

WFO 2009/067574 A1

COMPACT BEVERAGE PRESSURE REGULATOR

CROSS-REFERENCE TO RELATED APPLICATION

This application claims benefit to United States Patent Application Serial No. 11/986,674, filed 21 November 2007, which is hereby incorporated by reference in
5 its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a method and apparatus for regulating the pressure in order to control the flow of a fluid, such as water/syrup.

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2. Brief Description of Related Art

There are known pressure regulators that are mainly used to control water or beverage syrup flow in various pressures ranging from 15 PSI to 40 PSI. The devices typically consist of a body member with internal components to control
15 pressure, i.e. springs, rubber membranes, restrictors, etc. Both ends usually have a hose connection or a hose barb fitting. Water or syrup flow is controlled to the desired flow with a matching internal spring.

For example, Figure 1 shows one such known pressure regulator having an inner regulator portion and a male end portion on each side. The left end portion as
20 shown has a first fitting welded to the inner regulator portion, a second fitting screwed into the first fitting, and a third hose barb fitting screwed into the second fitting. The third fitting is configured for receiving a hose to adapt to a pump mounted on a mounting plate. The right end portion as shown has a corresponding first fitting screwed to the inner regulator portion, a corresponding second fitting screwed into

the corresponding first fitting, and a corresponding hose barb fitting screwed into the corresponding second fitting. The corresponding hose barb fitting is configured for receiving a hose to adapt to a reservoir of water or syrup. This prior art configuration results in very long hose connections that droop, are prone to break, make finding
5 the right connections difficult, result in liquid spills. It is also difficult to keep multiple lines organized and this could cause confusion finding the right connections and a possible health hazard and liquid spills. There may also be increased labor cost in configuring the same.

Other devices known in the art include the following:

10 U.S. Patent No. 3,601,361 discloses a hose coupling having a sleeve shaped like a female engaging a male conduit structurally similar for coupling two pieces of a garden hose or the like together.

U.S. Patent No. 4,819,908 discloses a quick connect fluid coupling having a closed position and an open position based in the insertion of the male part into the
15 female part housing. The male part is engaged in the female part housing by spring metal retainer.

U.S. Patent No. 5,263,508 discloses a sewer line trap charging valve for use in charging water into sewer line water traps to prevent the escape of gas, having an elongated shaft rotatably and frictionally mounted in a sleeve in working engagement
20 with an annular groove.

U.S. Patent No. 6,026,850 discloses a pressure regulating valve that operates to allow fluid flow if the pressure is maintained at a minimum pressure level, having a modulation device with a diaphragm that modulates the size of the port for allowing fluid flow based on the fluid pressure. In contrast, the pressure regulator being used

in conjunction with your invention is configured to prevent fluid pressure from exceeding a certain level.

U.S. Patent No. 6,374,852 discloses a leak arresting valve that regulates flow between a minimum and maximum flow, having biasing elements for biasing a
5 telescoping poppet between inlet and outlet members to close or partially close a fluid inlet.

In view of this, there is a need in the industry to solve this problem.

SUMMARY OF THE INVENTION

10 The present invention provides a new and unique pressure regulator featuring a body member for regulating the pressure of a fluid flowing therein, the body member having two ends, one end for receiving the fluid and another end for providing pressure regulated fluid; and a quick-disconnect device arranged on at least one end for coupling the body member to a corresponding quick-disconnect
15 device that forms part of a device that either provides the fluid or receives the pressure regulated fluid.

Other features of the present invention include one or more of the following:
the pressure regulator having two quick-disconnect devices, each quick-disconnect device being arranged on a respective end of the body member; the quick-
20 disconnect device being a male quick-disconnect device for coupling to a corresponding female quick-disconnect device that forms part of either a hose or a dispenser for providing the fluid or a pump for receiving the pressure regulated fluid;
the quick-disconnect device being a female quick-disconnect device for coupling to a corresponding male quick-disconnect device that forms part of either a hose or a

dispenser for providing the fluid or a pump for receiving the pressure regulated fluid; the pressure regulator being dimensioned so as to allow it to be coupled to a pump arranged on a mounting panel having multiple pumps and fit or stay within the mounting panel and not protrude out; the quick-disconnect device having one or
5 more O-rings; the quick-disconnect device having a locking clip; the pressure regulator controlling water, syrup or beverage flow; or some combination thereof.

