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AUTOMATIC CHANGE-OVER VALVE

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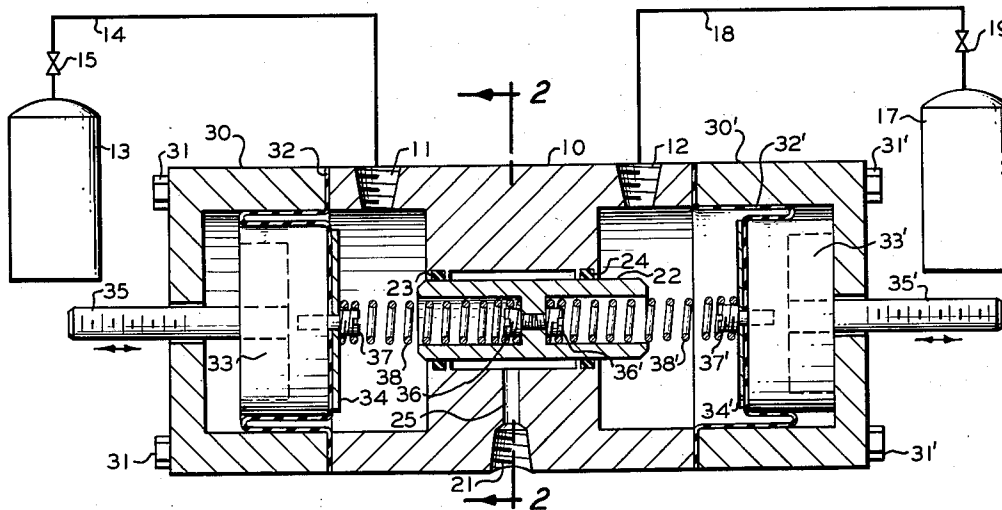


FIG. 1

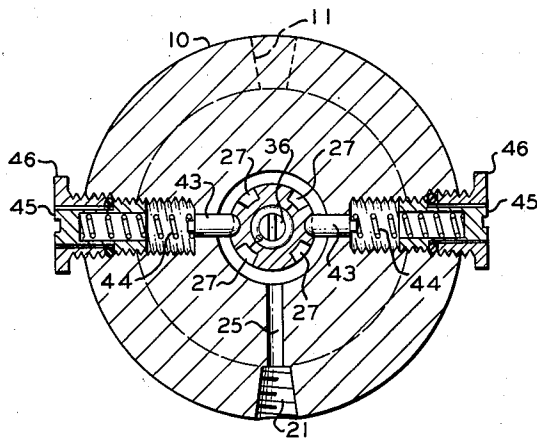


FIG. 2

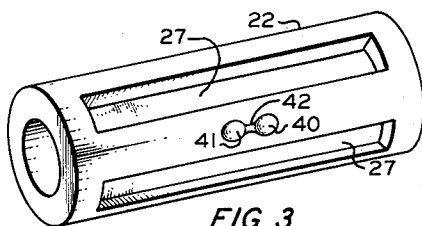


FIG. 3

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AUTOMATIC CHANGE-OVER VALVE

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3 Claims. (Cl. 137—113)

This invention relates to a valve for connecting two sources of fluid in sequence to a common receiver.

In dispensing fluids under pressure from containers, such as the dispensing of liquefied petroleum gas, it is desirable to have control means which automatically transfer the sources of fluid to a common receiving means so as to insure an uninterrupted supply of fluid at all times. In the liquefied petroleum gas industry, it is common practice to supply the customer with two tanks of the liquefied gas. The automatic change-over device permits the customer to withdraw gas from one tank until it is emptied and then to withdraw gas from the second tank. The first tank can be replaced at this time so that an uninterrupted supply of fluid is always available, the change-over device switching back to the first tank when the second is emptied.

The present invention provides an improved automatic change-over valve for use in systems of this type. This valve is supplied with fluids from two sources under pressure. As long as the pressure of one source exceeds a preselected value, the valve passes fluid from this source to a common outlet conduit. When the pressure of the gas from the first source falls below the preselected value, the valve automatically switches so the gas from the second source is supplied to the common outlet conduit. The valve is capable of operating without adjustment so that two sources of fluid can alternately be supplied to the outlet conduit to provide a continuous supply of gas. The automatic change-over valve of this invention is constructed so that a visual indication is provided at all times of the particular source that is being supplied and the pressure of this source.

Accordingly, it is an object of this invention to provide an improved dispensing system for fluids under pressure.

Another object is to provide a change-over valve which is automatic in operation.

A further object is to provide an automatic change-over valve wherein the position of the valve and the pressure of the fluid supply can readily be observed at all times.

Other objects, advantages and features of this invention should become apparent from the following detailed description which is taken in conjunction with the accompanying drawing in which:

Figure 1 is a view, shown partially in section, of the change-over valve of this invention connected to a gas dispensing system.

Figure 2 is a view taken along line 2—2 in Figure 1.

Figure 3 is a perspective view of the slide valve of the apparatus of Figures 1 and 2.

