May 13, 1969 N. L. BENEDETTI 3,443,589

GRAVITY VALVE

Filed Sept. 16, 1966 Sheet 1 of 2

Fig. 1

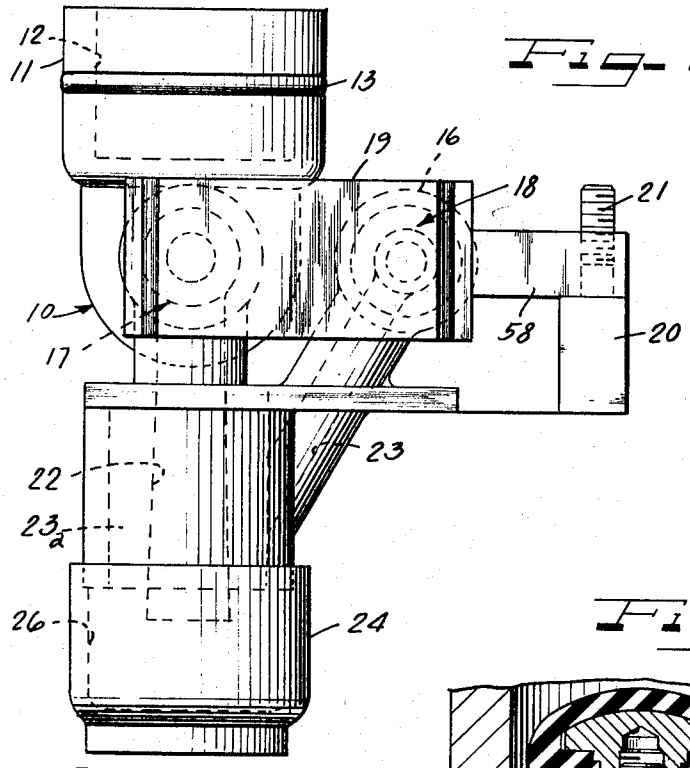


Fig. 4

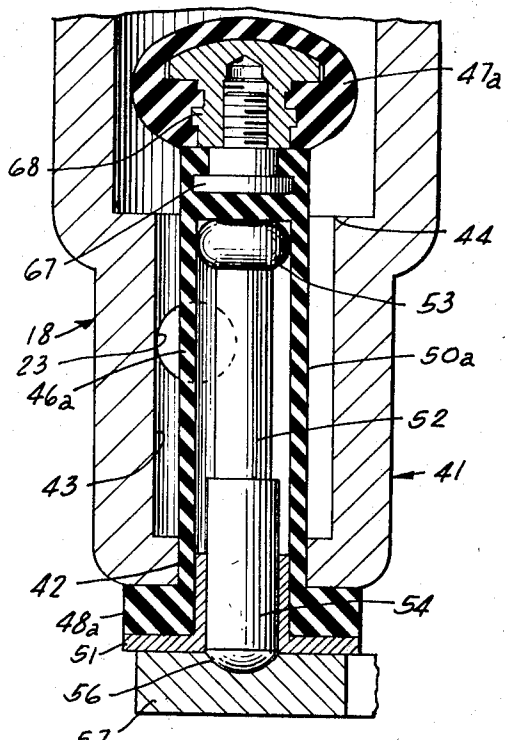
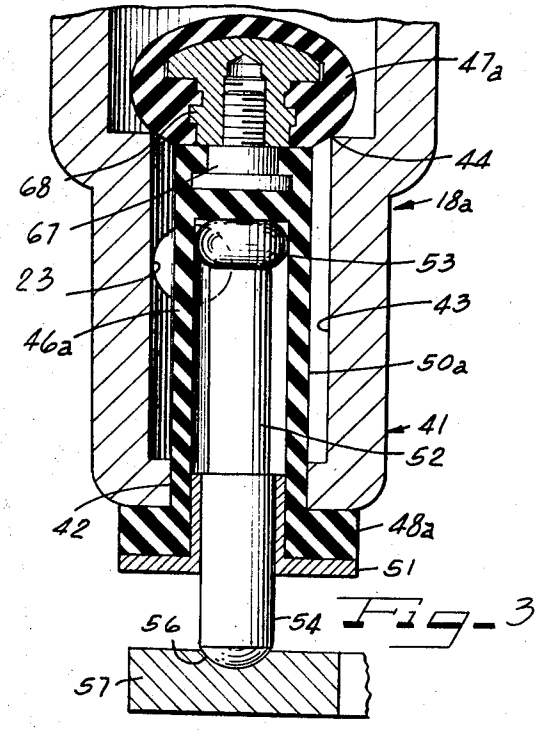