The body member may also include a male end having an opening with a multiplicity of inner strengthening ribs circumferentially arranged therein to help prevent the male end from breaking off.

10 The present invention also includes a method featuring steps of providing such a pressure regulator having such a body member for regulating the pressure of such a fluid flowing therein, the body member having two such ends, one such end for receiving the fluid and another such end for providing pressure regulated fluid, and having at least one such end with such a quick-disconnect device; and coupling
15 the quick-disconnect device to such a corresponding quick-disconnect device of such a pump for providing fluid flow.

The present invention also includes a pressure regulator and pump combination featuring such a pressure regulator having such a body member for regulating the pressure of a fluid flowing therein, the body member having two such
20 ends, one such end for receiving the fluid and another such end for providing pressure regulated fluid, and having at least one such end with such a quick-disconnect device; and such a pump having such a corresponding quick-disconnect device for coupling to the quick-disconnect device of the pressure regulator.

Advantages of the present invention include eliminating the hose connection between the pump and pressure regulator that would otherwise be left to droop, be prone to breaking, make finding the right connections difficult for a mounted panel of such pumps, and result in undesirable liquid spills. The direct connection between

5 the pressure regulator and pump also provides for better pressure regulation because there is less hose, while decreasing labor time when installing the configuration because there is no screwing/unscrewing of various parts, etc., which is being done in the prior art configuration. Moreover, according to some embodiments of the present invention, the new pressure regulator may be shorter by

10 about 4 inches from known devices, which allows the regulator to stay within the known mounting panel and not protrude out, and therefore are much less likely to be broken or damaged. Furthermore, equipping both ends of the new pressure regulator with the quick disconnect devices allows multiple lines to stay organized so there is less likelihood of mistakes. Also, lines can be easily disconnected which will

15 save time for services calls.

BRIEF DESCRIPTION OF THE DRAWING

The drawing includes the following Figures:

Figure 1 is a diagram of a pressure regulator that is known in the art.

20 Figure 2 is a diagram of one example of a pressure regulator according to some embodiments of the present invention, including Figure 2a which shows a perspective view of the pressure regulator, Figure 2b which shows a side view of the pressure regulator, and Figure 2c which shows a cross-sectional view of the pressure regulator.

Figure 3 shows a pressure regulator according to some embodiments of the present invention coupled to a pump.

Figure 4, which includes Figures 4a and 4b, shows multiple pressure regulators according to some embodiments of the present invention coupled to
5 multiple pumps.

Figure 5 is a cross-sectional view of another example of a pressure regulator according to some embodiments of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

10 Figure 2 shows a new and unique pressure regulator generally indicated as 10 featuring a body member 12 and one or more quick-disconnect devices 14a, 14b.

The body member 12 regulates the pressure of a fluid flowing therein, has two ends generally indicated as 16 and 18, one end 16 for receiving the fluid and another end 18 for providing pressure regulated fluid.

15 The quick-disconnect device 14a (i.e. male) and/or 14b (i.e. female) are respectively arranged on ends 16 or 18 for coupling the body member 12 to a corresponding quick-disconnect device (not shown) that forms part of a device that either provides the fluid or receives the pressure regulated fluid. As shown in Figure 3 or 4, the device may take the form of a pump for receiving the pressure regulated
20 fluid.

By way of example, the pressure regulator 10 is shown having two quick-disconnect devices 14a, 14b, each quick-disconnect device being arranged on a respective end 16, 18 of the body member 12, although the scope of the invention is not intended to be limited to the use of two quick-disconnect devices. For example,

embodiments are envisioned in which the pressure regulator has only one quick-disconnect device on one of the ends.

