pressure and having a primary outlet and a secondary outlet, of a valve housing portion extending across said manifold provided with a passage communicating with the secondary outlet on one side of the manifold and a valve housing chamber on the other side of the manifold, said chamber also communicating with the primary outlet, a check valve biased to close said passage for preventing back flow from the secondary outlet while permitting flow therethrough under pressure from said manifold, a diverter valve in said chamber biased to close said passage and open the chamber to said primary outlet, said diverter valve being manually movable to open said passage and close said primary outlet, a valve seat interposed between said manifold and chamber having a port therein, an opposed valve seat spaced therefrom positioned between said chamber and passage having a port therein, and a check valve disc movable by differential fluid pressure between said valve seats for closing the latter port upon greater than atmospheric pressure in said manifold and closing the first mentioned port upon the pressure in said manifold dropping below atmospheric pressure.

2. In a valve structure, the combination with a manifold connected with a source of water pressure and having a primary outlet and a secondary outlet, of a valve housing portion provided with a passage communicating with the secondary outlet and a valve housing chamber communicating with the primary outlet, a check valve biased to close said passage for preventing back flow from the secondary outlet while permitting flow therethrough under pressure from said manifold, a diverter valve in said chamber movable in one direction

to close said passage and open the chamber to said primary outlet and in the other direction to open said passage and close said primary outlet, a valve seat interposed between said manifold and chamber having a port therein, an opposed valve seat spaced therefrom positioned between said chamber and passage having a port therein, and a check valve disc movable by differential fluid pressure between said valve seats for closing the latter port upon greater than atmospheric pressure in said manifold and closing said first mentioned port upon the pressure in said manifold dropping below atmospheric pressure.

3. In a valve structure, the combination with a manifold connected with a source of water pressure and having a primary outlet and a secondary outlet, of a valve housing portion provided with a passage communicating with the secondary outlet and a valve housing chamber communicating with the primary outlet, a check valve biased to close said passage for preventing back flow from the secondary outlet while permitting flow therethrough under pressure from said manifold, a diverter valve in said chamber, said valve including a valve stem, a valve head slidably mounted on said stem, a stop on said stem for limiting its movement to diverter valve closed position with said head movable by differential fluid pressure to close said primary outlet upon the pressure in said manifold exceeding atmospheric pressure, and to open said outlet upon atmospheric pressure therein being greater than the pressure in said manifold, a valve seat interposed between said manifold and chamber having a port therein, an opposed valve seat spaced therefrom positioned between said chamber and passage having a port therein, and a check valve disc movable by differential fluid pressure between said valve seats for closing the latter port upon greater than atmospheric pressure in said manifold and closing said first mentioned port upon the pressure in said manifold dropping below atmospheric pressure.

4. In a valve structure, the combination with a manifold connected with a source of water pressure and having a primary outlet and a secondary outlet, of a valve housing portion provided with a passage communicating with the secondary outlet and a valve housing chamber communicating with the primary outlet, a check valve biased to close said passage for preventing back flow from the secondary outlet while permitting flow therethrough under pressure from said manifold, a diverter valve in said chamber movable in one direction to close said passage and open the chamber to said primary outlet and in the other direction to open said passage and close said primary outlet, a cup in said chamber communicating with said passage and open at the top for seating said diverter valve, said cup having a valve seat opposed to its open top and in opposed spaced relation to said first mentioned valve seat and provided with a port therein, and a check valve disc slidably guided between the

valve seat of said cup and said first mentioned valve seat to close the port in said cup upon the pressure in said manifold exceeding atmospheric pressure for effecting control of said passage by said diverter valve, said disc being movable to close said first mentioned port to prevent back flow into said manifold upon the pressure therein dropping below the atmospheric pressure in said chamber.

5. In a valve structure, the combination with a manifold connected with a source of water pressure and having a primary outlet and a secondary outlet, of a valve housing portion provided with a passage communicating with the secondary outlet and a valve housing chamber communicating with the primary outlet, a check valve biased to close said passage for permitting flow therethrough to the secondary outlet and preventing back flow, a diverter valve in said chamber movable to alternate positions to open and close respectively the primary and secondary outlets from said chamber, a valve seat interposed between said manifold and chamber having a port therein, an opposed valve seat spaced therefrom positioned between said chamber and passage having a port therein, and a check valve disc movable by differential fluid pressure between said valve seats for closing the latter port upon greater than atmospheric pressure in said manifold and closing first mentioned port upon the pressure in said manifold dropping below atmospheric pressure.

6. In a valve structure, the combination with a manifold connected with a source of water pressure and having a primary outlet and a secondary outlet, of a valve housing portion provided with a passage communicating with the secondary outlet and a valve housing chamber communicating with the primary outlet, a diverter valve in said chamber movable to alternate positions to open and close respectively the primary and secondary outlets, a valve seat interposed between said manifold and chamber having a port therein, an opposed valve seat spaced therefrom positioned between said chamber and passage having a port therein, and a check valve disc movable by differential fluid pressure between said valve seats for closing the latter port upon greater than atmospheric pressure in said manifold and closing first mentioned port upon the pressure in said manifold dropping below atmospheric pressure.

References Cited in the file of this patent

UNITED STATES PATENTS

993,806	Taylor	May 30, 1911
1,993,732	Bijur	Mar. 12, 1935
2,002,630	Eckhouse	May 28, 1935
2,173,064	Judell	Sept. 12, 1939
2,494,044	Jurisich	Jan. 10, 1950
2,608,412	Bletcher	Aug. 26, 1952
2,584,436	Donaldson	Oct. 5, 1952