Fig. 3



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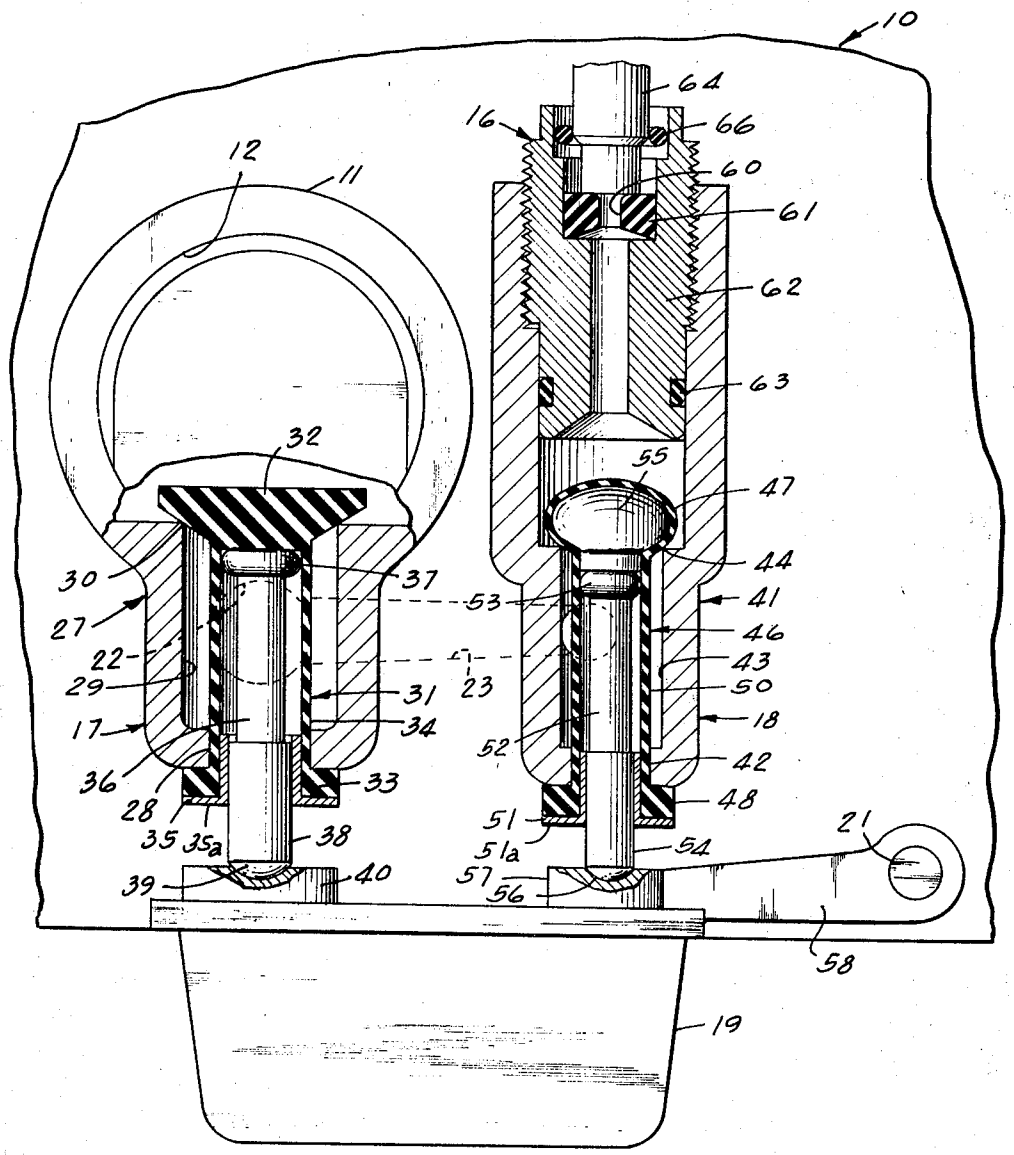
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Fig. 2