The quick-disconnect device may take the form of a male quick-disconnect device like element 14a arranged on the port beverage for coupling to a

5 corresponding female quick-disconnect device (not shown) that forms part of a pump 20 (Figure 3) for receiving the pressure regulated fluid. The quick-disconnect device 14a may include one or more O-rings 19a, 19b, as best shown in Figure 2c. It was found through experimentation that the use of two O-rings provides effective sealing, especially preventing leakage due to wiggling of the pressure regulator. Moreover, 10 the male end 18 of the body member 12 has an opening with an inner diameter d_1 that is dimensioned at about 0.298 inches, and also has four inner ribs, three of which are shown in Figure 2c as 18a, 18b and 18c, for providing protrusion strength, as shown in Figure 2c. (The fourth inner rib is not shown in Figure 2c since it is a cross-sectional view.) The inner ribs strengthen the male end 18 and help to prevent 15 it from breaking off. The scope of the invention is not intended to be limited to the dimension of the opening or the number of inner strengthening ribs, and embodiments are envisioned within the spirit of the invention having a different opening dimension and a different number of inner strengthening ribs.

The quick-disconnect device may also take the form of a female quick- 20 disconnect device like element 14b for coupling to a corresponding male quick-disconnect device that forms part of either a hose 21 or dispenser (not shown) for providing the fluid. The quick-disconnect device 14b may include a locking clip 19c, as best shown in Figure 2c.

Quick-disconnect devices like element 14a, 14b are known in the art, including the beverage industry. The scope of the invention is not intended to be limited to any particular type or kind thereof either now known or later developed in the future.

5 As best shown in Figure 4, the pressure regulator 10 may be dimensioned so as to allow it to be coupled to a pump like element 20 (Figure 3) arranged on a mounting panel 22 having multiple pumps 20a, 20b, 20c (Figure 4) and fit or stay within the mounting panel 22 and not protrude out;

 The pressure regulator may control water, syrup or beverage flow, although
10 the scope of the invention is not intended to be limited to any particular type or kind of fluid being regulated.

 As shown in Figure 2c, the body member 12 also includes numerous components that form part of an inner regulating portion of the body member 12 and cooperate together to regulate the pressure flow of the fluid, including the following:

15 Body housing 12a,
 Diaphragm 12b,
 Spring 12c,
 Piston 12d,
 O-ring 12e,
20 O-ring 12f,
 Retainer diaphragm 12g,
 Housing rear 12h,
 Check valve 12i,
 Seal ring retainer 12j,

Outer retainer 12k,
Seal ring 12l,
1/8 circular push on ring 12m, and
O-ring 12n.

5 A person skilled in the art would appreciate how the parts cooperate to provide pressure regulation. Moreover, the inner regulator portion that forms part of the body member of the pressure regulator of the present invention is substantially similar to the inner regulator portion of the body member of the pressure regulator shown in Figure 1. The whole thrust of the present invention relates to using one or more of
10 the quick-disconnect device 14a, 14b for coupling to the pump like 20 (Figure 3) on the mounting plate 22 (Figure 4), which both do not form part of the prior art device shown in Figure 1.

Figure 5 shows an example of an alternative embodiment of the pressure regulator generally indicated as 100 having a quick-disconnect device 102 with one
15 O-ring 104. It was found through experimentation that although one O-ring provides sufficient sealing, the use of two O-rings like that in the embodiment described in relation to Figures 1-4 provides better sealing.

The quick-disconnect 102 also has a larger opening 106 than the opening
15 of the pressure regulator 10 in Figure 2. By way of example, the opening 106 is dimensioned at about 0.320 inches and does not have the inner strengthening ribs
20 like the embodiment in Figures 1-4.

The remaining parts of the pressure regulator 100 in Figure 5 and the pressure regulator in Figure 1-4 are substantially the same.

POSSIBLE APPLICATIONS

Possible applications include at least the following: Water, soda, or syrup dispenser pumps, as well as water pressure regulators, e.g. in recreational vehicle (RV) and the like.