Referring now to the drawing in detail, there is shown a valve body 10 which is provided with first and second inlet ports 11 and 12. Port 11 is adapted to be connected to a first source of fluid, such as a liquefied petroleum gas tank 13. Tank 13 is connected to port 11 by means of a conduit 14 which has a valve 15 therein. A second tank 17 is similarly connected to port 12 by means of a conduit 18 which has a valve 19 therein. Valve body 10 is provided with an outlet port 21 through

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which gas from one of the tanks 13 or 17 is delivered continuously.

Valve body 10 is provided with a central passage into which is positioned a slide valve 22. Valve 22 forms a fluid tight seal with valve body 10 by means of O-rings 23 and 24. The central portion of the passage in valve body 10 is connected by a passage 25 to outlet port 21. As illustrated in Figures 2 and 3, valve 22 is provided with a series of longitudinally extending recesses 27. When valve 22 occupies the position illustrated in Figure 1, inlet port 12 is connected to outlet port 21 through these recesses. Communication between ports 11 and 21 is blocked by the end of valve 22. If valve 22 is moved to the left, ports 11 and 21 communicate with one another through recesses 27.

An end cap 30 is attached to valve body 10 by means of screws 31. A diaphragm 32 is positioned between valve body 10 and end cap 30. This diaphragm is held in engagement with a piston 33 by means of a retaining plate 34. A rod 35 extends from piston 33 through an opening in end cap 30. Rod 35 is provided with a series of marks so that the position of the rod relative to the end cap can be observed. A first spring retainer 36 is attached to valve 22, and a second spring retainer 37 is attached to piston 33. A spring 38 is secured to and extends between retainers 36 and 37. Spring 38 normally is maintained under tension so as to tend to pull retainers 36 and 37 together.

The right hand side of the valve assembly is identical to the left hand side and corresponding elements are designated by like prime reference numerals.

Valve 22 normally is retained in one of two positions by means of the mechanism illustrated in Figures 2 and 3. Each side of valve 22 is provided with two spaced depressions 40 and 41 which are connected by a groove 42. Detents 43 are urged into engagement with one of these depressions by means of springs 44. The forces exerted by springs 44 can be varied by adjusting screws 45 which are threaded into valve body 10. The adjusting screws are retained in place by packing nuts 46.

In order to explain the operation of the change-over valve of this invention, it will be assumed that tanks 13 and 17 are both filled with liquefied petroleum gas under pressure and valves 15 and 19 are both closed. Valve 19 is first opened so that tank 17 communicates with inlet port 12. The liquefied petroleum gas vaporizes when it passes through valve 19, and the resulting vapor exerts a pressure on piston 33' which moves the piston to the right, as illustrated. Valve 22 is moved to the right by the tension force of spring 38'. Ports 12 and 21 are then in communication through recesses 27 in valve 22. Detents 43 engage depressions 41 in valve 22 to exert additional forces tending to retain the valve in this position. Valve 15 can then be opened so that the vapor pressure of container 13 is transmitted to inlet port 11. This pressure tends to move piston 33 to the left. However, the combined forces of the detents 43 and the fluid pressure applied to piston 33' serve to retain valve 22 in the position illustrated.

The valve remains in this position as long as fluid pressure is applied to piston 33' from tank 17. When tank 17 is exhausted, the combined forces exerted by detents 43 and the fluid pressure on piston 33' become less than the force exerted by the vapor pressure on piston 33. This results in valve 22 moving to the left until detents 43 engage depressions 40. At this time, tank 17 should be replaced so that a new source of fluid will be available when tank 13 is exhausted. When this occurs, the valve automatically switches back to the position illustrated in Figure 1. The valve of this invention thus provides a simple structure which permits two tanks to be switched automatically so that a continuous source

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of fluid pressure is always available. As previously mentioned, indicating rods 35 and 35' provide a visual indication of the position of the valve. This is a valuable feature in such change-over device. If tanks 13 and 17 contain gas under pressure, the forces applied to respective pistons 33 and 33' gradually diminish as the tanks are exhausted. Rods 35 and 35' then provide visual indications of the pressures in the tank delivering fluid.

While the invention has been described in conjunction with a preferred embodiment, it should be evident that it is not limited thereto.

What is claimed is:

1. An automatic change-over device comprising a valve body having first and second spaced chambers therein connected by a first passage, said valve body having first and second inlet ports therein communicating with said first and second chambers, respectively, said valve body having an outlet port therein communicating with a central region in said passage; first and second pistons positioned in said first and second chambers, respectively, for movement toward and away from said passage, said first and second pistons tending to move away from said passage responsive to pressure being applied to said chambers through said first and second ports, respectively; a valve positioned to slide in said passage so that said outlet port is in communication with said first chamber when said valve is in a first position and said outlet port is in communication with said second chamber when said valve

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is in a second position; first and second resilient means connecting said valve to said first and second pistons, respectively, so that movement of said first piston away from said passage tends to move said valve to said first position and movement of said second piston away from said passage tends to move said valve to said second position; and means tending to retain said valve in said first and second positions.

2. The device of claim 1 wherein said valve comprises a member having at least one longitudinally extending recess therein and wherein said first and second resilient means comprise first and second springs under tension extending from said valve to said first and second pistons, respectively.

3. The device of claim 1 wherein said means tending to retain said valve in said first and second positions comprises first and second spaced depressions in said valve connected by a groove, a detent, and a spring urging said detent into one of said depressions, said detent sliding in said groove from one depression to the other as said valve moves from one position to the other.

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