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United States Patent Office 3,443,589 Patented May 13, 1969

3,443,589

GRAVITY VALVE

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Filed Sept. 16, 1966, Ser. No. 580,031
Int. Cl. F16k 21/04, 15/14
U.S. Cl. 137—604 11 Claims

ABSTRACT OF THE DISCLOSURE

A dispensing valve assembly having dual inlets communicating through dual valve seats to a single dispensing orifice. Elastic increased diameter valve stoppers are adapted to close the valve seat and are retained against the seat by the tension of a stretched elastomer body portion. The rods extending into the elastic body portion are adapted to stretch body portion and lift the increased diameter stopper away from the valve seat.

This invention relates generally to dispensing valve assemblies, and more particularly to dispensing valve assemblies which pass syrup, under the force of gravity, through a flow passage, and pass water, under pressure, to another flow passage, and thereafter the syrup and water are mixed in a mixing chamber which forms part of a dispensing nozzle. Specifically, the present invention is directed to an improved type of dispensing valve assemblies which incorporate a new, improved and novel type of valve construction to control the flow of fluid, such as syrup and water, through the valve assembly.

In the construction of the dispensing valve assemblies, it is of utmost importance to fabricate the valve components of corrosive-free material to insure proper operation of the dispensing valve when the valve is subjected to the normal corrosive properties of water, and to the normal corrosive properties of syrup which passes through the valve assembly.

Another important consideration in the construction of a dispensing valve is to provide a valve stem and valve seat construction which will not become clogged or which will not stick open due to low viscosity fluid, such as syrup, passing through the valve.

Therefore, one of the primary objects of the present invention is to provide a new and improved dispensing valve assembly which has a novel valve stem and valve seat construction which will not become clogged or stick open due to low viscosity fluids passing therethrough.

Another important object of the present invention is to provide a new and improved dispensing valve assembly which is inexpensive to manufacture, simple to assemble, and which requires a relatively few components for proper operation of the valve, and which components are of corrosive resistant material.

Briefly, the dispensing valve assembly of the present invention has a dispensing nozzle wherein syrup and water are mixed as they pass through the nozzle to form a soft drink. A container or syrup is connected to the dispensing valve assembly in such a manner as to pass syrup through a first flow control valve by the force of gravity. Also connected to the dispensing valve assembly is a supply of water, for example, carbonated water. The flow control valve which is provided for controlling the flow of syrup, is constructed of resilient material which is formed as a single integral part of a valve retainer and of a resilient hollow body portion. The valve head has an enlarged diameter portion which seats against a corresponding valve seat within the valve assembly, and a rigid shaft is inserted through the hollow body portion to stretch the body portion in such a manner as to displace the valve head from the valve seat to allow fluid to flow therethrough.

The flow control valve associated with the water is constructed in substantially the same manner. That is, the flow control valve is constructed of resilient material which is formed as a single integral part of a valve retainer which is connected to the valve head by a resilient hollow body portion. However, the flow control valve associated with the water is provided with an insert at the valve head thereof to prevent deforming of the valve head under normal operating conditions. In the preferred embodiment of the present invention, both of the flow control valves are mounted in a single plane and parallel to one another so as to be actuated by a single actuating lever. However, the actuating lever is pivoted in such a manner as to move the flow control valve associated with the syrup a further distance than the flow control valve associated with the water to provide the proper flow ratio of the two fluids.

Other objects, features and advantages will be more fully realized and understood from the following detailed description when taken in conjunction with the accompanying drawings in which like reference numerals throughout the various views of the drawings are intended to designate similar elements or components and wherein:

FIGURE 1 is a front elevational view of a dispensing valve assembly which is constructed in accordance with the principles of this invention;

FIGURE 2 is a top plan view of the dispensing valve assembly of FIGURE 1 wherein portions are shown in section to more clearly show the novel and important features of the present invention;

FIGURE 3 is an enlarged sectional view of the flow control valve associated with the water flow, and is shown in the closed position; and

FIGURE 4 is an enlarged sectional view of the flow control valve of FIGURE 3 shown in the open position.