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The Scope of the Invention

It should be understood that, unless stated otherwise herein, any of the features, characteristics, alternatives or modifications described regarding a particular embodiment herein may also be applied, used, or incorporated with any other embodiment described herein. Also, the drawings herein are not drawn to scale.

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Although the invention has been described and illustrated with respect to exemplary embodiments thereof, the foregoing and various other additions and omissions may be made therein and thereto without departing from the spirit and scope of the present invention.

15

WHAT WE CLAIM IS:

1. A pressure regulator comprising:

a body member for regulating the pressure of a fluid flowing therein, the body member having two ends, one end for receiving the fluid and another end for

5 providing pressure regulated fluid; and

a quick-disconnect device arranged on at least one end for coupling the body member to a corresponding quick-disconnect device that forms part of a device that either provides the fluid or receives the pressure regulated fluid.

10 2. A pressure regulator according to claim 1, wherein the pressure regulator comprises two quick-disconnect devices, each quick-disconnect device being arranged on a respective end of the body member.

15 3. A pressure regulator according to claim 1, wherein the quick-disconnect device is a male quick-disconnect device for coupling to a corresponding female quick-disconnect device that forms part of either a hose or a dispenser for providing the fluid or a pump for receiving the pressure regulated fluid.

20 4. A pressure regulator according to claim 1, wherein the quick-disconnect device is a female quick-disconnect device for coupling to a corresponding male quick-disconnect device that forms part of either a hose or a dispenser for providing the fluid or a pump for receiving the pressure regulated fluid.

5. A pressure regulator according to claim 1, wherein the pressure regulator is dimensioned so as to allow it to be coupled to a pump arranged on a mounting panel having multiple pumps and fit or stay within the mounting panel and not protrude out.

5 6. A pressure regulator according to claim 1, wherein the pressure regulator controls water, syrup or beverage flow.

7. A method comprising:

 providing a pressure regulator having a body member for regulating the
10 pressure of a fluid flowing therein, the body member having two ends, one end for receiving the fluid and another end for providing pressure regulated fluid, and having at least one end with a quick-disconnect device; and

 coupling the quick-disconnect device to a corresponding quick-disconnect device of a pump for providing fluid flow.

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8. A method according to claim 7, wherein the coupling includes coupling a male quick-disconnect device of the pressure regulator to a corresponding female quick-disconnect device that forms part of either a hose or dispenser for providing the fluid or the pump for receiving pressure regulated fluid.

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9. A method according to claim 7, wherein the coupling includes coupling a female quick-disconnect device of the pressure regulator to a corresponding male quick-disconnect device that forms part of either a hose or dispenser for providing the fluid or the pump for receiving pressure regulated fluid.

10. A method according to claim 7, wherein the method includes dimensioning the pressure regulator so as to allow it to be coupled to the pump which is arranged on a mounting panel having multiple pumps and fit or stay within the mounting panel
5 and not protrude out.

11. A method according to claim 7, wherein the pump forms part of a plurality of pumps arranged on a mounting panel.

10 12. A method according to claim 7, wherein the method includes using the pressure regulator to control water, syrup or beverage flow.

13. A pressure regulator and pump combination comprising:
a pressure regulator having a body member for regulating the pressure of a
15 fluid flowing therein, the body member having two ends, one end for receiving the fluid and another end for providing pressure regulated fluid, and having at least one end with a quick-disconnect device; and
a pump having a corresponding quick-disconnect device for coupling to the quick-disconnect device of the pressure regulator.

20 14. A pressure regulator and pump combination according to claim 13, wherein a male quick-disconnect device of the pressure regulator is coupled to a corresponding female quick-disconnect device that forms part of either a hose or dispenser for providing fluid or the pump for receiving pressure regulated fluid.

15. A pressure regulator and pump combination according to claim 13,
wherein a female quick-disconnect device of the pressure regulator is coupled to a
corresponding male quick-disconnect device that forms part of either a hose or a
5 dispenser for providing fluid or the pump for receiving pressure regulated fluid.

16. A pressure regulator and pump combination according to claim 13,
wherein the pressure regulator is dimensioned so as to allow it to be coupled to the
pump which is arranged on a mounting panel having multiple pumps and fit or stay
10 within the mounting panel and not protrude out.

17. A pressure regulator and pump combination according to claim 13,
wherein the pump forms part of a plurality of pumps arranged on a mounting panel.

15 18. A pressure regulator and pump combination according to claim 13,
wherein the pressure regulator controls water, syrup or beverage flow.

19. A pressure regulator according to claim 1, wherein the quick-disconnect
device comprises one or more O-rings.

20

20. A method according to claim 7, wherein the quick-disconnect device
comprises one or more O-rings.

21. A pressure regulator and pump combination according to claim 13,
wherein the quick-disconnect device comprises one or more O-rings.

22. A pressure regulator according to claim 1, wherein the quick-disconnect
5 device having a locking clip.

23. A method according to claim 7, wherein the quick-disconnect device
comprises one or more O-rings.

10 24. A pressure regulator and pump combination according to claim 13,
wherein the quick-disconnect device comprises one or more O-rings.

25. A pressure regulator according to claim 1, wherein the body member has
a male end having inner strengthening ribs that help to prevent the male end from
15 breaking off.

26. A method according to claim 7, wherein the body member has a male end
having an opening with inner strengthening ribs arranged therein that help to prevent
the male end from breaking off.

20

27. A pressure regulator and pump combination according to claim 13,
wherein the body member has a male end having an opening with inner
strengthening ribs arranged therein that help to prevent the male end from breaking
off.

25

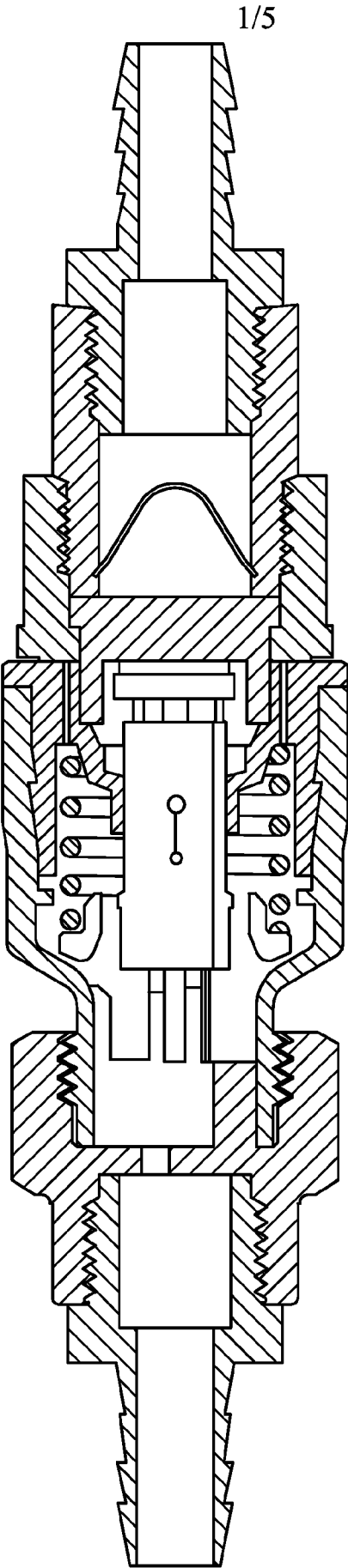


FIG. 1
(PRIOR ART)

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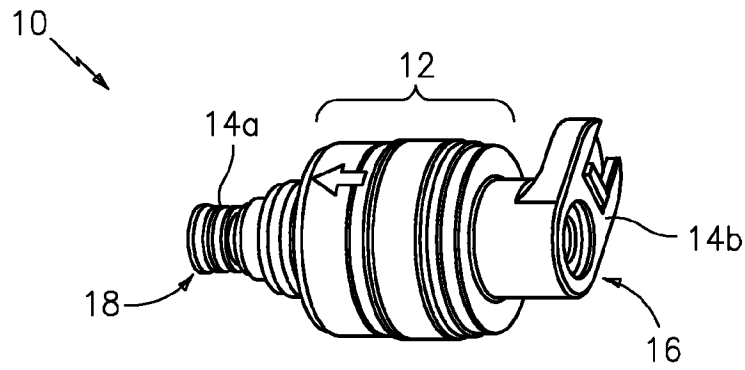