Seen in FIGURE 1 is a dispensing valve assembly **10** which is constructed in accordance with the principles of this invention. The dispensing valve **10** is provided with an inlet **11** which defines an opening **12** for receiving a low viscosity fluid, such as syrup. The outer peripheral surface of the inlet **11** is provided with a seal **13**. The inlet **11** and seal **13** form a socket assembly which is inserted into a container so as to allow low viscosity fluid to flow through the opening **12** under the force of gravity.

The dispensing valve assembly **10** is provided with a second inlet **16** which is connectable to a supply of water, for example, carbonated water. To insure a proper flow rate of the water passing through the inlet **16**, a flow metering orifice may be provided at the inlet **16**.

A pair of flow control valves **17** and **18** are mounted within the dispensing valve assembly **10**, and are actuated exteriorly thereof by a button **19**. The button **19** is pivotally mounted to a boss **20** by a stud **21**.

A port **22** is formed within the dispensing valve assembly **10** and is in fluid communication with the inlet **12** via the flow control valve **17**. Therefore, actuation of the flow control valve **17** will cause low viscosity fluid to flow from the inlet **11** through the flow control valve **17** and into the port **22**. A port **23** is in fluid communication with the inlet **16** via the flow control valve **18**. Therefore, actuation of the flow control valve **18** will cause water to pass through the inlet **16** and into the port **23** via the flow control valve **18**. The ports **22** and **23** converge in a nozzle **24** where the syrup and water are combined within a chamber **26** of the nozzle **24**. That is, simultaneous actuation of the flow control valves **17** and **18** will cause the syrup to flow through the port **22** and into the chamber **26**, and at the same time water will flow through the port **23** and circulate about the port **22** in a chamber **23a** and then flow downward in such a

manner as to enhance or surround the fluid emanating from the port **22**.

Referring now to FIGURE 2 wherein the detailed construction of the flow control valves **17** and **18** are shown. The flow control valve **17** includes a valve housing portion **27**, which may be formed as an integral molded part of the upper portion of the housing of the dispensing valve assembly **10**. The valve housing portion **27** is provided with an aperture **28** which extends into the housing **27**, and then forms an enlarged diameter portion **29**. The enlarged diameter portion **29** of the aperture **28** has a valve seat **30** formed at the end thereof interiorly of the valve housing portion **27**. It is seen in FIGURE 2, that the port **22** is in fluid communication with the enlarged diameter portion **29**.

To control the flow of fluid from the inlet **11** into the enlarged diameter portion **29** and the port **22**, a resilient valve member **31** is inserted through the aperture **28** and extends into the valve housing portion **27** to cooperate with the valve seat **30**. The resilient valve member **31** is provided with a valve head **32** for engaging the valve seat **30** to form a flow control aperture therewith. Also formed as an integral part of the resilient valve member **31** is a valve retainer **33** which is positioned exteriorly of the aperture **28** to engage the outer peripheral surface thereof. Furthermore, the resilient valve member **31** is provided with a cylindrical body portion **34**, which is apertured at the end of the valve retainer **33**.

A bushing **35** is inserted into the apertured valve retainer **33** and has a flange portion **35***a* which extends radially outwardly therefrom and overlies the valve retainer **33**. A pin **36** is inserted through the bushing **35** and has a flattened head portion **37** which engages the undersurface of the valve head **32**. The pin **36** is further provided with an enlarged diameter portion **38** for slidable movement through the bushing **35**. The enlarged diameter portion **38** is further provided with a rounded end **39** which engages a detent in a boss **40** which is formed on the button **19**.

The overall dimension of the resilient valve member **31**, between the head portion which engages the valve seat **30** and the retainer portion **32** which engages the exterior surface of the valve housing **27**, is less than the overall dimension between the valve seat **30** and the exterior peripheral surface of the aperture **28**. Therefore, when the resilient valve member **31** is inserted into the valve housing **27**, the valve head **32** will be urged against the valve seat **30** due to the resilient tension of the cylindrical body portion **34**. As the pin **36** is urged inwardly of the housing **27**, the valve head **32** will be displaced from the valve seat **30** to allow fluid to flow therethrough.

The flow control valve **18** includes a valve housing portion **41** which is provided with an aperture **42**. The aperture **42** has an enlarged diameter portion **43** which extends into the valve housing **41** to form a valve seat **44** interiorly of the valve housing **41**. The port **23** is in fluid communication with the enlarged diameter portion **43** to allow fluid to flow therefrom into the nozzle **24**.

A resilient valve member **46** is inserted through the aperture **42** to control the flow of fluid past the valve seat **44**. The resilient valve member **46** has a valve head **47** formed at one end thereof and engageable with the valve seat **44**, and a valve retainer **48** formed at the other end thereof and engageable with the exterior peripheral surface of the aperture **42**. A cylindrical body portion **50** is formed between the valve head **47** and the valve retainer **48**. The overall dimension of the resilient valve member **46**, between the portion of the valve head **47** which engages the valve seat **44** and the portion of the retainer **48** which engages the exterior peripheral surface of the aperture **42**, is less than the overall dimension of the valve housing **41**, between the valve seat **44** and the exterior peripheral surface of the aperture **42**. Therefore, the valve head **47** is urged against the valve seat **44** due to the elastic tension provided by the cylindrical body portion **50**. That is, the cylindrical body portions **34** and **50** act as tension springs to maintain the flow control valves closed.

A bushing **51** is inserted through the apertured end of the valve member **46** and has a flange portion extending radially outwardly therefrom and overlying the valve retainer **48**. A pin **52** is provided with a flattened head portion **53** which engages the interior surface of the valve head **47**. Also, the pin **42** is provided with an enlarged diameter shaft portion **54** which is slidable through the bushing **51**. The resilient valve member **46** is provided with a solid insert **55** at the valve head **47** to prevent undue deforming of the valve head **47**, which would otherwise cause the valve head to slip into the enlarged diameter portion **43**. The insert **55** may, for example, be formed of brass. The shaft portion **54** is provided with a rounded end **56** which engages a detent formed in a boss **57** on the button **19**.

The button **19** is connected to the stud **21** by an arm **58** which, for example, may be formed as an integral part of the button **19**. Since the boss **40** is positioned further away from the pivot stud **21** than the boss **57**, the boss **40** will move a further distance than the boss **57** for a given arcuate movement of the arm **58** about the stud **21**. Therefore, the resilient valve member **31** will be moved a greater distance than the resilient valve member **46** to insure proper flow ratios of the two fluids of different viscosity.

The flow control valve **18** is provided with a metering orifice **60** which is formed through a insert **61**, for example, of resilient material. A threaded fitting **62** is secured to the valve housing portion **41** and is provided with an aperture in alignment with the metering orifice **60** so as to allow easy passage of the fluid therethrough. A seal **63** is inserted into a notch which is formed about the fitting **62** to prevent fluid from leaking between the fitting **62** and the interior walls of the housing **41**. Fluid may be supplied to the metering orifice **60** by a pipe **64** which, in turn, is embraced by a seal **66**.

Seen in FIGURES 3 and 4 is an alternate arrangement of a flow control valve which is constructed in accordance with the principles of this invention. Although the alternate arrangement shown in the FIGURES 3 and 4 corresponds to the flow control valve **18**, it will be understood that a similar type of construction may be incorporated in the flow control valve **17**, of FIGURE 2. The flow control valve of FIGURES 3 and 4 is provided with a resilient valve member **46***a* which includes a valve retainer flange **48***a* formed as an integral part thereof. A cylindrical body portion **50***a* has molded at one end thereof a threaded stud **67**. The portion of the stud which is inserted into the valve member **46***a* may be narrowed to insure proper gripping thereof by the material of the valve member. A valve head **47***a* is provided with a threaded insert **68** for threadedly engaging the stud **67**. Although the alternate embodiment of the flow control valve shown in FIGURES 3 and 4 is constructed of two separate components, it will be greatly appreciated that this type of construction will simplify the assembly of the valve. That is, the cylindrical body portion **50***a* may be inserted through the aperture **42** and the valve head **47***a* inserted into the valve housing portion **41** through the opposite end thereof and threadedly connected to the cylindrical body portion **50***a*.