FIG. 2a

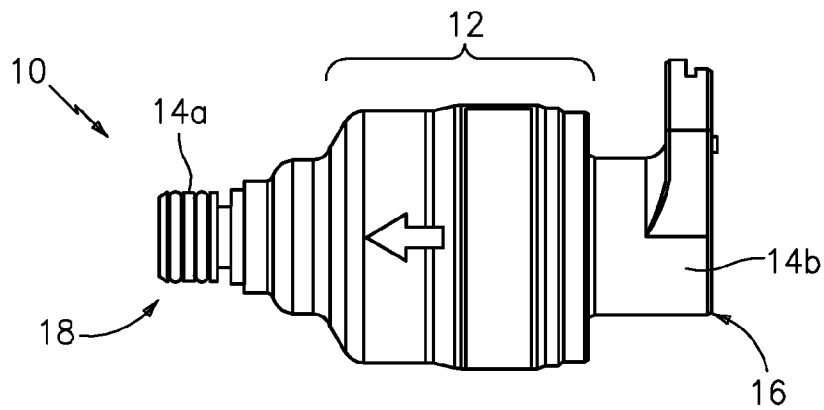


FIG. 2b

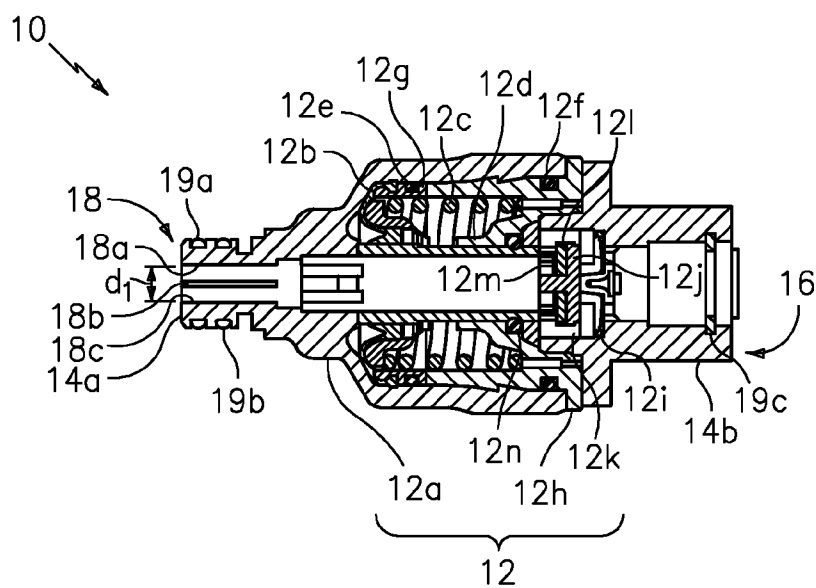


FIG. 2c

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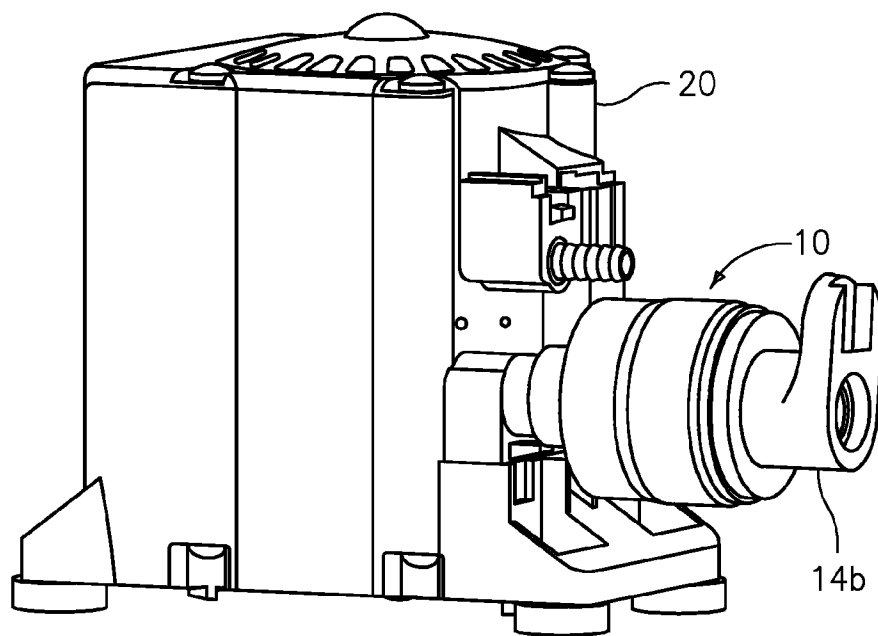


FIG. 3

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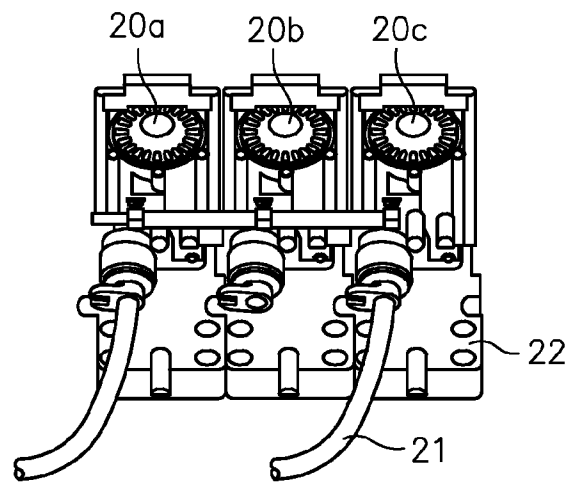


FIG. 4a

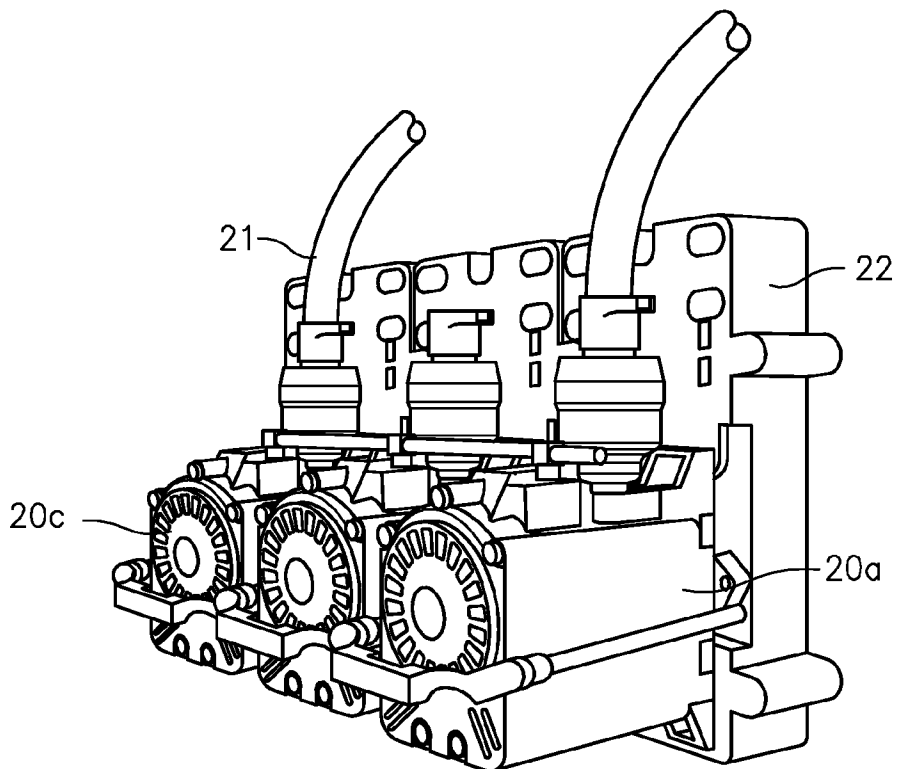


FIG. 4b

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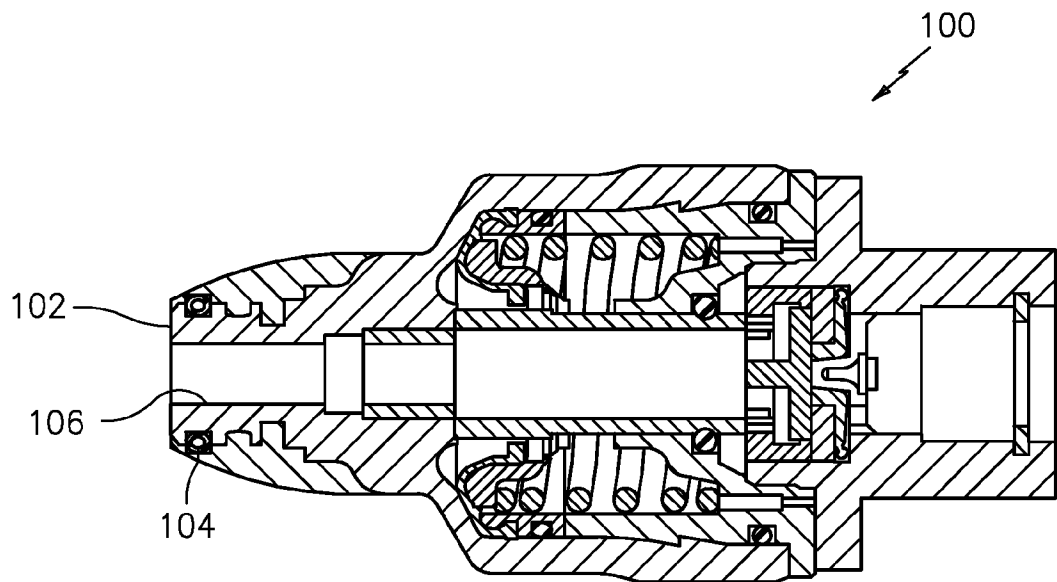


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 08/84116

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - F16L 37/00 (2008.04)

USPC - 285/305

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8): F16L 37/00 (2008.04)

USPC: 285/305

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

USPC: 285/306-321; 137/455; 285/; 137/

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PubWEST (USPT, PGPB, EPAB, JPAB); Google/Patents; Google/Scholar

Search Terms: pressure, regulator, controller, manage, valve, quick, disconnect, connector, coupling, pump, beverage, drink, soda, cola, syrup, male, female, o ring, gasket, mount, attach, panel, interface

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 7,240,693 B2 (KNOP) 10 July 2007 (10.07.2007), col 1, lns 44-45; col 3, lns 6-10, 21-31; col 5, lns 8-11; Figs. 1, 2, 4	1, 2, 4, 6 ----- 3, 5, 7-27
Y	US 4,333,587 A (FESSLER et al.) 08 June 1982 (08.06.1982), col 1, lns 6-9, 33-44	5, 10, 11, 16, 17
Y	US 5,492,455 A (DURHAM et al.) 20 February 1996 (20.02.1996), col 1, lns 8-12; col 2, lns 18-24; col 3, lns 36-40; Figs. 1, 2	3, 5, 7-21, 23, 24, 26, 27
Y	US 5,494,074 A (RAMACIER, JR. et al.) 27 February 1996 (27.02.1996), col 1, lns 9-15; col 2, lns 11-14; col 6, lns 5-13; Fig. 13B	22, 25-27

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

18 December 2008 (18.12.2008)

Date of mailing of the international search report

24 DEC 2008

Name and mailing address of the ISA/US

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