As best seen in FIGURE 4, when the resilient valve member **46***a* is actuated in the open position, the cylindrical body portion **50***a* is stretched and the valve head **47***a* is disengaged from the valve seat **44** to allow passage of fluid past the valve seat **44** and through the port **23**.

Therefore, the dispensing valve assembly of the present invention is provided with novel and improved flow control valves which are formed of resilient material. The valve head, valve body and valve retainer are formed as a

single integral part to greatly simplify construction and assembly of the dispensing valve.

It will be understood that variations and modifications may be effected without departing from the spirit and scope of the novel concepts of this invention.

I claim as my invention:

1. A dispensing valve assembly comprising: a body having first and second apertures therein; each of said apertures having an enlarged diameter portion interiorly of said body; a valve seat defined by each of said enlarged diameter portions; first and second ports in said body and in fluid communication with said enlarged diameter portions of said first and second apertures; first and second flow control valves each of resilient material having an increased diameter valve head formed at one end and engageable with a corresponding one of said valve seats, said increased diameter valve head having a diameter larger than said valve seat and effective to close said valve seat, and a retainer formed at the other end and engageable with the exterior surface of said body about the periphery of the corresponding one of said apertures, and an elastic cylinder portion between said valve head and said valve retainer, said elastic cylinder portion having an overall length such that said increased diameter valve head is elastically urged into seating relation with said valve seat and held there by the elastic action of said cylindrical portion; and means extending through said elastic cylindrical portion of said first and second flow control valves for using said valve heads away from said valve seats against the elastic action of said cylindrical portions.

2. The dispensing valve assembly of claim 1 wherein said second flow control valve further includes a reinforcing member inserted in its valve head.

3. The dispensing valve assembly of claim 1 further including a nozzle which is in fluid communication with said first and second ports so as to cause the fluid from said first and second ports to be combined within said nozzle.

4. The dispensing valve assembly of claim 1 wherein fluid passes through said first flow control valve under the force of gravity and fluid passes through said second flow control valve under pressure.

5. The dispensing valve assembly of claim 1 further including a single actuating button which is engageable with said means for simultaneously opening said first and second flow control valves.

6. The dispensing valve assembly of claim 1 further including: a single actuating button which is engageable with said means for simultaneously opening said first and second flow control valves, said actuating button being pivotally mounted in such a manner as to cause said first flow control valve to be moved a further distance than said second flow control valve.

7. An increased diameter valve assembly comprising: a body having an inlet, an outlet and an aperture, a portion of said aperture being in fluid communication with said outlet, and a further portion of said aperture defining a valve seat between said inlet and said outlet; a resilient valve member having one end thereof extending through said aperture and into said body, and the other end thereof exteriorly of said aperture to retain said resilient valve member in position; an increased diameter valve head detachably affixed to said one end of said resilient valve member and sealingly engageable with said valve seat due to elastic tension of said valve member; and means having a portion extending through said valve member and a further portion extending beyond said other end; whereby, urging said means in the direction of said valve bady will cause said valve head to be disengaged from said valve seat and allow fluid to flow from said inlet to said outlet.

8. The valve assembly of claim 7 further including a valve retainer formed at said other end of said resilient valve member and extending radially outwardly of said aperture to engage the exterior surface of said body.

9. The valve assembly of claim 8 further including an insert of non-resilient material in said valve head.

10. The valve assembly of claim 7

wherein said resilient valve member is formed of a cylindrical body portion which extends through said aperture and into said body,

and has a valve retainer formed at said other end thereof and engageable with the exterior pheripheral surface of said aperture; and

wherein said means includes a shaft having a portion thereof extending through said cylindrical portion a further portion thereof extending outwardly of said cylindrical portion;

whereby, urging said shaft in the direction of said body will cause said valve head to disengage said valve seat and allow fluid to flow from said inlet to said outlet.

11. The valve assembly of claim 10 further including a bushing having a cylindrical portion inserted into said cylindrical body portion and a radial portion extending radially outwardly therefrom and overlying said valve retainer,

thereby providing a guide for said shaft.

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U.S. Cl. X.R.

137—525, 607; 251—331